SCIENCE

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THE RISE OF NATURAL HISTORY MUSEUMS[1]

WHENCE they come and whither they go are inquiries that should be made from time to time by all institutions in order that they may profit by the experiences of the past and survey the way of the future. Owing to obvious limitations, I shall attempt to sketch the growth of but a single division of the museums represented in this association, leaving to others the rounding out of the inquiry if it shall ever seem to them desirable to do so.

A desire to preserve objects of nature which aroused special interest or possessed unusual powers may be presumed to have been an instinct of the earliest man. We may imagine the cave man storing in his cave the bright gem, or curious seed, or rare animal skin which attracted his attention and, perchance, urging upon his descendants the desirability of preserving it. Such instincts are undoubtedly possessed by barbarous tribes. But such hoards have no permanent value or maintenance as long as there is a lack of a fixed habitation or of a social organization sufficiently strong to pass them from one generation to another. Hence, it may be noted in passing, an essential condition for the existence of museums is a sufficiently civilized and permanent state of society to preserve objects from generation to generation.

In the life of the ancient Egyptians conditions making toward the preservation of natural objects doubtless became more favorable than had previously been the

[1] Presidential address read at the meeting of the American Association of Museums, San Francisco.

case, since there are preserved to us from their time many objects of their art which were originally objects of nature. While material which they prized now occupies an honored place in our museums and their civilization was instrumental in preserving it to us, there is no evidence, so far as I know, that they undertook the collection and preservation of natural objects for their own sake.

The Greeks gave us the word *museum*, but that they ever established a museum in the modern sense seems very unlikely. Whatever their practise may have been regarding the preservation and exhibition of works of art, it seems quite certain that they carried on little, if any, effort of this kind with regard to nature. Alexander the Great, about 325 B.C., is said to have gathered together many animals and plants in order that they might be studied by Aristotle, "the father of natural history," but so far as we know no effort was made to preserve these specimens to later times. The first record of placing natural history specimens on exhibition is said to be that made when Hanno, a Carthaginian, somewhat before Alexander's time, procured skins of gorillas in Africa and put them in the temple of Astarte. We also know that the monstrous horns of wild bulls which had occasioned great devastation in Macedonia were hung in the temple of Hercules by order of King Philip.

The Romans seem, like the Greeks, not to have taken much interest in the preservation of natural objects, at least as far as any record has reached the present time. We know that emperors and other individuals possessed collections of statues and other works of art, and among these we find occasional mention of the preservation of so-called "natural curiosities," such as bones of giants or peculiar human skeletons, but that any broad interest in nature existed which led to efforts to preserve and study its forms we have no record. Stray sources of information tell us of a crocodile, found in attempting to discover the sources of the Nile, being preserved in the temple of Isis at Cesarea, also that a large piece of the root of the cinnamon tree was kept in a golden vessel in one of the temples at Rome. Pliny relates that the bones of a sea monster, probably a whale, "to which Andromeda was exposed," were preserved at Joppa and afterwards brought to Rome. Suetonious says that the Emperor Augustus had a collection of natural curiosities in his palace.

One reason suggested by Beckmann for the rarity of collections of natural objects among ancient peoples was the lack of knowledge of satisfactory means of preserving such as were perishable. The preservative virtues of what was then called "spirit of wine," but which we now know as alcohol, seem to have been but little known, and only immersion in salt brine or a covering with wax or honey served at that time for the preservation of perishable materials.

The great institute of Alexandria in Egypt, founded in the third century B.C., is generally spoken of as being the first natural-history museum of antiquity, but while this had botanical and zoological gardens, there is little reason to suppose that it was a museum of nature in the modern sense. The name museum in that institution was applied to a portion set apart for the study of sciences, and indicated rather a place of study than one for exhibition of objects.

From the fourth to the seventeenth century A.D., according to Goode, the term museum dropped out of use and the idea for which it stood must also have been dormant, yet even in those times many monasteries had collections of curiosities. In the

treasuries of churches also were often preserved curiosities and rarities brought home by pilgrims or travelers. "In some churches," we are told, "eggs of ostriches and other things of like kind, which cause admiration and which are rarely seen, are accustomed to be suspended, that by their means the people may be drawn to church and have their minds the more affected." A few such objects may still be seen in churches. Thus, according to Murray, in the porch of the Cathedral of Merseburg, on the Saale, there is a large carapace of a tortoise. There are "antediluvian" bones in the church of St. Kilian at Heilbronn, and in the old Romanesque church of Alpirsbach, in the Black Forest. One hangs in the western entrance of the Cathedral of Halberstadt, and used to be passed off as one of the bones of Jonah's whale; while on the wall opposite hangs what was called a thunderbolt—or what we would now call a stone axe—kept as a protection against drought and lightning. In the choir of the parish church at Ensisheim, in Upper Alsace, there is a portion of a meteorite which fell in 1492. In the parish church of Petty, on the Moray Frith, the bones of a giant known as "Little John" were preserved in the sixteenth century. Giants' bones were also preserved in the Cathedral of Vienna. Boccaccio records that, in his day, in the Church of the Annunciation in Trapani, in Sicily, three teeth weighing a hundred ounces, of an enormous giant of 200 cubits in height, were hung up on a wire. From such preservations as these it was but a step to collections made by travelers and maintained for their own interest and the gradual accumulation of natural objects under the roofs of colleges and universities. Of such collections there were several of which we have record in the seventeenth century.

Certain natural objects seemed at this time to be especially desired. These were (1) the horn of a unicorn, a fabulous animal which some one was always just on the point of seeing, but never did; (2) Egyptian mummies, whole, if possible, but if not in part; (3) bones of giants, now known to be fossil elephants' bones but then regarded as human; (4) human skulls, especially those of criminals; (5) horns of deer or elk; (6) objects known as *ceraunia*, then thought to be thunderbolts but now known to be stone axes; (7) objects called *glossopetræ*, then regarded as serpents' tongues, now known to be arrow heads or fossil shark's teeth. Nearly all of these objects were believed to have great medicinal virtue and, moreover, by the mystery of their origin, appealed to the belief in the miraculous which characterized the time.

A traveler's description of the contents of the Museum of Ludovico Settala, a physician of Milan, Italy, gives an idea of how many such museums were filled in the seventeenth century. "Here we observ'd," he says, "several sorts of very ingenious machines contriv'd for finding out the Perpetual Motion, looking glasses of all sorts, dials, musical instruments, books, medals, curious keys and locks, fruits, stones, minerals, animals; a prodigious variety of shells; and a great piece of cloth made of asbestos." The collection of the University of Leyden, according to a catalogue published in 1691, contained among other things "a Norway house, built of beams without mortar or stone; shoes and sandals from Russia, Siam and Egypt; Chinese songs, paper, books; Egyptian mummies and idols; an hand of a Meermaide; a mushroom above 100 years old; a thunderbolt and a 'mallet or hammer' which the label said 'the savages in New York still kill with.'"

In the arrangement of these museums decorative effects were sought after rather

than any scientific order. The arrangement of the Wormian museum, which was one of the most celebrated museums of the seventeenth century, probably typifies that of many. "On the floor and on two shelves above it," we are told, "were boxes and trays containing small objects, beginning with earths and salts and proceeding in order through the mineral, vegetable and animal kingdoms, till they ended with parts of animals. Interspersed amongst these there was a miscellaneous assemblage of statuary, antiquities, birds, fish, bones, corals and petrifactions. The upper part of the wall was covered with tortoises, crocodiles, lizards, skeletons, spears, lances, arrows, paddles and costumes from Greenland. Between the windows hung horns, antlers and heads of deer and other animals; underneath on the floor lay vertebræ of a whale. From the roof were suspended a great polar bear, a shark and other fish, various birds and an Esquimaux kayak." The anatomical collection at Dresden is said to have been arranged like a pleasure garden, skeletons being interwoven with branches of trees in the form of hedges so as to form vistas. In the anatomical museum of Frederick Ruysch at Amsterdam, plants disposed in nosegays, and shells arranged in figures, were mixed with skeletons of animals and anatomical preparations. The so-called decoration of a cabinet or museum was also deemed of much importance in these times. The tops of the presses or cases, we are told, were frequently ornamented with shells of great size, wasp nests, rhinoceros horns, an elephant's trunk, the horn of a unicorn, urns and busts of alabaster, jasper, marble, porphyry, or serpentine. Here likewise were placed figures of antique bronze, large lithophytes, animals made of shell, gourds cut in two; little trunks of bark, books made of the palm tree, globes, spheres, etc. Even of the British Museum as late as 1786 a visitor said that "it contains many collections in natural history; but, with the exception of some fish in a small apartment, which are begun to be classed, nothing is in order, everything is out of place; and this assemblage appears rather an immense magazine in which things have been thrown at random than a scientific collection destined to instruct and honor a nation." Amid such chaos it is little to be wondered at that the great naturalists of the time, such as Linnæus, Cuvier and Buffon, set themselves above all things to the task of bringing about order, so that system and systematists ruled the eighteenth and nineteenth centuries till their dominance became in turn so great that a revolt appeared which we have witnessed in our own time. The chaotic condition of these centuries was in part the result of the times. The discovery of the new world had brought a flood of new material to the old, and inquiry and interest were active on every hand. The acquisition of new material was deemed more important than the study of that already possessed. Moreover, it was still the age of wonder, and the exceptional things were sought after instead of the common things. The wonder excited by an object of course depends largely upon the interpretation given it, so that many things which seem common and ordinary enough to us to-day were at that time deemed of great interest. Again the museums had in but few cases attained to the dignity of public support, so that those who were in charge of them had to depend upon fees for most of their maintenance. This led to a tendency to procure and exhibit material possessing some morbid or vulgar interest in order that greater attendance might be secured and larger remuneration thus obtained.

Murray says:

While an enormous quantity of material was collected in these museums it was only gradually that its real value began to be appreciated, and that it was turned to proper account. The early museums often had certain definite aims, and were intended to be exponents of science; but natural history was hampered by traditional opinions, and physical science was over-weighted by metaphysics. Everything was explained, but the explanations had always to be in accord with accepted doctrines of logic and metaphysics, which had themselves in turn to square with theology. The wonders of nature had an extraordinary fascination for men of science, who were constantly on the lookout for them. Any variation of the ordinary type of the common object was eagerly sought after, and the more extraordinary it was the greater was its attraction. Hence museums had a tendency to represent the abnormal rather than the normal, what was rare rather than what was common. A museum was a collection of curiosities, and although the word "curiosity" in its older sense had a broader meaning than at present, there was generally implied in it the idea of strangeness or rarity. The object to which it was applied was to be regarded as worthy of being looked at because it was odd or rare.

Among early museums which have survived until our own day the history of the Ashmolean Museum established at Oxford in 1682 may be considered typical. This had its origin in material gathered by John Tradescant and his son earlier in the century. Their collections were extensive and included materials illustrating not only natural history but industrial art and coins. Their collecting seems to have been of an indiscriminate character and without definite classification. These collections were acquired by Elias Ashmole in 1659 and passed by gift to the University of Oxford in 1682. We are told:

On the fifteenth day of May, 1679, the first stone of that stately fabric, afterward called Ashmole's Museum, was laid on the west side of the theater, and being finished by the beginning of March, 1682, there was put therein, on the twentieth day of the same month, about 12 cart loads of rarities sent to Oxon by Mr. Ashmole; which, being fixed in their proper places by Rob. Plot, LL.D., who before had been intrusted with the custody of the said museum, were first of all publicly viewed on the twenty-first of May following by his royal highness James, Duke of York, his royal consort Josepha Maria, Princess Anne and their attendants, and on the twenty-fourth of the same month by the doctors and masters of the university.

Thus rapidity of installation and difficulty of access seem to have characterized this museum. While the museum was evidently invested with a certain amount of importance, it could hardly have been highly appreciated at the time. Edward Young called it "Ashmole's baby house," and the curator, though a man of much learning, received no salary.

Some have urged that because they were derived from single collections, the early museums were, as a rule, confined to special lines, and that museums of broader scope were a product of later development. But so far as I can judge from accounts, the early museums were usually miscellaneous in their character, and development along narrower lines has been a modern practise. Such certainly was the history of the British Museum. This originated largely from two collections, one that of Robert Hubert, who had a collection "of many natural rarities" which he had gathered, according to the account, "with great industry, cost, and thirty years' travel in foreign countries." The other, and the collection upon which the British Museum was chiefly based, was that of Sir Hans Sloane (1660–1752/3), a celebrated physician, president of the College of Physicians and of the Royal Society of England. He early commenced to form a museum, and continued to add to it without intermission until the close of his long life. In 1687 he made a voyage to Jamaica, and is said to have been the first man of learning whom the love of science alone led to that, then distant, part of the globe. He brought home with him not fewer than 800

different species of plants, and this was the first large accession to his collection. His museum and library were said to have cost upward of £50,000, and their value, according to his own and other accounts, was to have been £80,000. At his death he bequeathed his whole collection to the British nation on condition that £20,000 should be paid to his family. The terms in which the bequest was couched showed a keen appreciation of the best means of making such a collection of public use. The will read:

> Whereas from my youth I have been a great observer and admirer of the wonderful power, wisdom and contrivance of the Almighty God appearing in the works of his creation, and have gathered together . . . books, both printed and manuscript . . . natural and artificial curiosities, precious stones . . . dried plants, . . . and the like, . . . amounting in the whole to a very great sum of money: Now, desiring very much that these things, tending many ways to the manifestation of the glory of God, . . . the use and improvement of the arts and sciences and benefit of mankind, may remain together and not be separated, and that chiefly in and about the city of London, where they may by the great confluence of people be of most use, I do hereby request that . . . (my) trustees . . . do make their humble application to Parliament . . . to pay . . . £20,000 . . . unto my executors . . . in consideration of the said collection . . . and also to obtain . . . sufficient and effectual powers . . . for the preserving and continuing my said collection, in such manner as they shall think most likely to answer the public benefit by me intended.

Sloane's gift was accepted by the British Parliament, and in 1773 an Act was passed for the purchase of the Sloane library and museum and of the Harley collection of charts and manuscripts, which was in the market at the time, for uniting them with the Cotton Library, and for providing one "general repository" for these and other additions that might thereafter be made. The act authorized the raising of the funds required by means of a lottery, and fully £90,000 was thus obtained. The three collections thus acquired and housed became the British Museum, which opened to the public on Monday, January 15, 1759. As originally organized, the British Museum was divided into three departments: (1) Manuscripts, medals and coins; (2) natural and artificial productions; and (3) printed books. In 1802 the great collection of Egyptian antiquities acquired under the capitulation of Alexandria passed into the museum. This was followed in 1805 by the purchase of the Townley marbles and terracottas, and the bronzes, coins, gems and drawings in 1814. These acquisitions rendered it necessary to create a new department, that of antiquities and art, to which were united the prints and drawings as well as the medals and coins. Botany was added as a fifth department in 1827, after the bequest of Sir Joseph Bank's collection. In 1837 the prints and drawings were separated from the department of antiquity and became an independent department. At the same time the department of natural history was divided into two, one of geology, including paleontology and mineralogy, and the other of zoology. In 1857 mineralogy was constituted a separate department. In 1861 the department of antiquities was subdivided into (1) Greek and Roman antiquities, (2) coins and medals, (3) Egyptian and Assyrian antiquities; and in 1866 the British and medieval antiquities were formed into a separate department along with the ethnographical collections. Between 1880 and 1883 the natural history collections were transferred to the new Natural History Museum in Cromwell Road.

In our own country the earliest general collection of natural history objects formed is said by Goode to have been one made at Norwalk, Conn., by a Mr. Arnold. This was prior to the Revolution. It was described as "a curious collection of American

birds and insects." This collection served at least one important purpose, since it is said to have awakened in President John Adams an interest in natural science which led to the founding of the American Academy of Arts and Sciences.

The first natural history museum to be established in our country, so far as appears from present records, was at Charleston, S. C., in March, 1773. This was founded under the auspices of the Charleston Library Society. The society urged, in order to present a "full and accurate Natural History" of the Province, that all the "natural Productions, either Animal, Vegetable or Mineral that can be had in their several Bounds," be sent to them. It is gratifying that this museum has retained its existence to the present day and under the influence of its present able and energetic director is younger and stronger than ever. As might be expected, Massachusetts did not yield long in initiative to South Carolina, so that we find the next natural history museum to be established in this country was at Salem, Mass., in 1799. This was founded to provide a permanent home for the collection of the East Indian Marine Society. Salem was at that time a great trading port and its ships traveled over all the world. Returning ship-masters brought back the products of many lands, and these rapidly formed an important collection. We are glad to record for this institution also a continuous career and abounding vitality at the present time. Another important early natural history museum in this country was the private museum of Charles Wilson Peale. Peale was a portrait painter of Philadelphia, but, though an artist by profession, was much interested in natural history. The foundation of his collection was a few of the bones of a mammoth, which he acquired in 1785. Sixteen years later he obtained the first entire skeleton of this animal which had, up to that date, been found. Besides specimens of natural history his museum contained wax figures of the different nations of the North American Indians, a collection of their arms and utensils, other Indian and European curiosities, and casts of ancient gems and statues.

The United States National Museum was practically founded in 1846, when, under the plans for using the Smithson bequest, arrangements were made for a museum in what is, incidentally, one of the longest sentences on record, as follows:

> Whenever suitable arrangements can be made from time to time for their reception, all objects of art and of foreign and curious research, and all objects of natural history, plants and geological and mineralogical specimens belonging to the United States, which may be in the city of Washington, in whosesoever custody they may be, shall be delivered to such persons as may be authorized by the board of regents to receive them, and shall be so arranged and classified in the building erected for the Institution as best to facilitate the examination and study of them; and whenever new specimens in natural history, geology or mineralogy are obtained for the museum of the Institution, by exchange of duplicate specimens which the regents may in their discretion make, or by donation which they may receive, or otherwise, the regents shall cause such new specimens to be appropriately classed and arranged.

In pursuance of this plan, in the building erected for the Smithsonian Institution, 30,000 square feet of space was made available for exhibition purposes. Occupancy of this was acquired in 1858. This space became inadequate after the Centennial Exposition, and in 1881 a new building providing 90,000 square feet of space was added. This building was occupied in part by industrial and historical collections, but those of natural history required by far the largest space. In a little more than twenty-five years the natural history collections, in which is included anthropology, had so in-

creased in importance and extent that a new building having 233,000 square feet of exhibition space and 160,000 square feet of laboratory and storage space was provided for these collections alone. The earlier buildings had no provision for laboratory or storage space. Another indication of the expansion of the National Museum in natural history lines is afforded by the fact that whereas as late as 1893 there was but a single curator or custodian of insects, at the present time there are nine.

In addition to changes in space the National Museum underwent changes from the administrative point of view which have been described by Goode as follows. There were three periods, he says:

First, the period from the foundation of the Smithsonian Institution to 1857, during which time specimens were collected solely to serve as materials for research. No special effort was made to exhibit them to the public or to utilize them except as a foundation for scientific description or theory.

Second, the period from 1857, when the institution assumed the custody of the "National Cabinet of Curiosities," to 1876. During this period the museum became a place of deposit for scientific collections which had already been studied, and these collections so far as convenient were exhibited to the public and, so far as practicable, made to serve an educational purpose.

Third, the period beginning with the year 1876, in which the museum undertook more fully the additional task of getting collections and exhibited them on account of their value from an educational standpoint.

The progress that has here taken place in the active acquisition of specimens instead of the passive reception of them and in paying more attention to exhibition of material, may be said to have characterized all active natural history museums in this country in the past half century.

The colleges of the country were in earlier periods, as now, centers to which natural history materials normally flowed, such materials being both acquired for teaching purposes and deposited for safe keeping. But the attention and funds devoted to the display and preservation of these objects were in most cases, meager, and little effective effort towards the establishment of a natural history museum in connection with a college or university in this country seems to have been made until that initiated by Professor Louis Agassiz at Charleston in 1850 and at Harvard College in 1852. Agassiz's stay at Charleston was too brief to effect noteworthy results, but at Cambridge he accomplished much. He found little material there suitable for illustrating his lectures upon geology and zoology and with characteristic zeal and energy he set about supplying the deficiency. Indeed it is possible that he regarded the founding of a museum as his most important work, since he expressed his purpose to "consecrate all his energy and ability to the creation of a great museum, the best arranged and most perfect in the world." It is a great tribute to the ability and enthusiasm of Agassiz that he was able under the shadow of the impending civil war to raise the sum of nearly $200,000 from the legislature and citizens of Massachusetts for the founding of this museum. Agassiz stated his purposes in establishing the museum to be: "(1) To express in material forms the present state of our knowledge of the animal kingdom; (2) To make the museum a center of original research, where men who are engaged in studying the problems connected with natural history could find all they needed for comparative investigation; and (3) To make the museum an educational institution having a widespread influence upon the study, the love and the knowledge of nature through-

out the country.'' That this museum has fulfilled and is fulfilling these high purposes no one will gainsay. Not only has it been a model institution in itself, but men trained in it have been active in the upbuilding of other museums.

Whether stimulated chiefly by the influence of Agassiz or by that of the Salem Museum, or if either, I do not know, but in 1867 the cause of college natural history museums was further advanced by the gift by George Peabody of $150,000 to Harvard College for a museum of archeology and ethnology, and of the same amount to Yale for a general natural history museum. Both of these funds have served to maintain important and valuable museums. A large and attractive natural history museum has recently been established at Princeton University, and many other universities and colleges in this country now have such museums of size and importance, some institutions of lesser means being better equipped in this regard than those with larger funds.

The formation of natural history collections in connection with the work of learned societies has often occurred and has led to the founding of several important museums in this country. Examples are the Museum of the Philadelphia Academy of Sciences, founded in 1812, and that of the Boston Society of Natural History, founded in 1830. Such institutions have performed services of incalculable value by their preservation of specimens and stimulation of continued interest in natural history.

With the exception of the aid given to the Charleston Museum by the city of Charleston in 1850 the first establishment of a museum of natural history under municipal auspices in this country seems to have been that in New York City in 1869. Leading citizens there, realizing the importance in the cultural growth of the city of such an institution, procured a charter from the legislature and obtained funds by private subscription. At first the city was asked to erect a single building to shelter both the museum of natural history and the museum of art, but fortunately sites were granted for a building for each. Fortunately also the plan of the building designed for the natural history museum was on a scale sufficiently large to provide for future growth. The first unit of the contemplated building was opened in 1877, and in less than forty years a large part of the original plan has been carried out, the present magnificent structure has been erected and it has been filled with precious material. In the view of the Hon. Joseph H. Choate, ''the money spent by the City of New York in the development of this Museum and the Museum of Art is the best investment of public moneys ever made by it, whether we consider the direct benefit to the people or the prestige and character attained by the city as the great metropolitan center of knowledge and culture.''

While the example set by New York City of supporting a great natural history museum largely by public funds has not been followed in exact form by many other American cities, the principle has been accepted either by the donation of sites and other privileges to museums founded by private munificence, or by municipal assistance to museums inaugurated by learned societies. The city of Milwaukee supports its natural history museum by a municipal tax, and there are gratifying indications that other cities will sooner or later adopt this method of support of museums. All cities should recognize such museums as an essential feature of their cultural equipment. Oakland, Denver, Providence, Charleston and Grand Rapids may be mentioned as cities which have already shown sufficient appreciation of such institutions to found or support

them. Among institutions supported by public funds several state museums which are doing work of great importance should also be mentioned.

To the beneficence of single donors has been largely due the founding of such museums as the Peabody, Field and Carnegie Museums. Such gifts as well as those of private individuals to museums already established show an interest on the part of individuals which has been in advance of that of the general public.

The natural history museums of Canada have developed chiefly under governmental or university auspices, and we are glad to note that increased appreciation and support seem to be accorded them in recent years.

The National Museum of Mexico has an excellent natural history section in which important material is preserved. Most South American countries maintain natural history museums, especially in their capitals, those of Brazil, Argentina and Chile being especially worthy of mention.

An endeavor to establish natural history museums and collections especially adapted to the interests of children has marked a new line of progress in recent years. The results have been very gratifying and promise wide usefulness. The purpose of such museums was well stated when in the plan of the Children's Museum of Brooklyn it was said that its purposes were "to form an attractive resort for children with influences tending to refine their tastes and elevate their interests; to create an attractive educational center of daily assistance to pupils and teachers in connection with school work; and to offer new subjects of thought for pursuit in leisure hours." Through a somewhat similar movement there has been brought about in many localities close connection between natural history museums and school work. This movement also seems destined to greatly increase the usefulness of natural history museums since it widens their appeal and brings about an acquaintance of the child with the museum which is likely to be an abiding and elevating influence.

The wide-spread public interest and support accorded to natural history museums which we have noted as occurring in recent years seem to mark a new era in their history. In earlier years these museums, partly perhaps because of the auspices under which they were founded, addressed their appeal chiefly to the learned and the specialist. They either did not endeavor to develop or did not succeed in developing wide public interest. Such an attitude was unfavorable both to the museums themselves and to the public. It tended to make the museums mere storehouses for the accumulation of material, and it gave the public an unfavorable opinion of their possibilities. Much of the awakening which I have noted as having taken place has no doubt had its origin in the labors of museum workers themselves, since they, with marked originality and enthusiasm, have shown what possibilities in the way of education and recreation lay in museums and their contents. Sir Hans Sloane's principle of the desirability of establishing museums where there is a "great confluence of people" seems also a sound one, since it is in such museums that the most marked development has taken place in the past quarter century. This does not mean that splendid work is not being done by museums in smaller communities, but simply that, since larger communities have as a rule larger opportunities, they may obtain greater results when they improve these opportunities.

Next to what may be called the democratization of natural history museums perhaps the most significant feature of their development in the last quarter century

may be said to be the introduction of art into their methods of illustration and exhibition. Not only has a pleasing variety thus been gained in the old methods of installation, but the attractive and well modeled groups which have been made effectively supplement the long rows of birds, shells, rocks, etc., which constituted the sole exhibits of earlier museums. In modern practise there are thus shown with more or less detail not only objects, but their environment and surroundings. The lesson taught by a single object no longer suffices; it must be represented, if possible, in its natural setting. This is, consciously or unconsciously, a recognition of the fact that nothing in nature is of isolated origin; it is the product of the working of complex and varied forces. These forces, then, should be at least hinted at in the representation of the object. The food of an organism, the various stages of its development, its habitat and its habits must be represented before the organism itself can be thoroughly understood. But in the development of this attractive and fascinating field, one note of caution should perhaps be sounded. A tendency to prefer imitation to reality is not one which those interested in the progress of science at least should seek to promote. The existence of this tendency from early times is shown us in the incident of the Greek audience who applauded wildly the actor who imitated the squealing of a pig, but drove off as an impostor the peasant who produced real squeals from a pig hidden under his coat. A chance companion with whom I visited the battlefield of Gettysburg was continually referring with enthusiasm to the well-known panorama of that battlefield, while in the locality itself he took not the slightest interest. Desirable as is the introduction of the best of art into our natural history museums, it should not usurp the place of science, for otherwise they become museums of art and not of science. Highly desirable as are museums of art and much as observance of the principles of art is needed in the conduct of natural history museums, we should not confuse them in modern development.

Another cause for recent increased interest in natural history museums is doubtless a growing appreciation of the value of nature study. The exigencies of city life have practically closed the book of nature to many dwellers in cities. There is one school district that I know of in Chicago which contains only two trees and at last accounts one of them was dying. How shall the wonderful lessons of nature of which man is after all but a part, be taught to children in the city unless there be institutions which will depict and reproduce its forms? If city life means that thousands of children can never see birds, butterflies, flowers, rocks, etc., in their native haunts, the city should try to provide means to show the form and, wherever possible, the substance of these things, especially as in doing so it can provide a far larger variety than would naturally occur in any single locality.

Another reason for an increased interest in the work of natural history museums may arise from a realization of how rapidly many of the forms of nature are vanishing before the progress of man and his works. The leveling of forests, draining of marshes and irrigating of deserts cause marked changes in nature. The destruction of one species makes changes in the habits and habitat of others. These in turn react upon their environment and cause new confusion. The practical disappearance of the Indian from the North American continent was not wholly due to his forcible segregation by the white man, but in part at least to the destruction of the buffalo, which constituted his normal food supply. With the buffalo disappeared, in part, at least, the

wolves and eagles which fed upon them. These in turn are doomed to practical extinction. A large share of the animals and plants inhabiting this continent at the time of its discovery by Europeans are not destined to survive long except as they are protected by man, and some will become extinct in spite of him. The wild pigeon, so common in Audubon's time that he saw shiploads which had been caught up the Hudson for sale on the wharves of New York for a cent apiece, has become entirely extinct. Other birds, flowers and even minerals have also become extinct in this country since the first coming of the Europeans. To museums must be largely assigned the work of conserving the remains of such forms ere they are absolutely lost. Specimens which are valuable now will be priceless in years to come. As but a single illustration of the value which specimens preserved now may prove to have later, may be mentioned the fact that an important link in the study of mutations has lately been furnished by specimens collected in this country by Michaux in 1785 and preserved in the Natural History Museum of Paris.

Again, interest in natural history museums has doubtless been quickened in recent years through recognition of the evolutionary trend of nature. This has given new meaning to her works and suggested interesting methods for the arrangement of collections. Where so well as in museums can the successive stages be shown by which the progress of nature has gone on, by which the creature has become adapted to its environment and the fittest has survived? As this great law of life is found more and more to express nature's methods, its lessons can be convincingly and satisfactorily taught by museums.

While a desire for more knowledge of nature has been the prevailing influence in the establishment of natural history museums, it should not be forgotten that these museums have themselves in turn contributed much to a knowledge of nature. Not only has this been done by research work and publications, but even in some cases by the mere necessity for orderly arrangement of museum material. The science of archeology is said to have dated its origin from the time of the arrangement of the Museum of Copenhagen. The study of meteorites has been made possible as a science by the accumulation of a large number of these bodies by museums. All biological sciences must admit their obligations to natural history museums for many of the data which have aided in their development.

The brief sketch which has been submitted serves to show that natural history museums must now be fully recognized as an indispensable feature of modern civilization, and I believe that the progress of civilization will only fix them more firmly in this place. The vicissitudes which the development of these museums has suffered have only emphasized their importance and made more evident their functions. The opportunities which now open before them are larger and at the same time more clearly defined than ever.

As an ideal toward which not only natural history museums, but all museums, so far as the outlook at the present day is concerned, should work, I can not do better than to quote, with some slight modifications, an utterance of Ruskin:

> The first function of a museum is to give an example of perfect order and elegance. Everything should be in its own place, everything looking its best because it is *there*. Nothing should be crowded, nothing unnecessary. The museum is only for what is eternally right and well done. The least things are there and the greatest, and all good. The simple may go there to learn, and the wise to remember.

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