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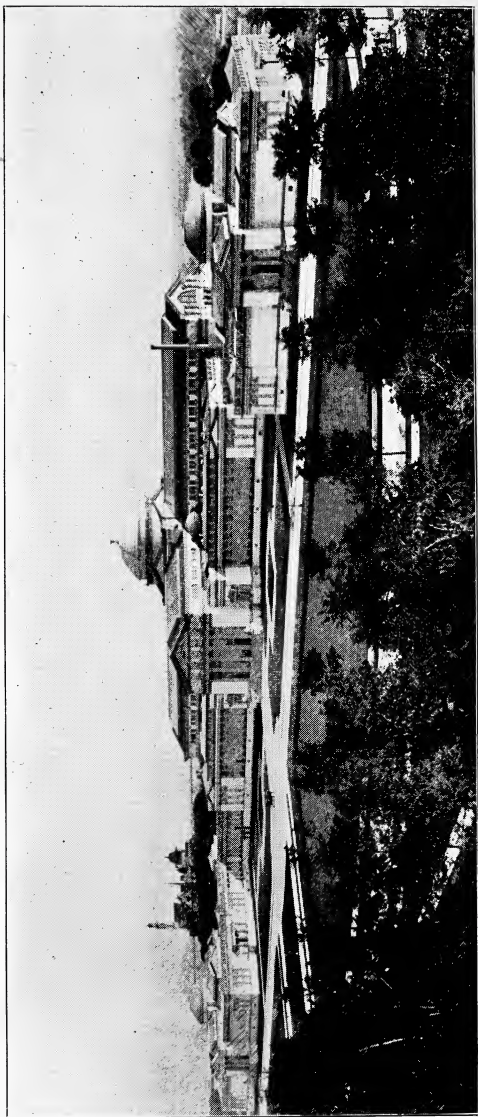


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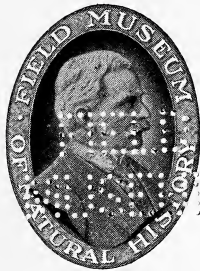
Field Museum of Natural History



FIELD MUSEUM  
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GUIDE

*EIGHTH EDITION*



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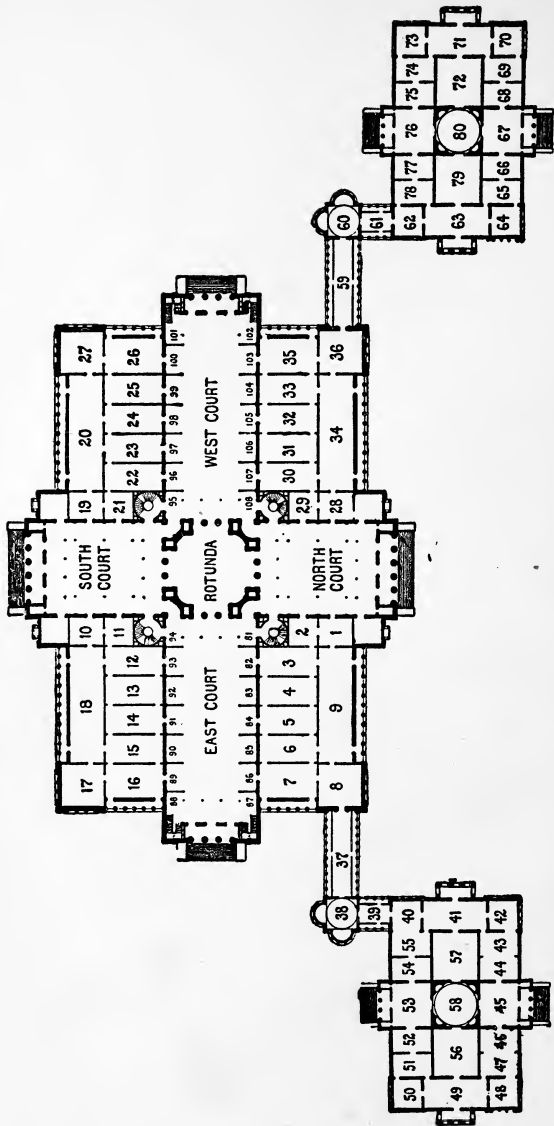
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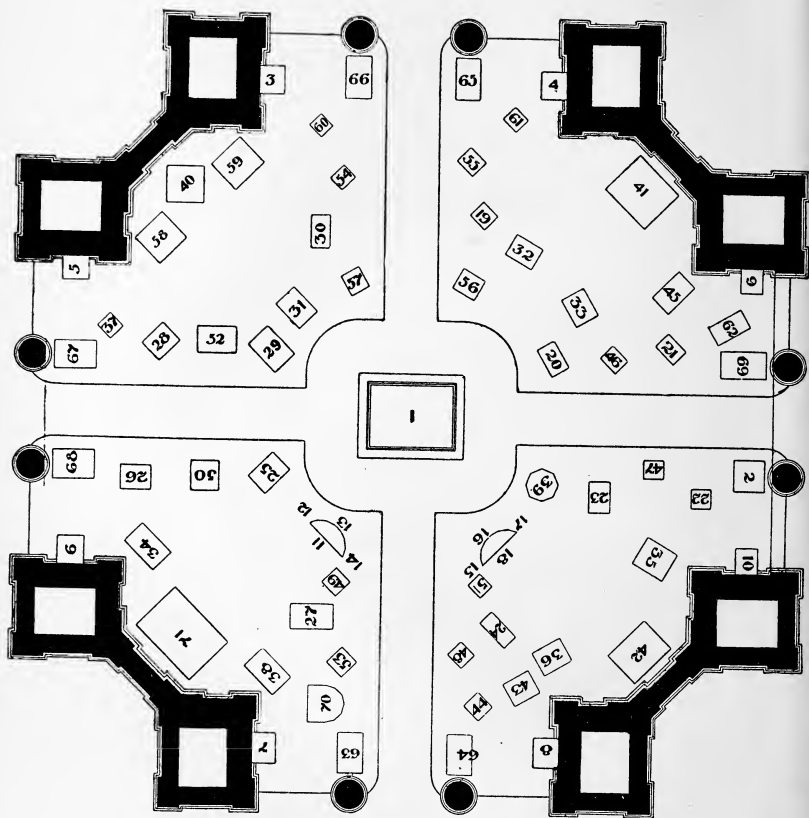


PLAN OF BUILDING

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Halls 33, 35 and 36 Halls 59 to 80	} Geology
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Galleries	{ Botany } Physical Anthropology
Hall 32	Gems and Jewels



PLAN OF ROTUNDA





# Sketch Models of Statuary.

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## World's Columbian Exposition 1893.

The Rotunda of the main building of the Museum is devoted to an artistic memorial of Columbus and of the Columbian Exposition. The center-piece — the statue of the Great Discoverer with uplifted sword consecrating the New World — at once attracts attention both as an historical study and as a masterpiece of art. The original sketch models of the figures and groups of figures ornamenting the main Exposition buildings, and donated by the Exposition to the Museum, occupy the entire space around the statue. These models are invaluable as works of modern art, representing the genius of the most talented sculptors of the present day.

In the contracts entered into with the various prominent sculptors they were called upon to furnish what are called "Sketches" of the sculptural decorations, i. e., the models were to be about one-sixth of the full size; from these models the Exposition's force of sculptors prepared full-size work by enlarging the "Sketches" six times. All the models were first submitted to the architects of the buildings for their approval, in order to harmonize the sculptural decorations with the architecture. The models here shown are the original "Sketches."

No. 1.— Columbus. By Augustus St. Gaudens. This imposing full-size statue stood overlooking the Court of Honor at the main portal of the Administration Building. Translation of Latin inscription on Pedestal:

"In late years the centuries will come

"When the ocean will loose its fetters

"And the vast earth will lie open,

"And Tethis will disclose new countries.

"When Thule will no longer be the remotest of lands."

No. 2.— Statue of the Republic. By Daniel C. French.

Nos. 3 to 38.— Statuary on Administration Building. By Karl Bitter, Sculptor.

- |                        |                |
|------------------------|----------------|
| 3. Water Controlled.   | 21. Education. |
| 4. Water Uncontrolled. | 22. Truth.     |
| 5. Fire Controlled.    | 23. Strength.  |
| 6. Fire Uncontrolled.  | 24. Liberty.   |
| 7. Earth Controlled.   | 25. Charity.   |
| 8. Earth Uncontrolled. | 26. Abundance. |
| 9. Air Controlled.     | 27. Theology.  |
| 10. Air Uncontrolled.  | 28. Diligence. |
| 11. Goddess of Fire.   | 29. Joy.       |
| 12. Fisher Maiden.     | 30. Unity.     |
| 13. Bather.            | 31. Strength.  |
| 14. Diana.             | 32. Peace.     |
| 15. Air.               | 33. Religion.  |
| 16. Harvest Girl.      | 34. Industry.  |
| 17. Blacksmith.        | 35. Art.       |
| 18. Flower Girl.       | 36. Commerce.  |
| 19. Patriotism.        | 37. War.       |
| 20. Tradition.         | 38. Justice.   |

Nos. 39 TO 45.—Sculpture Work on Agricultural Building.

By Phillip Martiny.

- |                   |                  |
|-------------------|------------------|
| 39. Four Nations. | 42. Horse Group. |
| 40. Four Seasons. | 43. Ceres.       |
| 41. Cattle Group. | 44. Zodiac.      |
|                   | 45. Victory.     |

Nos. 46 TO 51.—Figures of Inventors. Sculpture Work on Machinery Hall. By Robert Kraus.

- |               |                 |
|---------------|-----------------|
| 46. Galvani.  | 49. Ericsson.   |
| 47. Whitney.  | 50. James Watt. |
| 48. Daguerre. | 51. Senfelder.  |

Nos. 52 TO 57.—Six figures on Machinery Hall. By M. A. Waagen.

- |              |              |
|--------------|--------------|
| 52. Science. | 55. Fire.    |
| 53. Earth.   | 56. Air.     |
| 54. Water.   | 57. Victory. |

Nos. 58 AND 59.—Sculpture on Colonnade. By M. A. Waagen.

- |                  |                   |
|------------------|-------------------|
| 58. Horse Group. | 59. Cattle Group. |
|------------------|-------------------|

Nos. 60 AND 61.—Electricity Building.

- |  |
|--|
| 60. Electrification, by I. A. Blankinship.     |
| 61. Experimental Electricity, by N. A. McNeil. |

No. 62.—Sculpture Work on Lagoons.

62. Lion at base of Obelisk, by M. A. Waagen.  
Nos. 63 to 66.— Sculpture Work on Boat Landings, by  
D. C. French, and E. C. Potter.
63. Industry (Horse).                      65. Wheat (Bull).  
64. Sloth(Horse).                          66. Indian Corn (Bull).  
No. 67 to 69.— Sculpture Work on Bridges of Lagoons.  
By Edward Kemeys.
67. Buffalo — Male.                      68. Buffalo — Female.  
69. The Still Hunt.
- No. 70.— Glorification of Discovery. By Cratt.  
No. 71.— The Columbus Quadriga. By French and Potter.  
This crowned the arch of the Peristyle.

## Department of Geology.

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The collections of this Department illustrate the subject of geology and its subdivisions, chief among which are paleontology, mineralogy, economic geology, and geographic geology. The collections are grouped so as to represent these subdivisions separately while they also form a comprehensive whole. The collections occupy three halls of the main building and the entire west wing. The total number of specimens displayed is about 65,000, subdivided as follows: Paleontological specimens 25,000, mineralogical specimens 10,000, economic specimens 20,000, miscellaneous 10,000. Entering the Department from the West Court the visitor will find the alcove and first six halls devoted to paleontology.

**Alcove 103. Halls 33, 35, 36, 59, 60, and 61.**

### PALEONTOLOGY.

In the Division of Paleontology it is sought to illustrate by fossils or by casts and models of these, the animal and vegetable forms which have characterized the life of the globe at the successive stages of its history. The arrangement is primarily chronological and secondarily zoological. Advancing from hall to hall the visitor sees the development of life upon the earth illustrated in the same order in which it occurred in Nature. Thus in the first hall of the series, Hall 33, are to be seen the fossils of the earliest era of the earth's history, the Paleozoic; in the next three halls, Halls 35, 36, and 59, those of the middle era or Mesozoic; and in the remaining three halls, Halls 59, 60, and 61, the fossils of the Cenozoic or recent era. Within each hall, so far as is possible, the fossils of each period are arranged so that those of the earliest period shall come first, then those of the next succeeding age, and so on. Within each period, however, the specimens are arranged in accordance with their zoological rank, beginning with the lowest. Fossil plants,

where they occur, are thus placed first; then in order, Protozoans, Radiates, Molluscs, Articulates, and Vertebrates.

The specimen labels show: 1st, the name of the species, together with that of the authority by whom named; 2d, the geological period or epoch to which each belongs; and 3d, the locality.

### Alcove 103.

Here are shown several large specimens of general geological interest. Among them are two broad slabs of rock cut from ledges the surfaces of which had been scoured and polished by movement of the continental glacier over them. One of the slabs is sandstone from North Amherst, Ohio; the other is limestone from Kelley's Island, Lake Erie. Several types of glacial marking are illustrated on the slabs, including fluting and iceberg action. The slabs are probably the finest of the kind to be seen in any museum. Other specimens here shown are a section of *Arietites*, a huge mollusc allied to the modern nautilus, and tracks of reptiles of the Triassic period, on sandstone from Turner's Falls, Mass.

A model of the Moon is also exhibited here. This is a model in relief of the visible hemisphere of the Moon, made on a horizontal scale of 1:600,000 and vertical scale of 1:200,000. The hemisphere is 18 feet in diameter. It is much the largest and most accurate work of the kind ever executed.

The division of the Moon's surface into plains and mountainous regions is well illustrated, also the great size and peculiar characters of its so-called volcanoes.

### Hall 33.

This hall is devoted to fossils of the Paleozoic era and the Triassic period of the Mesozoic era. The series begins at the south end of the hall with the Cambrian period and continues toward the north end with the Ordovician, Silurian, Devonian, Carboniferous, Permian, and Triassic in the order named.

*Cambrian Period.*—The Cambrian is the earliest period from which well-defined fossils are found, and many of these are fragmentary and rather obscure. *Eozoon canadense*, of which several specimens are shown, is found in rocks older than the Cambrian and is supposed by some to represent the earliest form of life. The specimens are made up of alternate layers of calcite and serpentine, which are thought by some to represent the shell

and body cavity of an ancient, huge Rhizopod. But most paleontologists regard the masses as of wholly inorganic origin.

Plants are represented by impressions of seaweeds such as *Paleophycus* and other Algae. Trails and borings of marine worms such as *Scolithus* and *Arenicolites* are shown. *Lingulepis* is one of the earliest Brachiopods. The tracks of *Climactichnites* on a large slab of sandstone from Wisconsin were probably made by some large mollusc, although they have been considered by some to be Trilobite tracks. Trilobites are the most characteristic fossils of this period and a good series of specimens is shown, representing such genera as *Ogygopsis*, *Paradoxides*, *Olenellus*, *Chonocephalites*, *Dikelocephalus*, *Ptychoparia*, *Agnostus*, etc. These illustrate range in size.

*Ordovician Period.*—The fossils of this period, as a general rule, are well preserved and abundant. Nearly all classes of marine invertebrate animals are represented in the collection and the abundance of life is shown by slabs of *Plectambonites*, *Leptæna*, etc., which are literally masses of shells.

*Receptaculites* and *Brachiospongia* are calcareous sponges. *Graptolithus*, *Diplograptus*, *Tetragraptus*, etc., are Hydroids known as Graptolites, abundant fossils of this era. The name is derived from the Greek word meaning "to write," and refers to the plume-like nature of the remains.

Corals were rare in this period. Occurring forms are represented by *Streptelasma*, a cup coral and *Columnaria*, in large masses of honeycomb coral.

*Glyptocrinus* and *Iocrinus*, specimens of which are shown, are among the earliest known crinoids. They were attached by a jointed stem and bore many-branching arms. They have been appropriately termed sea-lilies.

Bryozoans are among the most important and abundant fossils of this period. They are illustrated by *Bythopora*, *Callopora*, *Batostoma*, *Constellaria*, *Monticulipora*, etc.

Brachiopods, though found only in small numbers at the present day, were in Paleozoic times one of the most abundant and characteristic forms of marine life. In structure they have points of alliance with the Worms on the one hand and with Molluscs on the other.

Articulate Brachiopods, or those having a well-developed hinge, are represented by *Strophomena* and *Rafinesquina* of the

concavo-convex forms, and by *Orthis*, *Rhynchotrema*, etc., of the globose forms.

*Byssonychia*, *Vanuxemia*, *Cystodonta*, *Orthodesma*, etc., are Pelecypods or bivalve molluscs.

*Bellerophon*, *Maclurea*, *Pleurotomaria*, etc., are Gastropods or single-valved molluscs.

*Tentaculites* were minute molluscs of the class Pteropods. *Conularia* — perhaps also a Pteropod.

Cephalopods were the largest known animals of this period. *Orthoceras*, *Camaroceras*, *Endoceras*, etc. represent them. One specimen of the last named genus exhibited over the wall cases probably attained a length of fifteen or more feet when complete.

Trilobites were, perhaps, the most characteristic fossils of early Paleozoic time. They were Crustaceans having a horny shell similar to the crabs of the present day. They reached their greatest development as to number of genera in this period. *Asaphus*, *Acidaspis*, *Illænus*, *Dalmanites*, *Triarthurus*, *Trinucleus*, etc., are typical genera.

Scales and teeth indicate the presence of fishes, which were the only vertebrate animals known. The number of important animal types having existence in even the early geological periods is worthy of note.

*Silurian Period or Age of Molluscs.*—Silurian fossils show continued development of life. Plants are still seaweeds, such as *Bythotrephis* and *Arthropycus*. Some writers consider the latter to be the cast of the trails of some animal. *Astreospongia*, *Astylospongia*, *Paleomanon* and *Cerionites* are typical Silurian Sponges.

*Monograptus*, *Graptolithus* and *Diplograptus* continue from the Ordovician but disappear, as do all Graptolites, with the close of this period. *Stromatopora*, one of the reef-building Hydroids, although quite different from the Graptolites in habit, is referred to the same group. True corals were abundant and are fully illustrated in the collections. The reef-builders, such as *Halysites* or Chain coral, *Favosites* or Honeycomb coral, *Theca*, *Heliolites* or Sun coral, etc., predominated. Cup corals, as *Zaphrentis*, *Streptelasma*, *Omphyma*, *Eridophyllum*, etc., are also shown.

Crinoids and Crystoids showed a wonderful development both as to size and number in this period. *Eucalyptocrinus*, *Periechocrinus*, *Siphonocrinus*, *Callicrinus*, *Caryocrinus*, *Holocystites*, etc., are some of the prominent genera represented. *Cladopora*,

*Trematopora* and *Fenestella* illustrate Bryozoans. They were not abundant in this period.

As examples of Brachiopods may be noted, besides the concavo-convex *Stropheodonta* and the globose forms *Meristina*, *Pentamerus*, *Atrypa*, *Whitfieldella*, etc., of the preceding period, the winged form *Spirifer*. This is abundant.

*Mytilarca* and *Megalomus* among Pelecypods and *Platyceras*, *Platystoma*, *Tremanotus*, *Strophostylus*, etc., among Gastropods are typical molluscs of the period.

Many specimens are shown illustrating the size and form of Silurian Cephalopods. The several sections show that the shell was divided by cross partitions into chambers. The animal occupied only the end chamber, but a long tube or siphuncle connected the others to its body. The straight forms, such as *Orthoceras*, predominate but the curved *Cyrtoceras* and *Oncoceras*, the open coiled *Gyroceras* and the closely coiled *Nautilus* and *Trochoceras* occur and specimens are shown. *Phragmoceras* and *Gomphoceras*, having a constricted aperture, constitute a new type of Cephalopod.

Silurian Trilobites are fewer in number and somewhat smaller than those of the former period but show a marked tendency to ornamentation. Many of the old genera continue and to them are added *Phacops*, *Encrinurus*, *Proetus*, etc., which are represented by specimens. The Eurypterids form a group of crustaceans which first appear in this period. They resemble the scorpions in form. They are the ancestors of the modern Horse-shoe crab. *Eurypterus*, *Pterygotus*, etc., belong to this group. They are represented in the collection by an especially fine series of specimens.

*Devonian Period or Age of Fishes.*—The fishes which by their size and abundance characterized this age, belonged to two orders — Ganoids, represented at the present day by the garfish and sturgeon, and Placoids, the order which includes sharks, skates and rays. They differed in many respects from the fishes of the present day, however. Part of the Ganoids were covered with bony scales, had teeth of reptilian character, and jointed, paired fins. Others, the Placoderms, were protected by bony plates covering the head and fore part of the body. The Placoids had cartilaginous skeletons, no scales, no gill covers, and many of their characters were embryonic. In most cases only teeth and spines are found fossil. *Mesacanthus* and



*Ptyctodus* are Placoids. *Paleospondylus* is considered an ancient lamprey. *Holoptychius* and *Palæoniscus* give a good idea of the general form of the scaled Ganoids and *Macropetalichthys*, *Pterichthys*, *Coccosteus* are representative Placoderms.

Aside from its fishes the Devonian period is noted for the appearance of the land plants, such as *Neuropteris* and *Alethopteris* (Ferns), *Asterophyllites* (Horsetails), *Adiantites*, etc.

*Dictyophyton* is a reticulate Sponge. Both the Honeycomb corals, such as *Favosites*, *Michelinia*, *Alveolites*, etc., and the Cup corals *Heliophyllum*, *Cyathophyllum*, *Acerularia*, *Cystiphyllum*, *Zaphrentis*, *Campophyllum*, etc., were very abundant both as to number of species and individuals. An especially large number of species of *Favosites*, *Heliophyllum* and *Zaphrentis* is shown.

Crinoids were comparatively rare in Devonian times. *Cupressocrinus*, *Megistocrinus* and *Hypsocrinus* represent the class in the collections. *Ræmeraster*, *Aspidostoma*, *Ophiura*, etc., are Starfishes. Brachiopods reached their greatest development in this period and all the typical forms are represented: perhaps the most noticeable of these is the winged *Spirifer* of which many species are shown.

Pelecypods and Gastropods are abundant but exhibit no decided changes from the preceding period.

Cephalopods are represented by *Orthoceras*, *Gomphoceras*, *Gyroceras*, etc., as before, but to these is added the *Goniatites*, which is a closely coiled form having the juncture of the septa and shell forming a zigzag instead of a straight suture.

*Carboniferous Period* or *Age of Coal Plants*.—Land plants are the striking features of this period. They are allied to the four modern groups of Ferns, Lycopods, Conifers and Horsetails.

The Ferns surpassed all others in number. *Pecopteris*, *Neuropteris*, *Alethopteris*, etc., are shown both as single leaflets and fronds. Many of these have been preserved in the center of clay concretions and are shown in a number which have been broken open.

*Lepidodendron* and *Sigillaria* are shown by sections of trunks and by impressions of the bark. The size of some of the stumps of *Sigillaria* shown indicates that the original tree must have attained a height of, perhaps, 80 or 100 feet. *Stigmaria* probably represents the under water stems of *Sigillaria* or *Lepidodendron*. These were similar, except in size, to the modern Lycopods, or club-mosses.

*Cordaites* appears to be allied to both the Conifers and the Cycads. It had a straight trunk 60 or 70 feet in height and long narrow leaves. *Trigonocarpum* and *Cardiocarpum* are supposed to be the fruit of this tree.

*Calamites*, *Annularia*, etc., are allied to the *Equisetum* or modern Horsetails. Stems of the former and leaf whorls of the latter are shown.

The animal life of the period is characterized by the abundance of Crinoids or sea-lilies. These reached their greatest development at this time. Such genera as *Platycrinus*, *Batocrinus*, *Actinocrinus*, *Agaricocrinus*, etc., are represented by many species. Those specimens having the arms and stems attached are of particular interest.

*Pentremites*, *Cryptoblastus*, *Schizoblatus*, *Granotocrinus*, etc., are typical Blastoids, or bud-like animals, and are near relatives of the Crinoids.

Large slabs of *Melonites*, an ancient Sea-urchin, are shown. These echinoderms differed from the modern forms in the greater number and smaller size of the plates.

Corals are on the decline, but such genera as *Zaphrentis*, *Lophophyllum*, *Cyathophyllum* and *Lithostrotion* occur and are shown.

The corkscrew-like Bryozoan *Archimedes* is illustrated by a number of species.

Such Gastropods as *Straparollus*, *Euompholus*, *Bellerophon*, *Pleurotomaria*, *Naticopsis*, etc., are still abundant.

The plain-sutured *Nautilus* and the zigzag-sutured *Goniatites* are the principal Cephalopods.

The Trilobites have disappeared and in their place is shown *Euprops* which somewhat resembles the Horseshoe crab.

The size of Carboniferous fish is indicated by the teeth of *Rhizodus*, the scales of *Megalichthys*, and the spines of *Ctenacanthus*.

*Permian*, or *Closing Period of the Paleozoic Era*.—Fishes are represented by *Paleoniscus*, Batrachians by *Archegosaurus*, an animal which combined the characters of Batrachian and fish. It had both lungs and gills, and was covered with scales. Plants are represented by leaves of *Walchia*, a Lycopod, and *Alethopteris* one of the Ferns.

The invertebrate fossils of the period shown are mostly Brachiopods and Pelecypods. They do not differ in any marked

degree from those of Carboniferous times, as may be seen by comparing the specimens of the two periods.

A portion of a trunk of a tree of the Carboniferous period is shown in a floor case. This trunk is about two feet in diameter and the portion shown is six feet in height. On the wall an oil painting represents a forest of the Carboniferous age, with Ferns, Clubmosses, Equisetæ, etc., grown to the height of forest trees of the present day.

*Triassic Period.*— This period is the first of the Mesozoic era or Age of Reptiles. The land plants of the period are illustrated by series of impressions of the leaves of *Pterophyllum*, a Cycad, and stems of *Equisetum*, a form allied to the modern Horsetails.

Sponges are represented by *Stellispongia* and *Corynella*. Crinoids by *Encrinus*, and Sea-urchins by detached spines of *Cidaris*.

Molluscs of this period assume a decidedly modern appearance. This is illustrated by *Lima*, *Pleuromya*, *Nucula*, *Myophoria* and *Modiola* of the Pelecypods and *Monodonta*, *Holopella*, and *Murchisonia* of the Gastropods. Two new types of Cephalopods are shown. *Ceratites* has serrated suture lines and *Arcestes* and *Rhacophyllites* are true Ammonites having the complex lobed sutures.

*Pemphix* is a crustacean of the type of the modern lobster.

Triassic fish are illustrated by the teeth of *Ceratodus* and nearly complete specimens of *Ischypterus* and *Samionotus*.

The huge frog-like head of *Labyrinthodont* shown by a cast is that of an Amphibian, and the Reptiles of the period are represented by a cast of a head of *Belodon*, an ancient crocodile.

### Hall 35.

This hall contains two somewhat distinct series, one introductory to the study of fossils in general, the other, fossils of the Mesozoic era.

Entering the hall from the West Court, the three wall cases on the right are devoted to the introductory series. The first two of these show a comparison of ancient and modern forms. Beginning with the lower orders of life, there are shown, for example, sponges which have lived at different periods of the earth's history, and a modern sponge for comparison; while in succession Corals, Crinoids, Brachiopods, Articulatates, and Vertebrates are similarly illustrated.

In the third case of the series, methods of fossilization are illustrated. The methods shown include preservation of hard parts, as shells and bones, internal moulds, external moulds, impressions and illustrations of incrustation, carbonization, silicification, phosphatization, etc.

The fossils of the Mesozoic era represented in this hall are chiefly the Dinosaurs of the Jurassic period. The Jurassic dinosaurs were great shore reptiles; they were the largest land animals that have ever been discovered. Among animals they are exceeded in bulk only by the great right-whales of modern times. The specimens exhibited were collected by special expeditions sent by the Museum for this purpose to Wyoming and Colorado.

The central exhibit is a partial skeleton of one of the largest dinosaurs known, *Apatosaurus*. Only a little more than half of the skeleton is here represented. The head, neck, shoulder girdle, fore legs and the extremity of the tail are wanting entirely. The right hind leg below the knee is copied in plaster from other similar specimens. The left is modeled entirely from the right.

The portion of the skeleton exhibited was found with all of its parts connected and has been carefully mounted in its natural position. Therefore, the body of the animal, the pelvis, the hind legs and the greater part of the tail are accurately represented in their natural relations.

The portion of the skeleton shown is thirty feet long and stands fifteen feet above the base. In life the neck was equal in length to the portion of the tail here exhibited. The tail was at least one half longer. From this it may be seen that the entire length of the animal would have been about sixty feet, or eight feet longer than the hall in which it is exhibited.

The various series of vertebræ, scapulæ, pelves, sacra, leg bones, and feet exhibited in the adjoining wall cases represent a number of other types of Dinosaurs, most of which are smaller than the central figure. Among these are represented the following genera: *Morosaurus*, *Camarasaurus*, *Brachiosaurus*, and *Creosaurus*.

At the end of the hall may be seen a complete fore leg and shoulder-blade of the medium-sized dinosaur, *Morosaurus*. Two large leg bones of *Brachiosaurus* shown are the largest known to science. They measure six feet eight inches in length, and the thigh-bone weighs seven hundred pounds. The unusual length of the humerus in comparison with the femur shows that

the animal to which they belonged must have stood higher at the shoulders than at the hips.

### Halls 36, 59, 60, and 61.

These halls are devoted to fossils of the remaining geological periods, from the Jurassic onward. Owing to the size of many of the specimens it has not been possible to place them in exact geological order, but groups are shown together as far as possible.

*Jurassic Period.*—*Goniospongia*, *Cnemidiastrum*, *Retispongia*, *Craticularia*, *Hyalotragos* and *Pyrgochonia* illustrate the various forms of Jurassic sponges. *Rhizostomites* shows the form of the gastral cavity of a jelly-fish.

Two types of Crinoids are shown. The first, illustrated by *Pentacrinus*, had a comparatively small body attached by a long stem and a large number of long, many-branching arms. The other type, illustrated by *Antedon*, was a stemless, free-swimming form with only a few short arms.

*Ophiura* and *Asterias* are typical starfishes.

Jurassic Sea-urchins are of two types and a representative series of each is shown. *Cidaris*, *Hemicidaris*, *Acrocidaris*, *Diadema*, and *Stomechinus* belong to the type having the shell divided into five equal rays. *Echinobrissus*, *Pygaster*, *Hyboclypeus*, and *Clypeus* represent the other type, in which the symmetry is bilateral instead of radial.

Many species of Brachiopods are shown but the majority of them belong to the genera *Terebratula* and *Rhynchonella*.

Molluscs were the most characteristic group of invertebrate animals in Jurassic time and both the Pelecypods and Gastropods bore marked resemblance to modern forms. Among Pelecypods are shown Oysters such as *Ostrea* and *Gryphæa*; Scallops such as *Pecten*, *Lima*, and *Avicula*; and Mussels and Clams such as *Modiola*, *Pinna*, *Pleuromya*, *Pholedomya*, *Trigonia* and *Cardina*. *Diceras* is a shell in which the beaks of each valve are long and coiled like a horn. *Nerinea*, *Natica*, *Pleurotomaria*, *Cerithium*, *Turbo*, and *Trochus* represent the Gastropods of this period.

Three distinct types of Cephalopods are shown. The first is illustrated by *Nautilus*, with a series showing variations in size and ornamentation. Polished sections show the internal characters of the shell.

The second type, the Ammonites, is the largest and most characteristic group of Jurassic invertebrate fossils. They are distinguished by their complex suture lines. A large and representative collection of this group is shown, comprising all the typical genera, and illustrating the variations in size from *Harpoceras*, less than half an inch in diameter, to *Olcostephanus*, attaining a diameter of three feet. Many of these specimens have the sutures colored to bring out their outlines. Polished sections show the interior of the shells.

The third type is that of the squids. These had no external shell but an internal bone or guard. A model shows the form of the animal and the location of the guard. Usually, all that is found fossil in *Belemnites* is the guard, of which quite a number are shown, but in several of the specimens the ink sac and hooks which are attached to the arms can be seen. Some of the specimens from the Lithographic limestone of Solenhofen, such as *Trachyteuthis*, *Geoteuthis* and *Plesioteuthis*, show the impression of the body, others only the skeleton.

A good series of Crustaceans of the type of the lobster and Horseshoe crab is shown. Among the Insects shown may be mentioned *Æschna* and *Petalia*, Dragonflies; *Belostomum*, an ant; *Nepa*, a water bug.

Fishes of the Jurassic are represented (Hall 36) by a large number of specimens from England, Bavaria, and Wurtemberg. These are chiefly of two types. The Ganoids, which were the predominant type, may be recognized by their heavy, angular scales. The following genera are well represented: *Caturus*, *Aspidorhynchus*, *Thrissops*, *Leptolepis* and *Dapedius*. The Selachians or sharks, having neither bony skeleton nor scales, are represented by the teeth and fin-rays only. Some genera of this type shown are *Acrodus*, *Hybodus*, and *Chondrosteus*.

Ichthyosaurs, from the Jurassic of England and Germany are represented (Hall 36) by an unusually fine series of skulls and skeletons. The Ichthyosaurs, or fish-lizards were a type of marine reptile having a fish-like body and tail, a short neck, a long, pointed snout, enormous eyes and paddles somewhat like those of a seal. They attained a length of twenty-five to thirty feet. A model exhibited on the floors shows something of their outward appearance.

A second form of marine reptile common to this period is that of Plesiosaurs. These were more slender and graceful animals

than the Ichthyosaur. Some forms had a very long neck. The body was short and armed with stout, paddle-like legs which were used in swimming. In the long-necked Plesiosaurs the head was broad and snake-like; in the short-necked types it ended in a slender snout similar to that of the Ichthyosaurs. A model of one of the long-necked types exhibited on the floor of Hall 36 will give some idea of the general proportions of the animal.

Pterodactyls, common to Europe and known also from the American Jurassic formations are represented by incomplete specimens. More will be seen of them in the next period.

*Cretaceous Period.*—Vertebrate fossils of the Cretaceous period are represented by specimens of Dinosaurs, Plesiosaurs, Pterodactyls and Fishes. They are of different types from those of the Jurassic. In addition there appeared a new type of marine reptiles — the Mosasaurs.

Cretaceous Dinosaurs are illustrated by a fine skull with a partial skeleton of *Triceratops* and a restoration of the skeleton of *Hadrosaurus* (Hall 36). *Triceratops* was a unique armored land reptile of gigantic proportions. It is very different in structure from the Jurassic Dinosaurs though commonly included in that order. The head was very large in proportion to the size of the body. It was armed with three horns as indicated by the bony horn cores on the skull. There was also a wide bony frill, covered in life by a dermal shield, which projected backward from the skull and served to protect the neck and shoulders of the animal from the attacks of its horned enemies.

The specimen shown is one of the largest of its kind. It was collected in eastern Montana by a special Museum expedition in 1904. Parts of the skeleton of the same individual will be found in a wall case in the next hall.

*Hadrosaurus*, illustrated by a restoration, is a large biped reptile found in the Cretaceous deposits of New Jersey. The animal walked entirely upon its hind legs, only using the smaller forward pair when resting or feeding.

Mosasaurs were a new type of marine reptile which appeared with the Cretaceous period. They were short-necked, round-bodied, long-tailed animals, with pointed snouts. The legs were paddle-like and adapted to swimming. The tail probably terminated in a narrow fin which was also used as an organ of propulsion. The skeletons of these animals are found in large

numbers in the chalk beds of western Kansas; also in England and Belgium. They are represented in the collection chiefly by a complete skeleton of *Platycarpus* from Kansas. (Hall 59.)

Plesiosaurs were a second type of marine reptile which, as has been mentioned, appeared in the Jurassic period and continued to the close of the Cretaceous. The specimen of *Elasmosaurus* is of interest in showing the shoulder and pelvic girdles in connection with a complete paddle. (Hall 59.)

Pterodactyls, or flying reptiles, represent one of the strangest forms assumed by reptilian life toward the close of the Mesozoic era. They were very slight and active creatures, somewhat bat-like in general appearance, but withal distinctly reptilian. The head was armed with a stout, bird-like beak, the bones were hollow, the wing-bones were long and supported a membrane which connected with the legs, thus forming the organ of flight. In powers of flight they doubtless equaled any of the existing birds. The group is represented by a splendid skeleton of *Nyctosaurus* from the chalk beds of Kansas. This is the most complete specimen known. Other related forms have been found in various parts of Europe. (Hall 59.)

Turtles of this period are represented by the shell of a large fresh water form, *Basilemys*. This was found in the latest Cretaceous beds of Montana.

Fishes. In this period true bony fishes of modern types made their first appearance. A number of these from Lebanon, Syria, as well as some American forms are exhibited.

Other fossils of the Cretaceous period shown include remains of plants and invertebrates as follows:

The first of modern plants, or Angiosperms. Imprints of eaves are shown, many being of modern genera, such as *Sassafras*, *Populites* or poplar, *Betulites*, or birch, *Viburnum*, *Ilex*, or holly, *Magnolia*, etc.

The localities represented are chiefly Kansas and Colorado.

Models much enlarged from the original, illustrate the forms of Foraminifera, whose shells make up the vast deposits of chalk which characterize this period.

Sponges are shown in many forms. Some of these served as nuclei for the formation of flint nodules. Several large nodules of this kind are shown from Ireland.

Echinoids are illustrated by *Ananchytes*, *Holaster*, *Toxaster*,



etc. These are free-moving forms in contrast to the stemmed crinoids so abundant in earlier times.

Pelecypods and Gastropods are illustrated by many specimens, mostly of modern types, such as *Ostrea*, *Exogyra*, and *Gryphæa*, which were Oysters of many and curious shapes. *Pectens*, *Vola*, etc., were Scallops.

Among bivalve molluscs the family of Rudistæ is unique, and characteristic of this period. In shells of this family one valve is enormously enlarged, and somewhat funnel-shaped; the other valve is small and acts as a lid. *Hippurites*, *Spherulites* and *Radiolites* belong to this family. *Inoceramus* sometimes reached enormous size.

Among Cephalopods are shown specimens of *Nautilus* of modern types; also members of the Ammonite family, which took on various and intricate forms. The series of *Placenticas*, an ammonite with coiled shells often two feet in diameter, is especially worthy of note. The specimens are chiefly from the Bad Lands of South Dakota. Many varieties of shape are found among the Ammonites, from straight shells to hook-shaped, partly uncoiled, spirals, etc. The genera are often named from their characteristic forms, some of them being as follows: *Baculites*, rod-shaped; *Hamites*, hook-shaped; *Helicoceras*, an open spiral; *Scaphites*, boat-shaped; *Turrilites*, tower-shaped.

*Cenozoic Era; Age of Mammals.*—With the close of the Mesozoic era the many and varied forms of reptilian life disappeared. The mammals which had existed as an unimportant form during nearly the whole of Mesozoic time now became the predominant type. Fossils from this era are exhibited in the west half of Hall 59, and Halls 60 and 61.

*Tertiary Period.* Tertiary plants and invertebrate fossils shown include *Flabellaria*, leaves of a palm which grew in the Eocene epoch near Green River, Wyoming. Also, leaves of *Acer*, or maple, and other trees of modern genera.

Such remains, with others that are found, indicate that a subtropical climate, like that of Florida, prevailed at this period over the northern United States. Even so far north as Greenland, the climate was so mild that cypress and cedar trees grew in profusion.

*Nummulites.*—These are abundant and characteristic fossils of this period. They are shells of a Rhizopod, which in Europe and Africa formed limestones many thousand feet in thickness.

A representative series of Mollusc shells is shown. In both the univalves and bivalves a close resemblance to modern shells will be noticed. Most of the genera are identical with living forms. Such are *Venus*, *Cardita*, *Arca*, *Tellina*, *Meratrix*, etc., of Pelecypods, and *Natica*, *Turritella*, *Cerithium*, *Strombus*, *Fusus*, *Murex*, etc., of Gastropods.

Vertebrate fossils from the Eocene, or first stage of the Tertiary period, are represented by a series of fishes from the Green river shales and a cast of the large horned mammal, *Dinoceras mirabile*.

The fishes from the Green river shales include a great number and variety of bony fishes, or *Teleosts*, of modern types. Such familiar forms as the perch, the herring, and the ray are included. (Hall 59.)

*Dinoceras* was a five-toed animal similar in size and in general proportions to the modern rhinoceros. It was characterized by the presence of three pairs of horns on the head, a strong tusk-like upper canine tooth, and an elephant-like foot. It differs from existing animals in the number and arrangement of the horns, the V-shaped molar teeth, and the elephant-like foot. (Hall 61.)

Mammals of the Oligocene stage, or second subdivision of the Tertiary period, are represented by a great number and variety of forms, most of them having been collected by special expeditions sent out by the Museum. (Hall 59.) These are mostly modern types of mammals. Among those represented are the primitive cats, dogs, squirrels, rabbits, camels, tapirs, horses and rhinoceroses. There are also shown a number of the older types of mammals which had their origin in the first Tertiary stage and have no modern representatives. Among these are the *Hyænodon*, *Oreodon*, *Elotherium*, *Anthracotherium*, *Titanotherium*, *Hyracodon*, and *Metamynodon*. The collection includes a mounted skeleton of the sabre-tooth cat, *Dinictis*, a representative series of skulls of the primitive dogs, *Cynodictis* and *Daphænus*, of the three-toed horse, *Mesohippus*, the cursorial rhinoceros, *Hyracodon*, the more typical rhinoceros, *Aceratherium*, the large suilline, *Elotherium* and the great horned ungulate, *Titanotherium*.

Mammals from the Miocene, or third stage of the Tertiary period are represented by collections from two localities, the Deep River beds of Montana, and the Loup Fork beds of Nebraska and Wyoming. They include the following forms:

A skull of the primitive bear *Amphicyon*, skulls and skeletons of smaller carnivores, and skulls, feet and legs of three-toed horses considerably larger than appear in the preceding epoch. Also a mounted skeleton and series of skulls of *Promerycochærus*, a successor to *Oreodon* of the last epoch; skulls of *Merycochærus*, *Merychys* and other members of the Oreodont family, and skulls of *Oxydactylus* and *Procamelus*, members of the camel family.

Another fossil from beds of this age shown is *Dæmonelix*, or Devil's Corkscrew, a curious spiral form found in great abundance in the sandstone strata of western Nebraska. Its exact nature is problematical. Some think that it represents the remains of aquatic plants. According to another theory natural casts of ancient gopher burrows form the fossil. The series shown is thoroughly representative, and includes specimens of supposed stages of development of the form. (Alcove, Hall 60.)

Other Tertiary forms represented include:

Restoration of *Colossochelys atlas*, a huge turtle which lived in India during the Tertiary period. (Hall 60.)

A restoration showing the jaws of *Carcharodon*, and within these, for comparison, the jaws of a modern shark. The *Carcharodon* was probably 50 to 70 feet in length. (Hall 60.)

A restoration of the skull of *Elephas ganesa*, one of seven species of elephants existing during the Miocene epoch in India. This species is remarkable for the length of its tusks, in this specimen ten feet long. (Hall 59.)

*Quaternary Period.*—Vertebrate fossils of the Quaternary period are represented in the collection by remains of the mastodon, mammoth, bison, rhinoceros, Irish deer, New Zealand birds, cave bear, and cave man, as well as by a large series of casts and restorations. The largest of these is the skeleton of the mastodon from southern Michigan. This was one of the earliest elephant-like mammals, differing from the elephant in having a more elongated body, shorter and stronger limbs, flatter cranium and less complex molars. The grinding surfaces of the molars were more or less tubercular, in contrast to the ridges which characterize the teeth of the elephant. Hence comes the name, mastodon, *nipple tooth*. The animal probably had no hairy covering to enable it to endure a rigorous climate as did the mammoth. It inhabited chiefly the temperate regions of the United States, where its remains are found in abundance. (Hall 59.)

The skeleton of the Irish deer from Limerick, Ireland, is that of a large Post-Pliocene deer, the bones of which are occasionally found in marl beneath peat beds in Ireland and England. The antlers of this animal have a spread of seven feet, and its height was nearly eight feet. (Hall 60.) The skull of *Diprotodon*, shown by a cast, represents an extinct member of the kangaroo family from Australia. It differs radically in proportions from the modern kangaroo, in that the fore legs were longer than the hind ones. The body was equal in bulk to that of the rhinoceros. (Hall 61.) The skull of *Toxodon*, shown by a cast is that of a short legged and cumbrous quadruped of immense size which lived in large numbers in Patagonia and the pampas of the La Plata. In habits it approached most nearly the modern hippopotamus. In structure it combined with the general proportions of the hoofed animals the large incisor-teeth common to gnawing animals and a structure of foot similar to that of the elephant family. Its nearest modern relative is the small tree-hyrax, found in Africa. *Megalonyx* was one of the great ground sloths similar to *Megatherium*. It is illustrated by the cast of a skull. The original of this specimen was found in Kentucky.

*Sivatherium* skull and fore legs are illustrated by casts. This was a gigantic, four-horned antelope as large as an ox and much taller. It is found in the Siwalik Hills of India. *Zeuglodon*, shown by the cast of a skull, is an extinct whale. Remains of the huge birds of New Zealand shown belong chiefly to the genus *Dinornis*. A complete skeleton of one is shown, also leg bones of several species. The limbs rivalled in size and strength those of a horse. Casts of eggs of this and an allied genus, that of the latter having a capacity of two gallons, are shown.

The following fossil vertebrates more or less contemporaneous with man are shown (Hall 61): Perfectly preserved lower jaw with teeth, also other bones, of mastodon from Morocco, Indiana; skulls of fossil bison and musk ox from Alaska; limb bones and teeth of hippopotamus and bison from England, showing that these animals lived in England in comparatively recent times; skull of *Ursus spelæus* or cave bear. This was a bear of great size, frequently reaching a length of nine feet, the remains of which are found in Europe in caves with human bones. It was evidently contemporaneous with early man, but has been

extinct since historical times. Remains of *Homo sapiens*, or man, found in a cave on the island of Crete — probably very ancient. Casts of the Neanderthal and Engis skulls, the former of which has given rise to much discussion because of its flattened form. This has been held by some to prove that early man was a being intermediate between man and the ape. The skull has, however, about the average human brain capacity.

### Hall 62.

## METEORITES.

The collection of meteorites includes representatives of about 300 distinct "falls" or "finds," the specimens of which have an aggregate weight of 5130 pounds (2327 kilograms). These are grouped in three classes, viz., Stone meteorites, Iron-stone meteorites, and Iron meteorites. Under each of these divisions the specimens are placed in chronological order, and labels show the locality, date of fall or find, and weight of each specimen. The specimens are in large part not the individual stones, but fragments of them, it being usual when a meteorite falls or is found, to break it up and distribute the pieces among museums and collectors in order to provide material for study. Otherwise meteorites could be studied only by going from one museum or collector to another.

In the four large cases occupying the floor of the hall are shown four meteorites of exceptional size and importance. These are, to the left entering from Hall 61, the meteorites of Long Island, Kansas, and Brenham, Kansas, and, to the right, those of Canyon Diablo, Arizona, and Toluca, Mexico.

The meteorite of Long Island, Kansas, is the largest stone meteorite known. As exhibited it is in several hundred pieces all of which once formed a single mass, the weight of which was about 1300 lbs. When the mass fell it struck a ledge and thus was broken into the pieces shown. The characteristic pittings of the surface of meteorites are well shown on this specimen. Of the Brenham, Kansas, meteorites, two large and two small individuals and ten sections are shown. One of the large individuals weighs 465 and the other 345 lbs. The total weight shown is about 1000 lbs. The sections show the characteristic structure of meteorites of this class, viz., a sponge-like mass of iron, the pores of which are filled by the yellow

magnesium silicate, chrysolite. The distribution of this silicate is irregular, some parts of the masses being wholly metal.

Of the Canyon Diablo meteorite nine individuals and five sections are shown. The largest of the individuals weighs 1013 lbs., and is one of the largest ever obtained from the locality. The next smaller individual shown, weighing 265 lbs. is remarkable for the perforation about one inch in diameter passing entirely through it. Of the sections, several are etched and show the characteristic figures of the meteorite. These figures are broad and irregular. The small projecting particles, about the size of a grain of wheat, are cohenite, a carbide of iron little attacked by the acid used in etching and hence standing in relief. In addition are seen larger nodules of oval form which are sulphide of iron, often surrounded by graphite or cohenite.

Of the Toluca meteorites sixteen individuals and seven sections are shown. The largest individual weighs 90 lbs. Another individual shows shaping for use as a hammer. Such use of these meteorites was frequent in early times. The etched sections show the typical figures of this meteorite, with laminae about 2 mm. in width and of a regular network pattern.

In the wall cases are shown the smaller specimens of the collection, also casts of meteorites. The casts are placed in the bays, the meteorites on the shelves above. In the two cases first in order from the entrance from Hall 61, beginning at the left, are shown the specimens of stone meteorites or aerolites. These specimens are in part individuals and in part fragments. They are arranged in chronological order passing from left to right. Specimens of about one hundred and fifty falls are shown. These include 660 individuals of the Forest City, Iowa, fall, about twenty individuals of Pultusk, Poland, and large masses from Farmington, Kansas, Saline, Kansas, Homestead, Iowa, Bluff, Texas, Estacado, Texas, etc. The rare carbonaceous meteorites are well represented by specimens from Orgueil and Alais, France, and Mighei, Russia.

Following the stone meteorites are shown the iron-stone meteorites, of which about twenty-five distinct falls are represented. These contain more iron than the stone meteorites and thus pass toward the iron meteorites. The iron varies in quantity from coarse flakes or nodules scattered among the stony minerals to sponge-like masses in which the stony portions are held. Complete individuals of the Crab Orchard, Tennessee,

and Admire, Kansas, meteorites are shown, while other falls are represented by sections. In the same case are shown specimens of terrestrial iron, which has a composition resembling that of meteoric iron. Santa Catharina, Brazil; Oviyak, Greenland; and Awarua, New Zealand, are among the localities thus represented.

Following the iron-stone meteorites are placed the iron meteorites, about one hundred and thirty falls of which are represented. The specimens are chiefly sections and most of these are polished and etched in order to show the characteristic figures. Especially well represented falls are those of Kenton county, Kentucky, Rodeo, Mexico, Indian Valley, Virginia, and Colfax, North Carolina.

The casts in the bays of the cases show the form, size, and surface characters of the meteorites represented. As the meteorite itself is usually cut up and distributed these casts afford the only record of such characters. Meteorites of remarkable form thus represented are those of Babb's Mill, which is cigar-shaped, those of Kokstad and Hex river, South Africa, shaped like a large lower jaw, and Charlotte and Boogaldi which are drop or pear shaped. A conical shape is also common, the apex of the cone having been the front side in falling.

On the north wall of the hall is a large map showing the distribution of known meteorite falls in the United States.

### Halls 63 and 64.

## SYSTEMATIC MINERALOGY.

This collection numbers about 10,000 specimens and illustrates the different species of minerals obtained from various localities of the world. The arrangement is in accordance with the system of Dana in the following order: Elements, sulphides, chlorides, fluorides, oxides, carbonates, silicates, phosphates, sulphates and hydrocarbons. The smaller specimens are placed in the floor cases, the larger in the wall cases. The series begins with the elements at the left of the entrance from Hall 62, then follows down this side of the hall and up the other and then passes to Hall 64. The order is also indicated on each specimen by the number placed at the left on its label. This shows its number in Dana's system. The specimen labels show

the name and composition of the species, the Museum catalogue number, and the locality. Beginning with the case of elements at the left of the entrance from Hall 62, an exact facsimile of the Cullinan diamond, the largest diamond ever found, is of interest. The large crystals of stibnite from Japan in the same case are also worthy of special note. The next wall case contains a remarkable specimen of millerite from Iowa, and a fine display of fluorite from Cumberland, England. In the floor cases in this group the specimens of gold, galena, pyrite, sylvanite and cerargyrite are especially noteworthy. In the floor cases following, the series of twin quartzes from Japan, of Placerville, California quartzes, of golden quartz from Colorado, chalcedony from Wyoming, precious opal from Australia, cuprite from Arizona, hematite from Elba, manganite from Michigan, and rutile from Georgia, are noteworthy. The adjoining wall cases contain among other specimens a large and fine series of quartz crystals from several localities, also a large group of amethyst from Thunder Bay, and a remarkable series of agates from South America. Passing to the east side of the hall a series of calcites is shown of exceptional completeness and beauty. These include a superb series of English calcites and large wine-colored calcites from Joplin, Missouri, with still larger ones of violet color from the same region. Other remarkable specimens of carbonates in the wall cases include blue smithsonite from Greece, aragonite from Sicily, and azurite and malachite from Arizona. In the floor cases containing carbonates, smaller specimens of calcites are shown, most of which are remarkable for their brilliancy and perfection. The rhodochrosites from Colorado are of rare beauty of color. The series of cerussites is excellent, and some remarkable azurites and malachites are shown. The series of silicates begins with the feldspars and is then followed by pyroxenes and amphiboles. A series of beryls following includes emeralds, aquamarines and other gem stones. The varieties and localities of garnet are next displayed and next a superb series of phenacite, diopside and topaz. Tourmaline is fully represented, the best specimens being from Maine, California, and the Island of Elba. Then follow the zeolites, a group of hydrous silicates named from their easy fusibility before the blowpipe. The specimens in the adjoining wall cases contain a remarkable series of the richly colored amazon-stones of Colorado, garnets of large size and various coloring, large crystals of



beryl, a mass of lapis-lazuli weighing about 200 pounds, a splendid group of epidote from Alaska, and large and fine specimens of tourmaline. Passing to Hall 64, the first wall case at the left contains a complete series of the varieties of mica, following which are the hydrous micas, the serpentines, talcs and clays, and the minerals containing the rarer elements, such as columbite, samarskite, etc. Following these in the wall cases on the north side of the hall are the phosphates, arsenates, borates, uranates and sulphates. Among these the vanadinites from Arizona, and olivenites, conichalcites and tyrolites from Utah, are of exceptional beauty and rarity. The turquoises from Arizona, autunites from South Dakota, barites from England and anglesites from Utah are also noteworthy. The systematic collection terminates in the wall cases on the east wall in the last case, especially noteworthy being the specimens of wulfenite from Arizona, amber from Prussia and jet from England. A collection of pseudomorphs illustrating how one mineral may be replaced by another follows. Then is exhibited a collection of radio-active minerals with photographs made by the specimens themselves. Large gold nuggets found in Australia and California are next represented by full-sized models. In the floor cases of the hall several hundred specimens of cut gems and ornamental stones are shown. These include topazes, amethysts, emeralds, tourmalines, moonstones, rock crystal, amber, etc. The specimen of carved amber is especially remarkable as a piece of lapidist work. The series also includes a number of jasper vases and trays from the Urals and pieces of polished serpentine and onyx. A complete series of models of the famous diamonds of the world, illustrating their size, form, and color, makes a part of the exhibit. The Chalmers crystal collection, which includes about 250 specimens from United States localities and is the most complete collection of the kind ever made, occupies one case.

### Hall 65.

## STRUCTURAL AND DYNAMICAL GEOLOGY.

The specimens in this hall for the most part represent phenomena met with in the study of the earth's crust, and illustrate phases of rock structure and geological processes. Entering from Hall 64, in the first case at the left are shown large slabs with ripple-marked surfaces. One of the largest of these shows

also cross ripples. Large surfaces of petrified mud cracks are also shown. In the next case the different results of glacial action are chiefly illustrated. The series includes glaciated pebbles and boulders from glacial regions of Switzerland and Mexico, also from Chicago and Rochester, New York. Among the most interesting of the specimens are a series of boulders of copper found for the most part about the southern end of Lake Michigan which were brought by glacial movement from the copper-bearing regions about Lake Superior. The largest of these boulders weighs 375 pounds. Rock surfaces, planed and striated by glacial movement, are also shown. These are from both ancient and modern glaciers. Specimens illustrating the effect of erosion by wind and water, also stages and forms of rock weathering are shown in this case. Numerous specimens of sandstone from the Black Hills with differently colored strata are shown. Cellular structure is illustrated by lavas and scoriæ. In the next case jointed structure is illustrated by basalts from Mt. Holyoke, Massachusetts, Auvergne, France, and other localities. Vein structure and faulting are also fully illustrated. The next case is largely devoted to concretions. These include lime concretions or clay-stones of many forms and from many localities; also sand, limonite and other concretions. A related structure called orbicular, found in eruptive rocks is illustrated by large slabs from California, North Carolina, and Sweden. A number of geodes are shown illustrating the forms and size of these bodies. The next case is largely devoted to septaria. These are formed from concretions by drying and shrinking and a subsequent filling of the cracks with some other substance. Several of those shown are of large size, one being nearly three feet in diameter. Polished sections are also shown. The next case illustrates cave formations and cave life. Stalactites and stalagmites and other cave formations chiefly from Indiana caves are mounted in natural positions so as to illustrate the formation and characters of typical limestone caves. The forms of life inhabiting such caves are also shown. The next case is devoted to specimens of individual stalactites and stalagmites of large size or perfection of form; also two fulgurites, one of these being of exceptional size. Adjoining this case a large specimen of lodestone from Missouri is shown. On the floor of the hall is a collection of basalt columns from the Giant's Causeway, Ireland, and the Rhine valley. These are grouped so as to

illustrate the stair-like arrangement which usually characterises cliffs of basalt.

### Hall 66.

## LITHOLOGY.

The collections of this hall illustrate the varieties of rocks occurring at different localities. About 2000 specimens are shown, most of them being of the size 3 x 4 x 1 inch. The specimens are classified under the heads of eruptive, aqueous, and metamorphic rocks. Of these the eruptive rocks are grouped according to their percentage of silica and their grain. Thus, beginning with the granites, which have from 80 to 65 per cent of silica, the order passes among the coarse-grained rocks to the diorites, which have between 65 and 55 per cent, then to the gabbros and diabases, having usually more than 45 per cent, and ends with the peridotites, having below 45 per cent. A corresponding series begins with the syenites and ends with the nepheline rocks. Again under the divisions representing different percentages of silica, the coarse-grained or holocrystalline rocks are placed first, then those having a porphyritic structure and, lastly, the amorphous rocks. Thus among rocks having from 80 to 65 per cent of silica, the granites, being coarse-grained, are placed first, the quartz porphyries second, and obsidian, etc., last.

Entering from Hall 65, in the first case at the left of the entrance are shown *granite* and its varieties, such as *granitite*, *graphic-granite*, etc. These are coarse-grained rocks having quartz, potash-feldspar, and one or more minerals of the mica, amphibole, or pyroxene groups as essential constituents. Then follow *granite-porphry*, *quartz-porphry*, *vitrophyre*, *felsophyre*, etc., which are like the preceding in composition, but more or less porphyritically developed. Following these are *rhyolite*, *nevadite*, *pumice*, *obsidian*, etc., which are amorphous volcanic rocks, having high percentages of silica, usually more than 70 per cent. Then follow *diorite* and varieties, holocrystalline rocks having plagioclase feldspar and hornblende or black mica as essential constituents, *andesites* and *dacites*, amorphous or porphyritic rocks composed of soda-lime feldspar, black mica, hornblende, and in the case of *dacites* quartz, then *porphyrites* of various kinds.

The next group begins with *gabbros* and *norites*, which are

coarse-grained rocks consisting of a basic soda-lime feldspar, with a diallage or other pyroxene. *Diabases*, rocks having plagioclase feldspar and augite as essential constituents follow, then come *basalts*, *dolerites* and *melaphyres*. The latter are usually found in the form of dykes and intrusive sheets. They are popularly known as trap rocks. Their composition is like that of the preceding.

*Pyroxene rocks*, *diallagite*, etc., which are basic rocks composed largely of pyroxene, come next, and the group ends with *peridotite* and varieties, including *lherzolite*, *picrite* and *dunitite*. These are highly basic rocks, composed chiefly of olivine, but often having chromite and other iron oxides present.

Rocks of the syenite-nephelinite series are placed next, as follows: *Syenite*, *minette*, etc. These are holocrystalline rocks, having dominant orthoclase and subordinate ferro-magnesian minerals. These are followed by *trachytes*, which are of the same composition as syenite but of porphyritic or felsitic texture. Then follow *Nepheline* or *elæolite syenites*, in which nepheline accompanies the feldspar; otherwise they are like syenite. *Phonolites*, which are like the above but of porphyritic or felsitic texture, and *tephrites* and *basanites*, rocks having nepheline or leucite and lime-soda feldspar as essential constituents, usually porphyritic in structure, with a more or less amorphous ground mass, follow next in order. *Kersantite*, *leucite basalt*, *leucitite*, *nepheline basalt* and *nephelinite*, which are rocks containing leucite or nepheline in place of feldspar, and these usually associated with augite, end the series.

Then follow aqueous rocks. Those formed as chemical precipitates are placed first. These include *hematite*, *limonite*, *calcareous tufa*, *oolitic* and *pisolitic limestone*, *onyx*, *serpentine* and its varieties, *talc* or *seatite*, including *verdantique marble* and *ophite*, *gypsum*, *alabaster*, etc. Then follow rocks formed as sedimentary deposits, and fragmental in structure. The principal varieties of these are arranged in this order: *Sandstone*, *conglomerate*, *breccia*, *quartzite*, *shale*, *clay*, *tufa* or *tuff*, *coquina*, *chalk* and *limestone*.

Then follow metamorphic rocks. These are divided into stratified or bedded, and foliated or schistose. The first class includes *crystalline limestones*, *marbles* and *dolomites*. They are made up chiefly of the mineral calcite, and are formed from the remains of molluscs, corals and other animals. These produce

limestone first and this is changed by the action of heat to the crystalline condition. In some cases the original fossils remain intact, as illustrated in many of the polished slabs. Following the *marbles* are placed the *crystalline schists*, which are rocks of variable composition, but characterized by a pronounced schistose structure, especially where mica is the prevailing constituent. Here are included *argillite*, *clay-slate*, *eclogite*, *quartzite*, *phyllite*, *paragonite schist*, *chlorite schist*, *mica schist*, and others.

Last in the series appear the *gneisses*, a class of rocks essentially like the granites in composition, but differing from them in structure, in that the constituents are arranged in approximately parallel bands or layers. Varieties shown depend upon the prevailing mineral.

In addition to the systematic collection above described some special collections, illustrating rocks of certain areas, are shown as follows:

Rocks of the copper and iron-bearing regions about Lake Superior.

Rocks of Manhattan Island. These were obtained chiefly from excavations made in and about New York City. They are crystalline, metamorphic rocks, and illustrate the great variations possible in kinds of rocks in a small region.

Rocks of the Green Mountain Range, as seen in passing eastward from Pittsfield, Massachusetts. These include a variety of schists, limestones, and other metamorphic rocks ranging in geological time from the Archæan into the Devonian. They illustrate the different formations distinguished by geologists in the region.

Lavas of well-known volcanoes, including Vesuvius, Mauna Loa, and the extinct volcanoes of central France.

Lavas and other products of the volcanoes of the Valley of Mexico.

**Halls 76 and 77.**

## **GEOGRAPHIC GEOLOGY.**

The purpose of this collection is to illustrate in a vivid and realistic way the surface configuration of the earth. The chief feature of the exhibit is a series of relief maps which reproduce on as natural and representative scales as practicable, the topography and structure of selected portions of the earth's surface. A part of the series shows only topography and sculpture, while

another part shows geological structure as well as topography. To some extent the topography is shown on one map and the geological structure on another, so that both elements are represented with the greatest distinctness. The portions of the surface selected to be represented are usually such as to portray some typical form of surface sculpturing or of volcanic accumulation. Some, however, represent natural or political divisions.

In addition to the relief maps, there are models showing geological structure or illustrating methods of development. Some of these are dissected so as to show the more intimate structure of the formations. There are also exhibited globes, wall maps, and other geographic material. The following is a list of the principal features:

#### Hall 76.

Entering this hall from the West Dome and passing around to the right, the maps against the wall will be found in the following order:

Relief map of Kentucky showing topographical and geological features and location of principal coal fields.

Relief map of the United States showing limits and theoretical curvature of the ancient ice sheet at the stage of the Glacial period following the main epoch. Modelled on a section of a globe 16½ feet in diameter. Scale, 1 inch equals 40 miles.

Relief map of Missouri showing topographical and geological features and principal mining districts.

Relief map of New Jersey showing topographical and geological features.

Model of Henry mountains and vicinity, Utah, showing geological formations and effects of erosion.

Geological and relief map of the Henry mountains showing effects of erosion.

This is on a larger scale than the preceding map and shows only a portion of the same territory.

Same as the above, ideally restored before erosion took place.

Model showing Henry mountains and vicinity ideally restored before erosion took place.

This is on the same scale as the first of the series.

The foregoing series of four maps illustrates the formation of laccoliths or dome-like mountains produced by the intrusion of lava.

Relief map of Yellowstone National Park, showing canyons of the Yellowstone and Madison rivers, etc. Horizontal and vertical scale, 1 inch equals 1 mile, or 1:63,360.

Relief map of the Yosemite Valley from surveys made by Captain of Engineers, George M. Wheeler, U. S. A., scale, 1 inch equals 1000 feet.

Relief map of Eureka District, Nevada, colored to show geological formations, scale, 1 in. equals 16,000 feet.

Relief map of the island of Porto Rico. Horizontal scale, 1 inch equals 4 miles. Vertical scale, 1 inch equals 2 miles.

Relief map of the Hawaiian Islands. Horizontal scale, 1 inch equals 4 miles. Vertical scale, 1 inch equals 2 miles.

Relief map of the Niagara river. Horizontal scale, 1 inch equals 1 mile. Vertical scale 4 : 1. The entire course of the Niagara river is shown.

Relief map of Niagara Falls and vicinity on a larger scale than the preceding. Horizontal and vertical scale the same, 1 inch equals 500 feet. This map, besides exhibiting the familiar features of the Falls and Gorge, also makes plain the ancient shore of Lake Erie and the old channel leading from the Whirlpool.

Relief map of the United States and the Gulf of Mexico, modeled on a section of globe 16½ feet in diameter. Horizontal scale, 1 inch equals 40 miles. Vertical scale, 1 inch equals 8 miles. This map is colored to show average annual rainfall and lines of equal temperature.

Relief map of the Grand Canyon of the Colorado and the cliffs of southern Utah, colored to show geological formations. Horizontal scale, 1 inch equals 2 miles. Vertical scale, 1 inch equals 5000 feet.

Relief map of Palestine. Horizontal scale,  $\frac{3}{8}$  of an inch equals 1 mile. Vertical scale,  $3\frac{1}{2}$  times the horizontal.

Mounted on easels and occupying the floor of the hall will be found the following:

Contour map, in relief, of the Washoe, Nevada, mining region, 50 foot contours. Scale, 1 : 20,000.

This form of map illustrates how a relief map is constructed from a printed contour map. By filling the contours here shown the ordinary relief map is obtained.

Relief model of Leadville and vicinity, showing geological structure. Scale, 1 inch equals 800 feet, or 1 : 9,600.

A dissected form of this map, useful for the study of folding and faulting, can be seen on application to the Curator.

Relief map of the Ice Spring craters, a group of extinct volcanoes, near Fillmore, Utah, illustrating the successive formation and partial abolition of craters and lava fields. Horizontal and vertical scale, 1 : 1000.

Relief map of Mount Taylor, New Mexico, showing geological formations. Scale, 1 inch equals 1 mile.

Relief map of the Uinta and Wasatch mountains, colored to show geological formations. Horizontal scale, 1 inch equals 4 miles, or 1 : 253,440. Vertical scale, 1 : 126,720.

Relief map of the high plateaus of Utah, colored to show geological structure. Scale, 1 : 1,680,000.

Two relief maps of Mount Shasta, one showing topographical, the other, geological features.

Relief maps of the Chattanooga District, one showing topographical, the other geological features. Note how, by folding and erosion, the formations originally overlying one another have been exposed so as to succeed one another laterally.

Relief map of Massachusetts, from maps of the United States Geological Survey and the Topographic Survey of Massachusetts. Horizontal scale, 1 inch equals 4 miles. Vertical scale 1 inch equal 4000 feet.

Relief map of Connecticut from maps of the United States Geological Survey and the Topographic Survey of Connecticut.

Relief map of the Caucasus mountains.

Relief map of the world on Mercator's Projection. Horizontal scale, 630 miles to 1 inch. Vertical scale, 78 times the horizontal.

Relief map of Palestine. Horizontal scale, 1 inch equals 6 miles. Vertical scale, exaggerated 5 times.

A number of large geological photographs are exhibited on a stand in the hall.

There is also exhibited in this hall a model on a large scale of the Chandler iron mine, Ely, Minnesota. It illustrates how the underground workings of a large mine are carried on. Two shafts (shown at the rear of the model) run from the surface downward. At levels 60 feet apart, horizontal galleries run from the shaft and connect at intervals with other passages. Figures of miners at work may be seen by looking through these crossways from the ends of the model.



From the two main galleries, sloping ways, not shown in the model, lead upward to passages at higher levels which do not connect with the shaft. Here as the ore is excavated it is thrown through chutes to the tramways of the main galleries, and there taken by ore cars to the shafts and raised to the surface. The timbering is to prevent the top and sides from caving.

Upon the wall is a large painting representing a section of the Soudan mine of Tower, Minnesota.

### Hall 77.

Passing into Hall 77, and turning to the right, maps will be found against the wall in the following order:

Relief map of the Isthmus of Panama, showing the proposed course of the canal.

Map of the Isthmus of Panama.

Model showing methods of irrigation on steeply and gently sloping fields.

Geological relief map of the Island of Palma.

Relief map of the Drainage basin of the Arkansas river in Colorado, showing the relations of the catchment basins to the reservoir sites and irrigable lands. The entire area drained by the Arkansas river from its source in the High Rockies to the plains of eastern Colorado is shown.

Relief map of Europe. Horizontal scale, 85 miles to 1 inch. Vertical scale, 45 times the horizontal.

Relief map of Asia. Horizontal scale, 216 miles to 1 inch. Vertical scale, 39 times the horizontal.

Relief map of Africa. Horizontal scale, 184 miles to 1 inch. Vertical scale, 53 times the horizontal.

Relief map of North America. Horizontal scale, 140 miles to 1 inch. Vertical scale, 39 times the horizontal.

Relief map of South America. Horizontal scale 147 miles to 1 inch. Vertical scale 30 times the horizontal.

The foregoing five maps permit study to advantage of the great features of continental relief. Among those that may be noted are: That the continents in general have elevated mountain borders and a low or basin-like interior; that the highest border faces the larger ocean; that the lines of greatest elevation are placed outside the center; that all the gentle slopes descend toward the Atlantic and the Frozen ocean, all the steep ones

toward the Pacific and Indian oceans; that elevations increase from the poles to the tropics.

Relief map of Japan.

Geological map of the Siebenburgen region, Bohemia, by Von Hauer. This map is an illustration of good coloring.

Relief map of the United States. Horizontal scale 85 miles to 1 inch. Vertical scale, 36 times the horizontal.

Relief map of the United States. Horizontal scale, 1 : 2,500,000. Vertical scale exaggerated 10 times.

Geological map of the State of New York.

Relief map of the State of New York. Scale, 1 inch equals 12 miles; vertical 5 to 1. The former bed of Lake Iroquois is shown, also the plateau-like character of the southern part of the state.

Relief map of New York City and vicinity. Scale, 1 inch equals 1 mile; vertical 3 to 1. The combination of land and water which have given New York its great commercial importance is well shown.

Physical map of the British Isles.

Geological map of Russia.

Geological map of the State of Illinois.

Series of four maps showing the successive stages in the recession of Lake Chicago, following the Glacial period, and the development of the Chicago plain. Former beach lines, spits and islands are well marked by the topography.

Relief map of northwestern Illinois, including Cook, Du Page, Will, and eighteen adjoining counties. The course of the Chicago Drainage Canal is shown.

Relief map of the region of extinct volcanoes in Auvergne, central France; geological and topographical. Henri Le Coq and G. P. Scrope.

Relief map of Carmel Bay, California, showing a submarine valley.

Geological relief map of Vesuvius and Monts Somma.

Relief map of the island of Teneriffe.

Several geological photographs, including one of the spine of Mt. Pelee.

On tables occupying the floor of the hall will be found the following:

Harvard geographical models, showing the effect of submergence and elevation of a coastal region.

Ideal relief of a complete glacier.

Ideal relief illustrating the formation of valleys by erosion.

Ideal relief of a volcanic island.

Ideal relief of a steep coast and dune coast, showing the two principal types of sea coast as they appear at ebb tide.

Geological relief map of Mount Aetna.

Geological relief map of the Island of Bourbon. Scale, 1 : 300,000.

Geological relief map of Blair, Bedford, and Huntingdon counties, Pennsylvania. A portion dissected to show geological structure.

Relief map of a part of Mount Desert Island, Maine. Scale, 1 to 40,000.

Relief map of Mont Blanc. Horizontal scale,  $\frac{3}{4}$ -inch equals 1 mile. Vertical scale,  $1\frac{3}{4}$  inch equals 1 mile.

Relief map showing irrigation system at Ontario, San Bernardino county, California.

The relief map of the moon exhibited in the alcove at the entrance to the Department may also properly be considered a part of this collection.

A complete series of the topographical maps issued by the U. S. Geological Survey can be consulted on application to the Curator.

## ECONOMIC GEOLOGY.

It is the purpose of the collections shown in this Division to illustrate modes of occurrence in nature of the minerals and ores which have economic importance, to show the localities from which they are obtained, the processes used in their extraction and treatment, and their application to human arts and industries. The collections may conveniently be classified into five groups, which can be most readily inspected in the order named:

Building stones and quarry products, Hall 67.

Clays and sands, Hall 68.

Carbon minerals, including coals, petroleum, etc., Halls, 69, 70 and 71.

Ores and products of the precious metals and lead.

Ores and products of the base metals, Hall 79.

Salts of the alkalies and alkali earths, Hall 78.

**Hall 67.****MARBLES AND BUILDING STONES.**

This hall contains a collection of the best known foreign and domestic marbles in the form of polished slabs. The names given on the labels are those by which the stones are commonly known, and in general refer to the color and markings of the stone rather than to the composition or the locality where it is quarried. Besides the more prominent groups in this collection which are mentioned, there are various smaller series and individual specimens of interest which will be encountered. The series of marbles from the United States includes all the most widely used American marbles. These are principally from Vermont, Georgia, and Tennessee. The Vermont marbles are fine textured and range in color from pure white through gray to black. The coarsely crystalline, brilliant marbles from Georgia run from white to pink. It must not be thought from the appearance of this case that colored marbles such as appear in the collection from foreign localities, do not exist in the United States. Deposits are known but for various reasons remain unworked. A collection of the mottled red dolomites, the "Winooski Marbles," which are quarried in the vicinity of Swanton, Vermont, presents a large number of peculiar patterns.

A collection of Norwegian and one of Greek marbles are installed together. These illustrate well the various breccia patterns of marbles, as nearly all forms, from a plain marble conglomerate through various phases of alteration until the brecciation is wholly obliterated, are present.

The series of French marbles shown is exceptional in size and in beauty and variety of the individual marbles.

Examples of many of the marbles used in the ornamentation of houses and public buildings may be recognized in this case. The names upon the specimen labels of this series are in large part descriptive, so that the collection serves to illustrate the class names dependent upon color and markings which are applied to the more ornamental varieties of marbles from all countries.

A series of marbles from Great Britain presents a variety of patterns of agreeable texture as well as some unusual markings. With these marbles are shown the English alabasters.

Japan is represented by a series of polished marble spheres of various sizes.

A series of marbles from Africa and Asia includes the well known ivory-colored Numidian marbles.

A series of travertines including some large polished specimens comprises the varieties commonly known as Mexican onyx, onyx marble and stalagmite marble. The clear translucent specimens represent the material as originally deposited. The opaque red-brown effects are produced where air has had long access to the material in the ground and has caused an oxidation of the iron contained in the material.

Serpentines. Next to marble the green or red serpentines are perhaps the most generally used of ornamental stones. A good series is shown. Especially noteworthy are the curiously mottled red and dark green serpentines from Lizard Point, Cornwall, and the dark colored variety from Saxony which is turned on a lathe to form various ornamental objects. All of these green serpentines are now commonly known as verde antique, although the name was formerly applied only to those of the shade of green possessed by the Greek specimen, E 504. The ophite from New York is a granular mixture of calcite and serpentine.

A number of slabs of granite and eruptive rocks are shown. Owing to their hardness and the consequent expense of working, these stones are not so frequently polished as the marbles, but, as illustrated by these specimens, when polished they often present very beautiful effects.

A systematic collection of common building stones is also exhibited in the form of four-inch cubes showing different kinds of finish on different faces. The series is classified according to the commercial groups of limestones, marbles, slates, sandstones and granites, and into the nearest of these classes are placed such building stones as lava, diorite, conglomerate, etc., which do not strictly belong to either. Foreign building stones constitute a separate collection.

Building stones of Mexico and Ecuador also are grouped as a separate series. These are mostly volcanic rocks, lavas, and tuffs, which are sufficiently durable for mild climates and yet soft enough to be easily worked with simple tools. The building stones from Ecuador are ordinary pumice stone. Other foreign building stones form a separate series of four-inch cubes representing principally English and Spanish localities.

Roofing slates are represented by specimens from various quarries in New York, Vermont, and Virginia. Specimens of slate from the Welsh quarries illustrate the manner in which blocks of slate are split or cleaved into a series of laminæ or thin plates, which may be afterwards cut to uniform sizes and used for roofing.

### Hall 68.

## CLAYS, SANDS, AND SOILS.

The arrangement of cases in this hall divides it into two alcoves on either side of a central passage. The space to the right upon entering from Hall 67 is occupied by a clay collection, the space to the left by the soils, sands, and cements.

### CLAYS.

The key to the arrangement of the clays is given by a synoptic collection which occupies the entire length of the front of the two cases facing the central passage. In this series are displayed typical specimens of each of the twenty-nine classes of clays of Orton's classification. Their relations to each other and to the rocks from which they are derived are expressed by a method of grouping and by a number of lines connecting the various groups. If these lines and the associated specimens be considered as a kind of genealogical tree of the clays the meaning of this series will be evident. Each specimen of clay in this series has received in order a class number printed upon the label in Roman numerals. As a similar numeral is placed upon the labels of all other clays shown in this hall, the nature of any clay shown may be determined in a moment by referring to the specimen in the synoptic collection with the same class number. After looking over the synoptic collection the visitor should inspect the series illustrating the effects upon their useful properties of the impurities commonly present in clays. The greater part of the space devoted to clays is occupied by specimens arranged according to industrial values. These are arranged in three series, each subdivided and numbered according to the synoptic collection. Each class of specimens is accompanied by a descriptive label. Each specimen is accompanied by a carefully burned briquette of the same clay which illustrates the color, texture, shrinkage, vitrification and other properties of the clay in question when burned. The three collections are:

The red-burning clays, which are red, pink, and yellow when burned. Chiefly used for brick, tile, coarse pottery, and other common uses. With these are placed the clays of similar properties which burn to a greenish yellow from the presence of lime.

The buff-burning clays, which burn to a buff color and include fire clays and most potters' clays.

The white and ivory-burning clays, which burn white or nearly so. Here are placed the kaolins, porcelain, and china clays, paper and pipe clays, and other comparatively valuable clays.

A variety of useful minerals which resemble clays, either in composition, appearance or use, are grouped in a separate collection. Here are placed the ochres and other mineral paints which are chiefly colored clays. Fuller's earths, used now chiefly for purifying fats and oils, talc, mineral soaps, and various other minerals of minor importance are included here.

### SANDS, SOILS, AND CEMENTS.

The half of Hall 68 not occupied by clays contains the sands, soils, and cements. Numerous specimens of sand illustrate the varieties of sand adapted to different uses, such as molding sand for molds for metal castings; fire sand for infusible furnace hearths and furnace bricks; glass sand for the manufacture of glass, and sand for sand-lime brick, etc., and suggest some of the qualities a sand must possess to be adapted to any of these uses. Another series contains hydraulic limestones, cement rocks, common limestones, clays, and marls suited to the manufacture of cement. All stages in the manufacture of Portland cement are illustrated.

The composition, nature and varieties of soils are illustrated by a number of small groups showing:—

The composition of soils;

The principal classes of soils;

The plant foods which occur naturally in soils. (For foods added to soils, i. e., fertilizers, see Hall 78.)

The formation of soil from an eruptive rock and from limestone is illustrated by two complete series showing the original rock and final product together with the intermediate products. A large number of soils from all parts of the world, arranged according to common classifications, illustrates the great variety of appearance and character which soils assume. Another series

is arranged according to the more elaborate classification of the U. S. Department of Agriculture.

### Hall 69.

## COALS OF THE UNITED STATES.

Here one may study the distribution and extent of the coal fields of the United States, also the kinds of coal produced by each and the available means of transportation.

On a large plate-glass map in the center of the hall, scale ten miles to one inch, the coal fields of the United States as developed in 1892 are indicated by areas in black, and the principal railroads connecting them are also represented.

In cases adjoining are shown specimens taken from these different fields, the exact locality of each being indicated by figures on the labels corresponding to those on the map. The order of numbers is the same as the alphabetical order of the states. The specimen labels show the uses of the coal, the names of the operators of the mines, the means of transportation, the markets, and the analysis of the specimens. Other data will be given to anyone desiring to obtain them, on application to the Curator.

### Hall 70.

## COALS AND HYDROCARBONS.

This hall contains a series of the carbon minerals, beginning with the diamond, and passing through graphite and the coals, (anthracite, semi-anthracite, semi-bituminous, bituminous, and lignite) to bitumen and asphalt.

The occurrence of diamonds is illustrated by diamonds in the "Blue Ground" or matrix in which they occur at the De Beers mines, Kimberley, South Africa. A series of the diamond-bearing gravels of Brazil is also shown.

Graphite is represented by a series of amorphous and crystalline graphites together with the artificial material made in the electric furnace.

Asphalts form a series of specimens of diverse characters, from the hard, glassy untaite to the soft, semi-liquid malthas. With them are placed the oil shales from which kerosene may be distilled and the ozocerites or natural paraffins.

The coals and lignites represented are as follows:



Lignites, chiefly from the western United States, South America, England, and Roumania;

Bituminous coals, from the United States, Australia, England and Wales, and Westphalia and Saarbrücken, Germany. With the latter series the associated rocks are shown, and the whole forms a typical series illustrating the rocks of a coal basin.

Anthracite coals, chiefly from Pennsylvania and Colorado.  
Cannel coals.

The grading and cleaning of coal by washing as performed in Germany is represented by a complete series.

A section of a coal seam five feet in thickness, from the Bore Hole seam, Duckenfield and Merthyr collieries, New South Wales, serves to give an impression of how coal beds lie in the ground.

Peat and its uses are represented by several varieties of raw peat and stages in the process of making a fuel from it and of manufacturing it into textile fabrics and paper. Several other uses of peat are also illustrated.

Large blocks of asphalts and coal are shown apart from the systematic series of specimens.

### Hall 71.

## PETROLEUM AND ITS DERIVATIVES.

This hall contains a very complete collection made by the Standard Oil Company to illustrate modes of occurrence of the mineral oils of the United States, the methods used for distilling and refining them, and the products obtained. It contains specimens of crude oil from the majority of the pools in the United States; specimens of various oil-bearing sands and minerals of the oil strata; models of oil refineries, and a complete series of the products of petroleum. By following the order given below, the visitor will find illustrated: (1) The natural history of petroleum; (2) its manufactured products, and (3) the uses or application of these.

The specimens of crude petroleum are arranged to show gradations of color, this being seen to vary from black, through shades of dark green and brown to amber, the greenish-brown being most common.

Tubes filled with drillings from the successive strata passed through in search for oil, illustrate the material through which oil wells are drilled in the Pennsylvania oil fields. One of these

represents a huge producer in the MacDonald field. A piece of sandstone from which the oil is obtained is placed at the bottom. Upon the wall a chart shows a geological section between Olean, New York, and Fort Wayne, Indiana. The position of the oil-bearing sands in these and the comparatively undisturbed condition of the strata are significant of conditions favorable to the storage of vast quantities of petroleum and gas. A similar chart gives a geological section between Olean, New York, and Massillon, Ohio.

Specimens of oil-bearing rocks from many localities include sands, gravels, porous sandstones, and limestones.

The minerals and fossils of the oil-bearing strata of Pennsylvania and Ohio are represented by a varied series of specimens.

A large bottle represents one barrel of petroleum, and the products of such a barrel of petroleum are arranged according to the order in which they are obtained. These are (1) naphtha, (2) burning oils, and (3) residuum of petroleum tar. The processes and products of further distillation of the latter will also be seen. A large model of a modern oil refinery permits the tracing of all stages of the manufacture of illuminating oils from petroleum. Above this model will be seen one of the refineries built in Cleveland, Ohio, in 1863.

Much of the space in this hall is occupied by various finished products ready for sale, these being chiefly illuminating and lubricating oils with, however, a variety of other useful articles. These products are classified into groups which include:

1. Cylinder oils of many grades. These are the heavier, more sluggish, lubricating oils.
2. Special grades of lubricating oils. These include spindle, sewing machine, screw-cutting and engine oils. They are light-bodied and quick-feeding as compared with the cylinder oils.
3. General heavy oils, including miners' oil, leather oil, and various engine oils.
4. A collection of the by-products of petroleum, including paraffin wax, crude, semi-refined and refined, with illustrations of its use for candles, matches, tapers, etc.; axle grease, lantern oil, harness oil, "miners' sunshine," for miners' lamps; vaseline products, such as cerates, pomades, soap and face paints.
5. Special grades of illuminating oils. These oils are designed to give the best light obtainable from kerosene.
6. High test illuminating oils.

7. Illustrations of some of the uses to which petroleum products are put, including waxed paper for wrapping purposes, water-proof coating for explosives, varnishes, wood stains and fillers, solvent for rubber cement, electric light carbons, and electrodes.

A series of Russian petroleums which is exhibited here presents some features differing from the American.

### Hall 72.

## PLATINUM. GOLD, SILVER, AND LEAD.

The collections in this hall comprise platinum, gold, silver, and lead ores. Besides the typical ores many unique occurrences are represented here. In the examination of these, as well as ores of other metals, it should be remembered that the mineral or metal is frequently present in such minute quantities that it cannot be seen by the naked eye or even with the aid of an ordinary magnifying glass. Ores of the precious metals are commonly, however, associated with certain mixtures of common and otherwise valueless minerals known as gangue minerals, and by a careful observation of such associated minerals and of the neighboring rocks, the skilful observer may frequently recognize the presence of valuable metals. Opportunity is given by the numerous examples shown in this hall to study the slight indescribable variations in the appearance of a mixture of gangue minerals, which often indicate the presence or absence of the precious metals. It should be said, however, that all indications of this kind are often more or less deceptive and the only positive proof of presence or absence of gold or silver is to be found in actual trial by assay. The above observations do not apply, however, to the lead ores, which are readily recognized by one having acquaintance with the lead-bearing minerals. This hall also contains a collection of products from the metallurgical treatment of ores.

These are so arranged that the separate steps in the treatment of the ores may be followed by the visitor. If the visitor enters from Hall 71, and passes around Hall 72, keeping to the right, the collections may be seen in the order in which they are mentioned in this guide. The general order will then be geographical beginning in northwestern North America, passing south along the Cordillera to the south boundary of the United

States, thence to the northeast and south along the Appalachians. After these are placed the ores of Mexico, then South America, then Africa, Australia, and Europe.

### PLATINUM.

A series of specimens illustrating modes of occurrence of platinum from over twenty localities, including Washington, Oregon and California, the United States of Colombia, and the Ural mountains is shown. In all of these specimens the metal appears in the form of flattened grains often associated with iridium, osmium, palladium, gold, copper, and chromite. The grains are usually found in river beds or placer deposits. A complete series of rocks and soils bearing platinum, from the Demidoff Platinum mines, Nizhni Tagilsk, Ural mountains, is shown, as well as a series of concentrates produced by washing these in order to separate the metal. Some unusual uses of platinum are illustrated as follows: Russian platinum coin, for a time used as money; coins struck in platinum and gilded, which passed for gold in Portugal and Spain during the past century; imitation gold dust made of platinum grains plated with gold.

### GOLD AND SILVER.

A series of specimens showing typical associations of gold with other minerals, as they are found in mining, is shown. A similar series of silver-bearing minerals shows those minerals which contain silver as an essential constituent and those minerals commonly closely associated with silver in the mines. Placer gold deposits are represented by a collection of auriferous sands and gravels principally from Alaska and California. All placer specimens are separated from the general collections and included in a single series.

The collection of gold and silver ores is composed of a series of regional collections arranged in geographical order. The more prominent are:

Auriferous quartzes from Alaska representing three widely separated regions.

A series principally of silver-lead ores from the Kootenai District of British Columbia.

A series chiefly of silver-lead ores representing the Okonagon and Stevens districts of Washington and the Coeur d'Alene of Idaho.

A collection of auriferous quartzes of Oregon and California.

A series of gold and silver ores of Nevada. These are very diverse in appearance and from widely separated parts of the state. The Comstock lode ores are represented by some fifty specimens.

A series of gold and silver ores from western Montana, including Butte and the several mining districts of eastern and southern Idaho.

A very diversified series of ores of both gold and silver from Utah. These include the brilliantly colored ores of Mercur and the peculiar fossiliferous sandstone from Silver Reef.

A collection of gold ores from the Black Hills, South Dakota, presents a good example of the great variety of gold ores which may occur in a limited area. Compare, for example, the ore from the Homestake mine with that from the Holy Terror, which again is wholly different from that of the Golden Reward mine. In Hall 79 may be seen ores of yet different characters from this region, some carrying tin, tungsten, etc.

The gold and silver mining districts of Colorado are represented by more than 500 specimens, grouped according to the mining districts in which they occur. The great variety of these ores is well illustrated. Cripple Creek gold ores, on account of their unusual character, are illustrated by numerous specimens both of the ore and the rocks in which it is found.

A series of ores from New Mexico presents chiefly lead-silver ores, among which the galena from the Hillsboro region, and the "carbonate" lead-silver ore and galena of the Magdalena mountains, are prominent. Ores of other classes including those of silver-copper from the northern part of the territory and various types of gold-silver ores from the Gallinas mountains are also represented.

The series from Arizona includes sufficient silver-copper and gold-copper ores to present somewhat the appearance of a collection of copper ores. With the ores from the Tombstone region are a series of the rocks of the district among which the ores occur.

The ores of the Appalachian mountains of Ontario, including Cobalt, and of Nova Scotia are installed in one series. They are, in general, except those from Ontario, gold ores with but little silver and consist of quartz or quartz and pyrite. These gold ores were the first exploited in the United States. They

were nearly all abandoned at the time of the discovery of gold in California and have never regained their earlier importance.

The series of Mexican ores includes representative specimens of ore from all the gold and silver mining states of that Republic, accompanied, in the case of the more important districts, by specimens of the country rock. The collection is especially interesting as showing the association of the ores with eruptive rocks such as are characteristic of most of the richest silver deposits of the world.

The series of ores representing South America is composed chiefly of specimens from Colombia, Ecuador, Brazil, and Venezuela. The collection of Colombian ores is especially complete and includes typical specimens of ores, gangues and rocks from practically all the mining districts of that country. This region was the ancient "El Dorado," or land of gold, from which came the first important yield of gold in the New World, and of which many wonderful stories were circulated.

The collections representing the ores of Australia consist principally of silver-lead and silver-copper ores. Many of the specimens are too large for the serial cases, and should be sought in the large center cases and pedestals.

The series of ores from Great Britain consists of lead-silver ores and gold ores. The lead-silver ores illustrate well some of the common associations of galena. Galena is commonly associated with pyrite, but here we find it mixed with blende, a zinc ore which is very troublesome to the lead smelters. Specimens from the Welsh mines which contain much blende are marked "Poor Ground." A good specimen of fluorite shown here, illustrates another common associate of galena in the English mines, as do also the specimens of calcite and galena. Some of these ores, as for example that of Snail Beach, are from mines formerly worked by the Romans. Note the general absence of "carbonates," and the fresh, undecomposed appearance of the specimens. This is also true of the Spanish and German ores. Carbonate and disintegrated ores occur near the surface where air and atmospheric waters have acted and formed them from the sulphides. These mines having been long worked, most of the superficial ores have been removed, so that now only the sulphide ores occurring at great depths are mined.

Gold ores from Great Britain are represented by specimens from a single Welsh mine. This series from the New Morgan

mine, Dolgelly, Wales, is worthy of special attention both on account of its completeness and of the character of the ore. The gold is nearly all free, and much of it is visible to the eye. Specimens of ores from various parts of the mine are shown, also specimens of the country rock.

The silver ores of Greece are represented by a unique series from Laurium, including slags left by the ancient smelters which are now mined and smelted anew. The mines of this locality had been operated by the Greeks from before the time of Themistocles up to the first century, A. D. Owing to the imperfect methods used, however, the slags produced retained appreciable quantities of metal. A modern company, collecting these slags and using them as ores, extracts sufficient lead and silver to yield a profit.

A series of lead-silver ores from Germany is especially instructive, as it shows the characteristic structure of veins. The different minerals are arranged in bands or layers and the metaliferous layers alternate with those of quartz, barite, or fluor spar.

African localities are represented by the banket of the Transvaal, and ores from various parts of Rhodesia.

Several series of metallurgical products illustrate the extraction of gold, silver, lead, and copper from their ores. Out of a multitude of processes used, eight of the more typical ones are illustrated. In general, the extraction is carried on by a series of operations. On one side of the case is placed the ore, and lines are drawn from it to specimens of the materials formed from it by the first operation of extraction. From each of these specimens lines are likewise drawn to specimens of the substances formed from them in subsequent operations, and so on until the final products are shown. It is thus possible for the visitor to follow readily each step of the operation. The processes illustrated are:

1. Copper smelting by the reverberatory furnace and by the blast furnace. Out of many processes in use two have been selected: (a) The antiquated but classical "Swansea" method, or reverberatory process, as formerly in use in Wales. (b) A modern combination of blast furnace and reverberatory process, as conducted in Omaha, Nebraska. There are a multitude of other processes adapted to different ores and conditions of labor, supplies, etc., but these two illustrate the underlying principles.

2. The cyanide process for the extraction of gold from low grade ore as carried out at Mercur, Utah. This process depends upon the solution of the gold from the ore by a dilute solution of cyanide of potassium and precipitation by metallic zinc. The case also contains a collection of concentrates from gold and silver ores, illustrating the process of enriching ores before smelting by the removal of much of the worthless material by mechanical means.

3. Extraction of gold as practised at the Argo Smelter, Colorado. This is a type of the processes where the gold is collected in copper by smelting and then isolated by a process of leaching or solution.

4. Extraction of lead and silver by the reverberatory process and by the blast furnace process. These do not represent the process of any particular smelter, but rather are generalized forms of the two most important smelting processes.

5. Extraction of silver and lead as practised in the Unterharz, Germany. By following the labels it will be seen that this apparently complicated process is resolved into the frequent repetition of comparatively few operations.

6. Extraction of gold, silver, lead, and copper as practised in the Oberharz, Germany. As with the preceding process the apparent complexity is due to many repetitions of a few processes.

Many specimens too large to be installed in their proper geographical order may be found in special cases and upon pedestals. These serve to give a truer idea of the appearance of the ores than the smaller specimens. They include:

Silver, lead, and copper ore, Cordillera Hill silver mine, Peelwood, New South Wales.

Gold and silver ore, British Columbia.

Gold ore. A group of large specimens from various localities.

Zinc-lead ore, Laurium, Greece.

Copper-silver ore, Leadville, Colorado.

Group of large specimens of gold ores from American localities.

Gold-copper-silver ore, Ouray county, Colorado.

Auriferous quartz, San Miguel county, Colorado.

Group of large specimens of refractory gold ores.

Block of ore from the forty-foot level of the Back Creek silver and gold mine, New South Wales.







Ores of the Base Metals

Gold ore, Alma, Park county, Colorado.

A collection of nearly all the known alloys of gold and silver with other metals is shown. It contains polished plates of each alloy with specimens of the materials of which it is composed placed beside it. The color of rings or other articles of jewelry may be compared here with gold plates of the different degrees of fineness.

A collection illustrating methods of saving gold and silver practised by Tiffany and Company, New York, is also shown. It includes wash water, concentrates from an exhaust blower that collects the dust of the shops, pieces of flooring of the shops, and shoes worn by workmen. Beside each of these are placed buttons of gold and silver obtained from articles of size similar to those shown.

### Hall 77.

## WEST DOME.

Beneath the center of the dome stands a statistical column giving the bulk of each product of the mines of the United States, in 1892, for one second of time. Multiplying this by the number of seconds in a year (31,536,000) will give the annual product. This column was built according to data given by the United States Geological Survey. In the four niches are pyramids of ore, containing respectively gold and silver ores; tin ores; iron ores; copper ores.

The four large specimens surrounding the column are respectively: Iron ore; silver ore; iron ore; nickel ore

This hall also contains collections of lead ores as distinguished from lead-silver ores. These as represented come mainly from the Mississippi valley. Here are installed also many lead-silver ores similar to those in Hall 72.

### Hall 79.

Frederick J. V. Skiff Hall.

## ORES OF THE BASE METALS.

The collections in this hall comprise ores of iron, copper, tin, zinc, nickel, manganese, mercury, and antimony, together with various metals and metalloids of minor importance. The ores of each metal are grouped together.

Under each group are placed type specimens of the different

ores of the metal arranged in order of their richness. Each of these is accompanied by a group of the materials of which the specimen is composed, so arranged as to show plainly the composition of the specimen. With the type specimens and making up the bulk of the collection are shown specimens of ore from different localities arranged in geographical order. Specimen labels show the mineral of the ore and the amount of metal contained, where this is known. It should be remembered that many of the ores produce more than one metal, in which case the specimen is placed in the group of the predominating metal.

Entering the hall from the West Dome, the visitor should keep to the left, following along the walls until the starting point is reached, when the large specimens along the center of the hall may be examined.

Upon the walls are three relief maps of the United States illustrating respectively the distribution of copper, zinc, and iron ores. The location of an ore deposit is represented by a specimen of the actual ore placed in proper position on the map. As the mountains are represented in relief upon these maps, the relationship of the different kinds of ore to the relief of the land becomes evident and may be profitably studied.

### COPPER.

Entering the hall from the West Dome, the copper ores are to the left. They fill six wall cases and the two adjacent floor cases. The first wall case contains the copper-bearing minerals arranged in the order of their richness.

On the lower shelves of this case is a collection of the copper ores of the Appalachian mountains.

The following wall case contains a collection of native copper and silver and the minerals which are associated with the copper of northern Michigan. The crystallized copper and the calcites are especially noteworthy.

The two following wall cases, in the northwest corner, contain copper ores from the western United States, chiefly the Rocky Mountains. The copper ores of this region usually carry gold or silver, and many localities producing a very considerable output of copper are represented among the gold ores of Hall 72.

Immediately in front of these cases are two table cases with large specimens of the copper ore from Keweenaw Point, north-

ern Michigan. In these ores the copper exists as nodules of free metal, which may be seen projecting from the enclosing rock matrix. With these are placed large specimens of Arizona ore of a similar nature.

Returning to the wall cases the visitor may inspect next foreign copper ores contained in two cases. Those of Great Britain, chiefly from Cornwall and Wales, have been worked from the time of the Phœnicians. Those from Germany, which also represent mines of great antiquity, should be studied in connection with zinc, silver, and lead ores from the same mines.

### ZINC.

The six cases along the wall from the last of the copper ores to the entrance to Hall 63 contain the zinc ores, which will be encountered in a geographical order which is the reverse of that of the copper ores; that is, the foreign ores come first and the American after. Three immediately adjacent floor cases contain the larger and choicer specimens. With the zinc ores are placed the ores of the allied but little used metal, cadmium.

The wall case nearest the copper ores contains foreign zinc ores, of which the most important represented in the collection are the English and Welsh, the Greek and the Spanish. The original "black jack" of the Welsh miners is here represented and may be profitably compared with the ordinary yellow and brown blendes, which are often miscalled black jack in this country. Immediately in front of this case are two floor cases, one of German zinc-lead ores, which should be studied in connection with the German ores of other metals, shown elsewhere. The other floor case contains choice examples of the zinc ores of Laurium, Greece, which have long been famous for their varieties of color and richness of lustre, making them very attractive to the eye. They are chiefly the carbonate, smithsonite.

Additional Spanish zinc ores occupy the bay of another wall case, the upper part of which contains the zinc ores of Arkansas. The great purity and richness of the American zinc ores, as compared with the foreign, is at once apparent, even on casual inspection, and this high quality will be noted in all the succeeding cases which contain American ores. In this case there is a collection of the final, intermediate, and by-products of the smelting of zinc ores as carried out at La Salle, Illinois. Following the Arkansas ores are two cases of zinc ores from Missouri,

the principal zinc producing state. Included with these are the Kansas ores, which form a continuation of the same deposits.

With the Missouri ores are shown ores from the similar deposits of Wisconsin and western Illinois. These ores appear darker than those of Missouri, owing to the enclosure of bituminous matter. Another visible difference is in the frequent flat or tabular form of the Wisconsin ores and the presence of larger quantities of sulphides of iron. Large specimens of Missouri ores are in an adjacent floor case.

Following the Missouri zinc ores come those of the southeastern and south-central states. The Virginia and Tennessee ores are not essentially different from those of the ordinary type of zinc ores, while the deposits of southern Illinois, Kentucky, and New Jersey are decidedly unique.

With the specimens from New Jersey there is a collection of those zinc-bearing minerals which occur in sufficient abundance to be of value as ores.

The three cases across the entrance to Hall 63 from the zinc ores, contain ores of mercury and of various metals and metalloids of lesser importance.

### MERCURY.

The first case to the right of the entrance contains a series of ores bearing mercury and cinnabar, with the rocks associated with them, from many localities. Mercury ores from Alaska, California, Russia, Mexico, and the United States of Colombia, are shown.

The larger number of specimens represent the well-known Spanish mines. A large iron flask, sealed with a leaden seal, represents the package in which mercury is ordinarily sold.

The following case contains ores of metals and metalloids of minor importance. These include ores of bismuth, molybdenum, uranium, wolfram, chromium, and certain rare elements.

### ANTIMONY AND ARSENIC.

The third case from the entrance of Hall 63 contains ores of antimony and arsenic.

Specimens of stibnite, the common antimony ore, are shown from various localities in Japan, California, New South Wales, United States of Colombia, and Greece. Nearly all these specimens carry an appreciable percentage of gold. With the stib-

nite are examples of rarer oxidized ores of antimony, valentinite, etc. Ingot antimony and products of smelting stibnite are also shown.

Arsenic ores shown here include the sulpharsenide of iron, leucopyrite. Much of the arsenic of commerce comes as a by-product from gold or other ores. One such by-product is the arsenical flue dust from treating the silver-lead ores of Laurium, Greece, in which distinct crystals of the oxide or "white arsenic" are plainly visible.

Following the antimony and arsenic ores is a case of ores of nickel, cobalt, and aluminum.

### NICKEL, COBALT AND ALUMINUM.

A series of specimens of nickel and cobalt-bearing minerals is arranged in the order of their richness.

A collection of nickel and cobalt ores from the important deposits of these metals is shown. The most important ores are two: (1) the sulphide of iron, pyrrhotite, which, in some localities, carries minute inclusions of the sulphide of nickel, pentlandite; (2) the apple-green silicate garnierite.

Nickel and cobalt ores from Canada, New Caledonia, and Norway, which are the important producing countries, also nickel and cobalt ores from Oregon, Missouri, and other minor localities, are shown. In the floor case opposite are larger examples of nickel ores and arsenic ores. This wall case also contains a series of minerals carrying aluminum in such form and quantity that it may be profitably extracted. These include the present universal aluminum ore, beauxite, and some minerals from which aluminum may be smelted in the near future.

### TIN.

Tin ores from South Dakota, New South Wales, Mexico, and Alaska, together with a nearly complete collection of the ores and rocks of the well-known tin mines of Cornwall, which have been worked from the beginning of history, are shown.

The process of reduction of tin ores to metal is illustrated by specimens from the Redruth Smelting Company of Cornwall.

Other examples of tin ore may be seen in the West Dome.

Following the tin ore is a case of manganese ores.

### MANGANESE.

A collection of minerals carrying manganese in commer-

cially available quantities, is shown, also ores of manganese from many important mining districts. Especially to be noted are the ores from Santiago de Cuba, which are typical, and those from New Jersey, which are unique in mineralogical character. Polished specimens of rhodonite from England, illustrate an occurrence utilized both as manganese ore and for ornament.

In the two adjacent floor cases are large specimens of manganese ores.

### IRON.

Iron ores fill six wall cases and two floor cases.

The case following the manganese ores contains iron ores of South America and Mexico. A full collection of iron ores and surrounding rocks of the Cerro Mercado or Iron Mountain, of Durango, Mexico, shown here, illustrates a valuable occurrence of an important but little understood type of iron-ore deposit. Large specimens of a specular hematite from the state of Minas Geraes, Brazil, in the lower portion of the case, illustrate a micaceous hematite of world-wide distribution. Many of the ores in this case are from deposits almost unknown to the world at large.

*Foreign Iron Ores.* — The most instructive specimens in this case are a complete collection of the ores and surrounding rocks from two iron ore deposits of eastern Russia. Better known ores represented here are those from England and Sweden. Conspicuous among the English ores here illustrated are the ochres, which are mixtures of limonite or hematite with clay; the soft, bright red hematites which occur in limestone, and the compact, spathic ore of the coal measures. German ores show more fibrous hematites and limonites and the well crystallized "sparry" siderite.

*Domestic Iron Ores.* — Following the foreign ores are three cases of iron ore from the Lake Superior region. The ores in these three cases are from the most important iron ore mines of the world. It is to the proximity of these remarkably rich and pure ores that Chicago owes its present importance in the iron and steel industry. The ores are arranged in the cases under the several "ranges" as the iron mining districts around Lake Superior are termed. While similar in many respects, differences between the ores of the several ranges may be noted even in the small specimens here shown. Specimens of a local magnetic iron sand are worthy of attention as coming from the immediate vicinity of Chicago.



The cases following the ores of the Great Lakes region contain iron ores of the Eastern States. These are here represented largely by limonites and hematites from Virginia and the important southern districts near Birmingham and Sheffield, Alabama. Magnetic ores from New York, New Jersey, and North Carolina represent another important class of eastern ores.

The last wall case contains types of iron ores. Each of the mineralogically different ores of iron appears here in many forms, giving rise to numerous sub-classes of iron ores.

Opposite the wall cases of iron ores, two floor cases contain larger specimens of various ores, of which the magnetites and hematites of Sweden are especially noteworthy.

The visitor should now proceed along the center of the hall and examine the large specimens showing the appearance of large masses of ore as actually met with in the mines.

The first specimen is a mass of zinc ore (smithsonite), weighing five tons, from Marion county, Arkansas, showing botryoidal forms not unusual in ores which are, like this, of secondary origin.

Passing this, the tall case to the left contains bornite, a copper ore from Griqualand, South Africa. The iridescent tarnish which characterizes this ore is exceptionally well shown in this specimen.

To the right stands another tall case containing a mass of red hematite from the Hart mines, Laramie county, Wyoming, one of the most largely used of western iron ores.

Passing these two cases, a case standing in the center of the hall is next encountered. This contains a collection of the green and blue copper ores, malachite and azurite, from the Copper Queen mine of Bisbee, Arizona, a locality which has long been famed for the beauty of its ores.

Beyond this are two cases, of which the one to the left contains a large block of lead-zinc ore from Laurium, Greece, while that to the right contains the green nickel and magnesium silicate, garnierite, which is a well-known nickel ore from New Caledonia.

Passing these, the last specimen, directly opposite the entrance to Hall 63, is a mass of nickel and copper ore weighing six tons, taken from 175 feet below ground in the third level of the Stobie mine, Sudbury, Ontario.

Hall 78.

## SALTS OF THE ALKALIES AND ALKALINE EARTHS.

These include besides salt and similar compounds such minerals as asbestos and mica. Here belong also the borates, phosphates, etc., which occur in nature chiefly in combination with lime or soda. Besides the alkali and alkali-earth compounds; sulphur and abrasives may be found in this hall as well as various minerals of special or limited use.

The series of abrasive and polishing materials exhibited includes specimens of corundum, emery, garnet, and quartz. These are the more important minerals used for rapid grinding and are illustrated by specimens from many localities. The rocks and minerals associated with the emery are characteristic and should be examined in connection with the emery itself.

For more delicate work and for polishing are shown specimens of pumice, tripoli, siliceous chalk, and similar materials, which are in general softer than the rapid grinding materials.

Agate, hematite, and flint are shown as examples of burnishing materials used to produce a very high polish on metallic surfaces.

Whetstones are represented by specimens of great variety in mineralogical composition ranging from a siliceous, fine-grained shale to gneiss and mica schist.

The great variety of substances adapted to grinding and polishing is well illustrated here.

Artificial abrasives are represented by carborundum, artificial corundum, and several substances of lesser importance.

Borax minerals and products form one large series. The minerals shown are borates of lime and soda. Other boron compounds such as tourmaline, while of fairly common occurrence, are not sufficiently rich in borax to be of economic value as a source of this material and do not appear in this series. Boron compounds of use in the arts and in medicine are illustrated by boric acid and the several forms of borate of soda or common borax. A boride of iron shown is representative of a series of boron compounds of recent introduction to the metallurgical industry.

A large series of the compounds of the alkaline earths, that

is, of lime, baryta, and strontia includes materials of varying values and properties. With them are placed also the compounds of magnesia.

Fluorite, which is characterized by the frequent occurrence of large crystals and brilliant colors, is here illustrated principally by the duller and more massive specimens of industrial value. This mineral is mined in large quantities for use as a flux and in the compounding of glazes, enamels, opaque glass, and similar materials. Minor uses and the chemical industries also consume considerable quantities.

Magnesite, the carbonate of magnesium, is represented by a small number of specimens, as it occurs in but few places, in which, however, it is extensively mined for its use as fire-resisting material, tiles, artificial marble, and even carbonic acid. Native epsom salt, sulphate of magnesia, from several localities, is also shown. Barite, the sulphate of barium, is represented by a series of specimens from many localities. The large series of crystals of this mineral shown is exceptional, as the massive form is usual in deposits of economic value. This material is largely ground for paint. The carbonate of barium, witherite, and strontianite, the sulphate of strontia, useful for colored fire and for sugar refining, are included here.

Common salt is represented by a large series of specimens both of the crude salt and of the forms in which it is prepared for the market in different parts of the world. A large series of African salt is included here.

Lithia compounds are represented by a large group of its ore, lepidolite, with an associated bright red tourmaline, rubellite, and also by its other common ore, spodumene, from various localities.

Miscellaneous soda-bearing minerals are represented by a series of specimens including natural carbonate of soda of several varieties from different localities, and natural sulphate of soda. The fluoride of soda and aluminum, cryolite, and its uses, is represented by a complete series of specimens showing all stages of manufacture from the crude mineral to ordinary and caustic soda, alumina and alum.

An unusually large and complete collection is that of the "Stassfurt Salts" which are soluble compounds of potash and magnesia from which nearly the whole of the world's supply of potash is drawn. With these are shown the more important potash compounds which are made from them.

Native alum from various localities and alunite from which alum is extracted represent another class of minerals of some economic importance.

Nitrates are represented by several varieties of the soda nitre of Chili and by cave earths from caves in various parts of the world.

Mica is represented by a series of specimens mainly from American and Russian quarries. Besides thin plates of mica of the best quality specimens of low grade material enable the visitor to note the difference between the ordinary micas and the more valuable kinds. The rocks in which mica occurs are also shown.

Asbestos is represented by two series, one of crude mineral and one illustrating its uses. These specimens are of asbestos as mined and are not confined to the commercially valuable material. Consequently all stages between a merely compact but somewhat columnar tremolite and the finely fibrous, flexible asbestos of the best quality may be traced through these specimens.

Phosphates are represented by a large series of specimens classified as Mineral phosphates, Rock phosphates, and Guanos. The principal localities represented are Tennessee, Carolina, Florida, Russia, Spain, Venezuela, and Cuba.

Gypsum is represented by a separate collection of specimens from many parts of the world, including the coarser kinds mined for land plaster, plaster-of-Paris, wall plaster, etc., and the finer varieties, selenite, alabaster, and satin spar, quarried for ornamental purposes.

Native sulphur and those metallic sulphides from which sulphur is regularly extracted form a single collection. With these specimens is a series illustrating the various forms in which sulphur reaches the market.

Processes for the manufacture of soda are illustrated by three collections. One shows the Leblanc process, all stages of which are illustrated by specimens of the raw, intermediate, and final products. The relations of the various products to each other are indicated by connecting lines.

The ammonia process is fully illustrated by a series of the raw materials, intermediate and final products being so arranged that the process may be followed step by step. The electrolytic process is illustrated in the same manner.

**Hall 32.****H. N. Higinbotham Hall.****GEMS AND JEWELS.**

The collection of gems and precious stones that, during the World's Columbian Exposition, attracted so much attention at the Tiffany pavilion in the Manufactures Building, and in the gallery of the Mines and Mining Building, occupies the central cases in this hall. It is one of the most complete collections in existence, for it contains nearly every known gem or precious stone, in the finest cut examples, as well as crystals, cleavages or rolled grains, always of gem value. Many of the objects in the collection are of historical interest and world-wide reputation.

CASE 1.— Handsome objects made of rhodonite, jasper, and varieties of rare gem stones found in the Ural mountains, Asiatic Russia. Prominent objects are a rhodonite jewel casket, rhodonite ink stand, two rhodonite coupes of rare markings, with jasper bases. Rhodonite is a favorite stone with the imperial family of Russia.

Three fruit pieces of realistic effect made at Ekaterinburg, Asiatic Russia, composed of the following hard and rare gem stones found in the Ural mountains: Raspberries of rhodonite, blackberries of amethyst, white currants of chalcedony, plums of onyx and sard, mulberries of citrine, black currants of onyx and red currants of sard. The bases are of Kalkansky jasper and the leaves of precious serpentine.

A composite bust of Empress Eugenie; feathers, opals and red jasper; hat, sard; hair, sard; face, chalcedony; collar, blood-stone; beads, yellow jasper; dress panel, lapis-lazuli; body, sard.

Cane of solid silver, inlaid with discs of turquoise from Kurdistan, southwest Asia.

Florentine mosaic of marble, malachite, etc., representing the "Fall of Rome."

CASE 2.— Engraved diamond bust of King William II. of Holland, executed by DeVrees, of Amsterdam, which required all of his spare time for five years. Was shown in 1878, at the Paris Exposition.

A diamond crystal adhering to common boart, from Kimberley, South Africa.

A model of the Dewey diamond, weight 23 1-2 karats, found in 1855, near Manchester, Virginia.

Diamond (round boart), weight 41 9-32 karats. This variety is extremely hard, shows a radiated structure if broken, and is peculiar to Brazil.

Cut and uncut specimens of black diamonds from Bahia, Brazil.

A collection of over fifty diamonds in their natural state, and a crystal in matrix from South Africa.

Gem gravel containing ruby, sapphire, zircon, tourmaline, quartz, etc., from Ceylon river beds.

A collection of fifteen rubies from the Ural mountains, North Carolina, and Georgia.

Cut and uncut specimens of various colored sapphires, found on the banks of the Missouri river sixteen miles from Helena, Montana.

Uncut specimens of sapphires from Ceylon, Siam, India, and Asiatic Russia.

Richly colored chrysoberyls and alexandrite, from Ceylon and the Ural mountains.

Six star sapphires, from Ceylon, the largest of which weighs 134 karats.

A 99 and a 66 karat yellow sapphire (oriental topaz), a 59 karat blue sapphire, also yellow, pink, white, and other colored sapphires. Spinel, fine red, blue and other colors.

The Chilton doubly-terminated emerald crystal in a matrix of black limestone, from U. S. Colombia.

Emerald crystal six inches in length and about a half inch in diameter, remarkable for its length, from Alexander county, North Carolina.

CASE 3.— Blue topaz of fine cutting and exquisite luster, from the Ural mountains, also topazes from Brazil, Ceylon, and Colorado.

The 331 5-8 karat Hope aquamarine, the 134 karat Stoneham aquamarine and other fine examples of sea-green, sea-blue, yellow and pink beryl from Maine, California, Russia and Brazil.

Turquoise from many localities. Also turquoise beads made by the Indians of Santo Domingo, New Mexico.

CASE 4.— An exceedingly fine collection of quartz and quartz cuttings, notably:

A large jewel casket composed of twenty-six engraved crys-

tal slabs, mounted in jeweled and enameled silver; style, seventeenth century; original in Ambras collection, Vienna.

Screen, "The Finding of Moses," engraved on a thin section of rock crystal 9 3-5 inches in diameter, believed to be the largest section of its kind in existence.

Tazza of quartz, engraved to represent a marine festival.

Large crystal sphere, from the summit of Mt. Antero, Colorado, one of the largest crystal balls ever polished.

A group of crystal balls mounted on a stand of metallic leaves, the whole representing fruit and foliage.

A quartz crystal, scratched so as to show the method of slicing quartz in the manufacture of spectacle lenses.

A series of fourteen specimens of crystal intended to show the various steps in the cutting of a brilliant.

Fine examples of cut crystal from Asiatic Russia; seal having a Turkish inscription on one end and a Russian on the opposite; a frame of the seventeenth century; chandelier pendant, eighteenth century, French cutting; a head of a horse and a bust of Ivan Tourgenieff.

A cut crystal, from Mexico, the finest specimen of aboriginal work of this kind ever found in that country.

CASE 5.—Zircons of various colors. A dark golden smoke color, round brilliant, weight 41 5-8 karats, Kandy, Ceylon. Also one weighing 46 1-2 karats from same place.

Tourmalines of many colors, from Brazil and Maine.

Fine specimens of phenacite from the Ural mountains and Colorado.

Rubellites from Brazil, one weighing 21 karats.

Green garnets, Ural cutting, cushion shaped.

Precious garnets: Navajo Nation, New Mexico, Bohemia, and Kimberley, South Africa.

Rare specimens of peridot from the Levant.

Rare specimens of almandite.

Essonites from Maine and Ceylon.

Spodumene, yellow, Minas-Geraes, Brazil.

Carbuncles, Sirian, Pegu, Burma.

Spessartites from Virginia.

CASE 6.—Rock crystal from Madagascar, Brazil, and Ural mountains. A beautiful collection of the doubly-terminated quartz crystals, loose and in the matrix, from Herkimer county, New York, commonly known as Little Falls diamonds.

Cats-eye quartz from Bavaria, North Carolina, and Ceylon.

Thirteen cut and two uncut specimens of rose quartz from Albany, Oxford county, Maine.

Three polished specimens of plasma from Openau, Baden, Germany.

CASE 7.—Agate sections. Natural color, transparent, from Uruguay, South America.

Wood opal from Colorado.

Opal in matrix, from Queensland, Australia.

Amethyst geodes from Uruguay.

Agates of Uruguay, grotesquely cut to resemble owls and human faces.

CASE 8.—Opals in the natural state, also engraved and polished, from Russia, Queensland, Mexico, and the State of Washington, also the famous Sun God opal from the Hope collection, which is said to have been known in a Persian temple for three centuries. Opalized bone and shells from Australia. Honduras opal.

Fine specimens of tiger-eye, jasper, mocha stones, moss agates, sardonyx, chrysoprase, agates, and chalcedony.

The finest specimen of hydrolite known (the bubble of symmetrical shape being two and one-half inches in diameter) together with numerous beautiful and rare specimens of agate and chalcedony, cut and uncut, from many parts of the world.

CASE 9.—Cut amethysts from Brazil, France, Ireland, Ceylon, Hungary, and Russia; believed to be the finest collection in existence.

Uncut amethysts from Mexico, North Carolina, and Russia.

Spanish topazes, a fine series. In the "Spanish topaz" the original coloring of the carbon in the smoky quartz has been changed by the action of heat to the rich hues so much admired.

Cut and uncut smoky quartz from North Carolina, Colorado, Ural mountains, and Switzerland.

CASE 10.—Sections of a boulder of jade from the western coast of Australia; jadeite from Burma.

Fluorite from Derbyshire and Cumberland, England, one group being encrusted with calcite crystals. Antique carvings of lion's feet in marble, from Rome, Italy.

Porphyry from Finland and Egypt.

Thulite from Norway. Landscape marble from England.

Brilliant slab of labradorite.



CASE 11.—Fine collection of crystallized Amazon stone from Pike's Peak, containing several unique specimens of twin crystals; moonstones from Ceylon; sunstones from Norway.

Interesting cut specimens of iolite, wollastonite, titanite, kyanite, prehnite, andalusite and chlorastrolite.

Gems cut from the so-called "minerals of the rare earths," samarskite, gadolinite, allanite and euxenite; also fine groups of diopside; a series of cut fluorites; moldavite, supposed by some to be of meteoric origin.

Ancient Mexican mirror of iron pyrite.

Antique Persian figures of lapis-lazuli; lapis-lazuli from Bolivia, South America.

CASE 12.—Obsidian fragments and obsidian arrow points and ornaments. Malachite and azurite.

A collection of jade ornaments from China, Mexico, and New Zealand.

A collection of pearls from Japan, Australia, Algiers, Singapore and California; pearl oyster shells, fresh water mussels, etc.

Collection of amber, precious coral, pink coral ornaments, mummy eye, etc.

Amber with vegetable enclosures. A circular amber bead from Mexico, believed to be the first known appearance of amber as an ornament in ancient Mexico. It was used as an incense in the Aztec temples.

CASES 13, 14, 15, 16, 17 AND 18.—These wall cases contain the Tiffany collection of Indian jewelry, and form the most complete series of the kind ever exhibited. Many of the pieces are very old, and of rare forms. They consist of rings, armlets, bosom ornaments, surah holders, ornaments for the forehead, hair, ear, waist, ankles, upper arm, etc., altogether they illustrate the remarkable variety of the ornaments and objects of the jeweler's handicraft practised in India for more than 2000 years. The collection is divided into three sections.

First: Objects made from pure unalloyed gold, as worn by the higher caste only, containing diamonds, rubies, emeralds, sapphires, pearls, garnets, rock crystals, etc., and embellished with rich red and green enamels peculiar to the Indian work.

Second: Collection of silver jewelry, consisting of many large and beautifully wrought pieces, worn by a lower caste.

Third: Base metal jewelry, worn by the lowest caste only.

CASE 13.—Contains forty-seven pieces of Delhi jewelry,

consisting principally of necklaces and head ornaments of gold set with diamonds, pearls, rubies, emeralds, garnets, turquoises, and crystal, and characterized by the great number of pearls used, and the frequency of small emerald pendants as decorations.

A gold necklace with yellow and green sapphire pendants. A pair of ear-rings of red and green enamel and pearls from Goa.

Two heavily wrought gold and silk necklaces from Muttra.

CASE 14.— Contains upwards of fifty examples of jewelry from Bombay, which is remarkable for the few gems used and the great delicacy and artistic feeling shown in the gold work; also, fourteen pieces of Rajputana jewelry which resembles the jewelry of Delhi, but is heavier and less delicate.

Thirteen pieces of jewelry, consisting of surah holders, necklaces, armlets, and nose rings from Baddhi. The jewelry from Baddhi is distinguished by the number of small gems used, one surah holder containing 492 rubies and 82 diamonds.

Four gold head ornaments from Bijapore.

One string of gold beads from Gwalior.

CASE 15.— Considerable space is occupied by talisman necklaces and other pieces of jewelry from Jeypore, which show an abundance of enameling. There are also fifteen beautiful specimens of jewelry from Kathiawar, principally necklaces, which resemble those of Delhi, though containing less enamel.

There are also several necklaces from Brahma, and eleven gold belts and necklaces from Amritsar.

CASE 16.— Devoted entirely to a collection of forty-seven pieces of gold jewelry from Gujarat which is characterized by the large quantity of gold and small number of jewels used.

CASE 17.— A collection of silver jewelry which contains many beautiful designs and fine examples of the ingenuity displayed by the oriental silversmiths in joining together the simple parts which united make a symmetrical whole.

The silver-work is from the cities of Gujarat, Rajputana, Amritsar, the Deccan District, Lahore, and Bombay.

CASE 18.— Examples of silver jewelry, and jewelry of base metal worn by the lowest caste. The latter while quite heavy is artistically designed, the ornamentation differing in great degree from that employed in silver and gold work.

The jewelry of base metal is mostly from the state of Gwalior.

CASE 19.— Collection of cameos and intaglios engraved upon sardonyx, rock crystal, jasper, topaz, chalcedony, etc.

Collection of antique jewelry from Bulgaria.

Collection of Egyptian, Etruscan, Roman, and Greek jewelry.

CASE 20.— Collection of Egyptian jewelry.

Collection of Etruscan jewelry. Pompeiian necklace.

Collection of gold nuggets from Washington placer mines, and of crystallized gold from Colorado. Gold nugget from the Klondike.

CASE 21.— Carved bronze eagle on red lacquered stand. Iron Damascene plate.

Solid silver communion plate, pierced by German bullets in the Franco-Prussian war at Saarbrück. This was the first volley fired in the war. A new plate of the style perforated by German bullets in Franco-Prussian war.

Pair of carved wood figures, silver mounted, made in 1673, from Lord Charlemont's collection.

A carved ivory ornament taken from Shakespeare's home.

An engraved mother of pearl and silver box from Kenilworth Castle.

An antique snuff box of brass and copper from Holland.

CASE 22.— Crown worn by the Duke of Sussex at the coronation of Her Majesty, Queen Victoria.

Two large and handsomely designed maces of solid silver which were carried in advance of a Maharajah by his attendants on all state occasions. The most prized possessions of a Maharajah are his maces. He may lose his jewels, his money, his lands and his friends, but very seldom is he willing to part with the emblems of his authority, consequently very few maces have ever been brought out of India.

Two large and handsome tortoise shell combs, the larger one measuring fourteen inches in breadth and twelve inches in height.

Card case, enameled work, sterling silver, hand painted, representing a bride in the national costume of Norway.

Walnut of silver containing a landscape made of natural pieces of Colorado native silver, gold, etc. Made in Denver.

Watch with Turkish numerals made in France in the latter part of eighteenth century for a Turkish dignitary. Enamel work on back. It is yet in good running order.

Silver gilt wine cup in the form of a ship, such as were much used in England in the sixteenth century.

CASES 23 AND 24.—Remarkable collection of aboriginal American jewelry, found in various parts of Colombia and Ecuador, South America. The collection consists for the most part of objects used for personal adornment. It exhibits surprising ability of workmanship in metals and knowledge of alloying.

#### **Alcove 105.**

CASE 25.—Coins of gold, electrum, silver, bullion, potin, aluminum, nickel, bronze, copper, brass, iron, tin, lead, glass, porcelain, and paper, illustrating the metallurgy of coinage.

Ancient coins: Roman, Greek, and Italian.

Collection illustrating folk lore of precious stones. A large number of specimens showing gems and other mineral or organic substances to which healing or talismanic virtues were ascribed.

ALCOVE WALLS.—Shield of steel and gold (5 feet by 8 feet) upon which are illustrated scenes in the Norse legend of Frithiof and Ingeborg.

Bronze group: Lafayette and Washington, by Bartholdi, the eminent French sculptor.

# Department of Botany and Plant Economics.

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This department occupies the galleries of the North, South, East (in part) and West Courts of the main building, and may be reached by any of the four flights of stairs near the central rotunda, or by the stairways at one side of the east and west main doorways.

The department is now being reinstalled. The old geographic arrangement, established in the beginning, is being replaced as rapidly as possible by a consecutive systematic series. This early installation being, on that account, in a more or less chaotic and depleted state, is not included in this guide. New cases are being constructed, installed and shifted into their natural places as rapidly as completed. The following systematic installation and elements for future arrangement will be found upon the transept galleries surrounding the central dome of the building, and in the north gallery.

## SYSTEMATIC INSTALLATION.

The new installation in this department occupies a series of red birch and plate glass cases, each numbered in the center of the crown above. The enumeration is as follows:

<b>Cases.</b>	<b>Location.</b>
1 to 9.....	North Gallery: Rotunda transept
10 to 26.....	North Gallery: West Side
27 to 31.....	North Gallery: North transept
32 to 47.....	North Gallery: East side
48 to 52.....	North Gallery: passage to East Gallery
53 to 62.....	East Gallery: Rotunda transept
63 to 70.....	South Gallery: Rotunda transept
71 to 74.....	South Gallery: passage to West Gallery
75 to 85.....	West Gallery: Rotunda transept
86 to 88.....	West Gallery: passage to North Gallery
89+	Not in place at this time

### The Pine Family (*Pinaceæ*).

CASE 1.—The left half of this case is devoted to an illustrative collection of the fruits (*cones*) of various types of Pines. Observe the pyramid form characteristic of the as yet unopened cones of the pine, as represented by those of the Aleppo Pine (*Pinus halepensis*), and the Larch Pine (*Pinus Laricio*); note also the opened cones of the Sugar Pine (*Pinus Lambertiana*) and the Georgia Pine (*Pinus palustris*); the characteristic egg-shaped, few-scaled form of the Weeping or Funeral Cypress (*Cupressus funebris*); the closely knit narrow-scaled form of the firs, as shown in the cone of the Red Fir (*Abies magnifica*); the hard woody-scaled fruits of the Virginia Pine (*Pinus pungens*) and the Western Pitch Pine (*Pinus Coulteri*); and the small sprawling-scaled, globe-shaped, nut producing fruits of the Mexican Piñon (*Pinus edulis*).

The right half of this case exemplifies seed types and some of the utilizations of members of the family. Note the three distinct forms of seeds; the nut-like seeds of *Pinus edulis*, the winged seed of the Mountain Pine (*Pinus montana*), and the peculiar elongated form of the edible seed of the Chandelabra Pine of Chili (*Araucaria imbricata*).

Note the general characters distinguishing the wood of this family as shown in the center of the case: Red Cedar (*Juniperus virginiana*), White Fir (*Abies concolor*), Cypress (*Taxodium distichum*), Douglas Spruce (*Pseudotsuga mucronata*), the Yellow Pine (*Pinus mitis*), the Sugar Pine (*Pinus Lambertiana*), and the Hemlock (*Tsuga canadensis*). The large block of inner bark of the California Red Wood (*Sequoia sempervirens*) indicates the great thickness to which this bark grows, while the walking stick made from it signifies its strength. Instructive examples of the utilization of pine bark as textile material are shown in the Giant Cedar bark of Vancouver Island (*Thuja plicata*).<sup>1</sup> Native uses of pine resins are exemplified in the Ceylon fishing torches formed by wrapping the resin of *Pinus longifolia* in the shredded leaves of the Talipot palm. Three medicinal uses of the Pines are exemplified in specimens of the ground bark of the Hemlock (*Tsuga canadensis*), and the White Pine (*Pinus strobus*), and the young tips of the Savin (*Juniperus Sabina*)

<sup>1</sup> See also Case 10, left

CASE 2.— This case displays the Russian method of collecting the oils and resins of the European Pitch Pine (*Pinus sylvestris*). The Russian method is to strip off the bark from a large portion of the circumference of the tree and scrape off the exudation. This is continued for a period of five years. Note the original package of pitch scrapings as sold in the native markets; the resin, colophony and “pek,” as well as the various products of tapping and of distillation exhibited on the top shelf of the case.

CASE 3.— Note the various products of turpentine orcharding from *Pinus palustris* in Georgia, as shown in tubes on the bottom shelf of the top of this case; also Mexican “resina” from *Pinus Montezumae*, Japanese “Chan” from *Pinus densiflora*, “Khasia” from *Pinus khasya* of British India, turpentine from the Indian *Pinus excelsa*, and “trementina” from the Mexican *Pinus teocote*. Amber, a fossilized resin from prehistoric pines, from the newly discovered beds on Staten Island, New York, is also exhibited in this case. Note also particularly fine natural amber nodules and a clear cut piece showing the inclusion of a Caddis Fly, from Germany.

CASE 4.— This case contains a complete series of trunks of the Georgia Pine (*Pinus palustris*) showing the method of “boxing” for turpentine and the appearance of the trees in the orchard from the first year’s boxing to the fifth year’s burning-off.

CASE 5.— Base of a Cluster Pine (*Pinus pinaster*) showing the Portugese method of boxing the trunks and collecting the resin.

CASE 6.— Illustration of the conversion of Spruce pulp from *Picea mariana* into fiber ware. Note the pulp boards and the examples of the processes necessary to render the pulp imperious.

CASE 7.— Top. Exemplification of the conversion of Black Spruce (*Picea mariana*) into the common newspaper stock of to-day. Note the yellow appearance exposure to light gives paper. Compare with this the Swedish product from the Norway Spruce (*Picea excelsa*). Below this observe the various Japanese utilizations of thin shavings of Hiba (*Thujaopsis dolabrata*) and the chip work and twine made from this species.

CASE 8.— Note the paper pulp trees of Japan: Momi (*Abies firma*), Tohi (*Picea Alcockiana*) and Tsuga (*Tsuga Sieboldii*).

CASE 9.— This case is devoted to specimens illustrating the conversion of the leaves (needles) of the Georgia Pine (*Pinus palustris*) into textile products: Pine Needle Bagging, Matting, "Hair," Oakum and Antispasmodic Cigars, and the by-products into antiseptic tow and soap.

CASE 10.— The left half of the case is devoted to various interesting uses of the pines. Note the Kwakiutl uses of Giant Cedar (*Thuja plicata*) and Cypress (*Chamaecyparis nootkatensis*); the inner bark of each is shown as used for making mats, bags, baskets, capes and blankets. It is dyed a brownish red with a decoction of Alder bark, or black with iron. Observe Japanese ropes made of the wood of Hinoki (*Thuja obtusa*), and Akamatsu (*Pinus densiflora*). Roof thatching of the bark and veneer strips of the wood of Sugi (*Cryptomeria japonica*).

#### Cycad Family (*Cycadaceæ*).

CASE 10.— Right half. Note the roots (corms) of various species of *Zamia* and starch produced from them: Florida Coontie (*Zamia floridana*) and Bahama Bay Rush (*Zamia tenuis*). Note also the male flower rhachis and starch of the Sago Palm (*Cycas revoluta*).

#### Yew Family (*Taxaceæ*).

CASE 10.— Right half. Note the character of the woods of this family one species of which yields the famous ancient English bow wood. *Torreya*, *Ginkgo*, and *Podocarpus*, from Japan, and *Dacrydium* and *Podocarpus* from New Zealand.

#### Cat Tail Family (*Typhaceæ*).

CASE 10.— Right half. The Cat Tail Flag (*Typha latifolia*), a bundle of the leaves as used in making rope for bottoming "rush seat chairs." Also fiber of the same species for spinning into textiles.

#### Pond-Weed Family (*Naidaceæ*).

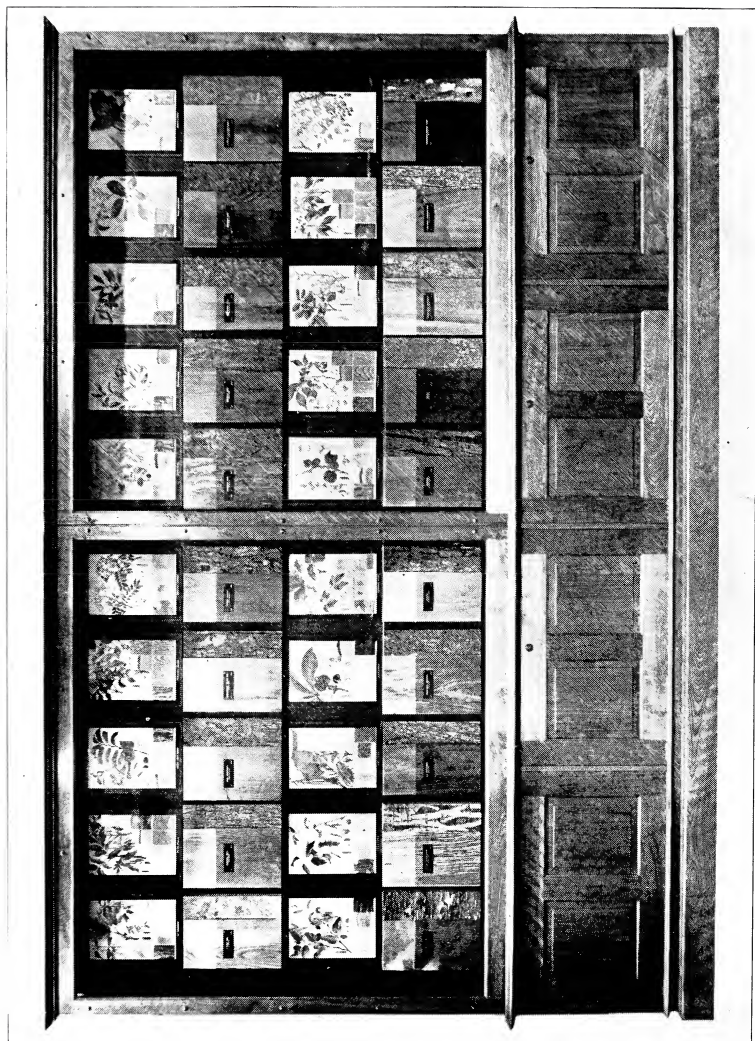
CASE 10.— Right half. Grass Wrack or Alva Marina (*Zostera marina*) showing its utilization as packing material, and as a lining (to deaden sound) in house construction.

#### Grass Family (*Gramineæ*).

CASE 11.— A fine example of Japanese Bamboo Basketry. This basket is made of the most prized, smoke-stained bamboo,







One of the Cases Showing the Less Frequently Used Japanese Woods

carefully selected as to color. Note the beauty of the band designs, the uniformity of the weave and the symmetry of the whole fabric.

CASE 12.—A complete collection of the principal bamboos of Japan. This series was collected and presented to this Museum by the Imperial Japanese Forestry Commission.

CASE 13.—An exposition of the major utilized bamboos of Japan. Note the section showing the partitions that, while giving strength to the stems of this giant grass, also serve to render them readily utilizable as drinking cups, casks, water buckets and bottles, cuspidors, flower pots, and vases, and many other containers. Note the brown, smoke-stained bamboo, Susudake (*Bambusa senanensis*) one of the most valued forms; the square bamboo, "Shikaku-take" (*Phyllostachys sp.*), highly valued for ornamental work; the black bamboo "Madake" (*Phyllostachys nigra*), used for screens, fans, and constructive work; the highly elastic "Gomadake" another variety of the same species; and "Yadake" (*Phyllostachys bambusoides*) the original arrow-making bamboo of feudal times.

CASE 14.—Various utilizations of grass fibers. Note the utilization of Canebrake (*Arundinaria tecta*) as a fiber producing grass; the various broom-roots (*Aristida* and *Epicampes*) utilized, as the name indicates, for small brooms and brushes; and the aromatic roots of the India "Khus-khus" (*Andropogon muricatus*), so extensively made into fans and screens which give off a fragrant and cooling odor when sprinkled with water during the heat of the day. A Pampas grass fly broom "Escobilla" from Mexico. Observe the interesting Kaya paper, of Formosa, made from *Imperata arundinacea*.

CASE 15.—Sugar cane (*Saccharum officinarum*). Bagasse paper manufactured from the refuse canes after the extraction of the juice. Note the native sugars of Peru, Mexico, and Java; the various muscovados and raw sugars; the brown crystal sugar of Peru; the beautiful white crystal sugar of Egypt; rum; alcohol, and vinegar. (Compare beet sugar in Case 49.)

CASE 16.—Various grains. Note the great variety of grass seeds used as foods, and the processes necessary to convert the four principal cereals into food shape.

CASE 17.—The wheats (*Triticum sativum*) of the world. Note the great variety of Russian wheats.

CASE 18.—Sorghum (*Sorghum saccharatum* and *halepense*).

Note the Kaffir Corn of Africa; Egyptian Corn, and the "long sweetning" or Sorghum Molasses of the Virginias, Millet (*Panicum miliaceum*). Note the "Rapoko" or "Munga" of Africa and the beautiful millets of Russia. Rice (*Oryza sativa*): note the "Paddy" or unhusked rice of Japan, the whitened rice, red speckled rice, glutinous rice, and "puffed rice."

CASE 19.—The Ryes (*Secale*) and Barleys (*Hordeum*) of the world.

CASE 20.—The standards of Maize or Indian corn (*Zea mays*) as utilized in governing the sales and shipments of this great cereal; note the varying grading of different states. In this case on the right note Maize as grown in various countries of the world. Observe the very large grains of the Andean corn of Ecuador, grown at an altitude of 9600 feet, and the very small grains of Korea.

CASE 21.—The types of Pop Corn (*Zea everta*); note the shape of the kernel and the amount of horny substance. Note the popped grains; each bottle contains the same number of grains thus showing the expansion of the various types. Sweet Corn (*Zea saccharata*): the specimens show the various standard types of this favorite fresh-food corn.

CASE 23.—The types of Dent Corn (*Zea indentata*) the principal fodder, meal, and starch corn. Note that each variety is shown in a manner displaying all of its characteristics of shape, size, grain, tip, butt, and cob. Types of Flint Corn (*Zea indurata*) are also shown in the right of the case, together with some of the fancy-colored corns of this country.

CASE 24.—The Oats (*Avena*) of the world, note the full series of Russian oats and those of Illinois.

CASE 25.—Various products of Maize (*Zea mays*): Meal, flour, hominy, cones, grits, and farina. Note the series illustrating the distillation of whiskey; corn feathers (chaff) as a resistant stuffing for cushions. The right of the case is occupied with a full series showing the manufacture of paper from the shives and pith of the cornstalk.

CASE 26.—The history of the utilization of Maize as a food. Note the prehistoric corn of the Peruvians, mummy corn, cliff dwellers' and mound builders' corn; the corn "compass" of the Hopi Indians, and the starchy Maize of various colors grown by the southwestern United States tribes of the present day. Note also the various native maize "breads," Mexican "guarditas," "tamales" and "tortillas," and Hopi "Piki."

CASE 27.— Left half. The utilization of the husks of maize ears as a textile base, and Klickitat Indian bag made from them. Note the use of the pith of cornstalks, compressed into briquettes, as an obtunder for naval vessels. Note also the full series of products and by-products in the manufacture of corn sugar (glucose); oil, rubber, starch, syrup, glucose, "sugar," dextrine, amyline, etc.

#### The Sedge Family (*Cyperaceæ*).

CASE 27.— Right half. The utilization of these common "ditch grasses" in the manufacture of mats, matting, and baskets.

#### The Palm Family (*Palmeæ*).

CASE 28.— The creeping palms. Note the full plant of Rattan (*Calamus rotang*) 125 feet long. These rattans often grow to a length of from 200 to 400 feet, spreading over trees and twining in every direction. Note the various grades of rattans used for cane work. Note the great fruit of the Ivory Nut Palm (*Phytelephas macrocarpa*); its nuts and their use in simulating bone buttons.

CASE 29.— The natives of Oceanica claim that there are as many uses of the Coco as there are days in the year. Some of these are illustrated in this case and in Cases 30, 31, and 33. Various utilizations of the wood, the leaf and the midrib of the Coconut Palm (*Cocos nucifera*). Note the broad board, the house rafter, and eave spout fashioned from this wood; and the brooms, baskets, and ekels from the leaf.

CASE 30.— Coir, the fiber surrounding the nut of the Coco Palm and its utilization for the manufacture of ropes. Note the rope 300 feet long tapering from four inches in diameter to little over a half inch. Coir rope makes the best of all cables for anchoring ship craft, as it is very elastic, acting like a spring, as well as very durable in sea water.

CASE 31.— Sections of a cocoanut tree showing the character of the growth: note the fibrous bundles of the interior and the dense tissue of the exterior. Note further uses of coir in the weaving of mats and bagging, and the cocoanut leaf skirt of a Sandwich Islander.

CASE 32.— A very large cocoanut trunk from Trinidad: note the thinness of bark in proportion to the diameter of the tree.

CASE 33.—The utilization of the nut of the Coco palm. Note the various sections of the fruit, showing the proportion of the cavity to the "meat" and "shell" of the nut, and that of the nut to the "husk;" the various uses of the nut meat, and of the mature and immature "shell." Note also sugar, oil, candles, butter, soap, meal, copra, wine, etc.

CASE 34.—The Saw Palmetto (*Sabal serrulata*) one of the "Fan Palms" of the southeastern United States. Note the use of cross sections of the "trunk" as brushes; the utilization of the leaf fiber for the same as well as for upholstery material; and that of an extract of the rootstalk for tanning.

CASE 35.—The Cabbage Palmetto (*Sabal palmetto*) in its similar utilization to the preceding species. The Bermuda Palm (*Sabal Blackbourniana*) showing the beautiful leaf and its utilizations.

CASE 36.—(Uninstalled at this writing. Reserved for a series representing the Coco de Mer or Double Coconut of the Secheyelles Islands.)

CASE 37.—The black palms. Fiber and rope of the Brazilian Piassaba (*Attalea funijera*), with brushes made of the same; flower spathe, fiber and wood of the Black Sugar Palm of Ceylon (*Borassus flabelliformis*); fiber and cordage from the Wine Palm of Ceylon (*Caryota urens*); Javanese Jaggery Sugar from the Jaggery Palm (*Arenga saccharifera*); stripped leaves of the Talipot Palm (*Corypha umbraculifera*) and a Cinghalese book made from the natural leaves of this species; and fiber, cordage, and mat made of the fiber of the Japanese Shuro (*Chamaerops excelsa*).

CASE 38.—Devoted to an exposition of various fruits of the palms and their utilization. Dates, the fruit of the Date Palm (*Phoenix dactylifera*) a noble tree, forty to eighty feet high, invaluable to the desert people of Northern Africa whose most important wants it supplies. Fruits of the Betel Palm of the Indies (*Areca catechu*) a favorite masticatory among the natives. (See also monograph on Betel Chewing, Case 80). Note wax obtained from the Brazilian Wax Palm (*Copernicia cereifera*). Note also in the various sectioned fruits of the Palms and the diverse disposition of the kernels. Palm Oil soap and candles obtained from the African Oil Palm (*Elaeis guinensis*).

**Hat Palm Family** (*Cyclanthaceæ*).

CASE 39.— Left half. Note the split leaf of the Panama-hat Palm (*Carludovica palmata*) and the prepared "Jipijapa" for hat making. This is not a true palm but a connecting link between the Palms and the Aroids.

**Pondweed Family** (*Pontederiaceæ*).

CASE 39.— Left half. A small family of water plants no member of which has so far been utilized in the arts or industries of the world.

**The Rush Family** (*Juncaceæ*)

CASE 39.— Left half. Note the "grass matting" or Rush matting manufactured from the stems (*culms*) of the common rush (*Juncus effusus*).

**The Calla Family** (*Araceæ*).

CASE 39.— Left half. A large family of water-loving plants typified by the common Calla "lily" of the gardens. Note the root of the Jack-in-the-pulpit (*Arisæma triphyllum*), the Skunk Cabbage (*Spathyema fetida*) and the Sweet Flag (*Acorus calamus*) used in medicines; also starches obtained from the Elephant's Ear (*Colocasia esculenta*).

**The Pineapple Family** (*Bromeliaceæ*).

CASE 39.— Right half. Note the photograph showing the habit of a large number of the members of this family of growing upon the branches of trees after the manner of parasites. They are, however, air plants, simply anchored on the trees. Note the "Tumbariche" of Mexico the fruits of *Bromelia pinguin*, small acid "pineapples" used for making a refreshing drink. Note the fiber of various species of Pineapples (*Ananassa*), and that of the Old Man's Beard (*Tillandsia usneoides*), the well known Spanish Moss of the southern states, utilized extensively as a stuffing for mattresses and other upholstery.

**The Lily Family** (*Liliaceæ*).

CASE 40.— Various liliaceous fibers: Bow string Hemp (*Sansevieria guineensis*) with cordage and an ornamental screen mat of the Ceylonese *S. zeylanica*; the Bear Grass of the southwestern United States (*Yucca filamentosa*) and its fiber; also the fibers of Spanish Bayonet (*Yucca aloifolia*), Texas Bear

Grass (*Dasylyrion graminifolium*) and New Zealand Flax (*Phormium tenax*) with their utilizations.

Note the utilization of the woody tissue of the Spanish Needle Plant (*Yucca gloriosa*) as splints for surgeons' use; that of the pithy interior of the West Indian Dagger Plant (*Yucca aloifolia*) for razor strops; and a soap made from the pith. Note Sarsaparilla from Brazil (*Smilax Spruceana*) in original bale. Note that onions and garlic belong to the lilies, and the specimens of Ramps (*Allium tricoccum*), the highly odoriferous wild onion used by the mountain people of the Virginias. Observe the medicinal sources of *Trillium*, *Colchicum*, and *Polygonatum*, as well as the fine specimens of Dragon's Blood (*Dracæna draco*), Soccotrine Aloes (*Aloe succotrina*), and Squills (*Scilla maritima*). Note the peculiar Oil of Garlic (*Allium sativum*); a soap made from a species of *Yucca* in Ecuador; and a Japanese starch obtained from the root of the Dog's-tooth Violet (*Erythronium dens-canis*) used in the manufacture of high-grade confectionery.

#### The Amaryll Family (*Amaryllidaceæ*).

CASE 41.— A leaf model and the fiber of the Yucatan Sisal Hemp or Mexican Grass (*Agave sisalana*) and its conversion into hammocks, binding twine, rope, etc., also as a substitute for Manila Hemp (See Case 43 left). The fiber of *Agave heteracantha* and its utilization in brush-making. Note the beautiful mantilla of Fayal lace (*Agave americana*) as grown in the Canary and Madeira Islands. Observe the various products of juice of the Mexican Pulque Plant (*Agave americana*); honey, whisky, gin, vinegar, rum, wine, and alcohol.

CASE 42.— (Not installed at this writing.)

#### The Banana Family (*Musaceæ*).

CASE 43.— This case represents, substantially, the genus *Musa* (the bananas), and their fiber. Note the fine series of Manila hemp (*Musa textilis*) from the Philippine Islands; models of the Banana fruit (*Musa sapientum*) and the Plantain (*Musa paradisiaca*); dried bananas used as a confection in Jamaica; and banana meal, flour, and starch, particularly valued as an infant food.

#### The Yam Family (*Dioscoreaceæ*).

CASE 44.— Left half. Note the true Yam (*Dioscorea sativa*) and starch from the same. Also starch from *D. alata* and *D.*



*trifida* of Venezuela. These yams are largely used in lieu of potatoes in the countries in which they grow. (The sweet potato, often called "Yam," is a morning glory tuber, not a true yam.)

#### The Iris Family (*Iridaceæ*).

CASE 44.— Left half. The members of this family have been but little utilized outside of horticulture; note however Orris Root (*Iris florentina*) and Blue Flag Root (*Iris versicolor*) from our bogs and ditches.

#### The Pepper Family (*Piperaceæ*).

CASE 44.— Left half. Note that white pepper is a product of the same plant as black pepper, the former having had its outer husk removed; both are the fruits of the East Indian Pepper Plant (*Piper nigrum*). Observe the full fruiting spikes of Long Pepper (*Piper longum*); and Cordoncillo and Matico (*Piper angustifolium*?) of Guatemala. Observe also Cubebs (*Piper cubeba*) and refer to Case 80 for the use of the Betel Peper (*Piper betel*) in Betel chewing.

#### The Orchid Family (*Orchidaceæ*).

CASE 44.— Left half. The commercial types of the Vanilla bean (*Vanilla planifolia*) used as a flavoring substance in cookery, and confectionery; also Salep (*Orchis mascula*), and Crawley Root (*Corallorhiza odontorhiza*) used in medicine.

#### The Indian Shot Family (*Cannaceæ*).

CASE 44.— Left half. A small monotypic family principally utilized in horticulture, where it is characterized by the Canna. Note the shot-like seeds of *Canna indica* and a necklace formed of the same.

#### The Arrowroot Family (*Marantaceæ*).

CASE 44.— Left half. Arrowroot flour and starch from *Maranta arundinacea* and *Maranta indica*, and the Venezuelan Lairen Starch from *Calathea allouia*.

#### The Ginger Family (*Zingiberaceæ*).

CASE 44.— Right half. Note the peculiarities of the flowers and roots of this family as indicated in the colored plate. Turmeric (*Curcuma longa*), an East Indian Dye-root; also used as a condiment. (See Curry Powder Ingredients in Case 80.) Ginger, the well known condiment obtained by powdering the roots

of the Oriental *Zingiber officinale*; note also Bleached Ginger, Candied Ginger, Jamaica Ginger and Oil of Ginger from the same source. Grains of Paradise, the seeds of the pungent African *Amomum Melegueta*, these also are known as Guinea grains or Melegueta Pepper. Observe the various forms of Cardamoms: The Wild Cardamom (*Amomum zanthioides*) and the cultivated Cardamom (*Elettaria cardamomum*).

#### The Willow Family (*Salicaceæ*).

CASE 45.— Left half. Observe the character of the fruits of the willow (Pussy willows), and the beautiful examples of Japanese Chip work from the Doro (*Populus suaveolens*), a Poplar peculiar to Japan. Note also the Japanese method of preparing match-sticks from the same species.

#### The Australian Oak Family (*Casuarinaceæ*).

CASE 45.— Right half. Note the character of the fruits of this family and their likeness to those of the Birch Family; note also the beautifully marked Forest Oak shingles (*Casuarina torulosa*) from Australia.

#### The Wax Berry Family (*Myricaceæ*).

CASE 45.— Right half. Note the bluish-green wax obtained from the seeds of the Wax Myrtle (*Myrica cereifera*), also hand dipped tapers made of the same and highly valued on account of their fragrance while burning. Note also the compressed leaves of the Sweet Fern (*Comptonia asplenifolia*) used in medicine.

#### The Birch Family (*Betulaceæ*).

CASE 45.— Right half. Observe the woods and seeds of various members of this family: The wild Hazel Nuts of this country (*Corylus rostrata*), the similar Cob Nut or Filberts of Europe (*C. avellana*), and the large, thin-shelled, improved nuts of California. Note the fruits of the Alder (*Alnus*) and their likeness to those of *Casuarina* on the left. Note the papery bark of the Paper Birch (*Betula papyracea*) utilized by the North American Indian tribes for canoe building and covering Summer dwelling places; note also a hornet's nest fashioned of this bark.

#### The Walnut Family (*Juglandaceæ*).

CASE 47.— Left half. Devoted to the fruits and nuts of this family. Pecan Nuts (*Hicoria pecan*) showing the finer strains of the orcharded trees in Texas; Hickory Nuts of several

species *Hicoria minima*, *Hicoria ovata* and *Hicoria alba*; Butternuts (*Juglans cinerea*) and Walnuts (*Juglans nigra* and *Juglans texensis*); and the English Walnut (*Juglans regia*) from the hard-shelled natural nut, through many fine thin-shelled grades, to the highly specialized form of California.

### The Oak Family (*Fagaceæ*).

CASE 46.—The Cork Oak (*Quercus suber*) from Portugal. A very fine and costly decortication of a young tree with three branches. This specimen is considered one of the best examples of dextrous cork peeling ever produced.

CASE 47.—Right half. The wood of three species of Japanese oak, Ichigashi (*Quercus gilva*), Akagashi (*Quercus acuta*), and Shirakashi (*Quercus glauca*). Note the fruits (acorns) of various species of oak and their variation of form; also the three species of Chestnuts: the Common Chestnut (*Castanea dentata*) the Chinquapin (*Castanea pumila*) and the Spanish Chestnut (*Castanea vulgaris*), also Polente meal and candied chestnuts from Italy. Note that the Beechnut (*Fagus americana*) also belongs to this family.

CASE 48.—Various products of the Cork Oak (*Quercus suber*). Observe the bark, or cork peelings of successive periods and the increase of density and thickness as a result. Note the finer grades of corks, their velvety surface and lack of holes and cracks; note also the skill with which cork can be carved as shown in the "Cork Picture" of the Doge's Palace, Venice. The utilization of waste cork is also exemplified in many ways.

### The Smartweed Family (*Polygonaceæ*).

CASE 49.—Left half. Note that Buckwheat (*Fagopyrum esculentum*), Rhubarb (*Rheum rhoponticum*), and Dock (*Rumex crispus*), belong to this family association. Observe the Kite made crudely of a single dry leaf of the Sea Grape (*Coccolobis uvifera*).

### The Wormseed Family (*Chenopodiaceæ*).

CASE 49.—Left half. The Sugar Beet (*Beta vulgaris*), showing all the steps in the extraction of sugar from the Beet by 23 distinct specimens representing the result of each process. Of the sugar product of the world (13,957,269 tons) that from the Beet exceeds that from Sugar Cane by over 500,000 tons.

### The Poppy Family (*Papaveraceæ*).

CASE 49.— Right half. The poppy (*Papaver somniferum*), the principal economic plant of this family is represented by a number of specimens showing various interesting products of the plant; Opium, Morphine, Codeine, the capsules from which opium is extracted, the oil of the seed, etc. Note that the Bloodroot (*Sanguinaria canadensis*), formerly used as a red paint (*Puccoon*) by the Indians; Celandine (*Chelidonium majus*) of the gardens, used in medicine; and the Dutchman's Breeches, (*Dicentra canadensis*) belong also to the Poppy Family.

### The Mustard Family (*Cruciferae*).

CASE 49.— Right half. Note, from the specimens of seed, how widely Mustard (*Sinapis nigra*) is cultivated in various parts of the world for the oil of the seed. Note also that the Cabbage (*Brassica oleracea*), the Turnip (*Brassica napus*), the Radish (*Raphanus raphanistrum*), and the Horse Radish (*Cochlearia armoracia*) are all members of this family of acrid plants.

### The Flax Family (*Linaceæ*).

CASE 50.— A framed napkin of finest Irish Damascene linen made for the Royal table of Queen Victoria. This exemplifies one of the extreme utilizations of flax as further represented in Cases 53, 54, 55, 56, 57, 58, and 61.

### The Mulberry Family (*Moraceæ*).

CASE 51.— Left half. Laos paper manufactured by the Siamese from the bark of Khoi (*Streblus asper*), showing the different processes and results, from the bark itself to the peculiar accordion-like Siamese books. Note the black books made from this paper treated with the charcoal of Ton Sanoh (*Aeschynomene indica* of the Bean Family) and used in the native courts of law, being written upon with a cream-colored steatite pencil: which see. Note also fibers and cordage from various species of fig. (See also right half of Case 62.)

### The Elm Family (*Ulmaceæ*).

CASE 51.— Right half. Note the various seeds of the Elms (*Ulmus*) and compare them with those of the Proteaceæ. Note the utilization of the mucilaginous inner bark of the Slippery Elm (*Ulmus fulva*).

**The Portean Family** (*Proteaceæ*).

CASE 51.— Right half. A family of peculiar plants having their highest development in Australasia. Their leaves and fruits show relationship to the Oaks and Elms though they are very characteristic in their differences. Note the peculiar fruits of the various species of *Banksia*, especially those of *Banksia serrulata*, and observe that the leaves are oak-like, the fruit-body chestnut-like, the fruit-cells *Hakea*-like, and the seeds Elm-like. Note the peculiar fruits of the *Hakea* Bushes (*Hakea sp.*); the heavy, woody, pear-like fruit of *Xylomelum pyriforme* and its small seed cavity; and the prettily marked wood of the Honeysuckle (*Banksia integrifolia*).

**The Clove Family** (*Myrtaceæ*).

CASE 52.— This case is devoted to an exemplification of various species of Australian Gum Trees (*Eucalyptus*) their woods, oils, and gums. The woods are hard and enduring, coming into many utilizations; their oils medicinal and utilized in the arts; and their gums (*Kinos*) valuable as tanning substances.

**The Flax Family** (*Linaceæ*).

Several cases devoted to flax (*Linum usitatissimum*), and the various utilizations of its bast fiber and seed in the manufacture of linen cloth, thread, paper; linseed oil and oil-cake.

CASE 53.— American Homespun Linen. Specimens illustrating the early American home manufacture of linen thread and cloth. Note the crude attempt at Damascene.

CASE 54.— Specimens of the principal kinds of linen thread of Irish and American manufacture. A series of specimens illustrating the manufacture of linseed oil and oil-cake from the flax seed. Specimens showing the various types of linen cloths and typical linen laces.

CASE 55.— The table part of this case contains a monographic series of specimens descriptive of the process of securing linen yarns from flax straw. The upright portion is devoted to photographs illustrating the old and the new method of producing linen.

CASE 56.— Two spinning wheels. The larger, which is known to be over 116 years old, was run by hand power and illustrates the older method of spinning with the aid of the distaff. The smaller one is a more modern, foot-power wheel.

CASE 57.— A homemade loom, built in 1802, used in the early part of the last century for weaving such fabrics as are shown in Case 53.

CASE 58.— An old hand flax-brake and two bromide enlargements showing the method of using this machine.

(See also Cases 50 and 61.)

#### **The Potato Family** (*Solanaceæ*).

CASE 59.— In the table portion are shown a number of forms of manufactured Tobacco (*Nicotiana*) for chewing or smoking.

CASE 60.— In the table portion are exhibited a few forms of tobacco leaves and various other tobacco examples.

In the top of these two cases (59 and 60) are temporarily installed four frames showing, in translucent examples, papers made from Sugar Cane refuse (See Case 15), from the Paper Mulberry (See Case 62, right half) and from the stalk and pith of Indian Corn or Maize (See Case 25). These frames are intended to be reinstalled against windows at some future time.

#### **The Flax Family** (*Linaceæ*).

CASE 61.— Contains specimens of Flax straw, hackled Flax, and Flax tow from the chief Flax growing regions of the world. (See also Cases 53 to 58 inclusive).

#### **The Nettle Family** (*Urticaceæ*).

CASE 62.— Left half. The Hemp plant (*Cannabis sativa*) and its utilization shown in process steps from the stalks to cordage; Hemp seed and oil; and Gunjah, the dried flowering tops of the Hemp plant as grown in India where they are smoked like tobacco or macerated into Bhang a highly narcotic intoxicant. Note also Hashish a dark green extract of the tops used as a hypnotic-narcotic and habit drug. (See also Case 63.)

#### **The Mulberry Family** (*Moraceæ*).

(See also Case 51.)

CASE 62.— Right half. Various products of this interesting family. Note the large photograph of a tropic Rubber Tree (*Ficus sp.*) and the peculiar method of rooting downward from the branches a characteristic feature in this genus. Note the bark of the Paper Mulberry (*Broussonetia papyrifera*) and Japanese paper manufactured therefrom. Observe milk from the Cow Tree (*Brosimum galactodendron*) and Vegetable Cheese

made from the same. Note flour and meal from the Bread Fruit Tree (*Artocarpus incisa*); and Central American Rubber from *Castilloa elastica*. Observe Strung Figs from Italy and Preserved Figs from Smyrna both the fruit of *Ficus carica*. Note also Hops the dried strobiles of *Humulus lupulus*; Shellac from *Ficus bengalensis*; and Fustic a yellow dye wood (*Chlorophora tinctoria*).

### The Nettle Family (*Urticaceæ*).

(See also Case 62).

CASE 63.—Ramie, the silk-like fiber of *Boehmeria cylindrica*, illustrated by a series of specimens ranging from the stalks to imitation silk objects.

### The Rose Family (*Rosaceæ*).

CASE 65.—Right half. Various seeds and products of the family. Note the family resemblance of the Almond (*Amygdalus communis*) to the "stone" of the Peach (*Amygdalus persica*). Note the tube of Ottar of Roses the oil of the Bulgarian Rose (*Rosa centifolia*) The physical appearance of this costly oil changes daily with the variations in temperature within the case; and it solidifies entirely at 57° Fahrenheit,

### The Bean Family (*Leguminosæ*).

CASE 65.—Left side. This half case is devoted to various types of leguminous fruits (legumes). Note the family resemblance characterizing them all, from the great pods of the South American Sea Bean (*Entada scandens*) to the brilliantly seeded Black-eyed Susan or Wild Licorice (*Abrus precatorius*) of the West Indies.

CASE 64.—The Peanut or Ground Nut (*Arachis hypogaea*). A long series of the nuts as produced in various countries; nut foods, oil, candles, soap, and glycerine from these valuable kernels.

CASE 66.—Various seeds of the Bean Family. Note the wide geographic range of the common Bean (*Phaseolus vulgaris*) and its many color forms. (See also Case 72). Note also that clover, peas, lentils, chick-peas, and vetches belong to this family. Note Fenugreek (*Trigonella foenumgraecum*) the seed that gives the peculiar flavor and odor to Curry Powder (See also Case 80), and a fine illustrative series of Gum Arabic the exudation of *Acacia arabica*.

CASE 67.— Various products of the Bean Family. A complete series illustrating the source of Licorice: the roots of *Glycyrrhiza glabra*. Algaroba yielded by *Hymenaea courbaril* a fossil and recent product utilized in varnish making. Note Chiga starch from the seed of *Campsandra comosa*; and the characteristic wood in this family.

CASE 68.— Observe fibers yielded by members of this family: Sunn Hemp by *Crotalaria juncea*, Colorado River Hemp by *Sesbania macrocarpa*, and the Indian Kachnar by *Bauhinia tomentosa*. Note Indigo the product of *Indigofera anil*; Tamarinds the fruit of *Tamarindus indica*; the odorous Tonka Bean (*Dipterix odorata*) with its vanilla-like aroma; Cutch an extract of *Acacia catechu*; Kudzu Starch from the seed of the Japanese *Pueraria Thunbergiana*; African Cam or Dye Wood (*Baphia nitida*); a number of tan barks and fruits from various species of *Acacia*, and notably the Tropic American Divi-divi (*Cesalpinia coriaria*). Note also the various oils obtained from the members of this family, especially the Copaiba Oils from *Copaifera sp.*

#### The Daisy Family (*Compositæ*).

CASE 69.— Left half. While this great family does not yield utilized products at all in proportion to its large representation in the Vegetable World, yet some of them are worthy of mention. Note the various specimens representing Chicory (*Cichorium intybus*) the roots of which serve to sophisticate coffee. Note also the new Colorado Rubber, a product of the prairie, *Parthenium incanum*; Fiber produced from the stalks of the common Burdock (*Arctium lappa*). Various medicinal plants; principally Arnica (*Arnica montana*), Tansy (*Tanacetum vulgare*), Yarrow (*Achillea millefolium*) and Wormwood (*Artemisia absinthium*).

#### The Castor Bean Family (*Euphorbiaceæ*).

CASE 69.— Right half. A large family of mostly poisonous plants with milky juice and peculiar beetle-like seeds of which those of the Castor Oil Plant (*Ricinus communis*) are typical. Note the extensive series of these oil seeds and oil expressed from the same. Note also the Purging nut (*Jatropha curcas*). Observe the various forms of meal, flour, and starch of Tapioca, Farinha, Mandioca, and Cassava, from the root of the principal tropic American food plant *Manihot aipi*. Note also



the forms of Cassava "bread" from this source. Observe Ceara Rubber from *Manihot Glaziovii* and Para Rubber from *Hevea brasiliensis*.

### The Laurel Family (*Lauraceæ*).

CASE 70.—The principal products of this important family of mostly odorous plants are those exemplified in this installation. Observe the various products of the Camphor Tree of China and Japan (*Cinnamomum camphora*), and the method of securing this substance. Note that our common Sassafras belongs to the same natural grouping that includes Cinnamon (*Cinnamomum zeylanicum*), and Cassia Bark and Buds from *Cinnamomum cassia*. The principal edible fruit of the family is the tropic Alligator Pear (*Persea gratissima*). Note the various odorous substances yielding oils utilized in perfumery; Puchuri or Sassafras Nuts of Brazil (*Nectandra Puchury-minor*), Benzoin from *Laurus Benzoin* and others.

### The Sumach Family (*Anacardiaceæ*).

CASE 71.—Left half. An interesting family having many useful and several poisonous members scattered in all climates of the globe. Among them note the Sumacs (*Rhus*), of which the red-fruited species are innocent and the yellow, papery fruited species poisonous. The Japanese Lacquer plant (*Rhus vernicifera*) which yields the poisonous juice so largely used in Japanese art. Note the berries and their resemblance to those of our Poison Sumac of the swamps (*Rhus vernix*), and Poison Ivy (*Rhus radicans*) of the sand lots and dune regions. Note Japanese Wax, Moku-ro from the seeds of the Lacquer tree (*Rhus vernicifera*) and Ju-ro yielded by those of *Rhus suaveolens*. Note the Cashew (*Anacardium occidentale*) an edible fruit (?) with an acrid, poisonous, nut-like seed borne outside; and the Mango (*Mangifera indica*) one of the delicious fruits of the tropics. Note also that Pistach Nuts (*Pistacia vera*) belong to this family, as well as the several fine gums that exude from wounds made on various species.

### The Cyrilla Family (*Cyrillaceæ*).

CASE 71.—Right half. A small family with but little of economic interest among its members. Note the wood of the Leatherwood (*Cyrilla racemiflora*) of the southern United States.

**The Bittersweet Family** (*Celastraceæ*).

CASE 71.— Right half. A family of vines or shrubs usually with bright-colored arilaceous fruits of which the Wax Work or Bittersweet Vine (*Celastrus scandens*) is a type. The root bark of this species is shown as used in medicine. Observe also the root-bark and trunk bark of the Wahoo or Burning Bush (*Euonymus atropurpureus*) and the fruits of the Bahamian *Elaeodendron xylocarpum*.

**The Maple Family** (*Aceraceæ*).

CASE 71.— Right half. Note the character of the woods of this family and the winged seeds of the several species. One of the important utilizations of the period is exemplified in the wooden plates so extensively used by pastry-cooks, market men, and for picnic purposes. Note Maple Sugar and Syrup from the vernal sap of the Sugar Maple (*Acer saccharum*).

**The Bean Family** (*Leguminosæ*).

(See also Cases 64, 65, 66, 67, and 68.)

CASE 72.— The more important varieties of Beans (*Phaseolus* and *Vicia*). A large series of this important nitrogenous food seed.

**The Holly Family** (*Ilicineæ*).

CASE 73.— Right half. A long series of the different forms of Maté or Paraguay Tea (*Ilex maté*), so largely used as a beverage by the peoples of temperate South America.

**The Tea Family** (*Ternstroemiaceæ*).

CASE 73.— Left half. A representative series of Japanese Teas (*Thea sinensis*) See also Case 81 for Ceylon Teas.

**The Madder Family** (*Rubiaceæ*).

CASE 74.— The Coffees of the world. A large series of typical Coffee (*Coffea arabica*) from the various coffee producing districts of both hemispheres. Note the sub-series showing by specimens the process of harvesting, cleaning, and separating the berry. A series of the Coffee standards of this country. A series of Coffee extracts. A series of sophisticants and adulterants: Soja beans, split peas, Job's tears, rice, barley, wheat, Chicory, etc., toasted for this purpose. A series of mock coffees and Coffee substitutes, sometimes termed Health Coffees.

**The Silk-cotton Family** (*Bombacaceæ*).

CASE 76.— Right half. Note the seed and bast fibers yielded by species of this family; and the characteristic pod of *Adansonia digitata*. Observe Natural Oakum, the inner bark of the South American *Ochroma lagopus*; this substance can be used as oakum for caulking ships without any treatment whatever. Note the silky coma of the seeds of various species of *Eriodendron* and *Ceiba* useful as stuffing for upholstery.

**The Chocolate Family** (*Sterculiaceæ*).

CASE 76.— Left half. Chocolate Fruits and Beans, the Cacao of South America (*Theobroma cacao*); chocolate nibs, shells, (Cocoa), butter, and confection. Note the Swizzle sticks used by the natives in preparing chocolate as a beverage; also native forms of prepared chocolate.

**GUMS.**

CASE 77.— Various rubbers from different species and plant families. These gums will be found in duplicate in the families to which they belong.

CASE 78.— Pharmaceutical collection of various gums; showing fracture, guttation, and other physical characters necessary to their proper understanding.

**PECULIAR FOODS AND BEVERAGES.**

CASE 79.— A series of odd foods eaten by various peoples. Japanese Woon or Tengusa, a dried seaweed (*Gelidium corneum*), and Siamese Agar Agar (*Encheuma spinosa*). Jamaica Flowers (*Hibiscus sabdariffa*) eaten or made into a cooling drink by the Mexicans; Mowha the flowers of an Indian tree (*Bassia latifolia*) eaten like figs, to which their taste is compared; Piñones, the toasted kernels of the Edible Pine (*Pinus edulis*) largely eaten by the Indians of the south-west United States and Mexico; Cassava Bread from the root of *Manihot aipi*; Kow Kliep cakes, made of rice flour and teel seed (*Sesamum orientale*) as eaten in Siam; and Klow Kow Niew, a thin cake made of starchy meal from a Siamese tuberous root at present unknown.

CASE 80.— The nuts of the Western Black Oak (*Quercus Emoryi*) from which the Apache Indians make meal and bread; the fruits of the western Black Walnut (*Juglans californica*)

from which the Apaches make a sort of soup; note also a sort of pulp and seed mass from a species of *Opuntia* called by these Indians Nanulcage. Observe a monographic assemblage of the ingredients of Ceylon Curry Powder, also a similar assemblage of the ingredients of Betel Chewing substances.

#### The Tea Family (*Ternstroemiaceæ*).

(See also Case 73. Left Half.)

CASE 81.— A temporary installation of some of the finer blends of Ceylon tea (*Thea sinensis*).

CASE 82.— In the table portion note a temporary installation of the various utilizations of Peat, the product of buried and partially disintegrated bog moss and grass roots.

CASE 82.— Top portion. Note the beginning of an installation intended to exemplify the methods adopted by plants for the natural dispersion of their seeds. The installation at this date takes up dispersion by the wind (*Aerovectence*) only.

#### The Mallow Family (*Malvaceæ*).

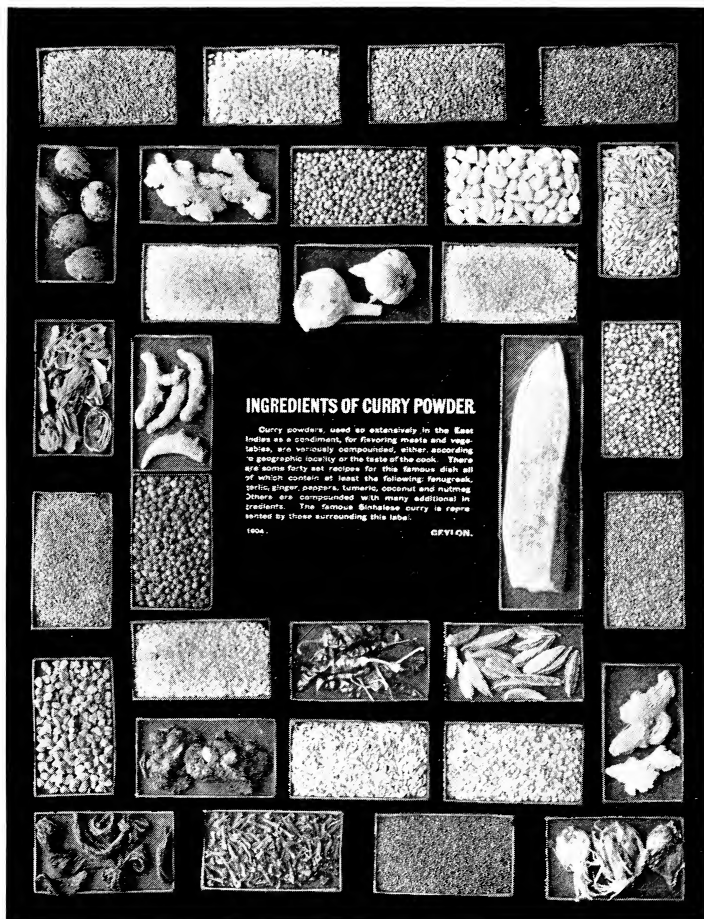
CASE 83.— The steps necessary in the rendering of cotton absorbent for use in surgical practice. Illustration of each process necessary in the conversion of cotton lint into thread. Above—the various types of cotton cloth and cotton laces. (Compare with Linen in Case 53).

CASE 84.— An object illustration of the picking, ginning, and cleaning of cotton and the steps necessary in the extraction of Cotton Seed Oil from the seed.

CASE 85.— The Cottons (*Gossypium*) of the world and various utilizations of the seed, oil stem, and lint. Note Cotton root extract used in medicine; stem-fiber utilized for coarse bagging; table oil, butter and lard substitute, soap, glycerine, etc.; Celluloid and its imitative character for use in lieu of glass, linen, tortoise shell, jade, onyx, ebony, ivory, etc., etc.

#### The Basswood Family (*Tiliaceæ*).

CASE 86.— A large series of specimens illustrative of the extensive use of Linden Bast (*Tilia europea*) by the peasantry of Russia: note, sandals, bags, harness, ropes, boxes, etc., etc. Jute (*Corchorus siliquosus*) and its conversion into cordage and textiles.



A Monographic Series Illustrating the Composition of Ceylonese Curry Powder — Case 80



**The Milkwort Family** (*Apocynaceæ*).

CASE 87.— Right half. Stems, fruit, and fiber of the wild hemp plant of the American Indians (*Apocynum cannabinum*). The various forms of African and Congo Rubber from the Rubber Vine (*Landolphia owariensis*). Note starch, called "Danish" by the Bahama Negro, a product of the tubers of *Echites umbellata*.

**The Gentian Family** (*Gentianaceæ*).

CASE 87.— Right half. Note the various medicinal bases from this family; the North American Buck Bean (*Menyanthes trifoliata*), the American Columbo (*Frasera carolinensis*); and the American Centaury (*Erythrea centaurium*).

**The Strychnine Family** (*Loganiaceæ*).

CASE 87.— Right half. A family having many very poisonous members containing strychnine. Note the Dog Buttons, seeds of *Strychnos nux-vomica*, and the gourd of Guianian Arrow Poison, Woorari, of which *S. toxicaria* is one of the principal ingredients. Note also the Yellow Jasmine (*Gelsemium sempervirens*) of the Southern United States.

**The Olive Family** (*Oleaceæ*).

CASE 87.— Left half. Note that the Olive, the Ash, and the garden Syringa and Privet belong to this family. Note the wood of the Japanese Olive, Hira-gi (*Olea aquifolium*), and the true Olive of the Mediterranean Region (*Olea europea*). Observe Ibota wax or Ibota-ro an insect wax on the Japanese Ash (*Fraxinus pubinervis*), and Clarincillo a similar wax from Mexico. Note the orange-red dye flowers of Harsinghar (*Nyctanthes arbor-tristis*). Observe a fruiting branch of the Olive, a fine series of Olive oils and Castile soaps from olive oil.

**The Mallow Family** (*Malvaceæ*).

(See also Cases 83, 84, 85).

CASE 88.— Various bast fibers from members of this family: the Ceylonese Anoda (*Abutilon asiaticum*), the American Abutilon (*A. avicenne*) the Indian Anodagaha (*A. indicum*) and the Antillean Maholtine (*A. periplocifolium*). Hollyhock fiber (*Althea rosea*) from Italy. Kapukinissa fiber (*Hibiscus angulatus*) from Ceylon; Okra, Vendai or Bandakka fiber (*Hibiscus esculentus*) from the commonly cultivated Gumbo plant the

fruits of which are eaten as a vegetable; Napiretta fiber (*H. furcatus*) from Ceylon; Rose Mallow fiber (*H. moscheutos*) from Louisiana; Majagua fiber from Venezuela the bast of *Parietium tiliaceum* called Belli-papatti in Ceylon; Suriya the fiber of *Thespesia populnea*; Tapkote (*Urena sinuata*) a flax-like fiber of India; and the excellent Aramina fiber (*Urena lobata*) of Brazil which forms a good substitute for jute.

CASES 89 and upward were not installed at the time this edition of the guide was issued.

### THE STUDY COLLECTIONS.

A full series of duplicates of the specimens displayed in each case is preserved in the lockers beneath it. While these collections are secluded, they are at all times at the service of any visitor who desires to examine more intimately any object of special interest. A member of the Department staff will be detailed to open any locker desired, and give such further information as may be possible concerning the specimens, on application to the Curator at his office in the northeast corner of the North Transept Gallery.

### THE HERBARIUM.

The Herbarium of the Department is located in the balcony above the North Transept Gallery. It contains about 250,000 mounted plants and is especially rich in plants of Illinois, Mexico, the Antilles, and the Bahamian Archipelago. These collections are open to specialists and students in Botany at any time, and also to those visitors who desire to examine them. Application should be made to the Curator as stated above.



# Department of Zoology.

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The collections in Zoology occupy Halls 19, 20, 22, 23, 24, 25, 26, 27, the West Court and its alcoves on South Side, and the South Court and its alcoves on the West Side.

## West Court.

Excepting the group of Musk Ox, this court is filled with groups of large mammals collected by the Museum's East African Expedition, in 1896. These groups were all mounted by Mr. C. E. Akeley, the chief taxidermist of the Museum. In the middle of the east end of this court is suspended from the roof of the building the skeleton of a North Atlantic Right Whale (*Balæna glacialis*). This skeleton has a length of 44½ feet.

In the middle of the east end is a group of Musk Ox. (For a description of this and other groups in the West and South Courts see labels in each case).

In the alcove at the west end of the court are three cases: one contains a Sea Lion and Fur Seals; one, Llamas, Alpaca and Vicugna; and one contains a group of Harbor Seals and Elephant Seal.

Beginning at the east end of this court and extending along the north side is a row of large cases, the contents of which are as follows:

A group of Cheetah, or Hunting Leopard, Somaliland, East Africa.

A group of Dibatag, East Africa.

A group of Beisa Antelope, East Africa.

A group of Zebra, Transvaal, S. Africa.

A group of Swayne's Hartbeest, East Africa.

A group of Orang-utans, Borneo.

A group of Striped Hyena, East Africa.

The case at the west end of the court contains a group of the Big Koodoo, East Africa.

Following from the west to the east end on the south side

of this court is a second row of large cases, the contents of which are:

A group of Spotted Hyena, Somaliland, East Africa.

A group of Proboscis Monkeys, Borneo.

A group of Somaliland Wild Ass, East Africa.

A group of the Lesser Koodoo, Somaliland and Ogaden, East Africa.

A group of Waller's Gazelle, Somaliland, East Africa.

A group of Northern Wart Hog, East Africa.

One case with Pacific Walrus, one case with Pumas, east end of West Court.

### Alcoves West Court.

ALCOVE 95.—Male Elephant and young.

ALCOVE 96.—Loggerhead Turtle and Leatherback Turtle; jaws of Bottle Nosed and Sperm Whales; skeleton of Elephant Seal.

ALCOVE 97.—Part of Osteological collection, the rest being installed in Hall 23.

ALCOVE 98.—Rhinoceros; Gaur Ox; models of Grampus, Porpoises, etc.

ALCOVE 99.—Insects. In the cases on the walls of this alcove are arranged a representative series of Butterflies and Moths from Europe, Asia, Africa, North America, and Central and South America. Among them and worthy of attention are the metallic blue Morphos, the richly adorned Caligos, and the brightly colored Catagrammas from tropical America; and the beautiful Bird-wing Butterflies (Troides) from the Malay Archipelago, insects which are unrivalled in the brilliancy of their color.

CASES 1, 2.—Contain a collection of Illinois Insects, illustrating all the orders of this class of animals from the highest to the lowest forms.

CASE 3.—Contains enlarged models of the Silkworm, showing the life-history, anatomy and various phases of the disease that attacks this important insect.

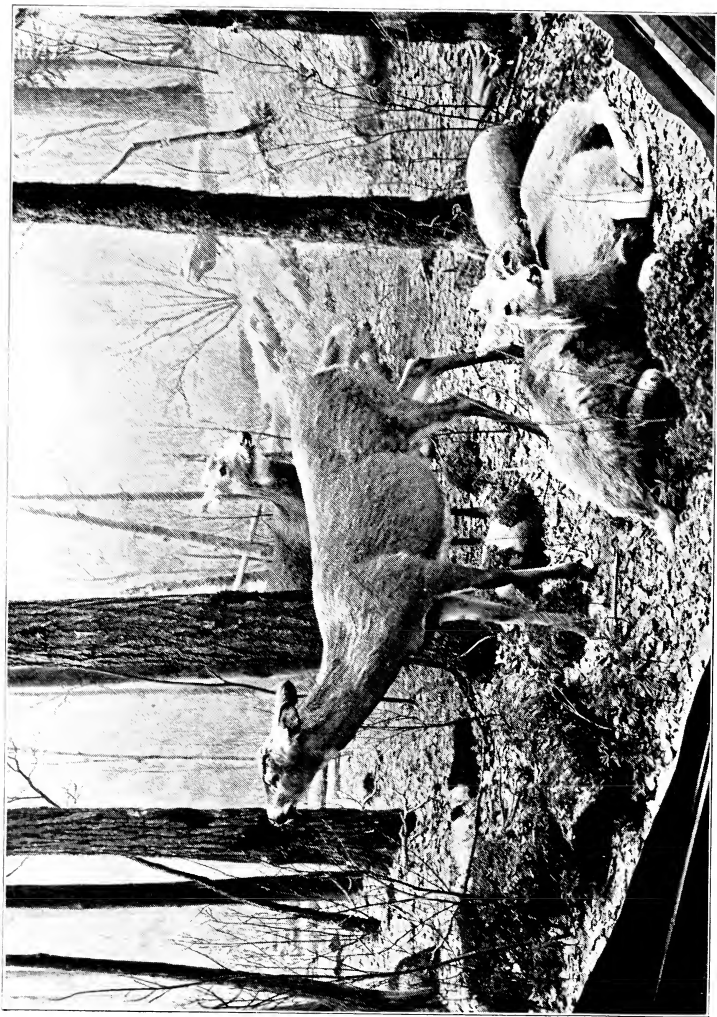
CASES 4, 5, 6.—In these cases is installed temporarily a more complete series of North American Butterflies.

ALCOVE 100.—Birds' eggs and nests.

### South Court.

In the center of this court are four groups of American





Virginia or White-tailed Deer in Spring. C. E. Akeley, Taxidermist

Deer, representing the animals in the four seasons. The case at the north end contains a group of Mountain Sheep, and that at the south end contains a group of Polar Bears.

Under the North Gallery and along the sides of this court are arranged table cases, numbers one to sixteen containing shells.

## COLLECTION OF MOLLUSKS.

The collection of Mollusca contains 7000 species or more. It is believed to represent fairly well the subject of conchology. The collection is shown in 34 table cases, in the South Court. In the arrangement of the families Dr. Paul Fischer's classification in its reverse order has been followed.

CASE 1.— This case contains a small collection of Brachiopoda; these are not Mollusca though in external form they resemble the Lamellibranchiate shells. The Brachiopods were very numerous in earlier geological times. The Molluscs proper follow the Brachiopods in Case 1, the important families represented are the *Anatinidæ*, *Pandoridæ*, *Tellinidæ* and the *Teredinidæ* (Ship Worms), Piddocks, etc. Also examples of injury done submerged wood by the ship worms; *Pholadidæ* (Burrowing Shells); *Myidæ* (Soft-shelled Clams).

CASE 2.— *Solenidæ* (Razor Shells); *Psammobiidæ*; *Donacidæ* (Wedge Shells).

CASE 3.— *Veneridæ*, a very large family which contains many beautiful shells; *Chamidæ*.

CASE 4.— *Cardiidæ* (Cockle Shells); *Tridacnidæ* (Giant Clams); two very large examples of this family can be seen in a separate case.

CASE 5.— *Unionidæ* (River Mussels).

CASE 6.— *Unionidæ* continued.

CASE 7.— In this case is represented a collection of pearl-bearing shells from Wisconsin, also a number of pearls. It contains also representatives of the *Arcidæ* (Ark Shells).

CASE 8.— *Mytilidæ* (Mussels); *Aviculidæ* (Wing Shells), this family includes among other species the "Pearl Oyster," of which specimens are here shown.

CASE 9.— *Pectinidæ* (Scallop Shells); *Spondylidæ* (Thorny Oysters); these two families contain many shells which are interesting on account of their forms and their brilliant colors.

CASE 10.—*Ostreidæ* (Oysters); *Dentaliidæ* (Tooth-shells); *Chitonidæ* (Chitons); *Patellidæ* (Limpet Shells); *Fissurellidæ* (Keyhole Limpets.)

CASE 11.—*Haliotidæ* (Ear Shells, Ablone).

CASE 12.—*Turbinidæ* (Top Shells); *Neritidæ*; *Naticidæ*; *Xenophoridaæ*.

CASE 13.—*Capulidæ* (Cup and Saucer Limpets); *Ampulariidæ* (Apple Snails); *Littorinidæ* (Periwinkles).

CASE 14.—*Melanidæ*; *Turritellidæ*; *Vermetidæ* (worm shells, the shells being more or less contorted like worm tubes); *Cerithidæ*.

CASE 15.—*Strombidæ* (Conch Shells); *Cypræidæ* (Cowries), a family containing some of the most beautiful shells known.

CASE 16.—*Doliidæ* (Tun Shells); *Cassidæ* (Helmet Shells).

CASE 17.—*Tritonidæ* (Triton Shells).

CASE 18.—*Muricidæ*, a large family of mostly spiny and roughened shells.

CASE 19.—*Nassidæ* (Dog Whelks); *Buccinidæ* (Whelks); *Turbinellidæ*.

CASE 20.—*Fasciolaridæ*; *Mitridæ* (Mitre Shells); *Volutidæ*, a family containing many large and beautifully colored shells.

CASE 21.—*Marginellidæ*; *Harpidæ* (Harp Shells); *Olividæ* (Olive Shells).

CASE 22.—*Conidæ* (Cones), an extensive family living mostly in warm seas.

CASE 23.—*Terebridæ* (Auger Shells)

CASE 24.—*Bullidæ*.

CASE 25.—Materials illustrating two groups of Mollusks, many of whose members have the shell rudimentary or wanting entirely. Many of these animals are represented here by beautifully executed glass models; *Limnaeidæ*.

CASE 26.—*Limnaeidæ* continued; *Stenogyridæ*, this family and the remaining ones, which belong to the order Pulmonata, are air-breathing Mollusks, the largest belonging to the genus *Achatina*. Most of the species live in Africa, where they remain in trees, descending to lay their eggs. Some of the eggs are exhibited.

CASE 27.—*Stenogyridæ* continued; *Pupidæ*; *Bulimulidæ* *Helicidæ*.

CASES 28, 29, 30, AND 31.—*Helicidæ* (Air-breathers), a large family containing over 6500 species. Many of the most attractive specimens in these cases are from the Philippine Islands. Some species of *Bulimus* reach a length of six inches. They lay large eggs, which resemble those of birds; some of these are shown.

CASE 32.—*Testacellidæ*; *Limacidæ* (Slugs), a few families of *Pteropoda* and the *Cephalopoda*, a class which includes the Nautilus, the Squids, the Octopus and Argonauts. A few of the soft *Cephalopoda* are represented by means of glass models. A model of the Giant Squid of the coast of New Foundland and the Giant Octopus of the Pacific Coast of the United States are suspended overhead in Hall 24.

### Hall 19.

## MAMMALS.

CASE 1.—Four representatives of the lower sub-class of mammals, the *Prototheria*. Of these the most interesting is the Duck-bill (*Ornithorhynchus*). It is so called on account of its duck-like beak. It is a native of Australia. It is aquatic in its habits and swims with facility. Although a true mammal, the remarkable fact has been discovered that it lays eggs instead of producing living young. The *Echidnas*, or Spiny Ant-eaters, are inhabitants of New Guinea, Tasmania and Australia.

This case also contains members of the second sub-class of mammals, the *Metatheria*, order *Marsupialia*. These comprise the Phalangers, the Bandicoots, the Kangaroos, the Dasyures, all inhabitants of Australia, Tasmania, and New Guinea, and the Opossums, dwellers in the Americas. They present many strange and interesting forms of life. The Phalangers usually live in trees and have prehensile tails. Some species subsist on vegetation, others on insects. The "flying phalangers" resemble our flying squirrels, in having a fold of skin which acts as a parachute. The Bandicoots (*Perameles*) burrow in the earth and subsist on roots and grain. The Kangaroos are grass-eating animals. The Dasyures are devourers of flesh. All the other animals belong to the sub-class *Eutheria*, and are continued in Case 2, and the two cases in the center of the room.

CASE 2.—Contains *Edentates* (*Bruta*). Among the Edentates shown are Armadillos, the strangely armored Pichiciago

from the Argentine Republic, two species of Sloth, several species of Ant-eaters and two species of Scaly Ant-eaters or Pangolins, from Africa. The Armadillos have most of the skin converted into an armor of bony plates. They live on roots, insects, reptiles and carrion. They are able to burrow with astonishing rapidity. The Pichiciago is a very rare burrowing animal. The Great Ant-eater lives on white ants, whose dwelling it tears open with its strong claws. The Pangolins have the body covered with overlapping horny plates. They subsist on ants.

This case also contains two representatives of the Sirenia. These are aquatic herbivorous animals which, in external form, resemble the whales. They have, however, no close relationship with the latter animals. The uppermost specimen is the American Manatee, or Sea-cow, a resident of Florida. The lower specimen is the Dugong from Australia.

CASE 3.—Hogs and Peccaries. The Peccaries here shown go in small herds of eight to ten, and are not as pugnacious as is another species found in South America. This case also contains three interesting species of deer, the Muntjac; the little deer, *Cervus steerii*, the type of its species; and the Sambur of India.

CASE 4.—Female Wapiti; the male of this species is in the South Court.

CASE 5.—Reindeer and its close relative, the Caribou, from Maine. These are the only deer the females of which have well developed horns.

This case also contains the female Moose.

CASE 6.—The male Moose.

### Hall 20.

CASE 7.—Several species of deer, including the Pronghorn or American Antelope.

CASE 8.—Two species of Antelope from British East Africa—Lichtenstein's Hartebeest, and Cooke's Hartebeest.

CASE 9.—The Sassabye.

CASE 10.—Two species of Gnus, the White-tailed Gnu and the White-bearded Gnu.

CASE 11.—Salt's Dik-dik, Eastern Abyssinia; Kirk's Dwarf Antelope, British East Africa, a very small species of antelope, remarkable for its projecting and distensible snout, and for the



tuft of hairs between the horns. It is said to frequent rocky hills. The case also contains the Indian Antelope, the Palla, and the Waterbuck.

CASE 12.— The Indian Gazelle, India; the Persian Gazelle and Grant's Gazelle, Africa.

CASE 13.— Contains a fine example of the Roan Antelope, a stately animal from Africa.

CASES 14 AND 15.— A number of goats and sheep from various regions of the world.

CASE 16.— An example of the Musk-Ox, from Great Slave Lake and the Tamaroa, three specimens. The Tamaroa is one of the most generalized of the buffaloes. It inhabits the Philippine archipelago.

CASE 17.— Old male, young male, cow and calf of the American Bison.

CASE 18.— Malayan Tapir, Burchell's Zebra and Common Zebra.

CASE 19.— Grevy's Zebra, male and female, from East Africa.

CASE 20.— Contains the gnawing animals (*Rodentia*). Among these are exhibited specimens of the Squirrels, Spermophiles, Rats, Mice, Muskrats, Beavers, Hares, Rabbits, the Capybara, Chinchillas and Porcupines. The Capybara is the largest living rodent. It is the prey of the Jaguar. The Chinchilla (*Lagidium*) here shown is not the true Chinchilla so prized for its soft fur. The Porcupines are remarkable for their long sharp spines. They are not able to shoot these out at their enemies.

CASE 21.— In this case begins the extensive order of flesh-eating animals (*Carnivora*). In the upper division of the case are exhibited several species belonging to the interesting family of cats; in the lower portion are Lions and Tigers, a male and female of each.

CASE 22.— Specimens of two species of Hyenas, and several species of Dogs and Foxes.

CASE 23.— Three Grizzly Bears, two adults and one young. In this case are also exhibited the Polar Bear; species from the Himalayas and Japan, and the Sun-bear from Borneo.

CASE 24.— The upper portion of this case contains the *Procyonidæ* (Raccoons, Panda, etc.), and the lower part contains species which belong to the large family of *Mustelidæ*.

Among the interesting forms are the Otters, Sea-otter, the Skunks, Badgers, Martens, the Glutton, etc.

The Minks, Wolverine, etc., are in the lower portion of Case 25, in the upper part of which are displayed the Insectivora, among which are found the strange Tenrec (*Centetes*) of Madagascar, the Solenodon from Cuba, the Hedge-hog, the Shrews, the Moles, and the so-called Flying Lemur (*Galeopithecus*) from Sumatra.

CASE 26.—In the south half of this case are Chiroptera (bats), among which are some large and remarkable species. The larger species belong to the family of Fruit-bats, living on fruits and the juices of plants. The smaller bats subsist mostly on insects.

In the north half of this case, and in Case 27, are representatives of the order Quadrumana, containing the Lemurs, Monkeys, and Chimpanzee. Some twenty-seven species are here shown. There is a case of Orangs, and another of Proboscis Monkeys exhibited in the West Court.

## Hall 22.

### FISHES AND REPTILES.

In this hall are representatives of the cold-blooded vertebrates or vertebrate-like animals which are included in the following classes: *Tunicata* (the Ascidiens); *Leptocardii* (the Lancelets); *Marsipobranchii* (the Lampreys); *Pisces* (the Sharks, Rays and the true fishes); *Batrachia* (Salamanders, Frogs, Toads, etc.); *Reptilia* (Snakes, Lizards, Turtles, etc.).

The first four classes are represented in the six cases in the north half of the hall, the remaining two classes are in the three cases in the south quarter of the hall, while the remaining two cases contain animals too large to be placed in the other cases where they properly belong.

CASE 1.—This case contains some material representing the group of Ascidiens (*Tunicata*). It consists almost wholly of glass models. There is also a small amount of material belonging to the *Leptocardii* and the *Marsipobranchii*.

CASES 1 TO 6.—The true fishes begin in Case 1. As far as possible they are arranged in systematic order, beginning with the *Selachii* (Sharks) and ending in Case 6 with the *Pediculati* (Bat-fishes, etc.).

CASES 7 AND 8.— Contain fishes and reptiles too large to be placed in cases where they properly belong. The labels indicate their position in the series.

CASE 9.— *Amphibia*. The collection of amphibians is small, and is arranged in the upper portion of this case. Only two forms are represented, *Gradientia* (the Salamanders) and the *Salientia* (the Frogs, Toads, etc.)

The *Reptilia* also begin in this case and are continued in Cases 9, 10, and 11. The living orders are represented; *Rhynchocephalia*, embrace the New Zealand Tuatera; *Squamata*, containing the Snakes and Lizards; *Chelonia*, Turtles; and *Crocodylia*, Crocodiles, Alligators, Gavials. Among the conspicuous reptiles exhibited are the Alligators, the Cayman, the Gavial, the large specimen of the Lace Lizard (*Varanus*), the Pythons, etc.

### Hall 23 and Alcove 97.

The Osteological collection consists of mounted skeletons of over 225 species. These belong to over fifteen orders and thirty families. It affords an excellent means for the study of the vertebrates.

CASE 1.— Occupies the west side of Alcove 97, and contains the skeletons of cold-blooded vertebrates.

CASE 2.— In Hall 23. Contains skeletons of the Ostrich, Emu, and the Rhea.

CASE 3.— The remainder of the birds. The rest of the cases contain the skeletons of mammals, the arrangement corresponding to that of the mammals in Halls 19 and 20, viz., beginning with the Prototheria and ending with the Quadrumana. In the middle of Hall 23 are skeletons of the Giraffe, Elephant, Hippopotamus, and the Rhinoceros; in the middle of Alcove 97, the Camel and Wapiti.

### Hall 24.

## SPONGES, JELLY-FISH, CORALS, ETC.

In this hall are exhibited materials illustrating the branches of the animal kingdom known as the *Protozoa* (the one-celled animals), the *Coelenterata* (Sponges and Corals), and the *Echinodermata* (Crinoids, Starfishes, Sea-urchins and Sea Cucumbers).

CASE 1.— Contains on one side the Protozoa, mostly animals of microscopic size. These are illustrated by models rep-

representing them magnified about 2300 times. Next in order are the *Porifera* or Sponges. These include some interesting forms such as Neptune's cup, the Glass-rope sponge, Venus' flower basket, etc. On the other side of the case are the Millepores, and Stylasters, and models representing the Jelly-fishes — such as the Portuguese Man of War.

CASE 2.— Contains representatives of the *Alcyonaria* (Eight-rayed Polyps). This group contains the Sea-fans, Sea-feathers, Organ-pipe Coral and Red Coral. These are continued in Case 3.

CASES 3, 4, 5 AND 6.— Contain the *Zoantharia*, which includes the Sea-whips, the Sea Anemones, and the Stony Corals. At the end of Case 6 are a few models representing the *Ctenophora* or Comb-bearing Jelly-fishes.

CASES 7 AND 8.— Contain part of the *Echinodermata*, which includes the *Crinoidea* (Sea Lilies, etc.); the *Ophiuroidea* (Brittle Stars and Basket Stars) and part of the *Asteroidea* (Star Fishes).

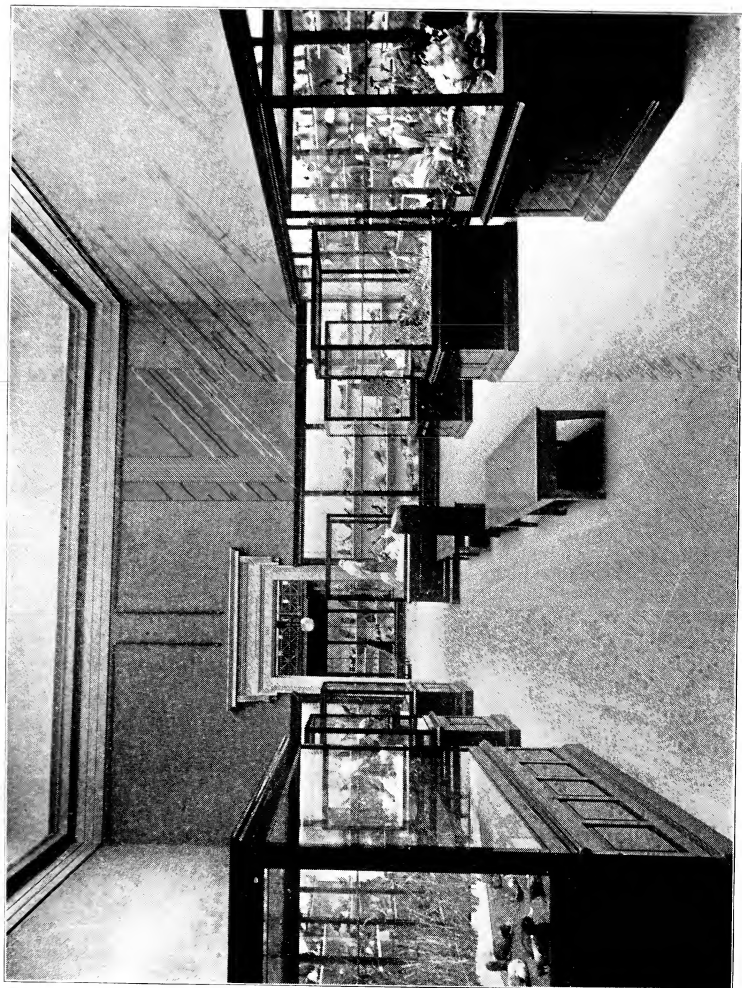
CASE 9.— Contains the *Echini* (Sea-urchins); and *Holothuria* (Sea Cucumbers).

CASES 10 AND 11.— Contain the *Vermes* (Worms); and *Crustacea* (Barnacles, Lobsters and Crabs).

## STUDY COLLECTIONS.

The study collection of Mammals, Fishes, Reptiles and Insects, consisting of thousands of specimens contained in tin, air tight cases and glass jars, is located in the balcony over the south entrance, and is accessible during museum hours to those who may desire to study the material or compare specimens. Every attention is paid to this important adjunct to the exhibition series, for the assistance of scientific investigation. The study collection of bird skins containing between thirty-five and forty thousand specimens is installed in the gallery of Hall





Hall 26. General Ornithology

# Birds.

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The collection of mounted birds occupies Halls 25, 26, and 27; and Alcove 100, in the West Court, is devoted to birds' eggs.

## Halls 25 and 26.

### GENERAL ORNITHOLOGY.

In this hall are represented about 550 species illustrating the characteristics of about 100 families. They are arranged systematically, beginning with the degenerates, which have lost the power of flight, and the diving birds, and ending with the highly specialized passerines.

#### Center Cases.

CASE A.— A group illustrating the peculiar domestic arrangements of the rhinoceros hornbill during the breeding season.

CASE B.— "A Surprised Mother," representing a domestic hen as mother of a lot of ducklings that are represented as plunging into a basin of water.

CASE C.— A group showing the nesting site and a pair of prairie chickens.

CASE D.— A group of quail in various attitudes.

CASE E.— A group of the American eider duck.

CASE F.— A group of the American robin, showing the nest and eggs, and the parent birds much excited by the approach of a black snake.

CASE G.— A group representing a section of a pond with the shore line fringed with grass. A group of ducks are shown; some stand on the shore, and others are swimming about near the edge of the pond, while in the background, half hidden by the grass, a Florida lynx is seen stealing upon the unsuspecting birds. Three species of ducks are shown in this group: The pintail, lesser scaup duck, and ring-necked duck.

CASE H.— A group composed of an adult African ostrich, a chick, and an egg.

CASE I.— Winter scene in the far North illustrating the protective coloration of birds inhabiting high latitudes.

**Hall 27.**

**BIRDS OF ILLINOIS.**

Devoted exclusively to Illinois birds, and their eggs. The specimens are arranged by families in vertical sections, beginning at the right hand of the entrance from Hall 26; the order of classification being that adopted by the American Ornithologists' Union.



# Department of Anthropology.

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NATURE AND PURPOSE OF COLLECTIONS:—The aim of the collections in the Department of Anthropology is to represent the different cultures which have existed and which are in existence at the present time. No attempt has been made to represent the culture of modern Europe, especial attention having been paid to the culture of more primitive people. The collections are installed in two well-marked groups according to two general divisions of anthropology. The first group relates to physical man, the exhibits being anatomical in nature, while the second group relates to man's culture, the basis of the study of which is psychology.

In the first group of exhibits are found the apparatus and appliances in general use in the study of physical anthropology, an extensive collection of crania, skeletons, casts, and other material illustrating the physical characteristics of types and races. A part of these exhibits is arranged in the gallery of the East Court.

The second great group in the Department of Anthropology comprises extensive collections representing past and present cultures; hence is both archaeological and ethnological in nature. The ethnological collections are those illustrating the living and the historical peoples, and as a rule are arranged according to the tribe or cultural area to which they pertain. The prehistoric collections are brought together in groups according to the locality from which they are derived, or, in certain cases, according to the people or time which they are thought to represent.

The archaeological and ethnological collections are placed on the main floor and occupy the entire east half of the building, also the North Court, the east alcoves of the South Court, the north alcoves of the West Court, and Halls 30, 31, and 34 in the northwest quarter of the building.

An attempt has been made to represent the cultures of the tribes or groups in an order corresponding as far as possible with their original geographical relations. Owing to the crowded condition of the department, and through the rapidity

of its growth, it has been found, however, impracticable to maintain for the present a satisfactory order. As a consequence, the order in which the collections are found will not be the best one in which to study them.

ORIGIN OF COLLECTIONS:—As to their origin the exhibits may be grouped in three principal categories: (1) Collections made for the World's Columbian Exposition by its Anthropological Department and turned over to the Museum at the close of the Fair; (2) Collections from various sources exhibited by the owners at the World's Fair, in the Anthropological Building and elsewhere, and acquired by the Museum by gift or purchase; (3) Collections not shown at the Fair, but acquired by gift, collection, or purchase, subsequent to the foundation of the Museum.

In this first group are many important collections secured as the result of investigations undertaken for the World's Fair under the direction of Professor F. W. Putnam. The archaeological collections thus obtained are those made by W. K. Moorehead, in the Little Miami and Ross county, Ohio, Ernest Volk in New Jersey, Harlan I. Smith in Michigan, C. L. Metz in Ohio, E. H. Thompson in Yucatan, M. H. Saville, and J. G. Owens in Central America, Lieutenant J. P. Scrivin in Costa Rica, and G. A. Dorsey in Peru, Ecuador, Chili and Bolivia. The ethnological collections include those made on the North Pacific Coast by Deans, Jacobson, Eells, Swan, Morrison and Hunt, all under the personal direction of Dr. Franz Boas; by Isaac Cowie, among the Cree; by E. F. Wilson, among the Assiniboin; by J. M. McLean, among the Blackfeet; and by F. P. Hall among the Ojibwa.

Of the collections of the World's Fair exhibits which were obtained by gift or purchase the following are the most important: Those by gift, the extensive collection from Mr. Edward E. Ayer which comprises ethnological material from the Northwest Coast, California, the Southwest, the Plains, and archaeological material from California, the Great Lakes region, the Mississippi and Ohio valleys, and Mexico, is the most important. Valuable collections were also donated by the governments of British Guiana, Mexico, and Nicaragua. Collections acquired by purchase are the Montez collection illustrating the archaeology of the interior of Peru, the Colombia collection of gold, silver, stone, and pottery from ancient Chibcha graves;

the Hassler collection from the Gran Chaco region of Paraguay; the Umlauff collection of ethnological material from northwestern America and from Patagonia, Africa, and Oceanica; the Peace collection from Melanesia; the Finsch collection from Polynesia; the Wyman collection of copper and stone implements from Wisconsin; the Boas collection of skulls and skeletons; the Remenyi collection from South Africa; the Pogosky collection from Siberia; the Lumholtz collection from Mexico; the Green cliff-dweller collection; the Harris collection from Peru; the Johnson collection of Irish jewelry, the Ward collections of skulls, skeletons, masks, etc., and the Cunningham collection of brain models.

The remaining collections found in the Department to-day have been secured since the opening of the Museum in 1894. These collections are so numerous that even the most important of them may not be enumerated. Most of them have been acquired by expeditions in the field. Some of these expeditions have been due to the generosity of friends of the Museum, especially to Mr. Stanley McCormick, Mr. Robert F. Cummings, Mr. Martin A. Ryerson, Mr. Harlow N. Higinbotham, Mr. Edward E. Ayer, and Mr. Allison V. Armour.

Investigators who have been largely responsible for these collections, and who have spent much time in the field, are the curator of the department, the two assistant curators, Mr. H. R. Voth, Dr. C. F. Newcombe, Dr. J. W. Hudson and Dr. M. L. Miller. The extensive collection of Etruscan, Roman, and Egyptian antiquities is due entirely to the interest of Mr. Edward E. Ayer. From the Bureau of Ethnology and the National Museum were obtained by gift large and interesting collections of Pueblo models, pottery, and material from ancient stone quarries. Several important collections have also been secured by exchange since the opening of the Museum. Among the most important of these may be mentioned the large collection of skulls, skeletons, and other material from the cliff ruins of the Southwest from the Brooklyn Institute Museum, Eskimo material from the American Museum of Natural History of New York City, a large number of skulls from the Ontario Archaeological Museum, an archaeological collection from the British Museum, a collection of shields from the United States National Museum, and a large collection of Brazilian material from the Museum für Völkerkunde of Berlin.

PLACEMENT OF COLLECTIONS:—The Department occupies the North Court, the east alcoves of the South Court, the north alcoves of the West Court, Halls 30, 31 and 34 in the northwest quarter of the building, all of the east half of the building including nearly all of the east annex, and the east and south galleries of the East Court. The more precious exhibits of the Department, especially those of gold, are installed in Hall 32.

The North Court is occupied mainly by collections illustrating the archaeology of Europe.

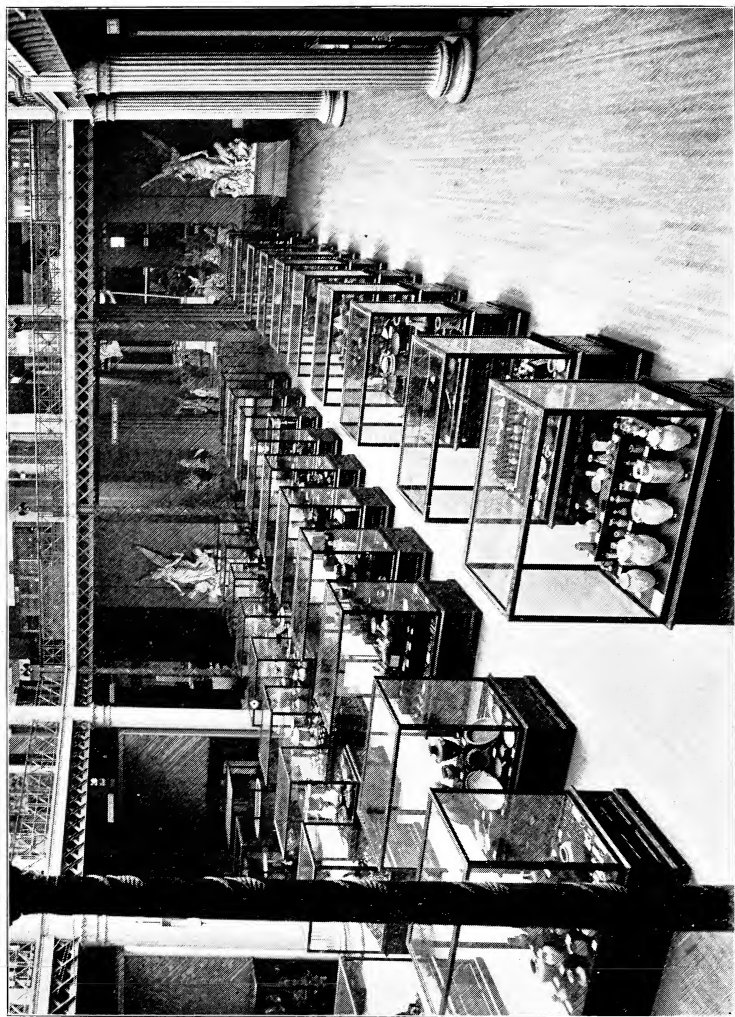
The east alcoves of the South Court are devoted to overflow collections of North American ethnology.

The East Court and its alcoves contain groups of exhibits relating to North and South American archaeology.

Hall 9 is filled with Egyptian antiquities, and halls on the north side (1, 2, 3, 4, 5, 6, 7, and 8), and the entire southeast section (11, 12, 13, 14, 15, 16, 17, and 18) are devoted to the ethnology of America. (Hall 18, or Ayer Hall is devoted especially to collections donated by Mr. Ayer, which pertain exclusively to the tribes of the Great Plains.) Hall 1 is devoted to temporary exhibits of newly acquired or loan collections. At present it is occupied by material from New Guinea; Halls 2 and 3 are occupied by exhibits from the tribes of the Columbia River and adjacent regions; Hall 4 is occupied by collections from the Eskimo; Halls 5 and 6 contain overflow collections from the Plains hall and are devoted exclusively to the Algonkin tribes of the Plains. Hall 7 may be regarded as a continuance of Halls 16 and 17 of the opposite sections; it is devoted to the non-pueblo tribes of the Southwest, namely, the Navaho, Apache, and tribes of Piman and Yuman stock. Hall 8 contains archaeological collections from the Southwest.

The east alcoves of the South Court and Halls 10, 11, 12, 13, 14, and 15, contain collections from the Northwest Coast. Halls 16 and 17 are devoted to the Hopi Indians of the Southwest, and with Hall 8 represent the results of the Stanley McCormick Hopi expeditions.

The north alcoves of the West Court contain overflow collections from Ayer Hall and are devoted to the Caddoan tribes of the Plains. Halls 30 and 31 contain ethnological collections from Mexico, Colombia, Venezuela, British Guiana, Brazil, Paraguay, and Argentina. Hall 34 is devoted exclusively to collections from California; the collections from the Mission Indians are necessarily placed in Hall 2.



General View of North Court Showing European Archaeology



The collections from the Islands of the Pacific, Asia, and Africa, are being rearranged in the East Annex, the provisional assignment of the halls being as follows: Halls 37, 38, 39, 40 and 55 are devoted to the Robert F. Cummings Philippine collection and other collections from Malaysia; in Halls 41, 42, 43 and 44 will be installed collections from Asia; in Hall 57 will be found collections from the Polynesian, Melanesian, and Micronesian Islands of the Pacific; while in Halls, 50, 51, 52, 53, 56 and 58 will be installed ethnological material from Africa. The storage collection of physical anthropology, instruments, and apparatus used in anthropometry and osteometry will be found in Hall 49. The collections of physical anthropology opened to the public are found in the south gallery of the East court.

## ARCHAEOLOGY.

### North Court.

#### EUROPEAN ARCHAEOLOGY.

The central floor space and many of the alcoves of this court are devoted principally to European archaeology.

CASES 1, 6 AND 7.— Contain the Johnson collection of reproductions of Irish antiquities, consisting of crosses, croziers, shrines, bells, harps, drinking-horns, vases, and personal ornaments. This is justly regarded as a most remarkable and interesting collection — the reproductions having been made with the utmost care.

CASES 2, 5, 8, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, AND 24.— Contain many Roman antiquities, a large part of the bronzes being reproductions from the originals now preserved in the Naples Museum. Of the reproductions, special attention may be called to the tables, braziers, chairs, etc., installed on pedestals in the court and alcoves. These collections were assembled by President E. E. Ayer during the years 1894, 1895 and 1896.

CASES 3 AND 4.— Contain nearly two hundred examples of the exquisite glassware of the ancient Mediterranean nations. Much of the great number are credited to the Romans, whose influence and art extended over so many widely separated regions, but it is believed that a limited number of specimens are Phœnician. The uses were largely those of the toilet. The forms and sizes are varied, and the color is in many cases attractive and brilliant.

CASES 11, 14, 17, 20, 25, 27, 28, AND 30.—These exhibits are mainly the contents of ancient Etruscan tombs, and consist of urns, vases, ornaments, etc., of special interest.

ALCOVE 121.—Reproductions of objects of bronze from Pompeii, on pedestals, originals preserved in the Naples Museum.

ALCOVE 122, CASES 47 AND 48.—The wall cases contain an excellent series of images and other works of art in stone, bronze, wood, earthenware, etc., relating to the religious beliefs and observations of various oriental peoples. Buddhist and Brahmanist subjects predominate. Forming a part of the same series are an elaborately wrought brass incense burner from Benares, India, and the model of a Japanese Buddhistic altar, occupying spaces next the doorway.

CASE 23.—Contains an Etruscan funeral bed.

CASE 26.—Contains an Etruscan decorated tomb.

CASE 29.—Contains an Etruscan decorated tomb.

ALCOVE 120, CASE 31.—Contains two ancient Roman stone grain mills.

ALCOVE 119, CASES 32 AND 33.—Contain archaeological material from Swiss lake dwellings; England, Ireland, Italy, and India.

ALCOVE 118, CASES 24, 35, AND 36.—Contain copies of the Bernays and Hildersheim treasures, also replicas of other historical gold and silver plate.

ALCOVE 117, NOS. 37, 38, AND 39.—Three large ancient Roman stone wine jars.

ALCOVE 124.—Wall, mural decorations from Bosco Reale; center, two Etruscan tombs.

ALCOVE 123, CASE 40.—Contains mural decorations from a village at Bosco Reale, near Pompeii.

CASE 41.—Contains Etruscan tiles, plaques.

CASE 42.—Contains an original Roman bronze bath tub.

CASE 43.—Contains original objects of bronze of great interest.

CASE 44.—Contains an original Roman bronze bath tub.

CASE 45.—Contains ancient Italian tiling.

CASE 46.—Contains mural decoration from a villa at Bosco Reale, near Pompeii.



## East Court.

## ARCHAEOLOGY OF AMERICA.

## The Central Floor Space.

The installation of the exhibits of this court and its alcoves may not be considered permanent, as collections are constantly being added which necessitate the shifting of the position of the collections. The general plan, however, is to keep the collections from South America in the south alcoves, and the collections illustrating processes of manufacture of stone implements, in the center of the court in the south row of cases.

Beginning at the west is a case containing a group of three Indians executed in plaster and elaborated with much detail. They are represented as engaged in the work of quarrying boulders and roughing out stone implements from them, there is also a case containing a model of the Serpent Mound in Adams county, Ohio. About these cases are many interesting reproductions of Central American stone carvings.

The contents of several table cases are devoted to illustrating the ancient flint, copper, soapstone and red pipestone quarries of the United States.

Eleven table cases contain interesting archaeological material from Kentucky, Missouri, Illinois, Michigan, Wisconsin, Ohio, Indiana, Maine, and Canada, and objects from the Cliff Dwellings of Utah.

Six table cases on the north side contain interesting and valuable collections from Yucatan, Chiapas, Oaxaca, Mexico.

At the east end of the court are models of the Pueblos of Hano, Arizona, Taos, New Mexico, Acoma, New Mexico, and Peñasco Blanco, New Mexico.

Swung at various points beneath the galleries are boats representing many primitive peoples, and along the sides and at the ends of the court are exhibited totem poles or heraldic columns from British Columbia and Alaska.

CASE 1.— Manufacture of gun flints from Brandon, England.

CASES 2 AND 3.— Manufacture of stone implements from Mill Creek, Illinois.

CASE 4.— Manufacture of stone implements from Illinois.

CASE 5.— Manufacture of stone implements from Peoria, Indian Territory.

CASE 6.— Manufacture of stone implements from eastern Wyoming.

CASE 7.— Manufacture of stone implements from District of Columbia and Arkansas.

CASE 8.— Aboriginal copper mining implements from Michigan. Manufacture of soapstone vessels from the District of Columbia. Manufacture of stone implements from Minnesota, Wyoming, Virginia, Pennsylvania, Ohio, and California.

CASE 9.— Manufacture of stone implements from Flint Ridge, Ohio, and cave finds from Missouri.

CASE 10.— Archaeology of Delaware Valley.

CASE 11.— Archaeology of Delaware Valley.

CASE 12.— Archaeology of Delaware Valley.

CASE 13.— Archaeology of Delaware Valley.

CASE 14.— Shell heaps of Maine.

CASE 15.— Archaeology of Chalcaqui, Argentine Republic.

CASE 16.— Archaeology of Chalcaqui, Argentine Republic.

CASE 17.— Archaeology of Chalcaqui, Argentine Republic.

CASE 18.— Archaeology of Chalcaqui, Argentine Republic.

CASE 19.— Cliff dweller remains from New Mexico.

CASE 20.— Archaeology of Georgia.

CASE 21.— Archaeology of Ohio.

CASE 22.— Archaeology of Canada, Kentucky, and Indiana.

CASE 23.— Archaeology of Indiana.

CASE 24.— Stone implements of Wisconsin.

CASE 25.— Copper implements from Wisconsin.

CASE 26.— Archaeology of Hopewell group of mounds, Ohio.

CASE 27.— Archaeology of Mexico.

CASE 28.— Archaeology of Valley of Mexico.

CASE 29.— Archaeology of Valley of Mexico.

CASE 30.— Archaeology of Valley of Mexico.

CASE 31.— Ruins of Xkichmook, Yucatan.

CASE 32.— Ruins of Chichen Itza, Yucatan.

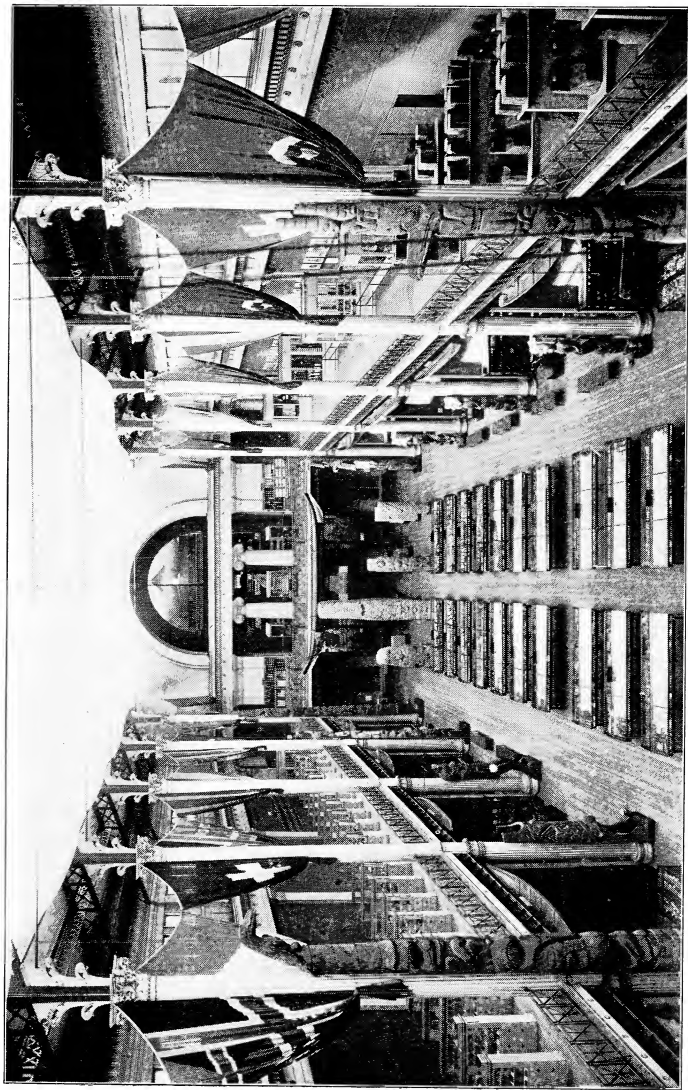
### Alcoves of the East Court.

ALCOVE 81.— Reproductions of Central American antiquities.

ALCOVE 82, CASE 1.— Prehistoric pottery of Mexico.

CASE 2.— Stone carvings from Valley of Mexico.

CASE 3.— Carved stone figures. Mexico and Central America.



General View of East Court Showing American Archaeology and Alaskan Totem Poles; Physical Anthropology and Botany in Gallery



- CASE 4.— (Temporary.) Archaeology of Mexico.  
ALCOVE 83, CASES 1, 2, 3, 4, AND 5.— Objects from the Hope-well group of mounds, Ohio.  
ALCOVE 84, CASE 1.— Archaeology of Costa Rica.  
CASES 2 AND 3.— Temporary installation of archaeological material from Archaeology of Mexico.  
CASE 4.— Archaeology of Nicaragua.  
ALCOVE 85, CASES 1 AND 3.— Prehistoric pottery from Arkansas.  
CASE 2.— Archaeology of Illinois.  
CASE 4.— Archaeology of Alabama, Florida, and Arkansas.  
CASE 5.— Archaeology of Illinois and Missouri.  
ALCOVE 86, CASE 1.— Archaeology of California.  
CASES 2 AND 3.— Pottery, woven articles, etc., from Cliff Dwellers.  
CASE 4.— Prehistoric pottery from Utah and New Mexico.  
ALCOVE 87.— Models of cliff dwellings.  
CASE 1.— Archaeology of Southwestern Colorado.  
ALCOVE 89, CASES 1, 2, 3 AND 4.— Prehistoric pottery, objects of stone, wood, and metal from Cuzco, Peru.  
ALCOVE 90, CASES 1, 2, AND 3.— Prehistoric pottery, objects of stone, wood, etc., from Santa Valley, and Northern Peru.  
CASE 4.— Archaeology of Iquique, Chili.  
CASE 5.— Objects of copper, wood, stone, and bone Necropolis, of Caldera, Chili.  
ALCOVE 91, CASES 1, 2, 3 AND 4.— Prehistoric pottery and contents of graves from Sierra Gorda, Ancon, Chancald, Cerro Azul, Peru.  
ALCOVE 92, CASES 1, 3, 3, 4 AND 5.— Contents of graves, mummies, Ancon, Peru.  
ALCOVE 93, CASES 1, 2 AND 4.— Prehistoric pottery from Colombia.  
CASE 3.— Archaeology of La Plata Island, Ecuador.  
ALCOVE 94.— Reproductions of Central America.

## ETHNOLOGY.

Owing to the rapid increase in the collections of ethnology and the peculiar size and arrangement of the halls and courts of this temporary building, it has not been possible to maintain

a geographical arrangement of material such as would be necessary to bring out the historical and psychological relationship of the collections. One desiring to obtain a comprehensive systematic view of the collections from North America would visit these halls in the following order: Halls 4 and 10, the east alcoves of the South Court, Halls 14, 15, 11, 12, 13, 3, 34, 17, 16, 8, 7, 6, 5, the north alcoves of the West Court, and Hall 18. Thus one would visit in order the collections from the Eskimo, the tribes of the North Pacific Coast, California, the Southwest, and the Plains. From the peoples of these regions are very extensive collections, nearly every tribe being represented.

### Hall 1.

This hall at present is devoted to the temporary exhibition of newly acquired or loan collections. At present it is occupied by very large collections representing several districts or cultural areas of North Guinea.

### Hall 2.

This hall contains certain collections from the tribes of the Columbia River region which properly belong to Hall 3.

### Hall 3.

CASE 1.— Implements of stone, baskets, games, etc., Wasco Indians, Oregon.

CASE 2.— Drums, painted and carved hide packing bags, costumes, Warm Springs, Oregon.

CASE 3.— Baskets, Klikitat Indians, Washington.

CASE 4.— Costumes, ornaments, horse-trapping implements, and utensils, Nez Perce Indians, Idaho.

CASE 5.— Costumes, ornaments, packing bags, musical instruments, Umatilla Indians, Oregon.

CASE 6.— Costumes, shields, implements, Comanche Indians, Oklahoma.

CASE 7.— Costumes, water jars or basketry, ornaments, games, utensils, Uintah Ute Indians, Utah.

CASE 8.— Painted hide and beaded bags, utensils, drums, flutes, Shoshoni Indians, Wyoming.

CASE 10.— Costumes, utensils, games, etc., Bannock Indians Idaho.

CASE 11.— Costumes, ornaments, etc., Ute Indians, Utah.

CASE 12.— Personal ornaments, amulets, dance paraphernalia, Shoshoni Indians, Wyoming.

CASE 13.—Objects of dress and ornaments, games, etc., Shoshoni Indians, Wyoming.

CASE 14.—Woven bags, Nez Perce Indians, Idaho.

CASE 15.—Costumes, hats, drum, painted packing bags, Yakima Indians, Washington.

CASE 16.—Costumes, Warm Spring Indians, Oregon.

#### Hall 4.

### ESKIMO.

This entire hall is devoted to collections from the Eskimo of Alaska, Siberia, Hudson Bay, and Greenland. Several groups with details carefully arranged, impart interest and instruction.

CASE 1.—Sleds, harness and whips.

CASE 2.—Eskimo hunter in kayak, with throwing stick and spear.

CASE 3.—Models of houses.

CASE 4.—Clothing from Yukon River, Alaska.

CASE 5.—Mats, basketry, etc., from Alaska and Siberia.

CASE 6.—Clothing, from Siberia.

CASE 7.—Bows, arrows, throwing sticks and lamps, from Alaska, Siberia, and Greenland.

CASE 8.—Cutting and digging implements, from Alaska and Siberia.

CASE 9.—Clothing from Greenland.

CASE 10.—Harpoons, ice scoops, blubber hooks, from Alaska, Siberia, Hudson Bay, and Greenland.

CASE 11.—Darts, paddles, and hunting knives, from Alaska, Siberia, and Greenland.

CASE 12.—Eye shades, seal calls, toggles, skin combs, implements, pipes, powder flasks, snuff mortars, and masks.

CASE 13.—Clothing from Northern Alaska.

CASE 14.—Industrial group—man drilling ivory and woman dressing a skin.

CASE 15.—Clothing, from Hudson Bay.

CASE 16.—Group of Eskimo family, with dogs and sleds.

CASE 17.—Snow knives, harpoon foreshafts, ivory boxes, man's working knives, net-making implements, ivory carvings, fish lines and bird snares.

CASE 18.—Girl fishing through hole in the ice.

Suspended above are the skin boats. Around the walls are placed fishing nets.

### Halls 5 and 6.

These halls at present contain collections from Polynesia, Micronesia, and Malanesia, but will soon be installed with collections from the Algonkin tribes of the Plains, which properly form a part of Ayer Hall.

### Hall 7.

This hall contains collections from the non-Pueblo tribes of the Southwest. Those from the Piman and Yuman stocks are found in the east half of the hall, while those from the Navaho and Apache are found in the west half of the hall. The Navaho and Apache are tribes of Athapascan stock.

### Hall 8.

The archaeological specimens of the Hopi Indian collections, presented by Mr. Stanley McCormick, are installed in this hall, and consist of pottery, bahos, stone slabs, implements and ornaments, from graves and ruins of Arizona and New Mexico.

CASE 1.— Ruins at Chevalon, twelve miles southeast of Winslow, Arizona.

CASE 2.— Ruins at Homolobi No. 2, seven miles north of Winslow.

CASE 3.— San Cosmos, Arizona.

CASE 4.— San Cosmos, Arizona.

CASE 5.— Ojo Caliente, New Mexico.

CASE 6.— Bittahoochee, Arizona.

CASE 7.— Ruins of Walpi, Arizona.

CASE 8.— Mishongnovi, Arizona.

CASE 9.— Sikyatki, Arizona.

CASE 10.— Sikyatki, Arizona.

CASE 11.— Homolobi No. 1, Arizona.

CASE 12.— Homolobi No. 1, Arizona.

CASE 13.— Homolobi No. 1, Arizona.

CASE 14.— Homolobi No. 1, Arizona.

CASE 15.— Homolobi No. 1, Arizona.

CASE 16.— Holomobi No. 1, Arizona.

CASE 17.— Round Valley, "X Ranch," Arizona.

CASE 18.— Ruins along Little Colorado River, Arizona.

CASE 19.— Various small ruins of Tusayan, Arizona.

CASE 25.— Ruins of Chukubi and Awatobi, Arizona.

CASE 21.— Ruins of Walpi, Arizona.



CASE 22.— Ruins of Walpi, Arizona.

CASE 23.— Ruins of Walpi, Arizona.

CASE 24.— Ruins of Mishongnovi, Arizona.

CASE 25.— Painted stone slabs and bahos, from ruins of Walpi, Arizona.

CASE 26.— Painted stone slabs and bahos, from ruins of Walpi.

(Halls 16 and 17 are also devoted to Hopi collections).

### Hall 9.

## EGYPTIAN ARCHAEOLOGY.

In this hall are installed the extensive collections brought together by Mr. Edward E. Ayer and others:

CASE 1.— Contains five mummies of younger persons. One of these is remarkable in having a portrait painted on wood substituted for the usual mask, and another has the wrapping removed, so that a good idea of the state of preservation may be gained.

CASE 2.— Mortuary papyrus of a lady named Isty.

CASE 3.— In the small floor case are mummies of two young children with elaborate gilt masks.

CASE 4.— Contains neatly prepared mummies in their original coffins, one of which is wood, and one, a unique specimen, of interlaced bulrushes.

CASE 5.— Two mummies of women in plain wooden coffins. Ptolemaic period 325 to 44 B. C.

CASE 8.— Coffins and mummies of a lady named Tentat. Thebes, XXII Dynasty, 10th century, B. C., presented by "The Railroad Table of the Chicago Club."

CASE 10.— Mummy case, containing the body of a lady named Dje-Mutesankh. Thebes, XXI Dynasty (about 1000 B. C.). Presented by Mr. James W. Scott.

CASE 15.— Mummy case of a lady named Naja-Rames, XXXII Dynasty, B. C., 700. Presented by Mr. F. H. Winston.

CASE 16.— Mummy of a man named Pu-Nefer. XIX Dynasty, B. C., 1200.

CASE 17.— Mummy of a lady named Men, in coffin with light colored lid with yellow stripes, containing inscriptions; XXII Dynasty, B. C. 1000.

CASE 18.— Casts of Egyptian rulers, etc.

CASE 19.— Busts and fragments of stone statues.

CASE 20.— Tomb tablets of stone of various periods.

CASE 21.— Mummy of a woman in a stooping position.

CASE 22.— Mummies of cats, dogs, jackals, hawks, alligators, etc.

CASE 23.— Wooden mortuary offerings.

CASE 24.— Ushebti figures of wood and implements of iron.

CASE 25.— Bronze figures of various divinities, mirrors, etc., presented by Mr. Watson F. Blair.

CASE 26.— Glazed pottery, amulets, temple vessels of bronze.

CASE 27.— Bronze implements and utensils.

CASE 28.— Papyri and personal ornaments.

CASE 29.— Clay vessels and inscribed potsherds.

CASE 30.— Stone and clay mortuary offerings, cut leather corselet of priest.

CASE 31.— Mortuary offerings of gray schist and stone vases.

CASE 32.— Glazed earthen ware ushebti figures.

CASE 33.— Writing material, palettes, etc.

CASE 34.— Earthenware vessels.

CASE 35.— Pottery vessels from tombs.

CASE 36.— Earthenware vessels.

CASE 37.— Alabaster vases and objects.

CASE 38.— Alabaster vases and objects.

CASE 39.— Two mummy cases.

CASE 40.— Two mummy cases.

CASE 41.— Alabaster vases.

CASE 42.— Bronze implements and utensils.

CASE 43.— Mortuary boat excavated at foot of Dashur pyramid.

CASE 44.— Mummy and case and mortuary jars.

CASE 45.— Coffin containing mummy of child named Padi-Amon.

Occupying the upper lines on the east and west walls are a number of good examples of balcony fronts from modern Cairo, and three specimens of colored glass screens.

Upon the north wall above the cases are arranged frames containing excellent specimens of mortuary cloths.

The south wall is covered with fragments of stone tombs.

**ALCOVES OF THE SOUTH COURT.****Alcove 109.**

- CASE 1.—Catawba and Cherokee pottery, basketry, etc.  
CASE 2.—Northern Athabascan clothing, ornaments, etc.  
CASE 3.—Cheyenne Sun Dance Altar.  
CASE 4.—Arapaho Sun Dance Altar.

**Alcove 110.**

## TLINGIT.

- CASE 1.—Travel and transportation.  
CASE 2.—Ornaments, shaman's paraphernalia, etc.  
CASE 3.—Shaman's paraphernalia, and dance paraphernalia.  
CASE 4.—Ceremonial dance paraphernalia.  
CASE 5.—Ceremonial dance head gear.

**Alcove 111.**

## TLINGIT.

- CASE 1.—Mortuary objects.  
CASE 2.—Warfare objects.  
CASE 3.—Ornaments, implements, from Kootenay, Idaho, and British Columbia.

**Hall 10.**

## TLINGIT.

- CASE 1.—Dishes.  
CASE 2.—Spoons.  
CASE 3.—Household furnishings.  
CASE 4.—Basketry.  
CASE 5.—Basketry.  
CASE 6.—Basketry.  
CASE 7.—Basketry.  
CASE 8.—Pipes and games.  
CASE 9.—Storage receptacles.  
CASE 10.—Men and women's tools.  
CASE 11.—Blankets.

**Hall 11.**

## KWAKIUTL.

- CASE 1.—Household furnishings.  
CASE 2.—Blanket weaving.  
CASE 3.—Dress and ornaments.

- CASE 4.— Basketry.  
 CASE 5.— Women and men's industries.  
 CASE 6.— Hunting and fish arts and manufactures.  
 CASE 7.— Mortuary objects, games, and model of house.

### Hall 12.

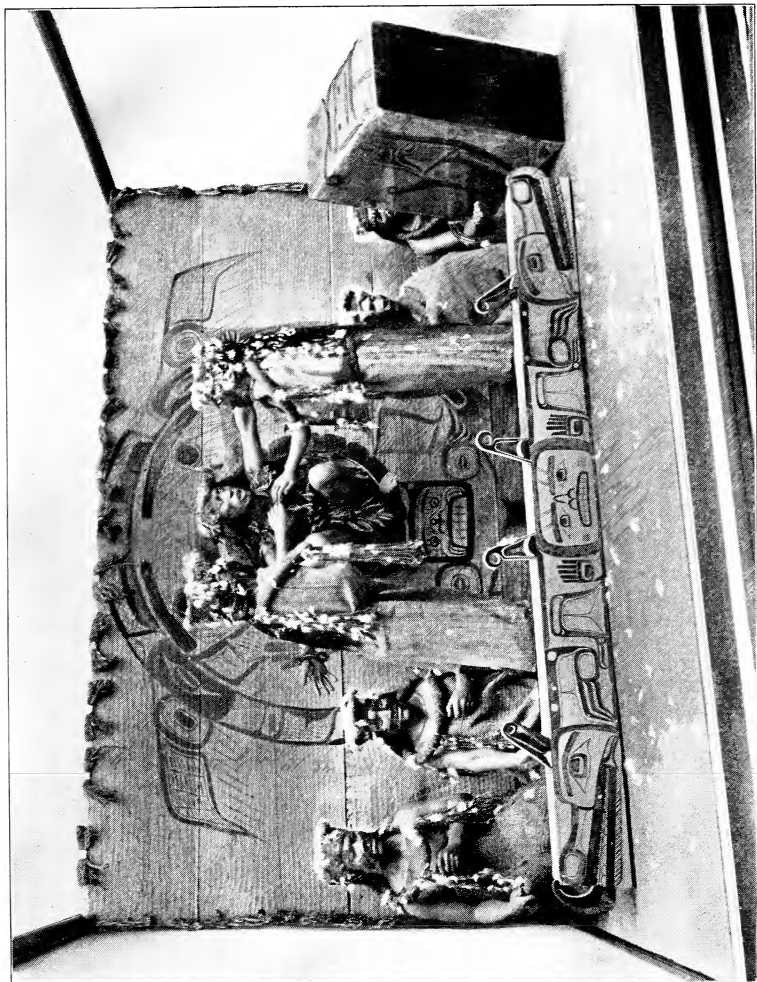
#### KWAKIUTL.

- CASE 1.— Clans ceremonial.  
 CASE 2.— Winter ceremonial.  
 CASE 3.— Guessing game.  
 CASE 4.— Feast dishes, and spoons.  
 CASE 5.— Potlatch paraphernalia.  
 CASE 6.— Cannibal Dance Group.  
 CASE 7.— Winter ceremonials.  
 CASE 8.— Clans ceremonials.  
 CASE 9.— Winter ceremonial.  
 CASE 10.— Winter ceremonial.  
 CASE 11.— Cannibal Dancer.  
 CASE 12.— Ceremonial feast dishes.  
 CASE 13.— Ceremonial feast figures.  
 Around the wall house crests, etc.

### Hall 13.

#### SALISH TRIBES.

- CASE 1.— Basketry, Lillooet.  
 CASE 2.— Basketry, spoons, boxes, Coast Salish, B. C.  
 CASE 3.— Mortuary objects, Lillooet.  
 CASE 4.— Ceremonial canoe, Salish, Washington.  
 CASE 5.— Basketry, spoons, games, etc., Salish, Puget Sound.  
 CASE 6.— Clothing, utensils, Chinook, Washington.  
 CASE 7.— Loom, weaving tools, Coast Salish, B. C.  
 CASE 8.— Dance paraphernalia, foods, Coast Salish, B. C.  
 CASE 9.— Basketry, Salish, Thompson River, B. C.  
 CASE 10.— Basketry, Salish, Thompson River, B. C.  
 CASE 11.— Industries from Coast Salish, B. C.  
 CASE 12.— House Group, Salish, B. C.  
 CASE 13.— Salish Industries.  
 CASE 14.— Basketry, and clothing, Skokomish.  
 CASE 15.— Industries, foods, etc., Thompson River, B. C.  
 CASE 16.— Salish, Thompson River, B. C.



Ethnic Group — Hamatsa Coming out of Secret Room. Kwakiutl Indians, Nawhitti, Vancouver Island



**Hall 14.**

## HAIDA AND TSIMSHIAN

- CASE 1.— House model, Haida.  
CASE 2.— Dance paraphernalia, Haida.  
CASE 3.— Household effects, Tsimshian.  
CASE 4.— Dance material, Tsimshian.  
CASE 5.— Industries and transportation, Tsimshian.  
CASE 6.— Hunting and fishing implements, Haida.  
CASE 7.— Mortuary objects, Haida.  
CASE 8.— Clan crests, Haida.  
CASE 9.— Storage chests, Haida.  
CASE 10.— Feast dishes and spoons, Haida.  
CASE 11.— Feast dishes and spoon, Haida.  
CASE 12.— Industries, Haida.  
CASE 13.— Dance paraphernalia, Haida.  
CASE 14.— Dance paraphernalia, Tsimshian.  
CASE 15.— Musical instruments, Haida.  
CASE 16.— Shaman's paraphernalia, games, war and hunting implements, Haida.  
CASE 17.— Chief's paraphernalia, Haida.  
CASE 18.— Basketry and Matting, Haida.  
CASE 19.— Storage chests, Haida.

**Hall 15.**

## BELLA COOLA AND NOOTKA-MAKAH TRIBES.

- CASE 1.— Masks, Makah.  
CASE 2.— Masks, ceremonial objects, Makah.  
CASE 3.— Ceremonial objects, Nootka.  
CASE 4.— Models of house and grave posts, Bella Coola.  
CASE 5.— Ceremonial objects, household utensils, Bella Coola.  
CASE 6.— Dance masks and whistles, Bella Coola.  
CASE 7.— Dance Masks and whistles, Bella Coola.  
CASE 8.— Fishing paraphernalia, Makah.  
CASE 9.— Household furnishings, Makah.  
CASE 10.— Ceremonial paraphernalia.  
CASE 11.— Basketry, matting, etc.  
CASE 12.— Hunting and fishing implements, Nootka.  
CASE 13.— Dance aprons, and robes, Nootka.  
CASE 14.— Stone implements, games, tools, Bella Coola.  
CASE 15.— Tools, matting, hats, and clothing.

**Hall 16.**

## HOPI INDIANS.

The collection in this hall is devoted to the religion and ceremonies of the Hopi Indians of Arizona, and was presented by Mr. Stanley McCormick.

Other parts of the Hopi Indian collection will be found in Halls 8 and 17.

CASES 1, 2, 3, 4, 5, AND 6.— Contain dolls or kateenas and ethnological and ceremonial objects.

CASES 7 AND 8 — Ceremonial masks and head dresses.

CASE 9.— Cho altar and sand mosaic.

CASE 10.— Altar of the Blue-Flute Society.

CASE 11.— Katecina initiation sand mosaic.

CASE 12.— Anga Katecina dances.

CASE 13.— Hemis Katecina dancers.

CASE 14.— Powamu altar and sand mosaic.

CASE 15.— Powalawu sand mosaic.

CASE 16.— Snake altar and sand mosaic.

CASES 17 AND 18.— Ceremonial masks and head dresses.

**Hall 17.**

## HOPI INDIANS.

The collection in this hall is devoted principally to the archaeology of the Hopi Indians of Arizona, and to the domestic side of their modern life, the main portion of which was presented by Mr. Stanley McCormick.

Other parts of the Hopi Indian collections presented by Mr. McCormick will be found in Halls 8 and 16.

CASE 1.— Soyal (Winter Solstice) altar, with star and war gods.

CASE 2.— Altar of Marau, a woman's society.

CASE 3.— Ooqol altar and priestess.

CASE 4.— Women's ceremonial costume.

CASE 5.— Costumes of men, women and children.

CASE 6.— Katecina and snake dance costumes.

CASE 7.— Model of Pueblo of Walpi.

CASE 8.— A Hopi home, illustrating the domestic pursuits.

CASE 9.— Shields, clothing, buffalo robes, Rio Grande Pueblo.

CASE 10.— Utensils, tops, etc., Oraibi.



CASE 11.— Ballukon screen.

CASE 12.— Stone implements, blankets, ornaments, feather cases.

CASE 13.— Katcinas and stone implements.

CASE 14.— A boomerang thrower.

CASE 15.— A bride.

CASES 16 AND 17.— Meal trays of basketry.

### Hall 18.

Edward E. Ayer Hall.

## TRIBES OF THE GREAT PLAINS.

This hall is devoted to the so-called tribes of the Great Plains, principally of the Siouan stock, though there are temporarily installed there collections from tribes of the Algonquin and Iroquois stock.

This hall contains only a small part of the gift of Mr. E. E. Ayer. Upon the north wall are arranged the original Catlin paintings of Indians. Suspended from the ceiling are canoes of various tribes.

CASE 1.— Costumes, ornaments, ceremonial objects, Osage Indians, Oklahoma.

CASE 2.— Matting, woven bags, bowls, ladles, pipes, etc., Osage Indians, Oklahoma.

CASE 3.— Arrows, pipes, ornaments, Kiowa.

CASE 4.— Buffalo robe, bags, ornaments, Flathead.

CASE 5.— Bags, games, spoons, knife cases, clothing, Gros-ventre.

CASE 6.— Painted hide tipi lining, sleds, harness, utensils, etc., Cree Indians, Alberta, Northwest Territory.

CASE 7.— Decorated hide tipi lining, wooden bowls, ladles, utensils, Blackfoot Indians, Montana and Alberta, Northwest Territory.

CASE 8.— Drums, rattles, bows, arrows, ceremonial objects, games, etc., Blackfoot Indians, Montana and Alberta, Northwest Territory.

CASE 9.— Wooden bowls, ladles, mortars, utensils, packing bags, Sauk and Fox Indians, Iowa. Wooden household utensils, etc., Micma Indians, Nova Scotia.

CASE 10.— Beadwork. Chippeway Indians, Minnesota. Packing bags, Kickapoo Indians.

CASE 11.— Men's costumes and ornaments, pipes and bags, Blackfoot Indians, Montana and Alberta, Northwest Territory.

CASE 12.— Women's costumes and ornaments, Blackfoot Indians, Montana and Alberta, Northwest Territory.

CASE 13.— Rabbitskin robe, child's robe, objects for women's use and wear. Cree Indians, Alberta, Northwest Territory.

CASE 14.— Men's costumes, pipes, ornaments, games, etc., Cree Indians, Alberta, Northwest Territory.

CASE 15.— Games, musical instruments, head dresses, ornaments, amulets, pipes, etc., Crow Indians, Montana.

CASE 16.— Horse trappings, painted tipi door flap, painted and carved hide bags, medicine bags, etc., Crow Indians, Montana.

CASE 17.— Decorated hide tipi. Cree Indians, Alberta, Northwest Territory.

CASE 18.— Men's and boys' costume, war bonnets, Crow Indians, Montana.

CASE 19.— Women's and girls' costumes and blankets, cradles, etc., Crow Indians, Montana.

CASE 20.— Buffalo hide shields, Crow Indians, Montana.

CASE 21.— Buffalo hide shields, Crow Indians, Montana.

CASE 22.— Buffalo hide shields, Crow Indians, Montana.

CASE 23.— Buffalo hide shields, bows and arrows, Crow Indians, Montana.

CASE 24.— Shields, bows, arrows, rattles, flutes, etc., Osage Indians, Oklahoma.

CASE 25.— Costumes, pipes, etc., Oto Indians, Oklahoma.

CASE 26.— Leggings, ornaments, Ponca and Tonkawa.

CASE 27.— Woven bags, drums, wooden bowls, ladles, mortars, etc., Winnebago, Indians, Wisconsin.

CASE 28.— Drums, flutes, medicine bags, beaded pouches, horn spoons, etc., Sioux Indians, North and South Dakotas.

CASE 29.— Stone war clubs, bows, arrows, etc., Sioux Indians, North and South Dakotas.

CASE 30.— Saddles, saddle cloths, beaded bags, painted bags, Sioux Indians, North and South Dakotas.

CASE 31.— Beaded cradles, dolls, amulets, etc., Sioux Indians, North and South Dakotas.

CASE 32.— Decorated buffalo hide, dancer ornaments, etc., Sioux Indians, North and South Dakotas.

CASE 33.— Ceremonial objects, rattles, drums, flutes, etc., Iroquois Indians, Canada.

CASE 34.— Masks worn in the ceremony of the burning of the white dog. Iroquois Indians, Canada.

CASE 35.— Hair ornaments, men's costumes, etc., Sioux Indians, North and South Dakotas.

CASE 36.— Women's and girls' costumes, etc., Sioux Indians, North and South Dakotas.

CASE 37.— Pipes, pipe cleaners, beaded pipe bags, Sioux Indians, North and South Dakotas.

CASE 38.— Painted robe, ornaments, ceremonial objects, games, Yankton Sioux, Montana.

CASE 39.— Rattles, carved wooden bowls, horn spoons, etc., Cuthead Sioux, North Dakota. Ornaments, games, etc., Sisseton Sioux, North Dakota.

CASE 39.— Berry bags, saddles, drums, head dresses, costumes, etc., Assinaboin Indians, Montana.

## ALCOVES OF THE WEST COURT.

### Alcove 106.

CASES 1 AND 2.— Wichita.

CASES 3, 4 AND 5.— Pawnee.

### Alcove 107.

CASE 1.— Miniature model of Pawnee Medicine-Men's ceremony.

CASE 2.— Miniature model of Pawnee Sacred Bundle ceremony.

CASE 3.— Miniature model of Wichita Grass Lodge.

CASE 4.— Miniature model of Thunder Ceremony of the Pawnee.

### Alcove 108.

CASES 1 AND 2.— Arikara.

## Hall 34.

### CALIFORNIA.

CASES 1-4.— Klamath and Modoc, Oregon, and California.

CASES 5-12.— Hupa, Yurok and Karok, North West California.

CASE 13.— Shasta.

CASES 14, 15.— Achomawi.

CASE 16.— Wintun.

CASES 17-23.— Pomo.

CASE 24.— Piute.

CASES 25, 26.— Shoshoni.

CASES 27-31, —Mono.

CASES 32-35.— Yokut.

CASES 36, 37.— Miwok.

CASES 38 AND 39.— Maidu.

CASES 40 AND 41.— Washo and Lake Tahoe.

### Hall 30.

In this hall are installed collections from the Sierra Madre Indians of Mexico. Modern Mexican ceramics, blankets, ponchos, and other objects of wearing apparel, implements of war and of the chase, household utensils, etc., from tribes of Colombia, Costa Rica, Peru, Bolivia, Paraguay, and Brazil.

Upon the north wall are arranged replicas of Mexican feather shields.

CASES 1, 2, 17 AND 18.— Indian tribes of Mexico.

CASE 3.— Goohiba, Paya, and Plain tribes, Colombia.

CASE 4.— Salamanca Indians, Costa Rica.

CASES 5 AND 12.— Jiveros-Indians, Peru.

CASE 6.— Chunchos Indians, Peru.

CASES 7 AND 11.— Tribes of Brazil.

CASES 8, 9, AND 10.— Tribes of Paraguay.

CASES 13, 14, 15, AND 16.— Quichma and Aymara Indians of Peru and Bolivia.

### Hall 31.

One side of this hall contains valuable collections from Venezuela and British Guiana. The other side of the hall contains collections from the Gran Chaco tribes. The most northern of the groups inhabit Brazil and Bolivia, while the more southern extend into the Argentine Republic.

The principal tribes represented in the collection are the Toba, Lengua, Chamacoco, Guarani, Cuximoso, Pana, Paita, and Omiri. The collection is especially interesting as representing tribes which have had but little contact with civilization. The collection contains much beautiful feather work.

CASES 1, 2, 3, 4, 5, 6, 7, AND, 8.— Tribes of the Gran Chaco region.

CASES 9, 10 AND 11.— Tribes of Venezuela.

CASES 12, 13 AND 14.— Tribes of British Guiana.

## THE LIBRARY.

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The Library is designed for reference purposes only. It contains many valuable scientific and technical works and is primarily for the use of the Curators and for those desiring to pursue special studies relating to the exhibits in the Museum.

The collection of books and pamphlets on the shelves numbers approximately 40,000. It includes:

The Kunz collection of works on minerals, gems and semi-precious stones, and containing many rare tomes on these subjects, in Latin, dating back to the Fifteenth and Sixteenth centuries.

The Skiff collection, containing many valuable books of reference on minerals, mining, and metallurgy. (This collection has been placed in the Library of the Department of Geology, West Annex.)

The Edward E. Ayer Library of Ornithology, which contains a set of the original Audubon books and over three hundred rare and valuable reference works.

There are valuable works on Anthropology and Botany in the Departmental Libraries.

## RULES OF THE LIBRARY.

1. The Library is open daily, except Sunday, from 9:00 A. M. to 4:30 P. M. It is entirely a library of reference.
  2. Books may be obtained by making application to the Librarian.
  3. Books or periodicals deposited in the Departmental Libraries will, in certain cases, upon application, be returned to the General Library for the use of an applicant.
  4. Current periodicals can be consulted in the Reading Room only.
  5. Curators may have accommodation transfers to their respective Departmental Libraries.
  6. Any defacement of books and all losses or injuries must be promptly adjusted to the satisfaction of the Librarian.
- In the Reading Room will be found the current magazines

and periodicals pertaining more particularly to scientific, technical, and kindred subjects.

**THE OFFICES OF THE MUSEUM.**

THE DIRECTOR.— Southeast corner of South Court.

THE DEPARTMENT CURATORS:

ANTHROPOLOGY — East Gallery of East Court.

BOTANY — North Gallery of North Court.

GEOLOGY — Southwest corner of West Annex.

ZOOLOGY — Southwest corner of West Court.

THE LIBRARIAN.— Northwest corner of North Court.

THE RECORDER.— Southeast corner of South Court.

