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GENERAL GUIDE

To The

BRITISH MUSEUM

NATURAL HISTORY

Cromwell Road

London

S.W.



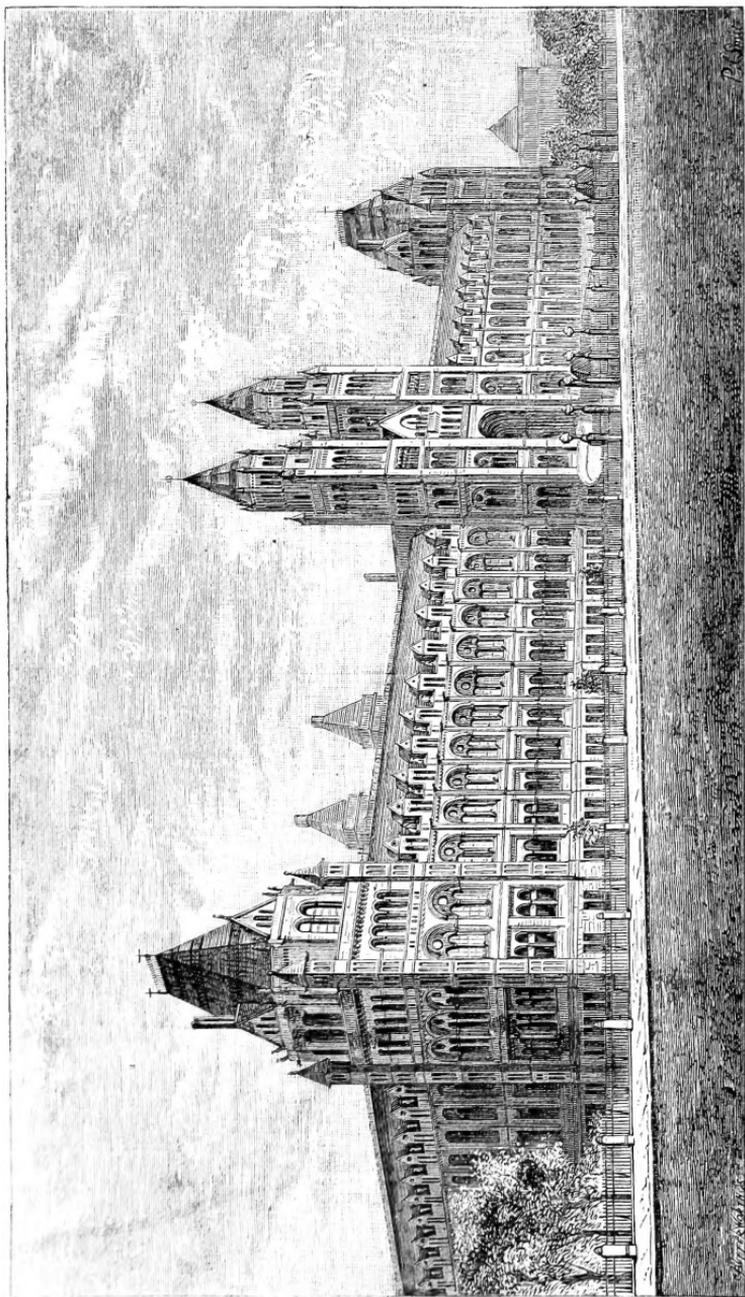
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1888

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THE NATURAL HISTORY MUSEUM, CROMWELL ROAD, FROM THE SOUTH-WEST, SHOWING THE WEST FRONT, NOT YET COMPLETED.

A GENERAL GUIDE

TO THE

BRITISH MUSEUM (NATURAL HISTORY)

CROMWELL ROAD, LONDON, S.W.

WITH PLANS AND A VIEW OF THE BUILDING.

[3rd ed]



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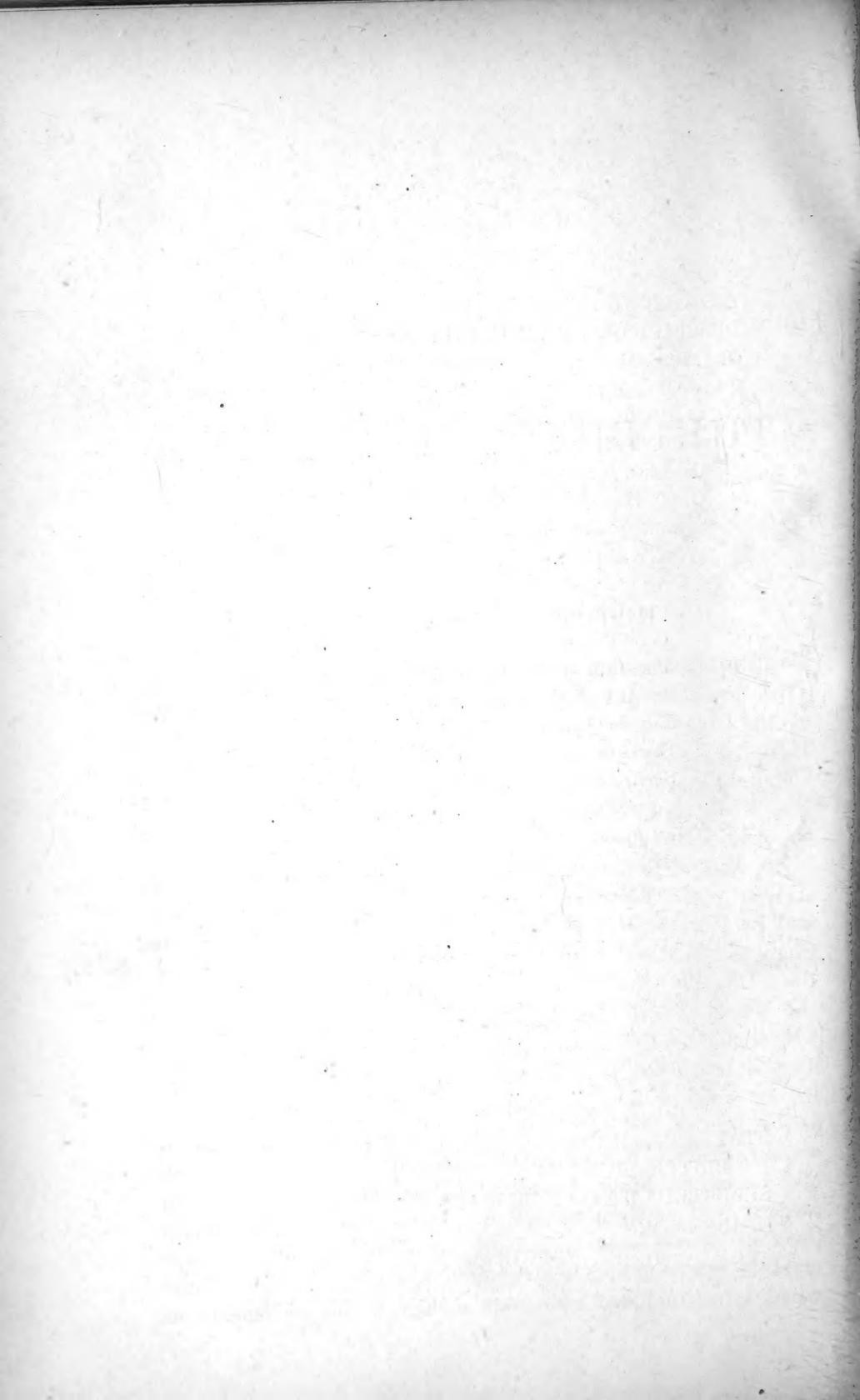
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GENERAL GUIDE
TO
THE BRITISH MUSEUM
(NATURAL HISTORY).

HISTORICAL INTRODUCTION.

THE British Museum dates its actual foundation from the year **Foundation.** 1753, when an Act of Parliament was passed "for the purchase of the Museum or Collection of Sir Hans Sloane, and of the Harleian Collection of Manuscripts, and for providing One General Repository for the better Reception and more convenient Use of the said Collections and of the Cottonian Library and of the Additions thereto."

Sir Hans Sloane, an eminent physician in London, was for **Sir Hans Sloane.** sixteen years President of the Royal College of Physicians, and in 1727 succeeded Sir Isaac Newton in the Presidential Chair of the Royal Society. He had been throughout his long life a diligent and miscellaneous collector, having, as stated in the Preamble of the Act of Incorporation of the Museum, "through the course of many years, with great labour and expense, gathered together whatever could be procured, either in our own or foreign countries, that was rare and curious." His collection, which at the time of his death in 1753 was contained in his residence, the Manor House, Chelsea, consisted of "books, drawings, manuscripts, prints, medals and coins, ancient and modern antiquities, seals, cameos and intaglios, precious stones, agates, jaspers, vessels of agate and jasper, crystals, mathematical instruments, pictures, and other things," which latter included numerous zoological and geological speci-

mens, and an extensive herbarium of dried plants preserved in 310 large folio volumes.

According to the terms of Sir Hans Sloane's will, this collection was purchased for the sum of £20,000, far below its intrinsic value, in order "that it might be preserved and maintained, not only for the inspection and entertainment of the learned and the curious, but for the general use and benefit of the public to all posterity."

The valuable collection of manuscripts formed by Sir Robert Cotton at the end of the sixteenth and beginning of the seventeenth centuries, was already the property of the nation, having been presented by his grandson, Sir John Cotton, in the year 1700. The Harleian Collection was obtained by purchase at the same time as the Sloanian, and the three were brought together under the designation of "the British Museum," placed under the care of a body of trustees,* and lodged in Montagu House, Bloomsbury, purchased for their reception in 1754. The Museum was opened to the public on the 15th of January, 1759. Admission to the galleries of antiquities and natural history was at first by ticket only on application in writing, and limited to ten persons, for each of three hours in the day. Visitors were not allowed to inspect the cases at their leisure, but were conducted through the galleries by officers of the house. The hours of admission were subsequently extended; but it was not until the year 1810 that the Museum was freely accessible to the general public for three days in the week, from ten to four o'clock. The present daily opening, with longer hours in summer, dates only from 1879.

At the time of the foundation of the Museum, the site allotted seemed amply sufficient for its purposes; but gradually, as the collections of all kinds increased, they outgrew the limits, not only of the original Montagu House, but even of its

* The Trustees under the Act of Incorporation were the Archbishop of Canterbury, the Lord Chancellor, the Speaker of the House of Commons, and seventeen principal Officers of State, for the time being; six representatives of Founders' families; the Presidents of the Royal Society and College of Physicians; and fifteen other Trustees to be elected by them. Subsequently, the Presidents of the Royal Academy of Arts and of the Society of Antiquaries, a Trustee by special nomination of the Sovereign, and three more family Trustees were added to the Board.

successor, the present classical building, completed in 1845 from the designs of Sir Robert Smirke. The erection of the magnificent reading-room in 1857 disposed for a time of the difficulty of finding accommodation for the ever-growing library ; but the keepers of other departments continued urgent in their demands for more space, and after much discussion of rival plans for keeping the collections together and obtaining the needful extension of room by acquiring the property immediately around the old Museum, or for severing the collections and removing a portion to another building, the latter course was finally decided upon. At a special general meeting of the trustees, held on the 21st of January, 1860, attended by many members of the Government in their official capacity, a resolution moved by the First Lord of the Treasury was carried "That it is expedient that the Natural History Collection be removed from the British Museum, inasmuch as such an arrangement would be attended with considerably less expense than would be incurred by providing a sufficient additional space in immediate contiguity to the present building of the British Museum."

Growth of Collections necessitating additional space.

Resolution to separate Natural History Collection.

No immediate action was taken on this resolution. In order to obtain fuller assurance of the best methods of proceeding, a Select Committee of the House of Commons was appointed in the Session of the same year, 1860, with instructions to enquire how far, and in what way, it might be desirable to find increased space for the Museum collections. Their report, which was adverse to the decision of the general meeting of the Trustees of the 21st of January, stated "that sufficient reason has not been assigned for the removal of any part of the valuable collections now in the Museum, except that of Ethnography and the portraits and drawings," and suggested the purchase of the land and houses in the immediate vicinity of the old Museum as the best site for future extension.

Select Committee of House of Commons.

The Trustees had no other course than to refer to the Government the final determination of the question ; and in November, 1861, they received intimation from the Lords of the Treasury that they were prepared to take steps for removing a portion of the National Collection to South Kensington, and the Trustees were asked to give further advice in respect to this proposal.

Government plans.

Their recommendation was that the whole of the Natural History Collections should be simultaneously removed, as well as those of Ethnography. Accordingly a Bill was brought in by the Government early in the Session of 1862 to enable the Trustees to effect this removal; but it was rejected on the ground of the great outlay required for the erection of the proposed new building at South Kensington.

Purchase of
land at South
Kensington.

In the Session of 1863 the Government renewed their efforts to cope with the Museum difficulty, and after failing to induce the House of Commons to sanction the purchase of the entire Exhibition Buildings at South Kensington, with a view to appropriating a portion of them to the purpose of a Museum of Natural History, succeeded in obtaining a vote for the purchase of the requisite number of acres from the exhibition ground at the price of £10,000 per acre. The prospect of the immediate erection of the desired building seemed now sufficiently promising; but nearly twenty years were to elapse before its complete realisation. Plans of the proposed building had already been prepared for Government. In September, 1862, Mr. Hunt, of the Office of Works, was instructed to work out the design of a building suggested by Professor Owen, and this was submitted to the House of Commons in June, 1863. The proposed building was to have covered about four acres of land; would have consisted of a vaulted basement, two storeys above the roadway for the exhibition of the collections, with an attic over a part of the centre for libraries and professors' rooms, and would have included a theatre, 100 feet in diameter, for lectures. The site was to be on the east side of Queen's Gate, and the cost was estimated at £350,000.

Competitive
designs.

In January, 1864, the Commissioners of Her Majesty's Works issued an advertisement for designs for a Natural History Museum and a Patent Museum, to be erected on part of the site of the International Exhibition at South Kensington, the plan prepared by Mr. Hunt in September, 1862, from Professor Owen's suggestions, being proposed as a model in respect to dimensions and internal arrangement.

Captain
Fowke's plan.

The plans of the various competitors were submitted to Her Majesty's Commissioners of Works, who awarded prizes to three of the number, giving precedence to that of Captain Francis

Fowke, R.E., and then referred the three premiated plans to the Trustees of the British Museum. As the internal arrangements in Captain Fowke's plan did not meet with the approval of the Museum officers, he was desired to modify them in conformity with the requirements of the Trustees. He was engaged in this labour when his death occurred, in September, 1865.

Early in the year 1866, Mr. Alfred Waterhouse was invited by the Chief Commissioner of Works to take up the unfinished work of Captain Fowke; but he found himself unable to complete the plan to his own satisfaction, and in February, 1868, he was commissioned to form a fresh design, embodying the requirements of the officers of the Natural History Departments of the Museum.

Mr. Waterhouse engaged.

Mr. Waterhouse was not long in submitting to the Trustees his plan and model of the building, with a disposition of galleries as required, and these were formally accepted by the Trustees in April, 1868. It was not, however, until February, 1871, that the working plans had been thoroughly considered, and received the final approval of the Trustees.

The actual work of erection was commenced in the year 1873, and the building was handed over to the Trustees of the British Museum by Her Majesty's Commissioner of Works in the month of June, 1880. Immediately that the exhibition cases were completed, and the galleries were sufficiently dry to receive the collections, the great labour of removing the Natural History Collection from Bloomsbury was commenced. The departments of Geology, Mineralogy and Botany, were arranged in their respective sections of the Museum in the course of the year 1880, and the portion of the Museum which contained these departments was first opened to the public on April 18th, 1881. It was not until the following year that the cases destined to receive the larger collections of the Zoological Department were sufficiently complete to allow of these collections following, and three more years were required before all the rooms could be brought into a state fitted for public inspection. The last that was opened was the gallery devoted to British Zoology, in May, 1886.

Completion of building and removal of Collections.

The following description of the structure has been contributed by Mr. Waterhouse:—

“The New Natural History Museum will, from its position, always be more or less identified with the International

Description of the building.

Exhibition of 1862, which occupied the whole of the site between the Horticultural Gardens and Cromwell Road. It was at one time thought that a portion, at any rate, of the Exhibition buildings could with advantage have been converted into a Museum of Natural History. Parliament, however, decided against the preservation of any part of these buildings, and they were accordingly entirely removed.

“In designing the present building, Captain Fowke’s original idea of employing terra-cotta was always kept in view, though the blocks were reduced in size, so as to obviate, as far as possible, the objection to the employment of this material, arising from its liability to twist in burning. For this and other reasons the architect abandoned the idea of a Renaissance building, and fell back on the earlier Romanesque style which prevailed largely in Lombardy and the Rhineland from the tenth to the end of the twelfth century.

“In 1873, a contract was entered into by the Government with Messrs. George Baker and Sons, of Lambeth, for the erection of the building at a cost of £352,000. Other subsequent contracts have been entered into by the Treasury, especially one for the erection of the towers; which in the first instance it was decided to omit.

Exterior.

“On looking at the exterior of the building, one of the first points which strikes a spectator is that the site is lower than the street. This arises from the fact that the whole surface of the ground between the three roads was excavated for the Exhibition building of 1862, and it was not thought desirable, for economical considerations, to refill the space. The building is set back 100 feet from the Cromwell Road, and is approached by two inclined planes, curved on plan and supported by arches, forming carriage-ways. Between the two are broad flights of Craigleith stone steps, for the use of those approaching the building on foot. The extreme length of the front is 675 feet, and the height of the towers is 192 feet. The return fronts, east and west, beyond the end pavilions, have not yet been erected.*

* In judging the appearance of the exterior of the building, it must never be forgotten that these fronts are required to complete the design, as the externally unsightly brick galleries which run back from the main front, and are now conspicuous when the Museum is seen from either west or east, are intended to be concealed by them (*see Frontispiece*).

“On entering the main portal, the visitor has before him the great central apartment of the Museum (170 feet long, by 97 feet wide, and 72 feet high), which it is intended to use as an Index or Typical Museum. The double arch in the immediate foreground which spans the nave (57 feet wide), carries the staircase from the first to the second floor. Opposite the spectator, at the end of the hall, is the first flight of the staircase, 20 feet wide, which rises from the ground to the first floor. The galleries over the side recesses form the connection between the two staircases, and are also intended for exhibition space, as are also the floor of the main hall and the side recesses under the galleries. The arches under the side flights of the main staircase at the end of the hall lead into another large apartment, cruciform on plan, intended for the exhibition of specimens of British Natural History, with an extreme length of 97 by 77 feet measured into the arms of the cross.

Interior.
Central Hall.

“Branching out of the Central Hall, near its southern extremity, are two long galleries, each 278 feet 6 in. long by 50 feet wide. These galleries are repeated on the first floor, and in a modified form on the second floor. They are divided into bays by coupled piers arranged in two rows down the length of the galleries, and planned in such a manner as to allow of upright cases being placed back to back between the piers and the outer walls, so as to get the best possible light upon the objects displayed in the cases with the least amount of reflection from the glass, and leaving the central space free as a passage. Owing to the nature of the specimens exhibited in one or two of these galleries requiring for their exhibition rather table-cases than wall-cases, advantage has only been taken to a limited extent of this disposition of the plan. These terra-cotta piers, however, are constructively necessary, not only to conceal the iron supports for the floor above, but to prevent these supports being affected in case of fire. Behind these galleries on the ground floor are a series of toplighted galleries, devoted, on the east side to Geology and Palæontology, and on the west to Zoology.

Side galleries.

“The towers on the north of the building have each a central smoke-shaft from the heating apparatus, the boilers of which are placed in the basement, immediately between the towers,

Towers.

while the space surrounding the smoke-shafts is used for drawing off the vitiated air from the various galleries contiguous thereto. The front galleries are ventilated into the front towers, which form the crowning feature of the main front. These towers also contain, above the second floor, various rooms for the work of the different heads of departments, and on the topmost storey large cisterns for the purpose of always having at hand a considerable storage of water in case of fire. On the western side of the building, where it is intended that the Zoological collection shall be placed, the ornamentation of the terra-cotta (which will be found very varied both within and without the building) has been based exclusively on living organisms. On the east side, where Geology and Palæontology find a home, the terra-cotta ornamentation has been derived from extinct specimens.

“The Museum is the largest, if not, indeed, the only, modern building in which terra-cotta has been exclusively used for external façades and interior wall-surfaces, including all the varied decoration which this involves.”

Space occupied by building and grounds.

The space covered by the building itself, including the detached portion behind, which contains the collections of animals preserved in spirit, is nearly four acres.

The whole ground on which the Museum stands, including the gardens which surround it on the south, east and west sides, is 12 acres and 635 yards. The gardens are open to the public whenever the Museum itself is open, under certain regulations which are posted at the entrance gates.

OBJECTS OF THE MUSEUM AND GENERAL ARRANGEMENT OF ITS CONTENTS.

NATURAL HISTORY is an old term, used to describe the study of all the processes or laws of the Universe, and the results of the action of those processes or laws upon the materials of which it is composed, *which are independent of the agency of man.* Use of the term Natural History.

It is thus contrasted with the history of Man and of his works, and the changes which have been wrought in the Universe by his intervention.

This distinction afforded a convenient and rational basis for the division of the numerous and multifarious objects which were collected together in the old building of the Museum at Bloomsbury. When it was decided, for the causes described in the previous chapter, to effect a separation of the collections, those that were purely the products of what are commonly called "natural" forces were removed to the new building at South Kensington, while all those which showed the effects of Man's handiwork remained at Bloomsbury. Like most others of the kind, this distinction cannot be applied too rigidly. Such lines of demarcation almost always overlap. For instance, examples of modification of animal or plant structure under Man's influence will legitimately find a place in a Museum of Natural History, especially as they may afford illustrations of the mode of working of natural laws.

Processes or laws cannot, however, be satisfactorily demonstrated in a museum; therefore such branches of knowledge as deal chiefly with them, as Astronomy, Physics, Geology (in the stricter sense of the word), and the experimental sciences, as Chemistry and Physiology, though essentially belonging to the domain of Natural History, have not found a place here. It is only the results of the working of these processes or laws as shown in the modifications of the arrangement of the elementary substances of which the material of the Universe is composed,

which can be fully illustrated by specimens admitting of being readily preserved and permanently exhibited in a museum. A Natural History Museum, therefore, in the sense in which the term is now usually understood, is a collection of the various objects, animate and inanimate, found upon the earth in a state of nature. It will be readily understood that as the study of such objects is one of the principal means by which the laws which have led to their formation or arrangement may be traced out, it is of the utmost importance for the progress of those departments of knowledge which the Museum is designed to cultivate, to bring together as complete an illustrative series of them as possible.

Division into
Mineral,
Vegetable
and Animal.

Although the validity of the old division of all natural objects into *inorganic* and *organic* or *living* has been the subject of some discussion, and although the separation of the latter into *vegetable* and *animal* is perhaps less absolute than was once supposed, yet for practical purposes, MINERAL, VEGETABLE, and ANIMAL still remain the three great divisions or "kingdoms" into which natural bodies are grouped, and this classification has formed the basis of the arrangement of the collections in the Museum.

Mineralogical
Department.

I. Inorganic substances occur in nature in a gaseous, liquid, or solid form. With very few exceptions, it is only in the latter state that they can be conveniently preserved and exhibited in a museum, and it is to such that the term "mineral" is commonly limited. The collection, classification and exhibition of specimens of this kind is the office of the Mineralogical Department of the Museum, to which is devoted the large gallery on the first floor of the east wing of the building.

Botanical
Department.

II. The study of the vegetable kingdom, as far as it can be illustrated by preserved specimens, is the province of the Department of Botany, which occupies the upper floor of the east wing.

Zoological
Department.

III. In the same way the animal kingdom belongs to the department of Zoology, to which is assigned the whole of the western wing of the building.

It will thus be seen that a department of the Museum corresponds with each of the great divisions of natural objects; there is, however, a fourth department, which owes its separate

existence to a period of scientific culture in which the terms Zoology and Botany were limited to the study of the existing forms of animal and plant life, and the extinct or fossil forms were associated with the minerals, rather than with their living representatives. This arrangement prevailed in the British Museum until the year 1857. The fossils were then severed from this incongruous connection, and placed in a separate department for which the name of "Geology" was reserved.* The result is that there are now two distinct zoological and botanical collections in the building, one containing the remains of all the animals and plants which have lived through successive ages of the world's history from the earliest dawn of life down to close upon the present time, and the other containing only those living at the particular period in which we dwell. Notwithstanding the objections which may be urged against this primary division of living things, it is one which prevails largely in museums, and which, owing to certain conveniences, as well as to the difficulty and expense of re-arranging extensive collections and reorganising the staff in charge of them, will probably be retained for some time to come.

**Geological
Department.**

Besides the four above-mentioned departments, into which the collection is divided for the purposes of custody and administration, each of which is under the charge of an officer called "keeper" and a special staff of assistants, there is a fifth, at present under the immediate supervision of the Director, and arranged in the Central Hall, which is intended to be an introduction to all the others. The formation of this has only recently commenced, and owing to the difficulty of procuring the most illustrative specimens when required, and the time needed for their preparation and arrangement, some years must elapse before it can be completed.

**Introductory
Collection**

When the last-named collection is more fully developed, the whole of the specimens contained in the Museum, whether Animal, Vegetable or Mineral, will be arranged in three distinct series, each having its definite end and purpose.

**The specimens
all arranged in
three series.**

* Palæontology, or the study of ancient living beings, would have been a more appropriate designation, as Geology, the science which investigates the history of the earth, and the changes which its surface has undergone in attaining its present condition, has a much wider scope.

**Introductory
or Elementary**

I. An Elementary or Introductory Series, by which the study of every group should commence, in which the leading features of the structure, and, as far as may be, the development of the various parts of some of its most typical members, are demonstrated in a clear and simple manner, and the terms used in describing and defining them explained by means of illustrative examples. This has been already carried out in the Department of Mineralogy, in a series of cases placed on the north or left-hand side of the gallery containing the rest of the collection. The introductory series to the zoological and botanical collections has just been referred to as under arrangement in the Central Hall.

**Exhibited
Systematic
Series.**

II. The Exhibited Systematic Series, in which the most important types of animal, plant, or mineral forms are shown, by means of carefully-selected and well-preserved specimens, arranged in a systematic manner, or one which exhibits, as far as may be, their natural relations to each other. Classification is an important feature in this series, which should be so complete and so arranged as to ensure that every visitor to the Museum can find, without recourse to assistance from the officials, every well-known and very distinct form of animal, plant or mineral, and satisfy himself about, at least, its external characters. In carrying out this ideal, great modifications must be made in practice, partly depending upon the readiness, or the reverse, with which the members of different groups lend themselves for exhibition, partly upon the exigencies of space, and partly upon special circumstances which render the exhibition of the leading forms of some groups of more interest than those of another.

While the two series above mentioned have for their object the *diffusion* of scientific knowledge, the next ministers mainly to its *advancement*, and thus between them the twofold object of a National Museum of Natural History is carried out.

**Reserve or
Study
Systematic
Series.**

III. The Reserve or Study Systematic Series contains all those exceedingly numerous specimens (in many groups, the great bulk of the collection in fact) showing the minute distinctions which are required for working out the problems of variation according to age, sex, season and locality, for fixing the limits of geographical distribution, or determining the range in geo-

logical time: distinctions which, in most cases, can only be appreciated when the specimens exhibiting them are kept under such conditions as to admit of ready and close examination and comparison. It is to this part of the collection that zoologists and botanists resort to compare and name the animals and plants collected in expeditions sent to explore unknown lands, to work out biological problems of the highest scientific importance, and generally to advance the knowledge of the science. In fact these reserve collections, occupying comparatively little room, kept up at comparatively little cost, and visited by comparatively few persons, constitute, from a scientific point of view, the most important part of the Museum, for by their means new knowledge is obtained, which, given forth to the world in the form of memoirs, books, or lectures, is ultimately diffused over a far wider area than that influenced even by the exhibited portions of the Museum. Indeed, without the means of study they afford, the order, arrangement, and power of imparting knowledge, which the exhibition galleries possess, would not be possible.

It is important to bear in mind that if the whole of such specimens as are really required for enlarging the boundaries of knowledge were displayed in the public galleries, so that each one could be distinctly seen, a museum very many times larger than the present one would not suffice to contain them; the specimens themselves would be quite inaccessible to the examination of all those capable of deriving instruction from them, and owing to the disastrous effects of exposure to light upon the greater number of preserved natural objects, would ultimately lose almost everything that now gives them value. This portion of the collection must, in fact, be treated as are the books in a library, and only used for consultation and reference by duly accredited students.*

In some parts of the Museum the reserve collections are contained in drawers beneath the cases in which the corresponding exhibited portion is placed. This applies principally to the palæontological specimens, the shells, and the minerals. The reserve birds and insects have special rooms devoted to them,

* For conditions as to admission and regulation, see p. 66.

and the extensive series of reptiles, fishes, and other animals preserved in spirit, are kept for the purposes of safety in a separate building behind the Museum. In the Botanical Department the reserve collections are kept as usual in the well-known form of an Herbarium or *Hortus siccus*.

Supplement-
ary Collec-
tions.

The great bulk of the specimens being arranged in these three series, there might still be supplementary collections for facilitating the study of the distribution of animals and plants, and perhaps also of minerals, in space and in time. The first, constituting a geographical series, might show by illustrative examples the leading characteristics of the fauna and flora of each great region of the earth's surface; the second, or geological series, would give examples of the fossil remains found most abundantly in each formation, arranged as far as may be in chronological order.

Geographical.

The only attempt hitherto made at exhibiting a geographical series in the Museum is the special collection of animals of the British Isles, arranged in a room on the ground floor behind the great staircase of the Central Hall. It would be impossible in the present building to find room for any further geographical collections, however interesting and instructive they might be.

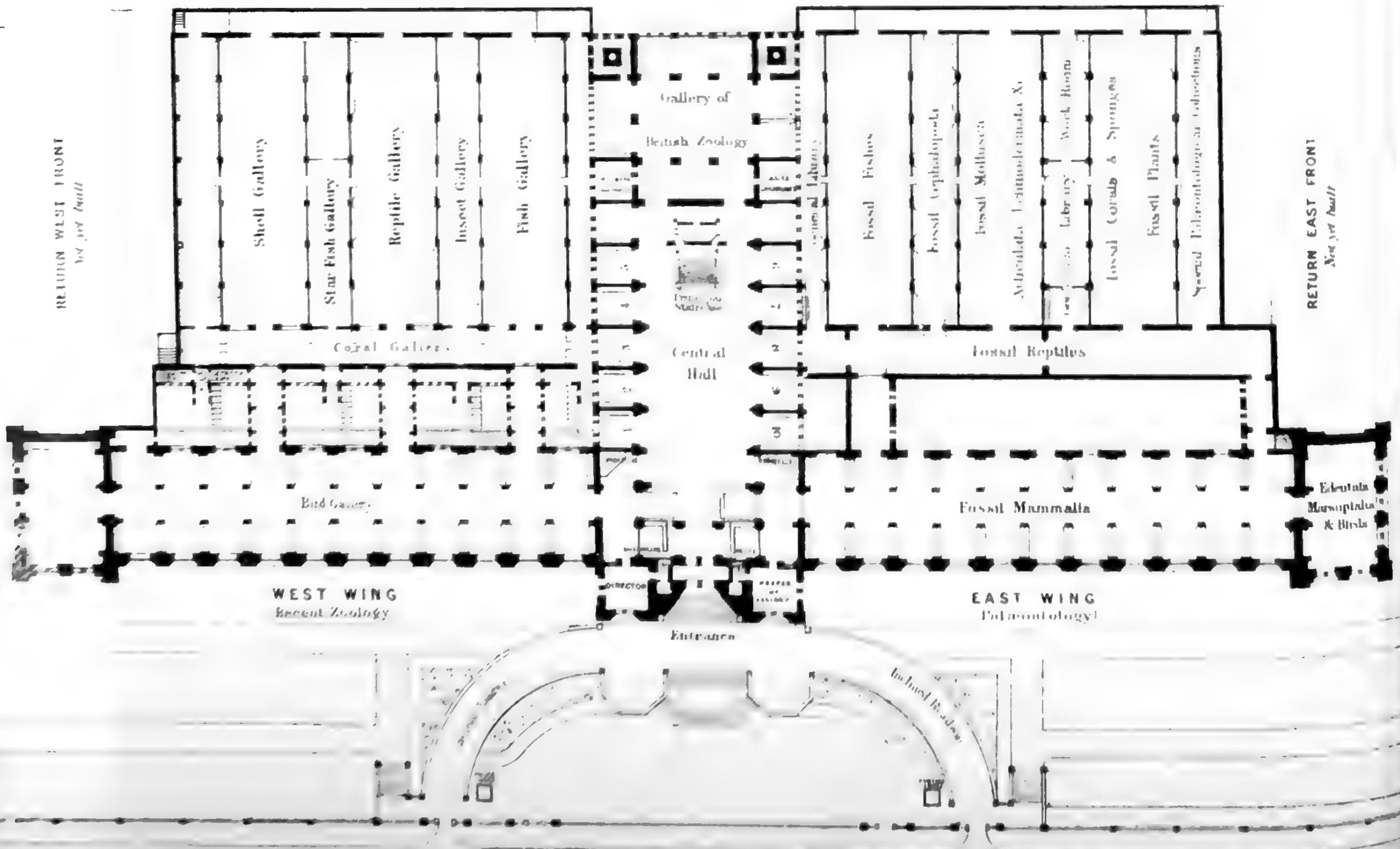
Geological.

With regard to geological collections, although the specimens in the department so called are mainly arranged not geologically, or according to stratigraphical position, but according to their natural affinities; yet, in many cases, it has been found convenient to adopt a mixed arrangement, the specimens within each large natural group being classified according to the sequence in age of the strata in which they were found. Such an arrangement however is only applicable to the fossils of a particular region, owing to the great difficulties in accurately determining the correspondence in age of formations occurring in distant parts of the earth's surface; hence a large and varied palæontological collection, such as that of the British Museum, must be arranged in the main upon a systematic or zoological and botanical basis. A limited but instructive series, showing the most characteristic fossil remains of the various British strata, arranged in chronological sequence, is exhibited in one of the galleries of the Geological Department.



BRITISH MUSEUM (NATURAL HISTORY)

Ground Floor.



TOPOGRAPHICAL DESCRIPTION OF THE MUSEUM AND ITS CONTENTS.

In following this short account of the contents of the various sections of the building, the visitor must bear in mind that the principal front faces the south, and that therefore on entering the great hall he will be looking due north, with the east on his right, and the west on his left hand.

THE CENTRAL HALL.

In the centre of the entrance hall is placed a specimen Central Hall.
of the bony framework of one of the most colossal of animals for which space cannot at present be found in its proper locality—the Cetacean gallery. It is the skeleton of the Skeleton of
Sperm-whale.
Cachalot, or Sperm-whale (*Physeter macrocephalus*), prepared from an animal cast ashore near Thurso, on the north coast of Scotland, in July, 1863, on the estate of Capt. D. Macdonald, R.E., by whom it was presented to the Museum. The Sperm-whale is the principal source of supply of the sperm oil and spermaceti of commerce. The former is obtained by boiling the fat or blubber lying beneath the skin over the whole body; the latter, in a liquid state at the ordinary temperature of the living animal, is contained in cells which fill the immense cavity on the top of the skull. It feeds chiefly on Cephalopods (squid and cuttlefish), and also fish, and is widely distributed throughout the warm and temperate regions of both Atlantic and Pacific Oceans. The skeleton is that of a full-grown animal. It measures fifty feet one inch in length, but wants three of the vertebrae from the end of the tail.

In order to render this skeleton more instructive, and to bring it into relation with the elementary specimens of osteology in the adjoining bay (No. I., west side), the names of the principal parts have been attached to them. This will enable the anatomist to trace at a glance the extraordinary modifications in the form and relations of its component bones which the

huge skull has undergone, and will show in the clearest manner to the least instructed visitor that the so-called fin or flipper of the whale is composed of all the same parts—shoulder, elbow, wrist, and fingers—as his own arm and hand. The hind limbs are entirely absent; but two bones are seen suspended at some distance from the spinal column, which represent the pelvic or hip bones of other animals. In some species of whales there are even traces of the thigh, knee-joint, and leg attached to this, and like it deeply buried within the body of the animal.

It is intended to place cases on the floor of the hall illustrating general laws or points of interest in Natural History which do not come appropriately within the systematic collections of the departmental series.

Group of
Crows and
Goldfinches.

One case contains a series of specimens illustrating *albinism*, a condition in which the pigment or colouring matter, usually present in the tissues constituting the external covering of the body, and which gives them their characteristic hue, is absent. Individuals in this condition occur among many animals of various kinds, and are called "*albinos*." In some of the specimens shown in the case the albinism is complete, but in many it is partial, the absence of colouring matter being limited to portions of the surface only.

A second group shows that two forms of Crows which appear quite distinct, and which, judged by their external characters, might be held to be different species, may in a state of nature unite, and produce offspring of a perfectly intermediate character. In the same case is also a series of Goldfinches, showing a complete gradation between birds of different coloration, and which have naturally been held to be different species. Both these examples may by some naturalists be considered instances, not of crossing of distinct species, but of "*dimorphism*," or the occurrence of a single species in nature under two different outward garbs; but from whatever point of view they are regarded, they illustrate the difficulty, continually increasing as knowledge increases, of defining and limiting the meaning of the term "*species*," of such constant use in biology.

Another group, in a case placed at present near the entrance to the hall, shows the great variation to which a species may become subject under the influence of domestication, as illus-

trated by choice examples of the best marked breeds of Pigeons, all of which have been derived by careful selection from the wild Rock Dove (*Columba livia*), specimens of which are shown at the top of the case.

The bays or alcoves round the hall, five on each side, are devoted to the Introductory or Elementary Morphological Collection, designed to teach the most important points in the structure of the principal types of animal and plant life, and the terms used in describing them, all which should be known before the systematic portion of the collection can be studied with advantage. This has been called the "Index Museum," as it was thought at one time that it would form a sort of epitome or index of the main collections in the galleries; but the name does not exactly express what it has developed into. It is really more like the general introduction, which almost always precedes the systematic portion of treatises on any branch of natural history. As mentioned before (p. 17), this collection is at present far from complete; in fact, only in its infancy; and as nothing exactly like it has been exhibited in any public museum before, it may, as its formation goes on, be subject to much modification and improvement; but it is hoped that it may ultimately serve as a guide for the formation of educational biological museums elsewhere. The space being strictly limited, the number of illustrative specimens is necessarily restricted, probably to the advantage of the student, at all events in the earlier part of his career. In examining this collection the visitor should follow each case in the usual order of reading a book, from left to right, and should carefully study all the printed explanatory labels, to which the specimens are intended to serve as illustrations.

The bays on the west side (left-hand on entering the hall) are devoted to the Vertebrated Animals, or those possessing a "backbone." In Nos. I. and II. are shown the characters of the Mammalian modifications of this type. The wall-cases of No. I. are already nearly filled with specimens showing the bony framework (internal skeleton) of Mammals.

In the first case (south side of the recess) will be seen a complete skeleton of a good example of the class—a large monkey, with all the bones separated, laid out on a tablet, and

**Bays or
Alcoves round
the Hall.**

**Bay I.
Skeleton of
Mammals.**

with their names affixed to them. Below it is a skeleton of the same animal articulated, or with the bones in their natural relation to each other, and also named. By examining these two specimens a fair idea may be obtained of the general framework of the body of animals of this class. In other parts of the case are placed examples of modifications of the skeleton to suit different conditions of life.

1. Man, showing a skeleton adapted for the upright position.

2. A Bat, or flying mammal, in which the fore-limbs are converted into wings by the great elongation of the fingers, which support a web of skin stretched between them.

3. A Sloth, in which the ends of all the limbs are reduced to mere hooks, by which the creature hangs back-downwards from the boughs of the trees among which it passes its entire existence.

4. The Baboon serves as an example of an animal walking on all four limbs in the "plantigrade" position, *i.e.*, with the whole of the palms of the hands and soles of the feet applied to the ground.

5. A small species of Antelope shows the characteristic form of a running animal, in which the limbs perform no office but that of supporting the body on the ground. It stands on the tips of the toes of its elongated slender feet.

6. A Porpoise, adapted solely for swimming in the water. The fore limbs are converted into flattened paddles, and the hind limbs are entirely absent, their function being performed by the tail. The rudimentary pelvic bones are preserved.

The rest of the case is occupied by details of the skull in some of its principal modifications. At the top are diagrams of the structure of bone and cartilage as shown by the microscope.

In the wall-case on the opposite (north) side of the bay the outline of the osteology of mammals is continued by illustrations of the structure of the limbs. At the top of the case is a diagram showing the correspondence of the hand and the foot in its complete typical form, with the names applied by anatomists to the different bones. The series of specimens below show the principal deviations which actually occur from the typical condition, which, as will be seen, is very nearly preserved in the human hand. One interesting series shows some of the stages of modification for special purpose (specialization) by which a typical five-fingered hand becomes converted

into that of the single-fingered Horse, and another series ends with the hand of the ruminants, with only two fingers remaining, sometimes, but erroneously, called a "cloven hoof." Similar changes are shown in the toes of the hinder extremity, illustrating the same common plan running through infinite modifications in detail, enabling the organ to perform such a variety of purposes, and to exhibit such diversity of outward appearance. The existence of this common plan is now generally thought to be due to inheritance from a common ancestor.

In the lower part of the case are examples of all the different kinds of articulations or joints by which the various bones of the body are connected together.

The central case of the bay contains a collection illustrating the principal characters of the teeth in the Mammalia. **Teeth of Mammals.** Its inspection should commence at the north-east corner, where the visitor will find himself after completing the survey of the osteological specimens in the wall-cases. In the first division specimens are placed showing the general characters of teeth, their form, the different tissues of which they are composed, the two great types of dentition in mammals, *homodont* and *heterodont*, the nomenclature and homologies of the different teeth, and their development and succession. The principal modifications of teeth according to their function are next shown by examples of forms adapted for fish-eating, flesh-eating, insect-eating, grass-eating, &c. The remainder of the case is taken up by select examples of the dentition of all the different families of mammals arranged in systematic order, prepared so as to display not only the shape of the crowns, but also the number and character of the roots by which they are implanted.

Bay No. II. contains, in its first wall-case (the only one yet occupied), illustrations of the outer covering or integument and its modifications in the class of Mammals, divided into the following sections: **Bay II. Integument of Mammals.**

1. Expansion of skin to aid in locomotion, as the webs between the fingers of swimming and flying animals, the parachutes of flying animals.

2. The development of true bony plates in the skin, found among mammals only in the Armadillos and their allies. The

cast of a section of the tail of a great extinct species (*Glyptodon*) shows well a bony external as well as internal skeleton.

3. The outer covering modified into true scales, much resembling in structure the nails of the human hand. This occurs in only one family of mammals, the Pangolins or *Manidæ*.

4. Hair in various forms, including bristles and spines. A stuffed specimen of a Porcupine at the bottom of the case affords a good illustration of a spiny covering. The two kinds of hair composing the external clothing of most mammals, the long, stiffer outer hair, and the short, soft under fur, are shown by various examples.

5. The special epidermal appendages found in nearly all mammals on the ends of the fingers and toes, called according to the various forms they assume, nails, claws or hoofs.

6. The nasal horns of the Rhinoceros, shown by sections to consist of a solid mass of hair-like epidermic fibres.

7. The horns of Oxen, Goats and Antelopes, consisting of a hollow conical sheath of horn, covering a permanent projection of the frontal bone (the horn-core).

8. The antlers of Deer, solid, bony, generally branched, projections, covered during growth with soft vascular hairy skin, and shed and renewed annually.

On the wall at the back of the bay is placed a series of antlers of the Common Stag or Red Deer (*Cervus elaphus*), grown and shed in six successive years, showing the changes which took place in their size and form, and the development of the branches or tynes in each year.

The other systems of organs of the class will occupy the remainder of this bay.

**Bay III.
General
structure
of Birds.**

Bay No. III. is devoted to the class of Birds. In the first wall-case the principal facts in the osteology of the class are shown. Sections of bones exhibit the large air cavities within; a complete skeleton of an Eagle, with the bones separated and named, and mounted skeletons of the Ostrich, Penguin, Pelican, Vulture, Fowl, &c., show the chief modifications of the skeleton. The Apteryx shows the smallest, and the Frigate bird the largest bones of the wing, the correspondence of which can be readily traced by means of the labels attached to them. The under surfaces of the skulls of various birds are shown with the different

bones coloured to indicate their limits and relations, followed by a series of the different types of sternum or breast-bone.

The table-case in the middle of the bay contains illustrations of the external characters, the beak, the feathers and the tail, as well as of the fore and hind limbs, or wings and feet. By the aid of the explanatory labels, the essential characters, and the principal modifications of all these parts, can easily be followed out by any one wishing to become acquainted with them.

Bays IV. and V. completing the west side of the hall, will, in a similar manner, show the most important points in the structure of reptiles and fishes. In the latter has already been placed a very fine skeleton of the Great Blue Shark (*Carcharodon rondeletii*) from New Zealand, with the names of all the parts affixed to them.

**Contents of
remaining
Bays not
completed.**

Of the bays on the east side of the hall, No. VI. is for the illustrations of the articulated classes, Crustacea, Arachnida, Myriopoda and Insecta, as well as of the Annulosa and Vermes. No. VII. for the Mollusca, Echinodermata, Cœlenterata, Porifera and Protozoa; and the remaining three, VIII., IX., and X., for the morphology of the vegetable kingdom: the first containing the Cryptogams, the next the Gymnosperms and the Monocotyledons, and the last the Dicotyledons. By this arrangement the lowest or simplest forms of animal or plant life, those on the border land, as it were, of the two kingdoms, will be brought into contact, and at the two ends of the series, in Bays I. and X., will be found the groups which show in the highest degree the special attributes of the division to which they belong.

The Introductory Collection of Minerals will be found in the gallery devoted to that department of the collection (see p. 46).

GALLERY OF BRITISH ZOOLOGY.

At the north end of the Central Hall, with entrances on either side of the great staircase, is a large room containing a collection of animals of all classes, which are, or have been in recent times, found in the British Isles, either as permanent residents, or as regular migrants or occasional visitors. The animal inhabitants of any country or district are collectively termed its "*fauna*." Our country in this respect belongs to the great zoographical

**Gallery of
British
Zoology.**

region called Palæarctic, embracing all Europe, the north of Africa, and the western and northern portions of Asia. As in the case of all islands, the species belonging to groups whose powers of locomotion are limited to the land or fresh water, are not numerous compared with those inhabiting large continental tracks. Their numbers can only increase under very exceptional circumstances, but, on the contrary, have a tendency to diminish, as the growth of human population and increase of the area of cultivated land gradually circumscribe their native haunts. In this way, the Brown Bear, the Wolf, the Beaver and the Wild Boar have all disappeared from Britain within the historic period, and others, as the Badger, Marten and Wild-cat, with difficulty maintain a somewhat precarious existence. These have all been originally derived from the mainland of Europe, probably before the formation of the channel which now makes our country an island. The wider and older channel which separates Ireland from Great Britain has proved a greater barrier to the emigration of animal life than that between the latter and the Continent, many species (as the Polecat, Wild-cat, Mole, Squirrel, Dormouse, Harvest-mouse, Water and Land Vole, Common Hare, Roedeer, as well as Snakes and Toads) never having crossed it, unless by aid of human agency.

On the other hand, those species that have the power of travelling through the air or traversing the ocean are far less fixed in their habitat, and thus the list of so-called "British birds" receives accessions from time to time from stragglers which find their way from the European continent or even across the Atlantic, and doubts as to the authenticity of some of the recorded occurrences make the list rather a vague and uncertain one. The constitution of the marine fauna in the same way is continually liable to undergo fluctuations.

Slight but permanent variations from the continental type can be recognised in a few of our indigenous species, but the only vertebrated animals undoubtedly peculiar to the British Isles are the common Red Grouse (*Lagopus scoticus*), and several species of fresh-water fishes (fifteen are enumerated by Dr. Günther), mostly belonging to the genus *Salmo*. Some of these have an extremely local distribution, being only found in some small

groups of mountain lakes. Many species, or at all events, well-marked varieties of insects, and a few land and fresh-water molluscs, have at present been only found within the limits of our islands.

The upright cases on the south side of the room, between the two entrances, contain the larger mammals which still inhabit the British Islands, except the Cetacea (Whales and Dolphins), which on account of their size are placed in the gallery appropriated to the general collection of animals of that order (see p. 38). Of the Seals, but two species are really indigenous, the Common Seal (*Phoca vitulina*) and the Great Grey Seal (*Haliçterus grypus*), but other species, as the Ringed and the Harp Seal of the Northern Seas, are exhibited in their capacity of occasional but rare visitors to our shores. Of the land Carnivora, specimens are seen of the Wild Cat, the Fox, the Badger, Otter, Marten, Polecat, Weasel, and Stoat or Ermine, which only occasionally (as in a beautiful example shown) assumes the white colour in England, though this change is the rule in countries with severer winter climates. The Rodents are represented by the Common and the Variable or Mountain Hare, which turns white in winter in the Highlands of Scotland, and by the Rabbit. Of the Ruminants, a specimen of the wild White Bull of Chillingham Park, Northumberland, stands between the cases, and there are stuffed specimens and antlers (above the cases) of the Red, Roe, and Fallow Deer; the latter, however, an introduced species, now naturalised in our parks.

The smaller mammals are exhibited in two square cases standing out in the body of the room, that on the left containing the Rodents (Squirrel, Dormouse, Voles, Mice, and Rats), and that on the right, the Insectivora (Hedgehog, Mole and Shrews) and the Bats.

Nearer the middle of the room is a larger case, divided into an upper and a lower compartment, the former containing the Amphibia (Frogs, Toads, and Newts) in spirit, the latter the few species of Reptiles (Snakes and Lizards) found in our islands. The distinctive characters of the three snakes, the Common or Ringed Snake (*Tropidonatus natrix*), and the Smooth Snake (*Coronella austriaca*), both harmless, and the venomous Viper (*Vipera berus*), can be made out from the

specimens, although the vividness of their natural colours is very difficult to preserve when long exposed to the light.

The far more numerous birds and fishes occupy the two sides of the series of upright cases, which fill the west and east ends of the room, and project on each side so as to make a partial division across it. Among the birds will be seen a specimen of the extinct Great Auk (*Alca impennis*), of which the Museum possesses a second example in the Bird Gallery (p. 32). The largest specimens of fishes are placed on stands out of the cases, near the middle of the room being a Greenland Shark (*Læmargus borealis*), fifteen feet long, which was captured near Anstruther, on the east coast of Scotland, May 18th, 1878. Next to this in size are the Porbeagle (*Lamna cornubica*) and the Fox Shark or Thresher (*Alopias vulpes*).

The cases occupying the northern section of the room (near the windows) are devoted to the Invertebrata. The wall-case on the west (left) side contains the larger specimens of Mollusca, Tunicata, Annelida, Echinodermata, and Cœlentrate in spirit, including some remarkably fine specimens of an Alcyonarian called *Funiculina quadrangularis*, one of which has a long-armed star-fish (*Astronyx loveni*) twined around it. These were dredged up in the Firth of Lorn, west coast of Scotland. The wall-case on the east (right) side contains a series of nests of hornets, wasps, bees, ants, &c. In the intermediate table-cases are arranged the collection of dried specimens of British Mollusca, Insects, Crustaceans, Polyzoa, Sponges, &c.

STAIRCASE.

On the first landing of the great staircase, facing the centre of the hall, is placed the seated marble statue of CHARLES DARWIN (b. 1809, d. 1882), to whose labours the study of natural history owes so vast an impulse. The statue was executed by Mr. J. E. Boehm, R.A., as part of the "Darwin Memorial" raised by public subscription. It was unveiled and placed under the care of the Trustees of the Museum on the 9th of June, 1885, when an address was delivered on behalf of the Memorial Committee, by the Chairman, Professor Huxley, P.R.S., to which His Royal

Statue of
Darwin.

Highness the Prince of Wales, as representing the Trustees, replied.

Above the first landing the staircase divides into two flights, each leading to one of the corridors which flank the west and east sides of the hall, and by which access is gained to the galleries of the first floor of the building. At the southern end of these corridors a staircase from each, raised on an arch which spans the hall, join to form a central flight leading to the second or uppermost floor. On the landing at the top of this flight is placed a marble statue by Chantrey of SIR JOSEPH BANKS (b. 1743, d. 1820), the munificent patron of science and scientific men, who for forty-one years presided over the Royal Society, and was an active Trustee of the Museum. His splendid botanical collections are preserved in the adjoining gallery, but his unrivalled library of works on natural history, also bequeathed to the Museum, remains in the old building at Bloomsbury, in the entrance hall of which the statue, erected by public subscription in 1826, stood, until it was removed to its present situation by direction of the Trustees in the year 1886.

Statue of
Banks.

The west corridor contains a portion of the series of British birds with their nests (see the following page), for which there is not room in the Bird Gallery on the ground floor. The specimens placed here belong to the smaller kinds, being mostly of the Perching or Passerine order.

In the east corridor is placed at present the collection of Humming-birds (*Trochilidæ*) arranged and mounted by the late Mr. John Gould, and purchased for the Museum after his death in 1881. The resplendent colours and singular varieties of form presented by these fairy-like objects must always excite feelings of admiration and wonder in all who gaze upon them. A special guide-book, pointing out the most interesting features of this collection, with a general account of the geographical distribution and mode of life of the humming-birds, has been published by the Trustees.*

Gould
Collection of
Humming-
Birds.

WEST WING.

The whole of the west wing of the building is devoted to the collections of recent Zoology.

* 'A Guide to the Gould Collection of Humming-birds.' Price twopence.

(A) GROUND FLOOR.

Bird Gallery. The ground floor is entered from the west side (left hand) of the Central Hall, near the main entrance of the building. The long gallery extending the entire length of the front of the wing is assigned to the exhibited collection of birds, the study series of the same group being kept in cabinets in a room behind.

Systematic Series in Wall-cases.

The wall-cases contain mounted specimens of all the principal species arranged in systematic order, beginning with the Vultures, on the left hand on entering, and ending with the Penguins on the right. The arrangement adopted is that of the Catalogue, now in course of publication.

From the multitude of specimens which are exhibited in this gallery, and which form but a small proportion of the different kinds of birds known to inhabit the globe, only a few of the most striking can be mentioned here. The various types of the birds of prey are very fully represented: from the Condor or Great Vulture of the Andes, the large Sea-eagle of Behring Straits, and the Great Eagle Owl of Europe, all of which are placed in separate cases, to the Dwarf Falcon in case 13, which is not much larger than a sparrow, and preys upon insects. Among the large group of perching birds, attention is drawn to the case of birds of Paradise opposite to wall-cases 17 and 20. At the end of the same side of the gallery are placed skeletons of the Dodo and Solitaire, gigantic pigeons with wings too small for flight, once inhabitants of the islands of Mauritius and Rodriguez, but now extinct. The cases on the right-hand side of the gallery are occupied by birds allied to the common Fowl, and by the wading and swimming birds; among them are a fine series of Pheasants and other game birds, the Great Bustard, once an inhabitant of our island, a pair of Flamingoes with their nest, the Great Auk from the Arctic Seas, now extinct, and finally the large Emperor Penguin from the Antarctic Ocean, the only known specimens of which were obtained on the British antarctic expedition of 1839-43.

In the "Pavilion," or room at the further end of the gallery, are placed the specimens of the peculiar division of birds called *Ratitæ*, from the flat or raft-like character of the breast-bone, and which, owing to the rudimentary character of their wings

have not the power of raising themselves off the ground in flight. They include the largest existing birds, the Ostriches, Emus and Cassowaries, as well as the small Kiwi or Apteryx of New Zealand.

In the middle of the gallery and in the spaces between the wall-cases are placed various isolated groups of particular interest, among which the visitor will doubtless be attracted by those showing the nesting habits of our best-known British birds. The great value of these groups consists in their absolute truthfulness. The surroundings are not selected by chance or imagination, but in every case are carefully-executed reproductions of those that were present round the individual nest. When it has been possible, the actual rocks, trees or grass, have been preserved, and where these were of a perishable nature they were accurately modelled from nature. Far more care has also been taken in preserving the natural form and characteristic attitude of the birds than was formerly the case in museums, as a large number of the old specimens in the wall-cases unhappily testify. This beautiful and instructive series is still in process of formation. Among the most attractive cases are, near to the entrance to the gallery, on the right, a pair of Puffins, feeding their single young one, and Black-throated Divers, with their eggs in a hollow in the grass on the edge of a mountain-loch in Sutherland. Hen-harriers, the male grey and the female brown, with their nest among the heather, from the moorland of the same county. Various species of Ducks, especially the Red-headed Roach, on the sedgy border of a Norfolk mere. This is in the sixth recess on the left side. A nest of the Heron, in a fir-tree, with the two old and three nearly fledged young birds. Various species of Gulls, and a particularly beautiful group of the graceful Arctic Terns from the Shetland Islands, in the seventh recess on the right. Then follow Plovers, Sandpipers, Snipes, &c., some of which (especially the Ringed and Kentish Plovers) show the wonderful adaptation of the colouring of the eggs and young birds to their natural surroundings for the purpose of concealment. Beyond are Ptarmigans and Capercaillies from Scotland, and on the left Woodpigeons and Turtle Doves building their simple, flat nests of sticks in ivy-clad trees. In the Pavilion at the end, are Sandmartins and King-

**Groups of
British Birds
and Nests.**

fishers, showing, by means of sections of the banks of sand or earth, the form and depth of the hole in which the nests are placed, and there is here also (on the right) a fine group of Gannets and other sea-birds from the Bass Rock in the Firth of Forth.

Owing to want of space in this gallery, the nests of the Perching or Passerine birds are placed for the present in the west corridor of the Central Hall.

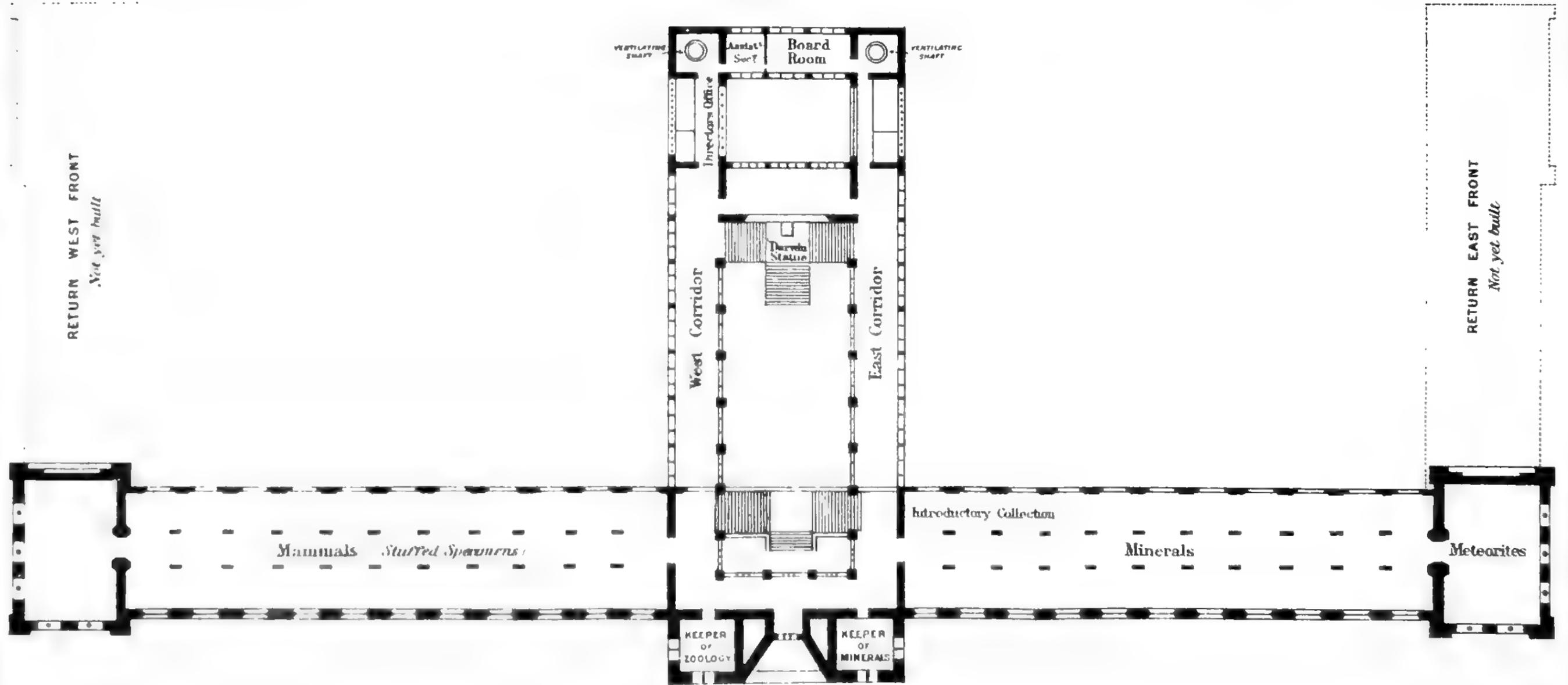
Coral Gallery. Parallel with the bird gallery to the north side (right on entering), and approached by several passages, is a long narrow gallery containing the collection of corals and of sponges and allied forms. Commencing at the eastern end, some of the lowest forms of animal life are exhibited in the wall case and table-cases; they belong to a group called *Foraminifera*, and, for the greater part, are so minute, that they can be studied with the microscope only; their structure is therefore illustrated by means of models and figures. The next divisions of the gallery are occupied by the sponges; most conspicuous among them is a series showing the variations of the common bath-sponge (cases 1 and 2), the beautiful siliceous *Euplectella* or Venus' flower basket, and the Japanese *Hyalonema* or glass rope sponge (case 3), and the gigantic *Rhaphiophora* or Neptune's goblet, of which several specimens are placed on separate stands.

Nearly the whole of the remainder of the gallery is given up to the Corals, showing the immense variety of form and colour of these animals, some presenting a marvellous resemblance to vegetable growths. The part exhibited is merely the dried, hard, horny or calcareous basis or supporting skeleton either of isolated individuals, or of colonies of creatures allied to the well-known sea-anemones of our coasts. Opposite to cases 8 and 10, which contain the Madreporal Corals, is placed a large fragment of a reef, entirely formed by a small kind of Madreporal. These reefs when raised above the surface of the water constitute the base of thousands of islands in the Indo-Pacific Ocean. Of the host of other forms, only the precious coral (*Corallium*), usually of a bright red colour, found in the Mediterranean and so largely used for ornamental purposes, and the crimson Organ-pipe Coral (*Tubipora*) in case 13, can be mentioned here.

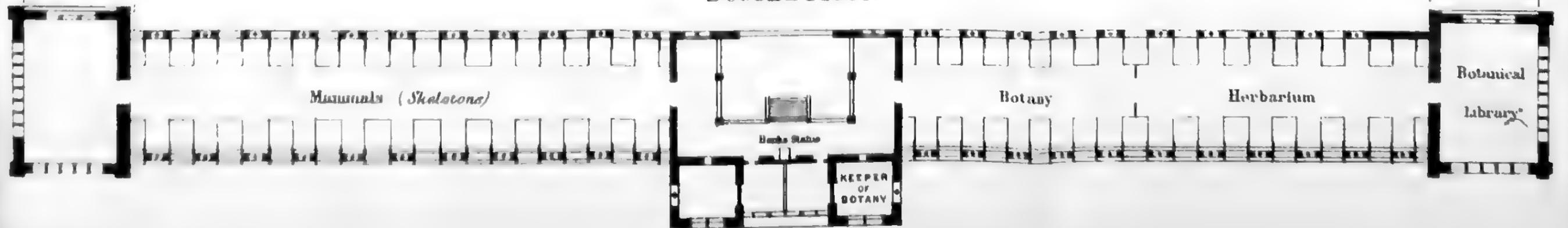
The wall-case at the western end of the gallery contains the

BRITISH MUSEUM (NATURAL HISTORY).

First Floor.



Second Floor.



Scale of Feet.

10

100



POLYZOA, a group of small animals which, like corals, are supported by a calcareous or horny plant-like growth, but in their internal structure are more nearly related to the *Mollusca*, a class exhibited in the adjoining gallery.

Approached through the Coral Gallery, and running backwards at right angles with it, are a number of galleries containing other portions of the zoological collections.

In the corridor which leads from the Bird Gallery into the Fish Gallery a large table-case is placed, containing a selection of the most important forms of Batrachians, which are divided into such as possess a tail—Salamanders and Newts, and into those without tails—Frogs and Toads. These animals live during some period of their existence in the water, and breathe by gills, and are therefore very closely allied to fishes.

I. The Fish Gallery, which is nearest to the Central Hall, Fish Gallery. contains the exhibited portion of the collection of Fishes, the greater number of which, preserved in spirit, are placed for safety in a detached building behind the Museum, where they are available for study under suitable regulations. The gallery contains stuffed examples and skeletons of all the most remarkable members of the class, the peculiarities of which are pointed out in a special guide-book.*

The wall-cases on the west side of the room (right on entering) and at its end contain the fishes with completely osseous skeletons, a division to which belong by far the greater part of the species now inhabiting the waters of the globe. Large and remarkable examples are placed in separate cases opposite to the wall-cases; and as the colours of fishes are very fugitive, and disappear more or less completely after death, some of the stuffed examples have been painted from life, to show the extraordinary brilliancy of many of the tropical kinds. The fishes allied to the Perch (case 1), Gurnard (case 8), Mackerel (case 10), Sword-fish (case 13), Wrasse (case 14), Codfish and Plaice (case 16), Catfish (case 17), Salmon (case 19), Pike (case 20), Carp and Herring (case 21), Eel (case 23), are represented by numerous examples, the last of which is that, at least in external form, most remarkable fish, the Sunfish or *Orthogoriscus*.

The eastern or left side of the room is devoted to the exhibi-

* 'Guide to the Reptiles and Fishes.' Price sixpence.

tion of a very different division of fishes, which was much more numerously represented in ancient times than at present. The majority have a cartilaginous skeleton. To this division belong the Gar-pike of North America (case 28), the Mud-fishes (*Dipnoi*) of South America, Africa and Australia (case 28), the Sturgeons (case 29), and finally the Sharks and Rays, including the singular Hammer-headed Shark, and the Saw-fish (*Pristis*) which has a long projecting flattened snout, with a row of teeth arranged something like those of a saw on each side. Another very small division of fishes comprises the Lampreys, of which a few specimens are shown in case 44.

The largest specimen of the class, placed near the centre of the room, is a full-grown example of the Great Basking Shark (*Selache maxima*) which was captured on the 2nd of March, 1875, near Shanklin, in the Isle of Wight. Its length is twenty-eight feet, but as the minute size of the teeth indicate, it is a comparatively harmless animal.

Insect Gallery.

II. A small gallery is devoted to the group of ARTICULATA or Invertebrated animals with jointed limbs, as Insects, Spiders, Myriopods, and Crustacea. In the wall-cases are many curious examples of nests, and of specimens illustrating the ravages of destructive insects, and also some of their economic products. Selected examples of the different groups of insects are exhibited in systematic order in the table-cases, so as to give the visitor who studies them a good general idea of all the most interesting forms and of their classification. Unfortunately, it is impossible to exhibit many of the most beautiful and rare species, owing to the deteriorating effects of continued exposure to light upon their colours. The main collection of insects is, on this account, and because of the immense space it would otherwise occupy, kept in cabinets in the "insect-room" on the basement floor, to which students can have access under the regulations which will be found at the end of this guide.

**Reptile
Gallery.**

III. A large gallery containing the collection of stuffed specimens and skeletons of Reptiles, including Crocodiles, Lizards, Snakes and Tortoises. As is the case with the fishes, a large number of the animals of this class are necessarily preserved in spirit, and therefore not suitable subjects for exhibition. The gallery contains examples of all the forms of general interest,

for an account of which the visitor is referred to the special guide.*

The fine and unique series of Gigantic Land Tortoises which are either extinct or doomed to speedy extermination; the interesting skeleton of the Leathery Turtle (*Sphargis*) in which the carapace is separated from the true skeleton; the large stuffed examples of the Fish-eating Gharial and of the dangerous Crocodiles of Africa, India and Australia; the Snake-eating Snake (*Ophiophagus*), the largest of poisonous snakes; and the great stuffed Anaconda (*Boa murina*) at the end of the room—are the objects which will most attract the attention of the visitors to this gallery.

IV. A small gallery is called the Star-fish Gallery from being specially devoted to Star-fishes and their allies—the ECHINODERMATA; these are arranged systematically in table-cases 1–6, and in case 7 there are specimens illustrating the anatomy of the skeleton, and models and figures descriptive of the remarkable changes undergone by these animals in the course of their development. As magnificent examples the visitor should not fail to notice in 1 D *Pycnopodia helianthoides*, and in 2 B and C the fine series of *Linckia*, and in 2 D–F and 3 A the extensive collection of *Oreaster*; in 3 E are two remarkable specimens of *Astropecten*; in 4 C an almost complete example of the brittlestar (*Ophiomastix annulosa*) should be noticed, and on the tops of cases 5 and 6 are good examples of *Diadema* and *Echinus*. The most beautiful and remarkable specimens in the gallery are the stalked Crinoids, which were collected by the “Challenger,” and one found attached to an old telegraph wire which was taken up in the Caribbean Sea. These deep-sea forms, so abundant in earlier periods of the world’s history, are exhibited on tables in the corners of the gallery, by case 7.†

The wall-cases contain types of the very various and different groups which are put together as Worms or VERMES. Case 1 contains the Tape-worms or Cestoda, and the Flukes or Trematoda, the life history of a type of each being illustrated by specimens, figures, and models; in case 2 the Round-worms are illustrated

* ‘Guide to the Reptiles and Fishes.’ Price sixpence.

† ‘Guide to the Shell and Star-fish Galleries (Mollusca, Echinodermata, Vermes).’ Price fourpence.

by models of *Trichina*, and the anatomical structure of various other forms is shown by the aid of diagrams. Case 3 contains the free-living Terrestrial and Marine Worms, the Leeches, and Gephyreans.

Shell Gallery.

V. A large gallery devoted to the extensive division of MOLLUSCA, the exhibition of which is however mainly restricted to their shells. In some cases the form of the animal itself is shown either by specimens in spirit or by means of models.

The first table-case on the left as the gallery is entered contains the Argonauts, the beautiful pearly Nautilus, the rest of the Cephalopods (Octopus, Squids, &c.), the fragile glassy Pteropods, and the Cones, one of the most beautiful groups of the Gastropods, a division which includes Snails, Whelks, Slugs and all those Molluscs which crawl upon the under surface of their body. They are contained in cases 1-17. The Bivalves or those Mollusca which, like the Cockle and Oyster, are protected by a shell formed by two pieces or valves, are arranged in cases 17-26. The most generally known of this division are the Venus-shells (case 17); the Cockles (case 19); the Giant Clam, sometimes weighing as much as 500 lbs. each (case 20); the Piddocks and Teredos, borers in wood and stone (case 19); the Razor-shells (case 20); the Pinnas (case 24); Scallops and Thorny Oysters (case 25); and the True Oysters (case 25).

A fine series of very large shells and some interesting Cephalopods in spirit occupy four upright cases at the ends of the room; and near the entrance to the gallery are placed some small table-cases, containing series of the eggs of Mollusca and of their opercula or lids by means of which the opening or mouth of the shell is closed in some forms; also specimens illustrating the formation of pearls, and other special points of interest connected with the group.

A special guide-book to the Shell and Star-fish galleries is published for the use of visitors, and guides to the remaining galleries are in preparation.

GALLERY OF CETACEA.

Cetacea or
Whale
Gallery.

Approached by a staircase, leading from the last (or westernmost) of the passages which connect the bird gallery with the

coral gallery, is a room in the basement, in which the specimens of whale-like animals, for which, on account of their large size, no other place could be found in the portion of the Museum galleries already completed, are placed. The room has, unfortunately, the disadvantage of being not well lighted, and of being intersected by massive columns, which interfere with the complete view of any of the larger skeletons; nevertheless the specimens will be safely preserved in it, until the erection of the west front shall afford them better accommodation, and visitors can, in the meantime with very little difficulty study most of the important peculiarities of these gigantic and very interesting members of the Animal Kingdom.

As it is almost impracticable to preserve the skins of the larger species of whales, owing to the quantity of oil with which they are saturated, the exhibition of the characters of these animals is chiefly limited to their skeletons, assisted by drawings of their external forms. The general appearance of many of the smaller kinds is, however, shown by stuffed specimens and coloured casts. A general account of the structure and classification of the Cetacea, with special reference to those exhibited in this gallery, will be found at the end of the Guide to the Galleries of Mammalia.*

On the left side of the door, on entering, near the window, is a case containing a stuffed specimen, skeleton, and several skulls of the very curious fresh-water Dolphin of the rivers of India (*Platanista gangetica*), and in the next case the peculiar Dolphin of the river Amazon (*Inia geoffrensis*). Among the specimens on the same side of the room, one of the most interesting, on account of its remarkable dentition, is the Narwhal or Sea-
 Unicorn. It has only two teeth, which lie horizontally in the upper jaw. In the female both remain permanently concealed within the bone of the jaw, so that this sex is practically toothless, but in the male, while the right tooth remains similarly concealed and abortive (as shown in the specimen, by removal of part of the bone which covered it), the left is immensely developed, attaining a length equal to that of half the entire animal, projecting horizontally from the head in the form of

Fresh-water
Dolphins.

Narwhal.

* 'Guide to the Galleries of Mammalia' (Mammalian, Osteological and Cetacean) in the Department of Zoology. Price fourpence.

a long, straight, tapering and pointed tusk, spirally grooved on the surface. In some very rare cases both teeth are fully developed, as in the fine skull exhibited near the skeletons.

Whalebone
Whales.

Most of the largest Cetacea belong to the group called "Whalebone Whales," in which a series of horny plates called "baleen," or more familiarly "whalebone," grow from the palate in place of teeth, and serve to strain the water taken into the mouth from the small marine animals on which the whales subsist. A fine representative of this group is the very perfect skeleton of the Common Rorqual or Fin-whale (*Balænoptera musculus*) near the further end of the middle of the room. It is sixty-eight feet long, and was captured in 1882 in the Moray Firth, Scotland. The flukes of the tail and dorsal fin are preserved with the skeleton and suspended in their natural position, and the small pelvic bones and a rudimentary nodule, representing the femur or thigh bone, the only trace of the hind leg of this gigantic animal, are also preserved. Beyond this skeleton is a skull of the Greenland Right-Whale (*Balæna mysticetus*) which yields most of the "whalebone" of commerce, and also a small wooden model of the animal, of the scale of one inch to the foot.

FIRST FLOOR.

The upper floors of the wings of the Museum consist only of single galleries extending along the whole front of the building; the galleries which run backwards on the ground floor containing only a single story.

Gallery of
Stuffed
Mammals.

The MAMMALIAN GALLERY is entered from the western corridor of the Central Hall. It contains the series of stuffed specimens of animals of this class, with the exception of the *Cetacea* and the *Sirenia*. Skeletons of the most important types are incorporated with this series. The collection of antlers of the family of Deer is ranged along the top of the cases.

The contents of this gallery and the next are described in considerable detail in a special guide, and therefore a very short notice here will suffice.

The series commences on the left with the most highly organised forms, viz., the apes and monkeys, of which the fine series of Gorillas, Chimpanzees and Orang-Outangs deserves special

attention. Among the Carnivora which occupy the cases next in order will be noticed the series of Tigers (cases 13 and 14), including the small and long-haired Persian race, and the large short-haired form of the jungles of Bengal. Typical forms of the Bats (such as the Flying Fox), of the small Insect-feeders and Gnawing Animals, and of the Edentata (Sloths, Anteaters and Armadilloes) follow. The remainder of the cases of this side of the gallery, of the pavilion, and nearly the whole of the right side are devoted to the Ungulata or Hoofed Animals; very complete series of the wild Sheep, Goats and wild Cattle, of the Musk-ox, an inhabitant of the Arctic regions, of the large African Antelopes, and of the Elk and Reindeer of both hemispheres are exhibited. Towards the end of the series, in cases 95-98, the Pouched Mammalia or *Marsupialia* (Kangaroos, Wombats, Tasmanian Wolf, Opossums, &c.), find their place; they carry their young in a pouch, until able to shift for themselves. Finally the Monotremes of Australia, the Duck-billed Platypus, and the Echidna, at the bottom of case 98, differ still more from the ordinary members of this class, inasmuch as they do not bring forth their young alive, but lay eggs.

SECOND FLOOR.

The Osteological Gallery is devoted to the skeletons and skulls of Mammalia, the arrangement of which corresponds, as far as practicable, with that of the stuffed specimens. The series commences (on the left hand on entering) with a male and female human skeleton, followed by a selection of skulls, showing the different modifications of the cranial and facial bones in the various races of Mankind. Among these is the skeleton of a full-grown Akka, only four feet high, which appears to be the usual size of this pygmy tribe of Negroes from Central Africa. The next wall-case contains several skeletons of man-like Apes, the Orang-Outang, Gorilla and Chimpanzee, with the principal forms of the other Monkeys and Lemurs. In cases 4-8 numerous representatives of the Carnivorous and Rodent Mammalia are shown, the remainder of the cases of this side of the gallery being devoted to the exhibition of skulls of the larger Ungulata, viz., the Elephants, Rhinoceroses and Horses. Of the first many skulls are exhibited,

**Skeletons and
Skulls of
Mammals.**

some in section showing the extraordinary modification of the skull in adaptation to the support of the heavy tusks and powerful trunk. The series of elephants is continued in the pavilion at the end of the gallery, where skulls and skeletons of the African and Indian elephants are exhibited, among them a skeleton of a very large tuskless elephant or Mooknah.

In the pavilion are also placed skeletons of the *Sirenia* or Sea-Cows, aquatic animals more nearly allied to the Ungulates than to the Whales with which they were associated in former times. Stuffed examples of these animals have also been placed here for want of space in the Mammalian Gallery.

The majority of the cases on the right hand of the gallery are occupied by the Ruminant Ungulata, such as the Camels, Oxen, Antelopes, Sheep, Goats and Deer; cases 23 and 24 containing the Edentata (Sloths, Anteaters, Armadilloes), the Marsupials or Pouched Mammalia, and finally the Monotremes of Australia (*Ornithorhynchus* and *Echidna*) which in their skeleton as well as other structures differ widely from the ordinary members of the class.

Along the centre of the gallery is ranged a very complete series of skeletons of the wild cattle of the old and new world and of the various species of Rhinoceros and Hippopotamus.

A collection of horns of Oxen, Buffaloes, Antelopes and Sheep is placed on the top of the cases of the gallery and on the wall of the pavilion.

EAST WING.

GROUND FLOOR.

Palæontological Collection.

The ground floor of this wing consists, as on the other side of the building, of a gallery running west and east the whole length of the wing in front, of a smaller parallel gallery behind it, and leading from the latter, a series of galleries running north and south. The whole of this floor is occupied by the collection of the remains of animals and plants which flourished in geological periods anterior to that in which we are now living.

Some of these belong to species still existing upon the earth, but the great majority are extinct. They are arranged mainly upon zoological principles, that is, the forms which are supposed to have natural affinities are placed together, but within some of the great divisions thus mapped out, especially of the Invertebrata and plants, it has been found convenient to adopt a stratigraphical or even geographical grouping, the fossils of different geological formations being kept apart, and those of the British Isles separated from those of foreign localities.

As this portion of the Museum is fully described in the Illustrated Guide* it will only be necessary to give a brief account of it here.

The large front gallery first entered from the hall is entirely devoted to the remains of Mammalia. Along the centre are placed a number of large and striking objects, of too great a size to be contained in the wall-cases. The first is a nearly complete skeleton of the American Mastodon, an animal closely allied to the elephant, from which it is chiefly distinguished by the characters of its molar teeth. Beyond this is the skull of an Elephant (*Elephas ganesa*), remarkable for the immense length of its tusks, from the Siwalik Hills of India, and another of the Mammoth (*Elephas primigenius*) with huge curved tusks, in a perfect state of preservation, found in the brick earth at Ilford in Essex. Then follow skeletons of the great extinct Irish Deer (*Megaceros giganteus*), male and female, the former distinguished by its magnificent palmated antlers, resembling those of a fallow deer on a large scale.

Remains of
extinct
Mammals.

Beyond these is a skeleton of a very rare and remarkable animal, the Northern Manatee or Sea Cow (*Rhytina gigas*), the last known resort of which was Behring's Island in the North Pacific, where it was completely exterminated towards the close of the last century. In the same case is placed the skeleton of a smaller allied form, the Halitherium, from the Miocene of South Germany. These, with their existing representatives, the Manatee and Dugong (see Osteological Gallery, West Wing, Second Floor, p. 42), belong to the order *Sirenia*, aquatic mammals of fish-like form, presenting considerable external resemblance

* 'Guide to the Exhibition Galleries of the Department of Geology and Palæontology.' Price fourpence.

to *Cetacea* (the Whales and Dolphins), although differing from them in many essential points of structure and habit.

Fossil remains
of Man.

The wall-cases on the south side (right on entering) contain remains of Man found under such circumstances as may justify the appellation of "fossil," in caves or pleistocene deposits, associated with the bones of animals either completely or locally extinct. Then follow in systematic order the bones and teeth of the other Primates, the Carnivora, Ungulata and Sirenia.

The greater part of the north side of the gallery is devoted to the exhibition of a magnificent collection of the remains of Proboscidea (Dinotheria, Mastodons and elephants), including the fine series from the sub-Himalayan Mountains collected by Cautley and Falconer.

In the pavilion, or expanded portion of the end of the gallery, are skeletons and bones of the animals of the order Edentata, mostly from South America, including some fine specimens of the great Ground Sloths, the largest of which is the Megatherium, shown in the act of rearing itself on its hind legs and powerful tail to seize and tear down the branches of a tree, in order to feed upon the leaves. That this was the habit of this huge animal is clearly indicated by the structure of the bones and teeth. The mounted specimen is not an actual skeleton, but is composed of plaster casts of the bones, most of which are in the wall-case at the side of the room. Of the Mylodon, a smaller, but nearly allied species, an almost perfect skeleton is exhibited in a glass case near the Megatherium, and not far off is the Glyptodon, a huge extinct Armadillo, enclosed in a solid barrel-like bony case. As these animals far surpassed in size their diminutive existing representatives, so the gigantic Australian Marsupials of the corresponding period (pleistocene, or latest tertiary), the Diprotodon and Nototherium, remains of which will be found in this room, greatly exceeded any of the species now existing on that continent. On the other hand, all the mammals of the earliest geological periods of which remains are known, are of diminutive size, as seen in the very interesting series, mostly from the Purbeck (upper oolite) beds of Dorset, and Stonesfield (great oolite) of Oxfordshire, exhibited in one of the table-cases on the north side of the room.

The south side of this room (right on entering) is chiefly devoted to the remains of extinct birds, including the famous Lizard-tailed Bird (*Archæopteryx*) of the Solenhofen beds of Bavaria, the oldest known member of the class, presenting many reptilian characters, but with well-developed feathers on the wings and tail, the impressions of which are beautifully preserved in the specimen. A series of skeletons of the Moa or Dinornis of New Zealand, a bird in which no trace of a wing has been discovered, show the diversity of size of different members of the group, some far exceeding any existing ostrich and others scarcely larger than a good-sized turkey. Some of these remains are so recent as still to be covered with dried skin, and even feathers. Several eggs are also shown, but large as these are, they are greatly exceeded in size by those of the *Æpyornis* from Madagascar, in the south-east corner of the room.

The long gallery north of the mammalian saloon contains a fine assemblage of Reptilian remains. The south side is devoted to the great sea-lizards (*Plesiosauria* and *Ichthyosauria*), including the collection described and figured in Mr. Hawkins's Book of the Great Sea-Dragons. Ranged in the cases on the north side are remains of the gigantic *Dinosauria*, which far exceeded in size any other land animals. At the eastern end of the gallery are the *Pterosauria*, or Flying Reptiles.

Of the galleries leading backwards from this, the one nearest the centre of the building, is devoted to the collection of fossil Fishes, an account of which has been published in a special guide.* The next contains the Cephalopods, a group of animals abounding in extinct forms, of which the Belemnites and Ammonites are the best known. The form and structure of their nearest living representatives, the various species of Cuttle-fishes, Squids, Argonauts and Nautilus are illustrated by models and drawings placed near the entrance of the gallery. The third gallery contains the remaining Molluscs, Echinoderms, Annelids and Crustacea; the fourth the Corals, Sponges, Protozoa and fossil Plants. In these last two galleries the British specimens are placed in the table-cases, and those of foreign origin in the cases round the walls.

* 'Guide to the Collection of Fossil Fishes in the Department of Geology and Palæontology.' Price fourpence.

**Historical
Collections.**

The fifth gallery is set apart for the reception of certain special collections of historical interest, which, from the circumstances under which they were formed, or came into possession of the Museum, or from their containing a large number of types described and figured in standard monographs, it has not been thought desirable to break up and disperse among the general collection. The principal of these are, the original collection formed by William Smith, the pioneer of geology in this country, the Searles Wood Collection of Crag Mollusca, the Edwards Collection of Eocene Mollusca, the Davidson Collection of Brachiopoda, the types of Sowerby's 'Mineral Conchology,' and lastly, but not least in interest, the specimens which, belonging to the collection of Sir Hans Sloane, form the nucleus of the whole Museum.

**Stratigraphi-
cal collection
of British
Palæontology.**

In the wall-cases on the west side of this gallery is exhibited a stratigraphical collection, intended to show the most characteristic organic remains of the various geological formations of the British Isles, arranged in the order of their sequence in time, commencing near the entrance door with the most recent, and gradually passing down to the most ancient fossil-bearing strata.

FIRST FLOOR.**Gallery of
Minerals.**

The gallery on this floor, entered from the south end of the east corridor of the hall, contains the extensive Mineral Collections, a full description of which will be found in a special guide.*

**Introductory
Collections.**

Entering the gallery the visitor will find, in the first window-case on the left-hand side, a series of specimens selected and labelled to serve as an introduction to the study of minerals. Beginning with a definition of what is meant by a mineral, it is there shown how essential characters were gradually recognised, and how minerals have been distributed into kinds and classified.

In the next three window-cases specimens are arranged to illustrate the various terms which have been found useful in the description of minerals.

* 'Introduction to the Study of Minerals, with a Guide to the Mineral Gallery.' Price threepence.

Recently acquired specimens are shown for a time in the fifth window-case. Recent acquisitions.

The remaining window-cases in the gallery contain the collections of crystals, models of crystals, and pseudomorphs, and are intended for the special student. The general visitor will do well to return to the entrance to the gallery and begin the examination of the table-cases, in which are exhibited specimens of every mineral species and variety in the possession of the Museum. The cases are numbered from 1 to 42, and the eight panes of each case are distinguished by the letters *a* to *h*. Crystals.
Pseudo-morphs.

General Collection of Minerals.

For the use of the student there is published a complete Index to the names and synonyms of all the mineral species and varieties represented in the Collection, with references to the table-cases in which specimens are placed.*

The system of classification, which is necessarily constructed to include, not only ores, but all known minerals, is not very easy for a general visitor to follow, and it is thus convenient to indicate here the positions in the gallery of those minerals—as, for instance, precious and ornamental stones, and metallic ores—which have an interest for all; for detail, reference must be made to the Departmental Guide.

In cases 1 and 2 are the native metals, as Copper, Silver, Gold, and Platinum; and non-metals, as Sulphur, Graphite, and Diamond. The large symmetrical crystal of Diamond, weighing 130 carats, presented by John Ruskin, is worthy of special attention (case 1g).

The next six cases contain minerals which have mostly a metallic lustre and consist of metals in chemical combination with sulphur or arsenic.

Argentite (3d) is an important silver ore, containing 87 per cent. of silver and 13 of sulphur.

Blende (4b) is a valuable zinc ore, and contains 67 per cent. of zinc and 33 per cent. of sulphur.

Galena (4e) is by far the most important ore of lead (lead 87, sulphur 13).

Copper-glance (3e) is an important ore of copper (copper 80 sulphur 20).

* 'The Student's Index to the Collection of Minerals.' Price twopence.

Cinnabar (3h) is the ore from which mercury or quicksilver is obtained (mercury 87, sulphur 13).

Pyrites (5d), one of the most common of minerals, is a compound of iron and sulphur (iron 47, sulphur 53).

Erubescite (5e), Copper pyrites (5f), and Tetrahedrite, or Grey copper ore (7a), are all valuable copper ores.

Common salt is represented in case 8f, and Fluor, a compound belonging to the same division, begins at case 7e.

The next division, consisting of compounds of oxygen and including most of the stony minerals, begins with Cuprite (10a), an important ore of copper (copper 89, oxygen 11).

Spinel (10e), in its transparent varieties, is one of the precious stones: the deep red is the Spinel Ruby (less dense and less hard than the true ruby), the rose-tinted is the Balas Ruby, and the yellow or orange-red is the Rubicelle of the jewellers: sometimes, too, it has a dark blue colour. On account of their hardness the less valuable specimens are used for the jewellery of watches.

Magnetite, or Magnetic iron ore (10f), is the richest and most valuable of the ores of iron, of which metal it contains 72 per cent. It is the natural loadstone.

Chrysoberyl (9e) is another of the precious stones. The beautiful greenish-yellow variety, almost equal in lustre and hardness to the sapphire, is the Oriental Chrysolite of the jewellers; another variety, with a peculiar play of light, is the true Cat's-eye; while a third, green by sunlight but red by candle- or lamp-light, is the stone known as Alexandrite.

Corundum (9h), when clear and of the proper colour, is after the diamond the most precious of stones. When pure it is the colourless variety known to jewellers as the Lux-sapphire: but with very minute traces of colouring ingredient it assumes the richest and most varied hues; when red it is the true Ruby; when azure it is the Sapphire; while the yellow, green, and purple varieties are known respectively to jewellers as the Oriental Topaz, Emerald, and Amethyst; the prefix oriental, though at first used to suggest that the stones are not the ordinary topaz, emerald, and amethyst, but others of a similar colour coming from the East (India, Ceylon, Siam, Pegu, &c.), was afterwards understood to imply only the excellence of their characters. The

star-stones are a variety which, when placed in a strong light, show a six-rayed star.

Hæmatite (11a) is a valuable ore of iron.

Cassiterite, or tin-stone (11f), is the ore of tin, of which metal it contains 79 per cent.

Zircon (13b), when clear and without flaws, is one of the precious stones: one variety with peculiar red tints is the Hyacinth or Jacynth, while the colourless, yellowish, and dull green are termed Jargoon: the colourless variety, owing to its high refractive power, approaches even the diamond in brilliancy.

Quartz is the most common of minerals. In its clear and transparent variety it is the crystal of the ancients and the rock-crystal of modern times; it is the Brazilian Pebble of the spectacle-makers (14b). After the clear come the smoky varieties, including the Scotch Cairngorm and Occidental Topaz (14g). Next comes the Amethyst (14h), one of the less valuable, though one of the most beautiful of the ornamental stones. The Quartz Cat's-eye (13f) is a variety presenting the opalescence, but not the hardness or the brilliancy, of the true cat's-eye already referred to: the opalescence is due to enclosed fibres of an asbestos-like mineral in the specimens from Ceylon, and to fibres of crocidolite in the blue, and of altered crocidolite in the brownish-yellow specimens from South Africa.

Jasper (13g), an uncrystallised coloured mixture of silica and clay, is distinguished from ordinary quartz by its opacity and dull earthy fracture. It is of various colours, chiefly red, brown, yellow and green; and the colours are arranged sometimes in a nodular form as in the Egyptian Jasper, at other times in stripes as in the Riband Jasper.

The Lydian- or Touch-stone (15a), by reason of its hardness and black colour, has been used from remote ages to test the purity of the precious metals.

Hornstone (15a) is a variety of silica without evident crystallisation, and generally presents a more or less splintery fracture; but in one kind, Flint (15b), the fracture is conchoidal, sometimes conical, as is well shown by specimens in the case.

Chalcedony (15b) has a lustre nearly that of wax, and is either transparent or translucent. The specimens from Uruguay (15d) are of especial interest as containing imprisoned water.

The Heliotrope, or Bloodstone (16a), is a green stone with red blood-like spots.

Next follow the Plasma and Chrysoprase, green stones: and the Sard, generally a brownish red; as also the Sardonyx, its banded variety: all of them much prized by the ancients because, though hard and tough enough to resist ordinary wear and tear, they are more suited to the display of the engraver's skill than are the harder and more precious stones.

Then come the Agates (16b), chiefly formed of thin layers of porous chalcedony of different colours, though the material of many of the white layers is a compact semi-opal. Most of the specimens are now brought from Uruguay, in South America, and are cut and polished at Oberstein, in Germany, where in former times agates were got in quantity from the mountains of the district. Sometimes the layers are plane and parallel, and the stone is then an Onyx, useful as a material for cameos: or the bands of a section are arranged in sets of straight but zigzag lines, and the stone is then called a Fortification-agate: but in the ordinary agate the layers are variously curved.

The Moss-agates, or Mocha-stones (16e), are varieties of chalcedony, enclosing moss-like forms of oxides of manganese and iron and green earthy chlorite.

The Carnelian (16e) is a beautiful stone much valued by the engraver: its fracture has a peculiar waxy lustre, and is distinct from that of the Sard, which is dull and horn-like.

Next follows the opal, including the Precious or Noble Opal (16f), among the specimens of which is a fine suite from Queensland, presented by Professor Maskelyne, M.P.

The carbonate of barium, Witherite (18a), is much used in the manufacture of plate-glass, and in France in that of beet-sugar.

Strontianite (18b), the carbonate of strontium, is the mineral from which most of the strontium nitrate is made for use in the manufacture of fire-works, owing to the fine crimson colour which it gives to the flame: it is also much employed in the process of sugar refining.

Cerussite (18b) is the corresponding carbonate of lead, and when abundant is a valuable ore of the metal.

Calcite (18e), carbonate of calcium, is represented by an extraordinarily fine suite of specimens, illustrating an almost endless variety of crystalline form. The clear variety from Iceland is largely used in optical instruments for the polarisation of light.

Chalybite, or Spathic iron ore (19e), is the carbonate of iron, and is a most valuable ore of the metal. The most important English iron ore, Clay iron-stone, is a mixture of chalybite and clay.

Calamine (19h), carbonate of zinc, is an important zinc ore.

Chessylite (21d) and Malachite (22b) are respectively the blue and green hydrated carbonates of copper, and are ores of that metal. Malachite is found in large masses; and by reason of the high polish which it takes and its beautiful markings, is much used for ornamental work of various kinds.

Passing to the silicates we come to Olivine (22f), one of the less hard and least valued of the precious stones; when of a yellow colour it is known as the Chrysolite, while the pistachio-green variety is the Peridot of jewellery.

Hiddenite (23a), a rare lately discovered emerald-green variety of spodumene, has been introduced as a precious stone.

Asbestos (24c) is a variety of hornblende used in the arts; it is found in long fibres, and in some of its varieties is so flexible that it can be woven into gloves and other articles; examples will be found among the worked specimens in the Pavilion at the end of the gallery. The term asbestos, unquenched or unquenchable, was applied to the mineral by the ancient Greeks, because, owing to its being unaltered by heat, wicks made of it were used in maintaining the sacred perpetual fires of their temples. Napkins of asbestos were cleaned by being thrown into the fire; asbestos cloth was also used in the process of cremation to keep the ashes of the body distinct from those of the fuel. It is now largely employed for more prosaic purposes, such as the lining of iron safes, packing for steam-pipes and boilers, and in gas-stoves.

Jade or Nephrite (24d), a much valued mineral, belongs to the same mineral group as hornblende. It has few known localities, and it has been difficult to find an answer to the question as to whence the older workers of jade can have got

their material: the pre-historic jade was got partly from China, partly from the Kuen Lun Mountains on the northern border of Thibet; all the white comes from the former country. The various shades of colour and the beautiful polish which this tough mineral will take are illustrated by specimens in the case. The worked specimens from New Zealand, of which there are several exhibited, are now rare. An immense water-worn mass, found some years ago in Asiatic Russia, is shown in the Pavilion.

Meerschaum (23g) is the light soft porous mineral used for tobacco-pipes: it is a hydrated silicate of magnesium.

Serpentine (25a) is another hydrated magnesium silicate: the ease with which it is worked and takes a good polish, its green colour, and varied markings render it much sought for as a material for fire-places, tables, and other indoor work: exposed to the weather it soon loses its polish. Only specimens illustrating the purer forms of the mineral are shown in the case.

Topaz (25d) in its clear varieties is one of the precious stones. The crystals from the Urulga river, in Siberia, are remarkably fine examples of crystalline development; they are of a delicate brown colour, but are kept covered up, as the action of light speedily bleaches them. The yellow crystals from Brazil assume a peculiar pink colour when heated, and are then known to jewellers as Burnt or Pink Topaz.

Garnet also belongs to the group of precious stones; when the red is tinged with violet, it is the Almandine and the Syrian garnet (from Syriam in Pegu), and when cut *en cabochon*, the Carbuncle of jewellery (26f); the Cinnamon-stone or Essonite is yellow (26e); the Pyrope and the Bohemian garnet are blood-red (26e); Uvarovite is a green chrome-garnet (26h).

Jadeite (27a) is one of the green stones, which, under the name of jade, are wrought into ornaments in China: from jade, however, it is distinguished by its chemical composition, structure, and higher specific gravity.

Among the specimens of Epidote (27c) a remarkable suite from the Untersulzbachthal is exhibited.

Mica (28a) is the name given to a group of minerals differing much from each other in chemical composition and optical properties, but having as a common character an easy cleavage in a

single direction, and thus affording plates remarkably thin, transparent, tough, and elastic. One of these minerals, muscovite (28d), has been used in Russia in place of glass for windows; it is now in common use for lanterns and stoves, not being so easily cracked as glass by change of temperature: it is still known in commerce as talc, a term formerly applied to it by mineralogists, but now restricted by them to a different mineral.

The group of Felspars, the most important of the rock-forming minerals, begins at case 28f.

After the Felspars comes Beryl, of which the bright green variety, Emerald (29c), is one of the most valued of precious stones. It was in ancient times worked in Egypt, as is proved by the rough specimens found in the old workings by Sir Gardner Wilkinson, and presented by him to the Museum. Emeralds are found in the Urals; but the locality for the finest stones has long been that of Muso, about seventy miles from Santa Fé de Bogotá, in South America. Lately emeralds, though not of a good colour, have been discovered at Stony Point in North Carolina: some of the best of those found are shown in the case. Facetted specimens of the colourless beryl, and also of the bluish-green beryl, known in jewellery as Aquamarine, are exhibited (30a).

In cases 30e to 32d will be found beautiful illustrations of the Zeolite group of minerals.

Tourmaline (33a), when free from flaws, is, in some of its varieties, to be classed with the precious stones. Among these is the pink variety called Rubellite. Two very fine specimens of rubellite from Ava are shown in the case; one of them, remarkable for its size and shape, was brought from that country by Colonel Symes, to whom it had been presented by the king; the other, not so large but of a deeper colour, was presented to the Museum by Mr. C. S. J. L. Guthrie. The pink-and-green tourmalines from Maine, U.S.A., are among the more beautiful of the mineral products of the United States. Good examples of the blue tourmaline, Indicolite, are shown in case 33b.

Haüynite (34b), in its rich blue variety, is the Lapis Lazuli of jewellery, and is brought from Persia, China, Siberia, and Bokhara. When powdered, lapis lazuli furnished the once

costly pigment ultramarine ; through the discovery of a method of producing an artificial and cheap form of the same material, the use of the mineral as a pigment has been quite superseded.

The sulphates of strontium, Celestine (35c), of barium, Barytes or Heavy Spar (36a), and of lead, Anglesite (36e), are all represented by long series of specimens.

Gypsum or Selenite (36f) is the hydrated sulphate of lime : when heated it gives up its water of crystallisation and falls to a white powder, known as "Plaster of Paris" ; when moistened the powder again combines with water and forms a coherent solid. A magnificent crystallised specimen, a gift from the late Prince Consort, will be found in the Pavilion. Gypseous alabaster is a massive variety of gypsum (36h); owing to its whiteness, fine texture, and softness, it is largely used as a material for statuettes and other in-door ornaments ; the Oriental alabaster is a harder substance, stalagmitic calcite, the carbonate of lime.

Borax (37c) is a hydrated borate of sodium. It is much used as a flux, also in the process of soldering, and in the preparation of easily fusible enamels. It was formerly carried over the Himalayas from a lake in Thibet, but is now obtained largely from borax lakes of the United States, and is extensively prepared from the boracic acid of the lagoons in Tuscany.

Nitratine or Soda nitre (37d) is found in beds extending for many miles ; it is used for the preparation of nitric acid and of saltpetre.

Calaité or Turquoise (38g) is a hydrated phosphate of aluminium ; it owes its blue or green colour to the presence of small quantities of salts of copper and iron. Being as hard as felspar and taking a good polish, it has been much prized in jewellery under the name of Oriental Turquoise ; that which comes into the market is chiefly brought from the turquoise mines, not far from Nishapur, in Persia.

As a supplement to the collection of simple minerals, there is arranged, in cases 41 and 42, a group of natural substances which either belong or are closely related to the Mineral Kingdom, although in their formation organised matter has played a very important part. The most important members are Coal and Amber.

Coal (41a), in most of its varieties, gives structural evidence of its vegetable origin: its chemical composition depends on the more or less complete change which has taken place, and is thus not so definite as in the preceding minerals. In the variety called anthracite all traces of the original organised structure have disappeared.

Amber (42c), in ancient times regarded as one of the precious stones, is likewise of vegetable origin. It is a fossilised resin, chiefly derived from trees allied to the existing pines: its originally viscous condition is sufficiently proved by the insects which are sometimes found enclosed in it.

In the Pavilion at the east end of the gallery the visitor will find many specimens which, owing to their size, cannot be satisfactorily exhibited in the table-cases. **Larger Mineral specimens.**

Of these we may specially call attention to the groups of British and Indian minerals in the centre of the long wall-case, and to the specimens of Stibnite, Galena, and Jade on separate tables: also the large specimen of gypsum or selenite, presented by the late Prince Consort, which, with some fine illustrations of calcite, is exhibited in a special case.

The four table-cases in the windows contain:—(1) a series **Rocks.** illustrating the various kinds of rocks, (2) specimens of the rocks met with in cutting the St. Gothard Tunnel, (3) a series of worked articles, and (4) specimens arranged by Professor Ruskin to illustrate some varieties of Silica.*

The most important feature of the Pavilion is the Collection **Meteorites.** of Meteorites,† of which the smaller specimens are shown in the four central cases.

The fall of masses of stone and iron from the sky, though observed again and again since the most remote ages, was very rarely credited by anyone beside the spectators themselves; and till the beginning of this century no attempt to collect such specimens for examination and comparison was made. In the special guide it is shown how evidence of the actual fall of such bodies at length became irresistible, and a description is given

* A Descriptive Catalogue of the specimens of Native Silica has been prepared by Prof. Ruskin, and can be obtained of the attendant in the gallery. Price one shilling.

† See 'An Introduction to the Study of Meteorites, with a List of the Meteorites represented in the Collection.' Price twopence.

of the striking circumstances attending their fall, of their general characters, and of their chemical composition : illustrative specimens, collected together for easy reference, will be found in one of the cases. It is also shown that meteorites are closely related, not only to the ordinary shooting stars, but also to comets, and probably to the nebulae and fixed stars.

The mass of meteoric iron from Cranbourne, in Australia, is the largest exhibited in any Museum.

SECOND FLOOR.

The upper floor of the East wing is devoted entirely to the Department of Botany.

Botanical Gallery.

The Collections of this Department consist of two portions, the one set apart for the use of persons engaged in the scientific study of plants ; the other open to the public and consisting of specimens suitable for exhibition, and intended to illustrate the various groups of the Vegetable Kingdom, and the broad facts on which the Natural System of the classification of plants is based.

Herbarium.

The portion devoted to the use of the scientific student consists mainly of the great Herbarium. This is a collection of plants, fastened on single sheets of folio paper, representing, as far as it has been possible to obtain them, first, every species of plant living on the earth, and then the distribution of each species on the surface of the earth. The various species are collected under their respective genera, and these are arranged in their Natural Orders, and the whole are systematically classified, beginning with the most highly organised (the *Ranunculaceæ*), and going down to the lowest members of the Vegetable Kingdom (the *Fungi*).

Historical Collections in the Herbarium.

Sir Joseph Banks.

The foundation of this great Herbarium was the collection of Sir Joseph Banks, consisting of the plants obtained by himself and Dr. Solander in their voyage round the world with Captain Cook, and of numerous series from all quarters of the globe presented to him or purchased by him. He bequeathed all his botanical collections to the Trustees of the British Museum in 1820, reserving to Robert Brown, in whose charge they had

been for years, the use of them during his lifetime. Mr. Brown transferred them to the Trustees of the Museum in 1827, and was appointed the first Keeper of the Department. The yearly additions since 1827 have been so extensive that the Banksian Collections form now but a small proportion of the great Herbarium. In a brief notice it is impossible to give a correct idea of the richness of this Herbarium. Among the principal collections contained in it may be mentioned those of Clayton, Roemer, Miller, Brown, Bowie and Cunningham, Gardner, Nuttall, Horsfield, König, Martin, Masson, Wilson, Hampe, Seemann, Welwitsch, Salt, and Miers. It includes also authentic specimens received from Loureiro, Gronovius, Tournefort, Jacquin, Aublet, Ruiz and Pavon, and Perrottet.

The cellular plants are accommodated in a large room in the Central Tower approached by a staircase, the entrance to which is on the left side of the statue of Sir Joseph Banks. The Mosses include the collections of Wilson, Hampe, Drummond and Spruce; the Liverworts contain the herbarium of Hampe; with the Lichens are incorporated collections made by Carroll, Spruce and Weddell. The Algæ contain the herbarium of Prof. Dickie, the Diatomaceæ of Kützing and Greville, and collections from Harvey, Robert Brown, Shuttleworth, &c. The extensive series of Fungi, including collections from various botanists, has been increased by the bequest of the valuable herbarium of the late Mr. C. E. Broome.

There is a separate Herbarium of British plants, based on the collections formed by Sowerby in the preparation of his great work, 'English Botany.' This is, perhaps, the largest and most interesting public Herbarium of British plants, and its value is constantly increasing by additions from botanists who make the British Flora their special study.

The extensive Herbarium formed by Sir Hans Sloane became the property of the nation in 1753, along with his other collections. The plants gathered by himself in Jamaica formed the nucleus of this Herbarium, and to them were added the collections of Petiver, Buddle, Plukenet, Kaempfer, Kamel, Merrett, Boerhaave, Vaillant, Banister, and others. According to the practice of the time these plants are preserved in large folio volumes, of which there are altogether 310. This collection had been placed

**Cellular
Plants.**

**Herbarium of
British
Plants.**

**Sloane's
Herbarium.**

in the library of the British Museum, and remained there until the establishment of the Department of Botany, when it was transferred to the care of Mr. Brown. The plants are well preserved, and are catalogued in a copy of Ray's 'Historia Plantarum,' so that they can be easily consulted.

The collections formed by Hermann in Ceylon, from which Linnaeus prepared his 'Flora Zeylonica,' with annotations by both Hermann and Linnaeus, are preserved in five volumes, four containing plants, and the fifth consisting of drawings.

**Ray's
Collection.**

The department also contains the singularly interesting and valuable collection of plants gathered in 1663 by John Ray in his travels in Europe, a catalogue of which was published in his account of the journey in 1673.

In these various Herbaria the Museum possesses an unrivalled series of historical collections from the middle of the seventeenth century to the present time.

**Collection of
Fruits, Seeds,
and Woods.**

Besides the collection of dried plants forming the Herbarium, there are two allied collections arranged in the same gallery in parallel series. The one is the collection of fruits and seeds occupying the table cabinets in the centre of the gallery, and the other the collection of woods placed in the smaller cabinets in the centre of each bay. The position of the cabinets has permitted the arrangement of the specimens belonging to these two collections in close proximity to the Natural Orders in the great Herbarium, to which they belong. The student can thus easily command the specimens in the three collections in the prosecution of his investigations. Nor is the facility of reference confined to the mounted and finally arranged specimens, for the method in which the unmounted collections are arranged and temporarily stored in small rooms behind the great Herbarium provides for their ready consultation, even though they may not yet be incorporated in the Herbarium itself.

Library.

The student receives assistance in his investigations from the extensive Library of the Department, and from a large collection of plates and drawings of plants systematically arranged in the same order as the plants in the Herbarium.

Original

The collection of original drawings comprises specimens of the work of the principal botanical artists, such as Ehret, J. Miller, Nodder, Aubriet, Sidney Parkinson, J. R. & G. Forster,

Jacquin, Masson, Sowerby, Fitch, Schleiden, W. G. Smith, and especially Francis and Ferdinand Bauer. **Drawings of Plants, and Manuscripts.**

The department possesses also many valuable manuscripts, such as those of Robert Brown, Solander, Ruiz and Pavon, König, Salisbury, and Miers, referring to plants now in the Herbarium on which these botanists have worked.

The arrangement of the collections in the public gallery is now in progress, but is not sufficiently advanced to permit the preparation of a guide to the cases. A general account of the plan being followed in this arrangement, and of the principal specimens, is all that can now be attempted. **Public Gallery.**

The natural system of classification, according to which the plants in the Herbarium are arranged, is followed in the exhibition cases in the public gallery. A half case next to the door on the left side is devoted to a series of original drawings and specimens exhibiting the principal fungal parasites of cultivated plants. The series of specimens begins in the next case with the Natural Order *Ranunculaceæ*, and the principal Orders are represented in this and the following cases by dried specimens of the plants themselves, coloured drawings, fruits, and prepared sections of the woods. Diagrams are employed to indicate the characters on which the grouping is based. The use of the same colour for the homologous structures throughout the diagrams readily conveys to the eye the points of agreement or difference on which the classification rests. The geological history of each Natural Order is indicated on a table of the earth's strata; and its present distribution on the surface of the earth is given on a small map of the world. Descriptive labels give particular information respecting each specimen. **System of Classification.**

Dicotyledonous plants occupy three cases on the left side of the gallery, and are followed by the Monocotyledonous Orders, which fill the last case on the same side, the two half cases at the end of the gallery, and the first case returning towards the door. The Gymnosperms are placed in the next case. Then follow the Cryptogams, a case being devoted to the higher vascular Orders, and another to the lower division of cellular plants. The series closes with an interesting collection of models of the larger British *Fungi* prepared by Sowerby when he was engaged on his work on this group of plants,

which have been recoloured and mounted in accordance with their natural habitats by Mr. Worthington G. Smith. A large chalk-like mass of Diatomaceous earth containing twelve billion plants is placed in a case by itself near the entrance to the gallery.

Large Specimens in Central cases.

The larger specimens are placed in the tall cases in the centre of the gallery following the order as far as possible of the specimens in the wall-cases. The right side of the first centre case is filled with specimens of Dicotyledonous plants, such as sections of White Oak and Walnut from Canada, of *Eucalyptus*, *Acacia*, *Laportea*, and other trees from Australia, of the Cork Oak grown in Chelsea Gardens, trunks of *Ficus* and *Carallia* with aerial roots, sent from Ceylon by Dr. Trimen, stems of *Bombax* and *Xanthoxylon* with conical prickles, and of *Flacourtia* and *Gleditschia* with branching thorns, and anomalous stems of *Bauhinia*, *Entada*, and *Dypsis*. The next two centre cases are filled with Monocotyledonous plants, among which in the first case are stems and sections of the Date palm, several species of *Areca*, sections and fruit of the Palmyra palm, stem and fruit of the Sago palm, and a large spike of the allied *Raphia* from Madagascar. In the next case are stems of the Wax palm, sections and fruit of the Cocoa-nut palm, and of the Seychelles palm. The remainder of this case is occupied with specimens of the Dragon-tree of Madeira, of the Grass-trees and Black-boys of Australia, of *Vellozia* from Brazil, of *Papyrus* from Egypt, of Bamboo and Sugar-cane. On the other side of this case specimens of Gymnosperms will be found, comprising a large plant of *Welwitschia* from Africa, sections of *Araucaria* from Norfolk Island, of Cedar grown in Chelsea Gardens, and stems and sections of several species of *Cycadææ*. The next two cases contain specimens of Tree-ferns, among which are a large stem of *Dicksonia*, clothed with aerial roots, from New Zealand, stems of species of *Alsophila* and *Cyathea* from various tropical regions, and of *Hemitelia* from South Africa.

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