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Natural History and Anthropology Museums

I don't know what 'natural history' means, and 'museum' means dead, stuffed, and in the past to me.

—public comment at a strategy session for the San Diego Museum of Natural History, 1997[1]

Whilst natural-science museums are concerned with the physical man as the apex of the tree of life they are also concerned with cultural man as the predator of the natural environment.

—Georges-Henri Riviere, 1973[2]

Museums place history, nature, and traditional societies under glass, in artificially constructed dioramas and tableaux, thus sanitizing, insulating, plasticizing, and preserving them as attractions and simple lesson aids; by virtue of their location, they are implicitly compared with and subordinated to contemporary established values and definitions of social reality. When we "museumify" other cultures and our own past, we exercise conceptual control over them.

—Michael Ames, 1992[3]

The early medieval and Renaissance collectors gathered natural curiosities thought to have magical powers to promote healing, longevity, fertility, and sexual virility. During the 16th and 17th centuries, the collections showed signs of becoming research centers, since they provided important documents for the scientist—rocks and minerals,

fossils and shells, anatomical and botanical specimens, and stuffed animals and fishes from all over the world.[4] Taxonomic displays of collections, first amassed to aid in understanding God's plan, evolved under the influence of humanists and later the impact of naturalist Charles Darwin. Furthermore, in the United States anthropologists associated with natural history museums sought to reveal the origins of the original "American" peoples.[5] By the end of the 19th century, advances in taxidermy allowed for more "natural" displays of habitat groups (from birds to elephants), attracting the public to what Charles Willson Peale called "statues of animals with real skin to cover them."[6]

Collections of Natural Curiosities

Many of the holdings of the early museums seem strange indeed to the modern naturalist. The fabulous unicorn's horn, thought capable of foiling poisoners or assassins, was worth a fortune, though no such beast existed; horns of rhinoceros or other animals were used, as well as the sea unicorn (narwhal) or fossils. Giants' bones were found in many a collection, though they actually might be of mammoths, elephants, or fossil remains. Egyptian mummies were greatly prized, and mummy powder (sometimes a criminal's body treated with bitumen) was sold by apothecaries to staunch the flow of blood or heal bruises and fractures. Human skulls and human skin, the best grades supposedly came from unburied corpses, were used for medicinal cures, as were stag and elk antlers. Figured stones included fossils, thunderbolts (actually the ax heads of primitive man), and serpents' tongues (in reality, fossil teeth of sharks). Barnacles were observed to have the shape of small geese and were thought to be born in decayed wood; barnacle geese became another medicinal source used by apothecaries.[7]

And, of course, some collections manifested a mix of purposes. In 14th-century Mantua, the Gonzaga family took advantage of an insurrection to depose the Bonacolsi who had ruled for a century and amassed a large palace. Rinaldo, the last of the Bonacolsi, was killed by bravos who pursued him in flight to his palace. The vast palace contained many rooms with collections of natural curiosities: a room of petrified objects; a second of corals, shells, and marine wonders; and a third of rare objects, diamonds, and curiosities from the plant kingdom.

The fourth room housed curiosities from the animal kingdom, showcasing a stuffed hippopotamus. After the Gonzagas took control of Mantua and moved into the palace, they mounted and displayed the embalmed body of Rinaldo sitting bolt upright on the hippopotamus. In his honor, the room was renamed for him, the name it bears today, although the hippopotamus and its mount are gone.[8]

In the 16th and 17th centuries, an astonishingly large number of collections of curiosities were found in every western European country. Conrad Gesner, the Zurich physician sometimes called "the Father of Zoology," in about 1550 had one of the first museums devoted chiefly to natural history; his collection was combined with one belonging to Felix Platter, remnants of which are found today in the Natural History Museum in Basel. Ulisse Aldrovandi had a large museum at Bologna that early in the 17th century was joined to one of Ferdinando Cospi and acquired by the City of Bologna.[9]

The 17th century saw technical improvements in handling zoological specimens. The use of spirits of wine made preservation in liquid possible; cheap flint glass enabled wet specimens to be viewed more easily; and wax or mercury could be injected into vascular systems so as to exhibit specimens dry. Ole Worm, physician, scientist, and founder of prehistoric archaeology, had a museum at Copenhagen, as did King Christian V. The Amsterdam collections of Bernhardus Paludanus, Frederick Ruysch, and Albert Seba found their way to the Imperial Palace in Saint Petersburg.[10]

Important centers of scientific research developed in Italy. At Bologna the Aldrovandi-Cospi collection was joined by the Instituto delle Scienze of the Conte de Luigi Ferdinando Marsigli. The Medici in Florence collected natural science specimens as well as art. Ferrante and Francesco Imperati had a well-known museum at Naples, while the Jesuit Athanasius Kircher, who considered Noah's ark to have been the most complete natural history museum, was director of the Museo Kircheriano in Rome.[11]

The collectors gave considerable thought to the classification and arrangement of their treasures. Caspar F. Neickel in his *Museographia*, printed at Leipzig in 1727, recommended six shelves around the room. Natural objects should go on one side with human anatomy, including skeletons and mummies, on the top shelf, and quadrupeds, fishes, and minerals below. Another wall was to hold man-made objects with ancient and modern productions separated. The short end of the room opposite the entrance and lighted by three windows contained cabinets for

coins. Portraits of famous men occupied the space above the shelves. Ole Worm's Museum in Copenhagen used three continuous shelves and suspended from the ceiling or mounted on the walls large objects such as stuffed crocodiles, a polar bear, skeletons, arms and armor, and an Eskimo kayak. The Imperati museum in Naples presented a similar appearance, while an Egyptian mummy at the entrance lured the visitor into the Museo Kircheriano.[12]

Displaying Collections

The displays of early natural history collections reflected the individual collector's interests and the growing "scientific" focus on identifying and classifying objects. Publications such as *Museographia* (1727) provided schematics for organizing collections. The actual displays evolved from simple shelves and cases of objects carefully laid out in some rational order into efforts to cluster and group items to explain their places in the increasingly complex world.[13] In Britain, museum founder and innovator William Bullock introduced realistic specimens to his displays, while the multitalented Charles Willson Peale added stuffed creatures to his Philadelphia museum displays. As tourists, collectors, and big game hunters scoured the far reaches of the world, the focus on displaying prized objects merged with museums' taxonomic systems. Collectors sought to show their collections in more realistic settings, placing the individual item within its natural context. In the United States, Ward's Natural Science Establishment (Rochester, New York) prepared specimens for hunters and as large metropolitan natural history museums began to open, technicians from Ward's applied their talents to museum displays. Popular agriculture fairs across the United States provided venues for displays of stuffed animals, adding to the demand for more realistic taxidermy and natural settings. American innovator Carl Akeley began his long career at Ward's.[14] Setting off these displays with backdrops—both realistic and fantastical—added to the visitors delight at "entering" the world of nature. The diorama made its entry into the museum exhibition space. "The recognition of the educational value of animal groups by such an acknowledged authority as a government museum (National Museum of Natural History of the Smithsonian) had much to do with their adoption by other institutes; once entrenched behind the bulwarks of high scientific authority, they began to find their way into all museums."[15]

British Antecedents

The Ashmolean Museum

The first public natural history museum was established at Oxford University in 1683. Two remarkable gardeners, the John Tradescants, father and son, may be considered its founders. The elder Tradescant laid out gardens for several English noblemen and journeyed to Flanders, France, Russia, Algeria, and the Mediterranean as far east as Turkey to bring back trees and plants chosen for their beauty and rarity rather than their medicinal qualities. In 1626 he moved to South Lambeth, outside London; his house, known as "Tradescant's Ark," was filled with his renowned Cabinet of Rarities and surrounded by a fine garden.

In 1656 the younger Tradescant issued *Musaeum Tradescantium*, a catalog of the collection that listed preserved birds, animals, fish, and insects; minerals and gems; fruits; carvings, turnings, and paintings; weapons; costumes; household implements; coins and medals; and beautiful and exotic plants, shrubs, and trees. The garden was especially strong in Virginia materials, many of them gathered by the son on three trips he made there. Typical rarities in the collection were "unicornu marinum" (narwhal); "dodar, from the Island Mauritius" (the famed, now-extinct dodo); "a cherry-stone, upon one side S. Geo: and the Dragon perfectly cut; and on the other side 88 Emperour's faces"; "Pohaton, King of Virginia's habit all embroidered with shells, of Roanoke"; "Henry the 8 his Stirrups, Haukeshoods, Gloves"; and "Anne of Bullens Night-vayle embroidered with silver."

Elias Ashmole, smooth-talking lawyer, amateur scientist, and collector, helped his friend Tradescant issue the catalog. When John died in 1662, the rarities passed to Ashmole and he gave the collection to Oxford but required the university to put up a special museum building to house the twenty cartloads of the Tradescant accumulation, to which he added books and coins of his own. The museum was on the upper floor, a school of natural science below it presided over by Dr. Robert Plot, keeper of the museum and professor of chemistry, and a chemistry laboratory in the basement. The whole was called the Ashmolean Museum, though some thought it might better have been named for the Tradescants. The museum printed regulations on its use in Latin in 1714. Only one group was admitted at a time, and entrance fees were in proportion to the time spent on the guided tours, though groups received a discount. Unfortunately, the Tradescant dodo, in

moldy condition, was ordered removed and burnt in 1755, though the head and one foot were salvaged from the flames.

The old Ashmolean building (now the Museum of the History of Science) is still extant today beside the Sheldonian Theatre on Broad Street. Its contents have been scattered—the geological and physical collection to the Clarendon Building, the ethnographic specimens to the Pitt Rivers Museum, natural history material to the University Museum, and the books and manuscripts to the Bodleian Library. The new Ashmolean Museum of Art and Archaeology (1894) is a general collection of art, antiquities, and numismatics with a few items related to its predecessor, including portraits of the Tradescant family and of Ashmole, and the shell-embroidered mantle said to have belonged to Powhatan.[16]

The British Museum and Others

The British Museum, the first great national museum in the world, was founded by the House of Commons in 1753 as a combined national library and general museum that soon became especially strong in collections of antiquities, natural history, and ethnography. In fact, the British Museum might just as readily be included in the previous chapter as an "Art Museum." It appears here as a Natural History Museum based on its origins. Today it stands with a few other national institutions with universal collections: the Louvre, the Smithsonian, the Metropolitan Museum of Art, and the Hermitage. The man behind the museum part of the enterprise was Sir Hans Sloane, eminent physician and observant naturalist and scientist. Sloane served as president of the Royal Society in succession to Isaac Newton and of the Royal College of Physicians. He was best known for his collection that was a kind of private museum housed in his home. Sloane's collection attracted many distinguished visitors—among others, Voltaire, Benjamin Franklin, Linnaeus, and Handel. The great composer angered Sloane by putting down a buttered muffin on one of his rare volumes. At his death in 1753, Sloane's natural history collection was enormous—a herbarium of 334 large folio volumes of dried plants; 12,500 vegetable specimens; zoological objects; and stones, minerals, shells, and fossils—without doubt the finest in the world. Then there were fifty thousand volumes, including seven thousand manuscripts; twenty-three thousand coins and medals; classical, medieval, and oriental antiquities; drawings and paintings; ethnographic objects; and mathematical instruments. All together, there were more than eighty thousand objects in addition to the herbarium. Sloane had spent large sums on arranging and cataloging his collections, at least 100,000 pounds.

In his will, Sir Hans stated that he had made the collection for "the manifestation of the glory of God, the confutation of atheism and its consequences, the use and improvement of physic and other arts and sciences, and benefit of mankind." He wished it to "remain together and not be separate" in the vicinity of London with its "great confluence of people." Parliament decided to meet Sloane's terms and the British Museum opened in 1759 in Montagu House in Bloomsbury. No admission charge was made, but tickets were required that often took several weeks and at least two visits to obtain. Armed sentries guarded the entrance after the Gordon riots of 1780; children were not admitted; and tours were hurried, lasting no more than an hour. By 1810, however, "any person of decent appearance" was admitted without a ticket during restricted hours.[17]

At first there were three departments—Manuscripts, Medals, and Coins; Natural and Artificial Productions; and Printed Books, Maps, Globes, and Drawings. A fourth—Antiquities—was added in 1807 that contained such rarities as the Rosetta stone; the Towneley collection of Greek and Roman sculptures, bronzes, and terra-cottas; and later, the Portland Vase and the famed Elgin Marbles from the Parthenon. Both the library and the archaeological collections with outstanding Egyptian, Babylonian, and Assyrian rarities expanded enormously and remained together at Bloomsbury in the neo-Grecian building begun by Sir Robert Smirke in 1823 and expanded often since that day.[18] In 2000 the museum opened the Great Court that increased public space by almost 40 percent. It allows for greater public access to galleries, including the 1857 Reading Room carefully restored to its original design, and adds auditorium space, classrooms, even studios, along with an educational center for young visitors. In fact, the new space provides the largest covered public space in Europe.[19]

Captain James Cook and other explorers contributed many specimens to the British Museum, and the Royal Society turned over its collection in 1781. Sir Joseph Banks in 1820 left it a herbarium, natural history library, and botanical collection. Between 1880 and 1883 the natural history collection was transferred to a twelve-acre site in Kensington; the institution (which became independent in 1963) was known as the British Museum (Natural History). Sir William Flower, its innovative director from 1884 to 1898, divided the collections into a selected and meaningful public exhibition series and a vastly larger reserve or study series for those with special interests (and credentials).[20] Flower

believed that scientific research and public instruction were parallel functions of the museum. To this end, he focused on exhibition techniques, especially naturalistic dioramas to display collections. His attention to improving the appeal of specimens led to improvements in basic taxidermy techniques that would further increase the public's interest. Today at the Museum's Darwin Centre, the museum remains true to Flower's parallel goals. The centre brings the researchers out of their labs to interact with visitors. Through World Wide Web connections, one can join these discussions.[21]

There were also several well-known private museums. Sir Ashton Lever began with a bird collection near Manchester, moved to London in 1775, and was knighted for his natural history museum. Though he charged one-half guinea admission, he could not make a go of it, and his collection was finally sold at auction in 1806. Scottish brothers William (1718–1783) and John (1728–1793) Hunter amassed large collections of specimens relating to their teaching of anatomy to aspiring doctors in London. Nearly thirty-five hundred items were on display in their London home. Upon the death of the younger brother, the Hunterian collections were left to the University of Glasgow and subsequently purchased by the Scottish government in 1799. They remain on view today. William Bullock formed a collection at Sheffield, moved to Liverpool, and then came to London in 1809. Two years later he had the Egyptian Hall built in Piccadilly with an appropriate facade. He was an innovator who, like American circus founder Phineas T. Barnum, did much to popularize museums; he devised crude habitat groups and displayed Napoleon's coach captured after Waterloo, parrots brought back by Captain Cook, Laplanders and their reindeer from Norway, and a distinguished Mexican exhibition that he had gathered on a trip there.[22]

Continental Natural History Museums

The Jardin des Plantes, originally part of the king's garden, was formed in Paris and opened to the public in 1739. Georges-Louis LeClerc, comte de Buffon, its superintendent from 1739 to 1788, used it in writing his thirty-six-volume *Histoire Naturelle*. During the French Revolution in 1793, the Museum National d'Histoire Naturelle was established there. Twelve professional chairs attached to the museum were held, over the years, by the leading French naturalists—Jussien,

Geoffroy Sainte Hillaire, Lamarck, Cuvier, Chevreul, Milne-Edwards, Quatrefages, and Marcellus Boule. The museum buildings situated in the sixty-acre Jardin des Plantes alongside the Seine provide today's visitors with the opportunity to experience two centuries of natural history museum exhibition techniques. Starting in the Galerie d'anatomie comparee near the park entrance, one can walk by case upon case of articulated skeletons from across the globe. At the other end of the park, however, stands the Grand Galerie de l'evolution opened in 1994. One enters the doors of this impressive 19th-century building (designed by Gustave Eiffel) at the lowest level of four floors and is surrounded by steel and glass 21st-century exhibition spaces.[23]

The Naturhistoriches Museum in Vienna was founded in 1748, when Emperor Francis I purchased a collection of J. de Ballou of Florence. The museum is housed today in an Italianate building (1881), situated with a twin art museum in a handsome garden. Its collections cover mineralogy, petrography, geology, paleontology, zoology, and botany. Rarities include the finest meteorites in Europe and outstanding prehistory exhibits. It has transferred superb ethnographic materials, including feather ornaments of the Aztecs, to the Museum fur Volkerkunde (1876).[24]

The closest approximation to a natural history museum in Italy today is La Specola, the zoological museum of the University of Florence. It goes back to the Medici, but was opened to the public by Grand Duke Peter Leopold in 1775. It contains wet specimens, live reptiles, and amphibians, mollusks, skeletons, dried bird and mammal skins, mounted specimens, and dioramas. Most unusual of all are wax anatomical models created between 1770 and 1840 in the museum laboratories. This collection may someday become the basis for an Italian national museum of natural history.[25]

American Beginnings

The first permanent museum in the American English colonies was started in 1773 when the Charleston Library Society decided "to collect materials for a full and accurate natural history of South Carolina." Gentlemen were asked to send natural products—animal, vegetable, or mineral—with careful descriptions to be looked after by four curators. The society ordered an orrery from David Rittenhouse of Philadelphia and acquired a telescope, camera obscura, hydrostatic balance, and a

pair of elegant globes. Early accessions included an Indian hatchet, a Hawaiian woven helmet, a cassava basket from Surinam, and parts of a skull and other bones of the fossilized Guadaloupe man. In 1850 the College of Charleston agreed to house the collection, and the Charleston Museum, incorporated in 1915 with its own board of trustees, has maintained unbroken its historical primacy.[26]

Pierre Eugene du Simitiere, the Swiss painter of miniatures, preserved snakes and other natural history specimens in his Curio Cabinet or American Museum opened to the public at Philadelphia in 1782. Du Simitiere may have been "the nation's earliest museologist," but far more important was Charles Willson Peale, also of Philadelphia. An accomplished artist, ingenious craftsman, enthusiastic student of nature, and a kind of universal scholar, Peale acquired most of du Simitiere's collection in 1784 to add to some mastodon bones, a preserved paddlefish from the Allegheny River, and paintings of Revolutionary heroes on display in his home. In 1786 he announced that he was forming a museum there—"a Repository for Natural Curiosities" or "the Wonderful Works of Nature"—to be arranged according to Linnaean classification. Among other exhibits was a grotto showing snakes and reptiles in natural surroundings. By 1794 the museum had outgrown Peale's house and moved to the newly completed Philosophical Hall of the American Philosophical Society; in 1802 it acquired the Long Room and Tower of what is today Independence Hall, rent free by unanimous action of the Pennsylvania Legislature. The Philadelphia Museum or Peale's American Museum was one of the leading attractions of the city and indeed of the eastern United States.

Peale was an imaginative and skilled museum director. His enthusiasm and good nature brought many gifts, and the American Philosophical Society in 1801 financed his expedition to Ulster County, New York, to exhume the bones of three "mammoths" (actually mastodons). Peale originated a habitat arrangement with curved, tastefully painted backgrounds to exhibit birds and animals showing their customary environment. He developed his own methods of taxidermy and carved larger animals of wood in natural poses to receive the skins. He used arsenic (even though it made him ill) and bichloride of mercury to protect his mounted specimens from insects. The fangs of a rattlesnake were shown under a lens, and "insects too small to be examined with the naked eye" were "placed in microscopic wheels." He also housed living animals and reptiles in the yard at Independence Hall.[27]

Peale's interest in interpreting his "School of Nature" was equally great; he was one of the first to appeal to the general public as well as

to the scholar. The Philadelphia Museum and the Baltimore branch developed pioneer systems of gas lighting so as to stay open at night. In addition to a framed catalog after the Linnaean system and an eight-page guidebook, there were lectures, magic-lantern shows, and demonstrations of chemistry and physics (including electricity). Peale's museum, however, received increasingly heavy competition from catch-penny museums and shows devoted solely to entertainment. The city of Philadelphia also took over Independence Hall and charged Peale twelve hundred dollars in annual rent. The result was that the museum began to sacrifice the "rational amusement" of its educational and scientific programs to become more entertaining. By 1820 it was featuring Signor Hellene, an Italian one-man band who played the Italian viola, Turkish cymbals, tenor drum, Pandean pipes, and Chinese bells. The Peale museums went downhill rapidly after Peale's death in 1827, and the Baltimore and New York ones were soon bankrupt.[28]

In Philadelphia, at the start of the 19th century, the Academy of Natural Sciences convened its first meeting. This group of a dozen or so apothecaries, chemists, and a dentist, came together first to socialize and then to collect natural history specimens and to pursue research into natural phenomena. Though slow to open their study collections to the public, they sponsored lectures for members and friends and by 1839 their library maintained regular public hours. By the time the Philadelphia Peale Museum doors closed in 1850 the Academy of Natural Sciences was open to the public, and in 1866 it welcomed more than thirty-four thousand visitors. In 1868, it displayed the first American dinosaur *Hadrosaurus* from Haddonfield, New Jersey.[29]

In 1790 the patriotic, fraternal Tammany Society of New York conceived the notion of "The American Museum" to emerge from its own members-only cabinet. By 1815 the city's alms house was designated the home for the New-York Historical Society (previously in City Hall), the American Academy of Fine Arts, and the American Museum and the City Library. But, as important as the designation of a central location was the strengthening of the commitment of the city's power brokers to supporting a museum. John Scudder, who was a naturalist, taxidermist, and youthful curator at John Savage's City Museum, bought his former employer's ragtag collections and gave his own establishment the designation the "New American Museum" which opened its doors to the public in 1816.[30]

Phineas T. Barnum took over John Scudder's American Museum in New York late in 1841. This master showman was determined to make his fortune by amusing and even bamboozling the public. He never

allowed scientific principles to stand in his way. By 1845 the Philadelphia Museum had failed, and Barnum eventually acquired much of its collection as well as the holdings of the Baltimore and New York branches. Barnum's American Museum, with more than six hundred thousand accessions, included "industrious fleas," three serpents fed their noonday meals in front of the crowds, two white whales swimming in tanks of salt water, a white elephant from Siam, two orangutans, a hippopotamus ("The Great Behemoth of the Scriptures"), grizzly bears, wolves, and buffalo. In addition there was a national portrait gallery, panoramas of the Holy Land, waxwork figures showing the horrors of intemperance, and an anatomical Venus (one shilling extra). Even more spectacular were General Tom Thumb and assorted midgets, giants, and bearded ladies; Barnum's traveling circus developed from this start.[31]

Despite the emphasis on entertainment and hokum, Barnum's American Museum had serious collections of shells, fish, animals, minerals, and geological specimens. When the museum was destroyed by fire in 1865, Barnum talked of building a great new national museum in New York, open to the public without charge. Henry Ward Beecher, Horace Greeley, William Cullen Bryant, and other leading New Yorkers backed the plan and urged President Andrew Johnson to instruct American ministers and consuls to help collect specimens. Nothing much came of the effort, though Barnum, in union with the Van Amburgh Menagerie Company, set up a New American Museum, which also burned, in 1868. His interest in natural history and museums continued, however, and he made gifts of animal skeletons, hides, and other materials chiefly to the Smithsonian Institution, the American Museum of Natural History, and Tufts College. His chief contributions to the museum movement, however, were on the popularization and entertainment side, where his promotional talent and sense of fun were most effective.[32]

Smithsonian Institution

James Smithson, illegitimate son of an English duke and keen student of chemistry and mineralogy, at his death left a contingent bequest to "the United States of America, to found at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men." When his heir, a nephew, died unwed and childless, the contingent inheritance became a reality. In 1835, 110 bags of gold sovereigns worth $508,318.46

were shipped to the United States. Smithson had never visited there, and a somewhat startled Congress began to debate what to do with the unprecedented gift.

Proposals were made to use it for a national university, a large museum of natural science, an astronomical observatory, an agricultural experiment station, a normal school for training teachers of natural science, a school for orphan children, or an agricultural bureau to aid farmers. John Quincy Adams, the grand old former president then serving selflessly in the House of Representatives, fought hard to keep the fund intact as an endowment for the promotion of science. In 1846 Congress created the Smithsonian Institution with a board of regents composed of the chief justice of the United States, the vice president, three congressmen, three senators, and six private citizens. The dispute over the use of the money (the income then amounted to about thirty thousand dollars per year) was reflected in the provision that the board erect a building to house a museum with a study collection of scientific materials, a chemical laboratory, a library, an art gallery, and lecture rooms.[33]

The regents chose as their executive or secretary Joseph Henry, probably the leading American scientist of the day, who had done distinguished research in electromagnetism and discovered the principle of the telegraph. Henry thought the increase of knowledge more important than its diffusion; there were "thousands of institutions actively engaged in the diffusion of knowledge in our country," he wrote, "but not a single one which gives direct support to its increase. Knowledge can only be increased by original research, which requires patient thought and laborious and often expensive experiments."[34]

Henry passionately argued the merits of pure science and resisted as much as he dared putting Smithsonian income into erecting a large building, acquiring a library, establishing a museum and art gallery, and offering a series of public lectures. He set up a system of meteorological observations throughout the country that became the United States Weather Bureau; cautiously backed Smithsonian participation in exploring expeditions to the western states, Alaska, and elsewhere; inaugurated an international exchange of scientific publications; and began to publish *Smithsonian Contributions to Knowledge*. He managed to defeat efforts to make the Smithsonian a general copyright library, firing the librarian and transferring the accumulated books to the Library of Congress. He placed the Smithsonian art holdings on permanent loan with the Corcoran Gallery of Art.[35]

Henry could not, however, stop the growth of a natural history museum. Spencer Fullerton Baird, a first-rate biologist who became Henry's assistant secretary in 1850, was too clever and too patient for him. Baird thought a United States National Museum would both increase public knowledge of flora and fauna and provide scholars with comparative materials for biological research. Pressure for such a museum came from the exploration of natural resources in the western United States and from Smithsonian participation in international expositions. Both activities brought a stream of specimens and artifacts to Washington.[36]

Baird employed a promising young ichthyologist, George Brown Goode, to arrange Smithsonian and United States Fish Commission exhibits for the Philadelphia Centennial Exposition of 1876. Goode became the leading American museum professional of his day and in his short career (he died in 1896 at age forty-five) placed Smithsonian museum activities on a sound scientific basis. He brought back forty-two freight carloads of specimens and objects from the Philadelphia centennial, and after Baird succeeded Henry as secretary, Congress established the United States National Museum in 1879 and provided it with a new home, the present redbrick Arts and Industries Building. Goode argued that they were creating a museum of record to preserve material foundations of scientific knowledge, a museum of research to further scientific inquiry, and an educational museum to illustrate "every kind of material object and every manifestation of human thought and activity. " In other words, Goode was determined to collect not only natural history specimens but also art, historical, and technological objects. The centennial haul included sculpture and graphics, machinery, and decorative arts materials of wood, metal, ceramics, glass, and leather.[37]

Since then the Smithsonian has grown enormously and today contains more than 143.5 million objects (including artworks and specimens), about 80 percent of them in the National Museum of Natural History. It has been housed in its own building since 1911 and has sections devoted to anthropology (including what was once the famed Bureau of American Ethnology), botany, entomology, invertebrate and vertebrate zoology, mineral sciences, and paleobiology. The museum has for more than a century led the world in the study, classification, and publication of descriptions of new forms of animals, plants, and fossils. Its huge collections of specimens from all over the globe have permitted systematists to conduct outstanding taxonomic research.[38]

The Smithsonian Institution is a complex mixture of scientific and museum programs. It has been called the "university on the National Mall." Though not entirely an agency of the national government, it receives more than six hundred million dollars per year of federal funds that covers 70 percent of its expenses. Individual, foundation, and corporate support, along with Smithsonian business ventures, provide the remaining 30 percent. The Smithsonian regards itself as "an independent establishment devoted to public education, basic research, and national service in science, the humanities, and the arts."[39] Dichotomies such as Smithson's "increase and diffusion of knowledge" or Henry's pure science and Baird's taxonomic research still exist, but Congress has been willing to support their different approaches. The Smithsonian Institution as a whole echoes European museums because of its governmental support, and its Museum of Natural History stands as a world leader in its field.

American Museum of Natural History

Albert S. Bickmore studied with Louis Agassiz, founder of the Museum of Comparative Zoology at Harvard, and was determined that New York City should have a museum of natural history second to none, "affording amusement and instruction to the public" and "teaching our youth to appreciate the wonderful works of the Creator." Bickmore's enthusiasm enlisted the aid of the financial titans of the city, and the state of New York chartered the American Museum of Natural History on April 9, 1869. Bickmore became superintendent of the new institution, which the Commissioners of Central Park provided with quarters and exhibit cases on the upper floors of the Arsenal Building in the park.[40]

The American Museum joined with the Metropolitan Museum of Art to secure an arrangement under which New York City provided museum buildings and paid for maintenance and guards, while the boards of trustees furnished collections and the curatorial and educational staffs. President Ulysses S. Grant in 1874 laid the cornerstone of the American Museum's new building on Central Park West, which President Rutherford B. Hayes dedicated three years later. On that occasion, Professor Othniel C. Marsh, of the Peabody Museum at Yale, made a singularly accurate prophecy. "These vast collections," he said, "will spread the elements of Natural Science among the people of New York and the surrounding region, but the quiet workers in the attic, who pursue Science for its own sake, will bring the museum renown

throughout the world." Professor Bickmore resigned as superintendent in 1884 to become curator of a new department of public instruction, for a time paid for by the state of New York. He offered schoolteachers a special course in natural history, devised high-quality lantern slides (known as "Bickmore slides"), and soon had reached more than one million persons with his public lectures.[41]

Morris K. Jesup, multimillionaire banker, became president of the museum in 1881. He was actually what today would be called the director—a working administrator who concerned himself with the smallest operating decisions. Though no scientist, Jesup attracted wealthy men to support the museum, appointed scholarly curators, personally financed museum expeditions, helped send Robert E. Peary on expeditions to the North Pole, and supported Frank M. Chapman in developing his bird-habitat groups. Jesup liked to see young people in the museum, which he considered a most effective agency "for furnishing education, innocent amusement, and instruction to the people."[42]

Jesup was followed in the museum presidency in 1908 by paleontologist Dr. Henry Fairfield Osborn. Osborn sensed the public appeal of large fossils, especially those of dinosaurs and when museum expeditions to the West brought back dinosaur bones, he had the huge skeletons articulated and placed on display. Many scientists considered this innovation radical and vulgar showmanship and insisted that the bones ought to be sorted into drawers and reserved for scientific study. Osborn got Carl E. Akeley, brilliant taxidermist, sculptor, explorer, and inventor, to obtain specimens from which a Hall of African Mammals developed with twenty-eight habitat groups placed around eight mounted elephants. Roy Chapman Andrews (memorialized as Indiana Jones in the film *Raiders of the Lost Ark*) was dispatched on a series of explorations of the Gobi Desert in Mongolia and in 1923 he brought back dinosaur eggs.[43] He developed a well-balanced program of exploration, scientific laboratory work, and exhibition techniques that attracted a large popular audience, including numerous school groups. Publications were of great importance, both the numerous series of scientific reports and the popular, copiously illustrated *Natural History* magazine. Dynamic reactions took place between patrons contributing financial backing and a quality program that attracted new patrons. The Smithsonian museums often contrasted governmental penury with this private generosity.[44]

After Osborn's retirement in 1932, the museum secured less flamboyant but more professional administration. Its departments were devoted to astronomy, minerals and gems, paleontology, forestry and conservation, living invertebrates, insects, living fishes, living reptiles, living birds, living mammals, and man and his origins. The museum continued to attract strong financial support from the wealthy and installed the much-appreciated Hayden Planetarium. The team of curators and designers provided ever more authentic and telling exhibits, and school programs broadened in their appeal. Still, the museum's chief function remained research; its 23 million specimens were under study by a large staff of scientists, while its expeditions constantly brought in more materials.[45]

The late Margaret Mead, the museum's well-known anthropologist, thought that the museum existed for the children and ideally should be planned for twelve-year-olds. But she valued its research function also when she said: "The Museum is an old-fashioned institution, though up-to-date in relation to the media. Nobody is here just to make money. . . . Most of the curators could get better paying jobs elsewhere, and some of them have, but the ethos is so good that not many are tempted. The Museum gives you great intellectual independence."[46]

Visiting the museum today, Mead might not recognize some exhibition halls such as the Hall of Biodiversity that surrounds visitors with evidence of the earth's diversity and the impact of evolution on development. Rather than the narrative messages of the exhibit halls dedicated to particular places, exhibitions now transcend those designations and provide visitors with evidence of the world's complexities and interconnectedness. In addition to reinstallations of the "old halls" the museum offers visitors IMAX theater presentations, a "walk-in" butterfly conservatory, and changing exhibits from across the globe. In 2000 the building itself expanded to the north with the glass cube surrounding the sphere of the Hayden Planetarium in the new Rose Center for Earth and Space to provide visitors with the largest, most powerful virtual reality simulator experience of the universe and Earth's role within it. The "natural" in the museum's name has expanded exponentially from the 18th-century Enlightenment notions of classifying and creating rational order for the universe.[47]

Museum director Ellen Futter describes the museum's commitment this way: "[B]iodiversity . . . is foursquare what natural history museums are all about: the natural world and humanity's place within it. . . . Natural history museums . . . support enormous collections and large scientific staffs that are not typically fostered elsewhere. The formidable scientific research produced by the scientists from those collections and their allied field work provide both a standard for assessing the

scale of historical changes affecting habitats and insights into the use of species as indicators of the health of the environment. This research has immediate relevance to many conservation measures and policies."[48]

Field Museum of Natural History

A third great American natural history museum is the result of another world's fair—the World's Columbian Exposition of 1893 in Chicago. Frederick Ward Putnam, curator of the Peabody Museum at Harvard, in 1891 was appointed to head the Department of Anthropology for the exposition, and he urged that the collections shown there become a permanent museum to be known as the Columbian Museum of Chicago. For two years Putnam and his assistants carried out excavation, collecting, and research from Greenland to Tierra del Fuego that brought anthropological and ethnographic materials to the exposition. Putnam also secured a great collection of minerals, skeletons, mastodon bones, and mounted mammals and birds from Ward's Natural Science Establishment of Rochester, New York.

When Marshall Field, the merchant prince, was asked to give money for the proposed museum, he said: "I don't know anything about a museum and I don't care to know anything about a museum. I'm not going to give you a million dollars." But Edward E. Ayer, an incorporator and the first president, convinced Field that his gift would bring him a kind of immortality, so that he changed his mind and gave 1 million dollars; other wealthy patrons contributed nearly five hundred thousand dollars. The articles of incorporation of 1893 defined the museum's purpose as "the accumulation and dissemination of knowledge, and the preservation and exhibition of objects illustrating Art, Archaeology, Science and History." Putnam secretly hoped to become the director, but was passed over in favor of Dr. Frederick J. V. Skiff, who had been chief of the exposition's Department of Mines and Mining.[49]

The new museum, opened in 1894 in the Palace of Fine Arts building of the exposition in Jackson Park, has been generously supported by the elite of Chicago, and the Park District paid maintenance and security expenses through taxation. Marshall Field eventually gave the museum 9 million dollars; his nephew Stanley Field was its president for fifty-six years and contributed 2 million dollars; and his grandson Marshall Field III bestowed another 9 million dollars. The museum's name was changed to the Field Museum of Natural History in 1905 and moved into a mammoth white marble building in Grant Park along the lakeshore in 1921.

The museum has four main departments—anthropology, botany, geology, and zoology—and issues scholarly research publications known as *Fieldiana* in each area. Its scientific expeditions are outstanding and numerous; in 1929, for example, seventeen expeditions included Eastern Asia (with Theodore Roosevelt Jr. and Kermit Roosevelt), the Pacific (on Cornelius Crane's yacht, the *Elyria*), West Africa, the South Pacific, the Amazon, Mesopotamia (the Field Museum–Oxford University Expedition to Kish), Abyssinia, the Arctic, British Honduras, and the Bahamas.

Many of the museum's exhibits are world famous, as, for example, Malvina Hoffman's 1930s life-size bronze sculptures of the races of mankind and the more recently exhibited *Tyrannosaurus rex*, "Sue," the most complete such skeleton on view. Today one can visit the museum's exhibitions online, "traveling" through the museum's halls by type of collection or by geographic location. And, one may even check in on the museum's expeditions and their current research "finds" through Web connections. Beginning in 1997, the museum created the "Center for Cultural Understanding and Change" following the popular *Living Together Exhibition* that addressed contemporary cultural attitudes. The center's programs focus on Chicago and its environs as venues for cultural understanding. Together with twenty-one cultural organizations ranging from the Chicago Historical Society to the Korean American Cultural Resource Center, the Field has built up a Cultural Diversity Network for both research and public programs. The center's Urban Research Initiative (URI) employs college-age interns to research issues of cultural diversity and change, using the tools of "urban anthropology" in the Field Museum's own neighborhoods. These efforts confirm one of the museum's mottoes that "a living museum is never finished." As its website declared in 2005: "The Museum invites its visitors, and all the other communities it serves, to use these rich [anthropology] collections not only as a window on the past but also as a framework for imaginative yet practical solutions to the challenges of the future."[50]

Anthropological Museums

A word should be said here about the placement of collections of anthropology, archaeology, and ethnology in museums. Sometimes encyclopedic or universal museums such as the British Museum, the

Louvre, the Metropolitan Museum of Art, and the Museum of Fine Arts, Boston, possess important antiquities and ethnological materials. Many natural history museums contain such objects, as, for example, the three American museums we have just discussed. Other museums are devoted primarily to the anthropological field. Outstanding among them are the National Museum of Ethnology in Leiden, the Musee de l'Homme in Paris, and the National Museum of Anthropology in Mexico City.

The Leiden museum was founded in 1837 by Dr. F. B. von Siebold, who had lived in Japan and gathered an ethnographic collection of some five thousand objects. The museum suffered for a century because of inadequate housing, but slowly accumulated an important collection of materials from outside the European and classic regions. Transfers from the Royal Cabinet of Rarities, the International Colonial Exhibition held at Amsterdam in 1883, and the National Museum of Antiquities greatly strengthened the museum's holdings. In 1939 it was able to expand its exhibits as a result of acquiring the former building of the University Hospital. Its chief strengths lie in materials from Japan, China, Indonesia, Oceania, India, the Near East, Africa (including Benin bronze heads), America (Peruvian pottery and the Mayan so-called Leiden plate), Java, Tibet, and Siberia. Its dramatic presentation of Buddha on display in a stark gallery is most noteworthy. As the 21st century opened, the museum was fully renovated and adopted a global perspective seeking not only to link with the Indonesian National Museum but also to host a computer-based network of Asian-European Museums (ASEMUS) to encourage collections information sharing. In addition to its long tradition of exhibitions, the museum has extended its reach to cultural minorities throughout Europe through "global experiences" that combine the museum's exhibitions with art, literature, theater, and music events.[51]

The Musee de l'Homme in Paris is an offshoot of the Museum National d'Histoire Naturelle. Its founder, anthropologist Paul Rivet coined the name for the new museum; he believed that "humanity is an indivisible whole, in space and in time," and that scholarship should break down the barriers of political geography and synthesize the artificial classifications of physical anthropology, prehistory, archaeology, ethnology, folklore, sociology, and philology. The Musee de l'Homme opened in 1938 in the Palais de Chailot that had been built for the world's fair of 1937. The museum has been innovative in its exhibits, using sound ethnography and aesthetic display but subordinating them to the exposition of anthropological theory. It seeks to

illustrate the function of the objects against the total background of the culture. The museum has been undergoing major renovations of its physical plant and exhibitions. The African, Oceanic, and Asian artworks and collections from the Musee de l'Homme and the Musee des Arts Africains et Oceaniens moved across the Seine in 2006 to the architecturally striking Musee du Quai Branly. The installation has been criticized as focusing more on the aesthetic appeal of the objects as spotlit artworks than on their ethnographic content and context, although the installation does reflect context through evocative scenic backdrops and dramatic lighting.[52]

One of the greatest museums of the world is the National Museum of Anthropology in Mexico City, opened at Chapultepec Park in 1964 and recently renovated, an architectural triumph reminiscent of the ancient Mayan governor's Palace in Uxmal with an imposing interior patio and pool dominated by a vast umbrella fountain from which falls a curtain of water. The building is set in a handsome park, and from the interior visitors can see gardens and exciting outdoor exhibits that they may inspect, such as a colossal Olmec stone head from LaVenta or the reconstructed Mayan temple of Hochob. Near the entrance is an imposing twenty-three-foot-high ancient statue of the rain god Tlaloc that weighs 168 tons.

The museum has two floors of display rooms, the first devoted to anthropology and archaeology. In the Mexica Room, for example, are Coatlicue ("Goddess of the Serpent Skirt"); the Sun Stone ("Aztec Calendar"), twelve feet in diameter; and the Stone of Tizoc. These three huge monoliths, found in Mexico City about 1790, inspired official collection of antiquities. In addition to original artifacts, the museum has ingenious and artistic displays, such as the spectacular diorama of the Market of Tlatelolco with hundreds of authentically modeled miniature figures in an area measuring thirty by twelve feet or the setting of the Pakal tomb in the Mayan Room. Also on the first floor visitors see all kinds of archaeological remains, from prehistoric times to the most recent cultures before Columbian times, and representing all regions of the country.

The second floor of the museum is devoted to ethnology with buildings, furnishings, tools, and costumes of the different cultures of Mexico as they exist today. Not only did the anthropologists, archaeologists, architects, and artists co-operate in the creation of this museum, but humble skilled craftsmen from different cultures also came to build the ethnographic displays—until they were complete, actually living in the museum. The result of all this scientific, artistic, and

practical effort is a museum of breathtaking beauty that serves as a scientific anthropological center for all of Mexico.[53]

Whither Natural History and Anthropology Museums?

Museum scholar and critic Paula Findlen writes: "The openness of eighteenth-century cultural institutions contributed significantly to the redefinition of natural history. As museums became more of a public phenomenon, learned practitioners took greater pains to differentiate themselves from the unlearned audience who exhibited only curiosity and not virtuosity. . . . Curiosity was no longer a valued premise for intellectual inquiry but rather the mark of an 'amateur.' . . . Lamarck differentiated the 'cabinet of curiosity' from the 'cabinet of natural history' to underscore their diverse purposes; the former for amusement and the latter for the progress of sciences."[54] To close this discussion, can the late 19th century be considered the heyday of natural history and anthropology museums? At that time imperialism and colonialism brought to these museums objects for study and exhibition. Add to these phenomena growing urbanism and the "back to nature" movement that sought to promote nature to protect citizens from the negative effects of cities. The popularity of world's fairs and their use of dioramas meant that these museums adapted these techniques to their exhibition halls and, often located in city centers, emerged as institutions able to both entertain and educate the public.

Since that time, the world has continued to shrink. Travel, communication, and growing empowerment of the world's peoples have meant that the authority once proclaimed in natural history and anthropological museums has become at best dated and to some offensive. One example of this sea of change can be found at the Smithsonian Institution on the National Mall in Washington, D.C. On the mall's northern boundary stands the 1911 National Museum of Natural History and less than a quarter of a mile southeast is the 2004 National Museum of the American Indian. The former contains all the elements of a 21st-century natural history museum with 19th-century roots, including galleries that represent the continent's earliest inhabitants. Across the mall, the American Indian Museum is described by its director as a "museum different," stepping away from previous forms. The museum's formal mission statement begins: "[The Museum] shall recognize and affirm to Native communities and the non-Native public the historical and contemporary culture and cultural achievements of the Natives of the Western Hemisphere by advancing—in consultation, collaboration, and cooperation with Natives—knowledge and understanding of Native cultures."[55]

As the 18th-century cabinet collections changed from the "curious" and "exotic" to scientific specimens to be studied, the ethnographic museum form, at least at the National Museum of the American Indian, strove to give voice to its subjects in a manner unprecedented. The objects' owners and their heirs participated in interpretive decision making, changing the nature of the museum's relation between its collections and audiences. The installations supplied functional context for native objects with multimedia narratives supplied by collaborating National American sources supplementing large photographic backdrops. Today, although there are few displays of numerous objects of similar type, there is more emphasis on visual excitement than on an investigation of function, as in an array of projectile points with identifying information on a nearby touch screen, but without a comparison among examples from, for example, Plains or Eastern Woodland types. Even the museum's name suggests this new balance. And across the Atlantic, the Musee du Quai Branly offers a similar approach to public exhibition of ethnographic objects, but without the involvement of relevant communities.[56]

Challenges

Scientists in Museums

When the early natural history museums were established, they served as centers of scientific work. Their expeditions added to human knowledge of the natural world and brought in vast collections of specimens. Their staffs described and classified these ever-increasing materials, and Darwin's theory of evolution provided a rational framework to explain the whole. Today, however, the study of nature and life has moved in many directions and technology has altered the scientists' reliance on museum specimens. The same is true for students of cultural anthropology. These scientists have a greater need for field studies and laboratories than for museum collections and tend to work for scientific agencies or universities. Michael Ames offers three reasons for the lack of scholarly involvement with museums (and their collections): "First, many items are not worth studying anyway, either because they are intrinsically uninteresting or because they lack sufficient data concerning

provenance, function, or meaning. Second, many museums, ironically, offer meager facilities to researchers and some seem to discourage visiting scholars. . . . Third is the absence of important theoretical issues in material culture studies."[57]

Nineteenth-century Forms in Twenty-first-century Institutions

Scholar Carol Yanni writes: "Since biologists tend to study living organisms in the laboratory or in the field, they do not need museums as nineteenth-century paleontologists and taxonomists did. . . . Scientists determined the way their discipline was presented to the public and, not surprisingly, museums represented the interests of science. Rather than admit their obsolescence (or possible estrangement from the biological sciences), natural history museums have shifted their focus to educating the public about conservation. Their role in research has been pushed, literally, to the back room." And, National Museum of Natural History former assistant director for public programs Robert Sullivan confirms: "In the same way that the vertical, evolutionary paradigm became the skeletal framework for natural history museums in the 19th and 20th centuries, the horizontal, interconnected, 'ecosystem' paradigm may serve the 21st-century natural history museum. We must reconnect our collections, exhibitions, and interpretive programs and take steps to synthesize the fragmented, isolated and specialized knowledge that characterized preceding natural history museums."[58]

Museum Expeditions for Science and Profit?

Nineteenth-century natural history museums sponsored expeditions to "the holy lands" and other exotic venues, returning with objects to enrich their exhibition halls. Today, that process has evolved into a growing tourism opportunity where everyday citizens can dig in the mountains of Peru or join groups tracking migration patterns of animals of all stripes. The natural history museum literally opens the doors of its research laboratories and invites the public to participate in its research efforts (and the public pays the museum to join the process). "Ecotourism" is good marketing, but is it good science for the museum?

Public Science and Public Entertainment

Visit any natural history museum in a midsize city around the world and most likely you will find multimedia programming (IMAX theaters; screeching, moving dinosaurs; and virtual reality headsets). These new "entertainment" opportunities add to the visitor's museum experience in ways that extend museums' missions and services but should be assessed for their value (as museum programming, educational opportunity, and marketing expense). How do they enhance the natural history museum and its role as a cultural and scientific institution?

Evolution versus Creationism

European and American collectors' early cabinets sought to explain science and beauty, God's plan, and the order of the universe. Darwin's theory of evolution altered the message, but not the desire for order. Today, interpretations of evolution continue to affect natural history museum displays and interpretation. American "creationists" have raised their voices within community discussions, pressuring natural history museums to represent evolution as simply one theory. The American Museum of Natural History catalog states [n.d.]: "The view of evolutionary history seen in these halls represents the best interpretation of the available evidence according to researchers at the American Museum of Natural History. These views like all scientific ideas are subject to change and refinement. Further research and the discovery of new fossils may well modify our present understanding."[59]

American Museum of Natural History astrophysicist and director of the Hayden Planetarium Neil deGrasse Tyson writes: "Science is a philosophy of discovery. Intelligent design is a philosophy of ignorance. You cannot build a program of discovery on the assumption that nobody is smart enough to figure out the answer to a problem. Once upon a time, people identified the god Neptune as the source of storms at sea. Today we call these storms hurricanes. We know when and where they start. We know what drives them. We know what mitigates their destructive power."[60]

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4

Science and Technology Museums and Centers

> Technological artifacts . . . suffer from having been wrenched out of contexts that cannot be restored. The structure within which they were used has vanished. Kits of tools have been separated from the men and the shops in which they were used and from the products fabricated, machines from their operators and factories.
>
> —Brooke Hindle, 1983[1]

> Explaining science and technology without props can resemble an attempt to tell what it is like to swim without letting a person near the water.
>
> —Frank Oppenheimer, 1968[2]

> Showplace for the idea of technological progress, "value free" playground for scientific exploration, or lively forum for learning, controversy and the search for solutions—each of these is a scenario for a contemporary science museum.
>
> —Alice Carnes, 1986[3]

Artificial curiosities in the early collections included a broad spectrum of practical and scientific technology—tools and utensils; locks and keys; lighting devices; clocks and watches; arms, armor, and apparatus of warfare; musical instruments; globes, astrolabes, and navigational devices; machines, automatons, engines, and mechanical models; telescopes, microscopes, and other optical apparatus; magnetic and