

Opening a New Natural History Museum in Twenty-first Century America: A Case Study in Historic Perspective

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The great natural history museums of America were built in the latter half of the nineteenth century around two basic purposes: to house collections of specimens for use in scientific research, and to enlighten the general public about the natural world and humans' place in it. No major non-university natural history collection has ever succeeded in America without a major public education role. As natural history museums enter the twenty-first century, they face essentially the same challenges they always have — providing service to and deriving support from this very broad spectrum of users, from society at large to the general public to students at various levels to professional scientists. Although much has changed in society, science, and the culture of museums over the past 100 years, the institutional and intellectual structure, mission, and justification for natural history museums in America have changed surprisingly little. The challenges and opportunities confronting these museums today are, in a way, unprecedented, but in another have always been inherent in their nature.

The Paleontological Research Institution spun off from Cornell University in the 1930s and survived through much of the century as a tiny independent enclave serving mostly scientists. Over the past decade, however, it has reinvented itself and in late 2003 opened a major new public exhibit facility, the Museum of the Earth, based on many of the same premises — and facing many of the same challenges — as the great natural history museums of a century ago. While this new museum will serve mainly visitors from the northeastern region of the country, it is also intended to allow its parent institution to assume a larger national role in both public education and scientific research in the future.

If you were designing a natural history museum from scratch, what would you do? Where would you start? Would you focus on exhibits, education, collections, research? What would the right balance among these be? These questions have not been answered very often over the past century, as very few new major natural history museums have been established during this time. The “golden age” of starting natural history museums in America was the second half of the nineteenth century, a fact that might suggest caution to anyone considering doing so in the early twenty-first century. Yet this is precisely the situation in which the Paleontological Research Institution (PRI) found itself in the early 1990s. After six decades of building a major fossil collection and publishing well-respected scientific journals, it sought to expand its mission to include greater service to a wider public. PRI approached this task philosophically and historically by asking what a natural history museum is and what it is for. This exercise led the Institution to the conclusion that, far from being a dusty anachronism, the modern natural history museum is a vibrant, relevant,

coherent intellectual enterprise consisting of an inextricably interconnected and mutually reinforcing nexus of collections, research, and public outreach. These functions are inseparable, and one cannot exist without the other two. Although much has changed in science, education, and society over the past century, the natural history museum (whether international, national, or regional) remains as essential a part of the modern cultural landscape as it was when their great period of establishment began in the nineteenth century. This paper tells the story of the historical exploration that PRI undertook and the lessons that it learned as it examined its own mission and built the Museum of the Earth.

WHAT IS A NATURAL HISTORY MUSEUM?

Use of the word “museum” for a place “devoted to the procurement, care, study, and display of objects of lasting interest or value” (*Webster’s New Collegiate Dictionary* 1974) is a relatively modern convention.¹ The word “museum” comes from the Greek *museion*, meaning a “place or seat of the Muses,” that is, a place of inspiration, creativity, and knowledge.² The Latin word *museum* (or *musaeum*) referred more generally to a place for learned occupation. The great library and university at Alexandria, Egypt built by Ptolemy Soter (372–283 BCE) is generally cited as the first “museum” in this sense. The word does not appear to have “had any independent meaning of its own” during the Middle Ages (Findlen 1989:61; see also Alexander 1979). As the Renaissance began, “museum” began to refer not just to a collection but of knowledge but to a collection of objects that represented knowledge. This shift from a very broad concept toward one focused on objects occurred gradually during the sixteenth and seventeenth centuries, and was linked to two important elements of Renaissance humanism — encyclopedism and the connection between knowledge and real objects (Findlen 1989, 1994). By around the middle of the seventeenth century, “museum” had come to refer most frequently not just to a collection, but also to a physical place in which were stored objects from nature or human culture and works of art, historical artifacts, or natural curiosities (Findlen 1989). Initially, these storage places were pieces of furniture and eventually whole rooms in the homes of wealthy individuals, who called them “cabinets of curiosities”, *Wunderkammern*, *Kunstkammern*, or (increasingly) “museums” (Impey and MacGregor, 1985; Yanni, 1999). Those of Ferrante Imperato in Naples (1599) and Ole (or Olaus) Worm in Copenhagen (1655) are among the most well-known and frequently illustrated (see Schepeleyn, 1989). These very early museums were important not only because they assembled collections of objects arranged in a particular way, but also because they “established specific places for studying nature” (Yanni 1999:23).

By the end of the seventeenth century, museums were changing from strictly private and exclusive domains to public institutions. The first museum to explicitly announce its public and institutional status was the Ashmolean Museum at Oxford, which opened in 1683, based on the collections of John Tradescant and his son (Alexander 1979; Findlen 1989; Yanni 1999). The British Museum, the first true “national” museum, opened in 1753, in Montagu House (the home of the Earl of Halifax), to hold the collections of Sir Hans Sloane (Alexander 1979; Yanni 1999:24).³ Thus, by the eighteenth century, the word “museum” had come to combine two meanings, describ-

¹ The American Association of Museums has defined a museum as “an organized and permanent non-profit institution, essentially educational or aesthetic in purpose, with professional staff, which owns and utilizes tangible objects, cares for them, and exhibits them to the public on some regular schedule” (AAM, 1973, quoted in Alexander, 1979, p. 5).

² The Muses were the nine goddesses of poetry, music, and the liberal arts. “They are called Muses,” wrote Jaucourt in the entry under “Musée” in his *Encyclopédie* (1765), “from a Greek word which signifies ‘to explain the mysteries’, μῦθεν, because they have taught men very curious and important things which are from there brought to the attention of the vulgar” (quoted in Findlen 1989:60).

ing a place where collections of objects were housed, cared for, and made available for study and public exhibit and a center of storage, scholarship, and public education.

The term “natural history” has an equally long and complex etymology. In the eighteenth and nineteenth centuries it meant essentially the study of all objects and phenomena in nature. The first edition of the *Encyclopedia Britannica* (1771) defined “natural history” as “that science which not only gives compleat descriptions of natural productions in general, but also teaches the method of arranging them”. In 1802, John Playfair (famous as the popularizer of the “father of geology” James Hutton) described natural history as “the branch of knowledge which collects and classifies facts [in] the three kingdoms, the mineral, vegetable, and animal.” This usage, however, is somewhat puzzling: if it is simply description and classification, why call it “history”?

The answer lies in the term’s distant past. The earliest use may have been by Pliny the Elder (Caius Plinius Secundus, 23–79 CE) in his 37 volume work *Historia Naturalis*. There, Pliny said, his purpose was “to give a general description of everything that is known to exist throughout the earth”. Pliny’s use of “history” for this field of inquiry, however, may come from the even earlier work of Aristotle (384–322 BCE), whose *Historia Animalia* included descriptions of much of what was then known about animals, including their form, habits, and reproduction. Aristotle may have used the word “history” for at least two reasons: first, he saw all life as connected to a “great chain of being”, a system of connections that implied temporal continuity. Second, although no evolutionist in the modern sense (Mayr 1982), Aristotle was much impressed by a sense of motion in all animals — an unfolding during embryology, a realization of potentialities (Nordenskiöld 1928); in a word — history. Organisms, thus, were seen to come from something earlier, not from nothing; they have histories. This theme (and even the title) is repeated fifteen hundred years later in the works of early “natural philosophers” such as Conrad Gesner (*Historia Animalium*, 1551) and John Ray (*History of plants*, 1686; *History of fish*, 1686; *History of insects*, 1710), reaching its acme in Georges Buffon’s 44 volume masterwork *Histoire Naturelle* (1749–1804).

It is not coincidental that Ray, Buffon, and others of similar interests set the stage for Lamarck and Darwin in the early nineteenth century (Bowler 2003). Evolutionary biology (and the closely related disciplines of paleontology and historical geology) rely at their heart on the notion that things in the natural world have *histories* — that they have not been created from nothing in completely their modern form, and that these histories leave records in the shapes of natural objects. The ancient classical authors and their Enlightenment descendants thus recognized the need for history even if they did not grasp the mechanisms by which it is played out.

Even while “natural history” was at the forefront of what would eventually be biological science, it also began to be connected to a more popular pursuit of description of nature. Beginning with Gilbert White’s enormously popular and influential *Natural History of Selborne* (1789) (see e.g., Daniel 1985), a tradition of practice, as well as a literary genre, developed of avocational description of local nature by non-professionals (Barber 1980; Merrill 1997). This natural history “did not emphasize objectivity, but rather reveled in the pleasures and the romance of nature” (Rainger 2001:12). It is this tradition, as well as the shifts of biology and other sciences toward experimentation and away from pure description (e.g., Reingold 1964; Bruce 1987; Mayr 1982), that are responsible for the more pejorative usage of the term “natural history” that has become common in the late twentieth century. Modern dictionaries define it as “the study of natural objects esp. in the field from an amateur or popular point of view” (*Webster’s* 1974) or “the study of these sciences [botany, zoology, etc.], esp. of a non-technical nature” (*Random House Dictionary* 1975).

³ Peter the Great of Russia (1672–1725) had a great interest in collecting curiosities and opened a state-supported, nominally “public” museum in 1715 in St. Petersburg, although this may have been more of a royal cabinet (see Impey and MacGregor 1985; Asma 2001).

Coming out of this usage, the use of the term “natural history” has more recently expanded to applications of the (somewhat analytical) description of almost anything (e.g., Ackerman 1990; Fisher 1995; McMillan, 2002), further diluting its scientific credentials.

Yet, despite the “old fashioned” and obsolete reputation that natural history acquired in many quarters over the past century, the approach of the natural historian has been and remains essential to biology. Natural history is much more than “mere description”; it is the area of human endeavor that takes as its goal the understanding not just of how natural phenomena work, but where they came from (e.g., Bates 1950). The central method of natural history is comparison, and the “comparative method” lies at the heart of all historical science (e.g., Harvey and Pagel 1991). In order to pursue comparison, adequate data are of course required, and those data originate in description, are organized by classifications, and are vouchered by museum collections. Natural history has, furthermore, always been concerned with the diversity of life, the exploration of which, as discussed in more detail below, is now of paramount importance to biology as a major biodiversity crisis is upon us (see, e.g., Wilcove and Eisner 2000).

More generally, natural history fulfills the need to see nature as a unified whole. When Charles Darwin was on the voyage of HMS ‘Beagle’, he was once ashore in South America and introduced to a local military commander as a “naturalist”. When the soldier asked what a naturalist was, the translator, who had some knowledge of the kinds of things that Darwin had been doing on the voyage, said that a naturalist is “a man that knows every thing” (Capt. Robert Fitzroy’s journal, quoted in Darwin, 1962:82). The definition embarrassed Darwin, but was strikingly accurate. Naturalists — scientists who study natural history — must think about, if not “know”, just about everything, from genetics to geology, because in seeking historical causes for things all parts of the Earth are connected (e.g., Allmon 1993; Wilson 1994, 1998).

A HISTORICAL PERSPECTIVE

How did the essentially European notion of the natural history museum become realized in this country? What were the central elements of American natural history museums? These were crucial questions as PRI struggled to envision what a new public museum should look like. We examined the individual histories of eight of the largest American natural history museums established during the nineteenth century.⁴ We wanted to know how these institutions in their early years balanced the separate missions of collections, research, and public education, and what, if anything, we could learn from this history that might guide us as we designed our new museum.

The Academy of Natural Sciences: The Academy of Natural Sciences of Philadelphia was founded in 1812 in order to achieve intellectual independence from the city’s botanically-oriented Linnaean Society. It was also distinct from the American Philosophical Society, which encouraged the arts as well as science, and from the museum of Charles Willson Peale (1741–1827), which, despite Peale’s aspirations to make it the national museum of the United States, was viewed as aimed primarily at mass education and entertainment (Alexander 1979; Sellers 1980; Semonin 2000). The original purpose of the Academy was thus not explicitly public, and its early member-

⁴ This paper focuses on the early history of natural history museums in America. The history of such museums in Europe is somewhat different. Almost all European museums were wholly or mostly state-sponsored. American natural history museums, furthermore, were, from the very beginning particularly and explicitly focused on public education as one of the several major reasons for their existence (see, e.g., Burt 1977; Alexander 1988, 1997; Orosz 1990; Kohlstedt 1995; Conn 1998), to a greater degree than their European counterparts. The decision to focus only on museums founded in the nineteenth century was an arbitrary one. Several major natural history museums were founded in the early twentieth century in the U.S. (e.g., Natural History Museum of Los Angeles County).

ship was very small. This changed, however, when a series of public lectures was established. In 1815, the treasurer reported that these lectures had caused the Academy to rise “into public notice, has attracted the attention of strangers and has established for [the Academy] a character and reputation far exceeding our most sanguine expectations” (Gerstner 1976). In 1828, the Academy opened its first public exhibit hall for “two half days in every week for citizens” as long as they held a ticket signed by a member of the Academy. The opening of the Academy’s public exhibit space has been said to mark “the beginning of museum-based natural history in this country” (Conn 1998:38).

The decision to open a formal public exhibit space was a logical outgrowth of the Academy’s earlier experience with public lectures, but was also probably a result of the influence of William Maclure (1763–1840), a successful businessman, avocational geologist, and philanthropist interested in public education (Stroud 1992:31). Maclure not only encouraged the Academy to expand its role in public education but also donated funds, as well as thousands of volumes to the Academy’s library. The shift was probably a crucial one:

The relatively early trend toward public involvement in the Academy through its museum may have been a factor in the survival of the Academy through the first half of the nineteenth century, when other societies rose and then disappeared with some frequency The tendency after 1850 to emphasize the museum at the Academy suggests that the [public] museum may have been looked upon as the road to long-term survival and security. (Gerstner 1976:63.)

The Smithsonian Institution: When Englishman James Smithson died in 1829, he left a 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.” Yet it was not until 1846 that Congress finally approved establishing such an Institution. Much of the delay was due to controversy over what type of entity it would be: a library, a national university, a research institute, or a national museum (Kopper 1982; Rivinus and Youssef 1992). Under its first Secretary, Joseph Henry (1797–1878), arguably the leading American scientist of the day, the Smithsonian emerged as essentially a research institute, emphasizing pure research rather than public education and collections, and Henry resisted efforts to make it anything like a national museum. This did not change until Henry’s death in 1878, when Spencer Fullerton Baird (1823–1888) became Secretary. Baird was a collector of the first order and established the United States National Museum in 1879 within the Smithsonian as both a repository of collections and a public museum. The Smithsonian as we know it today is essentially the construct of Baird (even though the USNM was officially abolished in the 1970s):

Today’s assemblage of museums and galleries, devoted to memorializing our national achievements and resources and constituting the Smithsonian Institution, is essentially the bequest of Spencer Baird to the millions who visit them annually. Obviously, each of the secretaries who have succeeded him have added elements extending the scope of the Institution far beyond even Baird’s dreams. However, the American people are the direct heirs of Spencer Fullerton Baird in their cultural and educational enjoyment of this great national museum complex. This would not have been true had the development of the Smithsonian followed Joseph Henry’s interpretation of James Smithson’s intent. (Rivinus and Youssef 1992:190.)

Baird employed a young ichthyologist, George Brown Goode, (1851–1896) as his assistant in charge of arranging exhibits for the Philadelphia Centennial Exposition of 1876. Goode went on to become the leading American museum professional of his time (Goode 1888, 1895; Alexander 1979; Kohlstedt 1991; Conn 1998). He held that a natural history museum, especially a “national” museum, should exist to accomplish several functions: to preserve material on which scientific

knowledge could be based, to carry on basic research, to be “a nursery of living thoughts”, and to educate the visitor by illustrating “every kind of material object and every manifestation of human thought and activity” (Goode 1888).

The California Academy of Sciences: The California Academy of Sciences was founded in 1853 (as the California Academy of Natural Sciences) by seven prominent citizens of San Francisco for the purposes of “a thorough survey of every portion of the State and the collection of a cabinet of her rare and rich productions”. The founders clearly thought that there was (or would be) significant public interest in such a venture. “Natural history”, read one of the new organization’s earliest documents, “. . . has within the last half century attracted the attention of the scientific world; and our own countrymen have shared largely in the general enthusiasm, which is year to year becoming more general and absorbing” (Leviton and Aldrich 1997:12–13). The early years of the Academy were very lean financially and focused mainly on scientific research by its members. At the October 16, 1854 meeting, however, it was resolved “that the Curators examine and report at their earliest convenience whether there are in the Cabinet any surplus specimens which can be spared as donations to a Cabinet for the Public School at North Beach in this city” (Miller 1953:25). The Academy did not open its first public museum until 1874, in a rented church building. In 1873, San Francisco real estate magnate James Lick (1796–1876) donated a piece of valuable downtown property to the Academy and his estate ultimately provided substantial funds as well (Leviton and Aldrich 1997). In 1891, a large building was erected on the Lick property on Market Street; the structure was described as one of the finest public museum buildings in America at the time (Miller 1942). This building and virtually all of the Academy’s collections and library were destroyed in the 1906 earthquake and fire; “nothing was saved except what could be loaded into one spring wagon and carted to safety ahead of the fire” (Miller 1942:371). The Academy’s present museum complex in San Francisco’s Golden Gate Park opened in 1916, with major additions in 1923, 1934, and in the 1950s, 60s, and 70s (with a major renovation currently underway).

The Museum of Comparative Zoology: The Museum of Comparative Zoology (MCZ) was founded at Harvard College by Louis Agassiz (1807–1873) in 1859. Agassiz raised funds for his museum by appealing to Brahmin sensibilities of the relationship between religion, science, morals, and education, and by pitching with masterful skill his peculiar view of this relationship (Lurie 1960). He convinced Boston industrialists such as Francis Calley Gray and Abbott Lawrence, as well as state legislators and College administrators, that the public good could be served by an institution that would not only collect and research, but also present to the general public, the works of the Creator. Even with Agassiz’s loss of prestige in the aftermath of the publication of the *Origin of Species*, he remained able to generate support from these sources. The influence of Agassiz and his museum went far beyond its status as a “university museum” (Winsor 1991). He set standards of simultaneous scientific use and public presentation of the collections, and these standards were influential on his many accomplished students, including A.S. Bickmore (founder of the American Museum), S.F. Baird and G.B. Goode (founders of the U.S. National Museum), H.A. Ward (founder of Ward’s Natural Science Establishment in Rochester, NY), D.S. Jordan (president of Stanford University), and C.F. Hartt (founder of geology at Cornell University).⁵ The extraordinary degree of independence enjoyed by the MCZ for most of its history was further secured when Agassiz’s son Alexander (1835–1910), who had made his fortune in copper mining in South America, returned and bestowed upon it a large endowment (Winsor 1991).

The Peabody Museum of Natural History: In October, 1866, banker George Peabody (1795–1869) gave \$150,000 “for the foundation and maintenance of a Museum of Natural History,

especially in the departments of Zoology, Geology, and Mineralogy, in connection with Yale College” (Schuchert and LeVene 1940:84). The Peabody Museum of Natural History was founded at the urging of and essentially for Peabody’s nephew, paleontologist Othniel Charles Marsh (1831–1899). Construction of the Museum was completed in 1876, but of its 34,000 square feet only one modestly-sized room was devoted to exhibits. Only in 1924, when the original Museum had been torn down and a completely new structure completed, was adequate space made available for public exhibition (Schuchert and LeVene 1940). Marsh was largely responsible for the stature of the collections that were ultimately to comprise most of these public exhibits (even if he forbade skeletons to be mounted in life positions). Peabody’s bequests paid for Marsh’s famous expeditions to the American West and the resulting discovery of skeletons of *Brontosaurus*, *Stegosaurus*, *Diplodocus* and *Triceratops*, among others; Peabody also provided for Marsh’s salary, and Marsh received no salary from Yale until 1896 (Rainger 1991; see also Wallace 1999; Jaffe 2000).

The American Museum of Natural History: Albert Smith Bickmore (1839–1914) was an ambitious man with few resources or social connections (Preston 1986). After attending Dartmouth and Harvard, he moved to New York City in 1867, where he began to make contact with wealthy patrons who might further his vision of a great and democratic museum for that city. Bickmore envisioned a museum with not only important research collections, but also learning opportunities for the general public. Through his persistence and persuasion, the idea gained the ears of the city’s rich and powerful, including Theodore Roosevelt, Sr., Benjamin A. Field, Isaac N. Phelps, Robert Colgate, William E. Dodge, and later and most importantly J.P. Morgan (1837–1913) and Morris K. Jesup (1830–1908). Thus was founded in 1869 the American Museum of Natural History. The cornerstone of the new museum was laid by President U.S. Grant on June 2, 1874. Joseph H. Choate, a prominent lawyer and politician, was influential in obtaining the support of the New York political boss William M. Tweed and Superintendent of Parks Andrew H. Green. From its beginning, the Museum was organized as a public institution that received maintenance and operating expenses from the city’s Department of Parks and Recreation (an arrangement still in effect), but private philanthropists on its Board of Trustees were responsible for the acquisition of collections and the management of the institution (Rainger 1991:55). President Rutherford B. Hayes dedicated the Museum in 1877.

The early years of the Museum were financially difficult ones, but this changed in 1881, when Jesup became President (in the same year, Bickmore stepped down as Superintendent). Almost single-handedly, he saved it from its uncertain financial future, and presided over (and in large part paid for) a period of extraordinary growth. Under Jesup’s leadership, the Museum established its first endowment to support research and moved firmly in the direction of both education and science, in addition to public exhibition (Alexander, 1979). This captain of industry surprised many when he stressed that the Museum must be dedicated “to something that cannot be measured in the scales of the merchant” (Rexer and Klein 1995:26). Jesup’s attitude to the Museum was strongly influenced by his moral and religious fervor. He “infused the institution with his mandate for popular instruction at a critical moment when the appeal of Bickmore’s scientific research was waning among upper-class patrons” (Kemp 1990:273). For example, Jesup promoted a project to provide lectures on nature and science to the state’s school teachers. The lectures proved so popular that in 1887 an addition had to be made to the building to accommodate the classes. “The program pro-

⁵ Agassiz was famous for giving an incoming student a single natural object and telling them that their entrance examination consisted of their adequately describing it. Bickmore’s was a sea urchin (Preston 1986:14). Agassiz was also famous for the dictum “study nature, not books” (which he may or may not have said; see McCullough 1991). This philosophy — that natural objects had only to be carefully and patiently observed and described to reveal their secrets — was a widespread one among nineteenth and early twentieth century museum naturalists (see further discussion below).

vided the museum with much-needed exposure and resulted in additional funds from the state superintendent of education and the legislature” (Rainger 1991:58). Jesup’s estate eventually left the Museum bequests totaling \$6 million.

J.P. Morgan served as Museum treasurer during the 1880’s and made large and numerous personal donations of funds as well as a famous gem collection. Morgan was the uncle by marriage of Henry Fairfield Osborn (1857–1935), who joined the staff of the Museum in 1890 and was its President from 1908 to 1933 (succeeding Jesup). With funds provided by Morgan and others, Osborn was able to expand the Museum, and particularly vertebrate paleontology, still further, raising private funds for, among many other projects, the Central Asiatic Expeditions of the 1920’s (more than \$1 million) and the great mammal life groups in the 1930’s (\$10–35,000 each at the depths of the Great Depression; see Bodry-Sanders 1991) (Hellman 1968; Preston 1986; Rainger 1991).

The Field Museum of Natural History: The Field Museum of Natural History was founded to house the materials from the Columbian Exposition, which had been held in Chicago in 1893. That same year, Marshall Field (1834–1906) wrote a check for \$1 million to begin what was at first known as the Field Columbian Museum (Boyer, 1993). 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” (Alexander 1979:56).

In 1906, Field’s will provided \$4 million for construction of the grand building on the shore of Lake Michigan and \$4 million more for endowment. Construction began in 1915 and was completed in 1921. In the meantime, the Museum’s staff amassed large collections and built impressive public exhibits in its “temporary” home in Jackson Park. In 1895, for example, Field brought Carl Akeley to Chicago to create the first of his famous habitat groups of Recent birds and mammals (Bodry-Sanders 1991). In 1898–99, the Museum launched an expedition to Wyoming for dinosaurs, fully funded by Field (Porter 1990:10). From 1909 to 1962, Marshall Field’s nephew Stanley served as the Museum’s President, and was central to its success during this period. He oversaw day-to-day operations of the Museum and also personally funded its operations during lean years, such as during the Great Depression. Stanley Field was also responsible for securing for the Museum subsidies from the Chicago Park District (Boyer 1993).

The Carnegie Museum of Natural History: The Carnegie Museum of Natural History was founded in Pittsburgh in 1896, completely with funds provided by Andrew Carnegie (1835–1919). The original museum building alone cost more than \$10 million. Fascinated by the accounts of recent dinosaur discoveries, Carnegie immediately made the Museum’s top priority the acquisition of a dinosaur “as big as a barn” (Rainger 1991:97); the discovery of *Diplodocus carnegiei* in 1899 more than fulfilled that objective (Rea 2001). In 1909, Carnegie field parties found the site of present-day Dinosaur National Park in Utah, and the Carnegie quickly amassed one of the world’s outstanding collections of dinosaurs which, with Carnegie’s additional personal donations of over \$250,000, continued to grow until his death (Porter 1990:10). From the beginning, Carnegie saw his Museum as a contribution to public education, albeit with somewhat conflicting emotions and mixed motivations. The Museum was a monument to his rejection of orthodox social Darwinism and to his contention that the masses could be improved by education, while at the same time a testament to organic progress. “Despite the dinosaur fossils with which Carnegie illustrated [progressive] evolutionary development, his museum was dedicated to uplifting the weak. It owed little to Spencerian philosophy and much to the philanthropic tradition of George Peabody. Carnegie himself insisted that the museum entablature of great men include Franklin, the patron-saint of self-

improvement” (Kemp 1990:271). In any case, dinosaurs and other exhibits served an essentially public purpose that supported as a byproduct behind-the-scenes scholarly research: “At the Carnegie and other museums, vertebrate paleontology served a social objective: to educate and entertain the public. That was the bedrock on which a program of fieldwork and research in vertebrate paleontology was sustained” (Rainger 1991:22).

THE LESSONS OF HISTORY

This brief survey of the history of some major museums of natural history in America reveals that some things have changed over the past 150 years, while others have remained the same.

Differences Between Past and Present

Today’s great natural history museum were creations of the nineteenth century, a time very different from our own. Even as it gave birth to much of modern western culture, the Victorian age was intellectually very different from the early twenty-first century (see, e.g., Gay 1984–1998; Lightman 1997; Conn 1998; Wilson 2003). It was a time when observation (as opposed to experimentation) was at the cutting edge of science, and objects, rather than theories, were at the core of learning; “facts” were at the core of education and it was widely accepted that nature could simply “speak” to you if you were willing to listen. It was also a time of colonialism and empire, which made collections of cultural and natural objects from abroad both easy to obtain and potent symbols of political power. It was a time of widespread racism, which affected the study and public presentation of topics such as human culture and evolution. It was also a time of environmental exploitation, when conservation was still a novel concept.

OBSERVATION, OBJECTS AND KNOWLEDGE: The Victorian period was dominated by an “object-based epistemology”; that is, the “belief that objects, at least as much as texts, were sources of knowledge and meaning” (Conn 1998:4). This translated beyond intellectuals and academics to the more general passion for collecting and popular natural history that was so much a part of Victorian culture (e.g., Barber 1980; Merrill 1997; Conn 1998). But this soon changed, with profound implications for the future role of museums in American culture. “By the first quarter of the 20th century, objects could no longer hold the meaning with which they had been invested. In an intellectual world now dominated by theoretical and experimental knowledge, produced at dynamic and expanding universities, objects, and the museums which housed them, remained static. When the curtain fell on an epistemology based in objects, museums left the center stage of American intellectual life” (Conn 1998:31), their place being taken largely by universities.

The late nineteenth and early twentieth centuries were also a time committed to Baconian inductivism, in which “facts” of nature were widely believed to be able to “speak for themselves”. With their collections of objects, museums were particularly well-suited for such an approach. This Victorian belief that “the meanings held within objects would yield themselves up to anyone who studied and observed objects carefully enough” (Conn 1998:4). George Brown Goode wrote that “The museum cultivates the powers of observation, and the casual visitor even makes discoveries for himself and under the guidance of the labels forms his own impressions” (*ibid*, p. 22). Henry Fairfield Osborn said that “The peculiar teaching quality of a museum is that it teaches in the way nature teaches, by speaking to the mind direct and not through the medium of another mind” (Osborn 1912).

Most of these ideas are anachronistic at best today. We live in a time of uncertainty, contingency, and constant and rapid change. Modern science is dominated by extreme specialization,

experimentation, and reductionism. Despite the explosion of information, education is decreasingly about memorization of facts and increasingly about critical thinking “inquiry-based learning” (NRC 1996). Furthermore, the nature of knowledge itself no longer appears as clear as it once did. Objects no longer have unambiguous meanings, and “truth” is a much more elusive thing than it once was. Even though the most extreme of post-modern attacks on science appear to have been beaten back (e.g., Koertge 1998; Sokal and Bricmont 1998), almost all scientists accept that scientific knowledge is created in a social context and can be shaped by non-scientific influences.

COLONIALISM: The imperialism and colonialism of the Victorian period fostered — with regard to the natural and cultural objects of colonial lands — an ethic of, at best, paternalism and at worst justified taking the spoils of war. From the Elgin Marbles to Theodore Roosevelt’s big game safaris to the manufacture of Northwest Coast Amerindian art exclusively for the museum trade, the collecting of natural and cultural materials during the nineteenth and early twentieth centuries added enormously to the holdings of European and American natural history museums, but frequently did so in what we now judge to be ethically questionable or even scandalous ways (e.g., Cole 1985; Sheets-Pyenson 1988; Thomas 1991; Barringer and Flynn 1998). Even if it was ethically possible (and it mostly is not), it is in many cases logistically not possible to make such collections today. Many human and non-human communities are simply gone. Others are convulsed in war or other strife that make them impossible to examine. The politics of repatriation are, furthermore, an ever-present issue for modern museum collectors and curators (e.g., Griffin 1996; Harth 1999), something about which explorers such as Roy Chapman Andrews generally did not have to worry. The end of empire has also affected how objects from foreign lands are displayed. In the post-colonial world, the expectations of museum visitors are very different (Simpson, 1996; Macdonald, 1998).

RACISM: The nineteenth and early twentieth centuries were also a time of explicit racism, scientific and otherwise, which was easily and deliberately transferred to museums for public consumption (e.g., West 1996; Shipman 2002; Regal 2002). Museum exhibits routinely displayed non-white races as evolutionarily “lower” than Caucasians and non-European cultures as inferior to those of white Europeans (e.g., Macdonald 1998; Rainger 2001).

SOCIAL ENGINEERING: Even while they were dedicated to teaching about nature, early natural history museums were also strongly motivated by a paternalistic and elitist desire to “civilize” the lower social classes. Charles Willson Peale wrote that his natural history museum would be an instrument for teaching order, harmony, and progress, inspiring citizens through “charming models for every social duty, in order to render man . . . more content in the station where he is placed” (quoted in Levin 2002:56). In the late nineteenth and early twentieth centuries, many of the leaders of both the New York Zoological Society and the American Museum of Natural History (the two organizations had many benefactors in common) believed that one of highest purposes of Museum and Society was to “teach immigrants and the native poor how to behave in public places and how important the conservation of nature was” (Regal 2002:112).

COMPLEXITY: Finally, the modern world is immeasurably more complex than the Victorian world. Museum administrators today worry about a host of issues, from information management to human resources to earned income streams, of which nineteenth century museum “superintendents” could never have dreamed (Brown et al. 1997; Schwarzer 2002). Modern large museums are truly huge organizations with enormous budgets and infrastructure. Even mid-size and small museums today are organizationally and bureaucratically much more complex than — and therefore significantly different from — their nineteenth-century counterparts.

Similarities Between Past and Present

For all of these differences, however, history tells us that there are strong and important similarities between the structure, mission, and role of the natural history museum today and in the past.

FUNDING AND MISSION: Almost all of the great museums depended early in their history on the generosity of one or a few wealthy patrons. American museums have been called more “democratic” (e.g., Levin 2002), in part because they have relied on a mix of government funding and private philanthropy, rather than almost wholly on the state as was (until very recently) the case in Europe. But in almost all cases it was a few rich and powerful men who funded the early years of America’s great natural history museums, and this meant that the motives of these individuals played a disproportionate role compared to those of the public at large or the scientists who staffed the new institutions. These motives ranged from national, regional, or local pride and boosterism to belief in the importance of public education to evangelical zeal for one or another social or intellectual ideal. In other words, almost all natural history museums have had to appeal to the sometimes narrow interests of donors, while they also appealed to the broader (or different but equally narrow) interests of the general public and/or scientists. Although museums of all sorts are today heavily dependent on government support of one sort or another, it remains true that the agendas of the rich and powerful can play an important role in the mission and activities of museum programs and exhibits.

BALANCE: Almost all of these institutions began with a fundamental mission to collect and study — regionally, nationally, or internationally — objects of natural history. Some were also dedicated from the outset to broad public education. Others initially held their mission to be the service of a small select constituency of scholars and serious aficionados, but these eventually broadened their scope to serve a much wider public. The role and level of active scientific research also varied throughout the history of each institution. In all cases, however, the collections remained at the core of the institutional mission. All continued to care for, increase, and study or provide for the study of their collections even while they expanded their mission into public exhibition and education and scholarly research. Museums have thus always struggled to balance the demands and opportunities of their core missions of collections care, research, and public education.

LEARNING ABOUT NATURE: The founders of America’s great natural history museums wanted to understand the natural world — for scientific, economic, aesthetic, or educational reasons. And they wanted to share that understanding with the wider public. Museums still do this through their most distinctive attribute, their collections — and they do so in a way that no other institution of society can. Whereas the ultimate motivation for this understanding may once have been to reveal the thoughts of the creator, now a, perhaps the, most powerful motivation is to ensure that as much of the natural world as possible is saved from the ravages of human environmental modification. Collections have always been central to this quest and they remain so today. As discussed below, the biodiversity crisis is new, but in a way it is an extension of the investigation and presentation of the diversity of life to which natural history museums have always been committed.

AUTHORITY: We no longer believe that objects can be presented in museums without context, that they “speak for themselves”. Despite their pronouncements to the contrary, museums have always exhibited their objects with some point of view. Museums have come under criticism not just for the particular point of view that they presented (often mostly male, Western, paternalistic, imperialistic, ethnocentric, and anthropomorphic), but also for not acknowledging that they were in fact presenting a point of view not inherent in the objects. Authority has, therefore, come to be something of a dirty word in the museum business. Museums, in their critics’ view, should “present all sides” of issues, and acknowledge relativistically that all views are equally valid (e.g.,

Becker et al. 1992). Yet there is a strong contemporary counter-view. Many directors and curators in art museums have stated baldly that museums *should* be elitist in what they show the public. James Cuno, Director of Harvard's Fogg Museum of Art, for example, has stated that "museums are by their very nature elitist . . . Museums exist as sacred precincts, places apart, and we need to articulate that purpose well. I firmly believe in the civilizing role of the museum. We have preserved, pulled aside from the tumult of the world, these precious things, and have made them accessible" (quoted in Tassel 2002). The Director of the Metropolitan Museum of Art, Philippe de Montebello, agrees that art museums are elitist: "That is exactly what we are. That is what art is, and that is what every visitor to the Met is — by crossing the threshold they are joining the elite" (quoted in Tassel 2002; see also de Montebello 2004). The museum, writes Michael Kimmelman, the chief art critic for the *New York Times*, "exists to provide an experience unlike any other in life . . . it exists to give people something they can't get elsewhere. Of course art is elitist. The glory of the art museum is that anyone who walks through the door becomes an elitist too" (Kimmelman 2002). The same could easily be said about the natural history museum.

UNIQUE CHALLENGES AND OPPORTUNITIES OF THE PRESENT

These similarities between the beginnings of natural history museums and conditions today offer something of a roadmap to what a natural history museum can and should be in twenty-first century America. But the differences enumerated above have also put natural history museums in a position to offer new benefits of enormous social value that were undreamed of 150 years ago.

AUTHENTICITY: In a world of increasing virtuality, the "real thing" is more important and valuable than ever. This applies to art as well as natural history. Philippe de Montebello says that "In an increasingly prosaic and materialistic world . . . especially with the growth of the new electronic media, it is the mystery, the wonder, the presence of the real that is our singular distinction and that we should proudly, joyfully proclaim" (quoted in Kimmelman 2002). "In our highly simulated post-modern culture," writes Glenn Lowry, Director of the Museum of Modern Art in New York, "museums play what the philosopher Andreas Huyssens would call a compensatory role by providing authentic experiences" (Lowry 1999). Even as — or perhaps especially because — museums of all kinds are aggressively pursuing digital imaging of their collections (e.g., Müller 2002), the continued existence of and accessibility to the original is a vital touchstone and reality check, a reminder of the "power of the original object — even the fragment of an object — to stir, stun, and exalt" (Tassel 2002:54). After all, "digital technology can perfectly replicate only what is already digital" (Anonymous 2001).

INTERDISCIPLINARITY/WHOLENESS: The natural history museum, writes Alexander (1979:57-58), "occupies a unique place in the cultural world" because the naturalists who inhabit them "are often generalists who examine plants and animals as wholes or entities living in the complex environments of the natural world. These scientists can help solve modern-day problems . . . problems of the highest social and economic importance to all humankind." Modern science is still dominated by specialization and reductionism, but there are, increasingly, calls for the unification of knowledge (e.g., Wilson 1998). By their very nature, natural history museums can contribute to this movement.

CONSERVATION AND BIODIVERSITY: Although accumulations of dead animals may strike the modern visitor as antithetical to conservation, natural history museums have become major forces in conservation biology, particularly around the problem usually called the "biodiversity crisis". The scope of the crisis has been widely discussed (e.g., Cracraft and Grifo 1999; Wilson 1992, 2002). If even the moderately dire predictions are true, the Earth's biosphere is facing devastation

on a geological scale and the situation is a reason for the gravest concern and the most urgent of actions. Museums have a major role to play in understanding, and perhaps in mitigating this crisis (e.g., Mehrhoff 1997; Novacek 2001; Wheeler 2004) by pursuing the basic systematic biology they had been doing all along and for which they are uniquely well-qualified. To the basic descriptive strengths of systematic expertise and collections, many museums have added new administrative, educational, and fundraising structures, new exhibits, and new analytical lab capabilities. It remains to be seen whether museum visitors are grasping what is being presented to them about all of this activity and urgency.

PRI AND ITS MUSEUM OF THE EARTH: A CASE STUDY

At its founding in 1865, Cornell University was strongly dedicated to the natural sciences. This was due in part to its land-grant mission, but also to the intention of the founder, Ezra Cornell, that “any person can find instruction in any study”. Louis Agassiz was a visiting professor for several years and played an important role in the beginnings of both geology and zoology at Cornell.

Col. Ezekiel Jewett (1791–1897) had fought in the Mexican-American war. He became an accomplished amateur paleontologist and eventually curator of the New York State cabinet of natural history. He was described in his time as “unsurpassed in America as a field paleontologist” and was an important early influence on a young O.C. Marsh (Schuchert and LeVene 1940:17–18). Jewett eventually offered his large fossil collection to Marsh at Yale for \$7,000, but Marsh was unable to raise the funds. Jewett then raised the price to \$10,000 and it was purchased at this price by Ezra Cornell (*ibid*, p. 89). The Jewett collection was described as “especially rich in New York fossils, containing many of the original specimens described in the state reports, and not a few unique specimens” (Merrill, 1903:117). By the turn of the century, to this collection had been added a number of significant collections: “rich faunas of the Cretaceous and Tertiary formations along the eastern and southern parts of the Union; a large number of characteristic English and European fossils; a fine series of English Mesozoic fossils; of Tertiary fossils from Santo Domingo; of preglacial fossils from Sweden; and numerous smaller collections from various typical localities in our own country; the Ward series of casts [see Kohlstedt 1980]; the unique collection from Brazil made by Prof. Hartt and party on the Morgan expedition [see Brice 1994], containing the original specimens and a great number of duplicates” (Merrill 1903:17). All of this joined significant collections of zoological, entomological, and anthropological specimens in the Cornell University Museum (Fig. 1), housed in McGraw Hall (Brice 1989).

In 1932, Gilbert Dennison Harris (1865–1952), who had taught paleontology and geology at Cornell since 1895, was preparing to retire. The University’s museum had been largely disassembled by this time, and Harris lacked confidence in the University’s willingness to care for his collections as well as his scientific printing enterprise in perpetuity.⁶ He demanded that the University build a new building that would house his legacy. But Harris had not ingratiated himself with the University administration, and they demurred. So he built a small building next to his house just behind the Cornell campus, applied for and received a State charter for an independent educational institution, and founded the Paleontological Research Institution as a place where people like him and his students could study their fossils (Brice 1989, 1996).

Over the next half century, the PRI collections grew enormously and the *Bulletins* became the oldest paleontological periodical published in the nation. After Harris’ death, his protege and student Katherine V.W. Palmer (1895–1982) assumed the helm of the Institution. Although she appar-

⁶ Harris had started his own journals, *Bulletins of American Paleontology* (in 1895) and *Palaeontographica Americana* (in 1916).

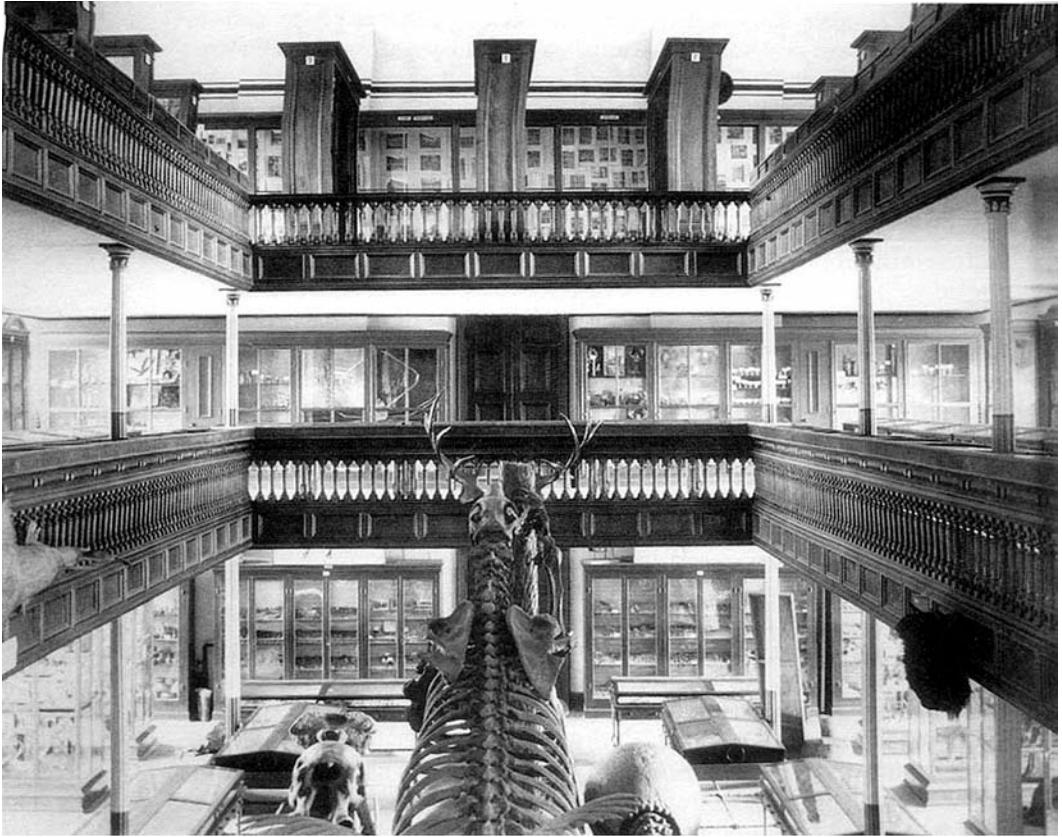


FIGURE 1. Zoological, entomological, paleontological, and anthropological specimens in the Cornell University Museum, housed in McGraw Hall around 1890. Courtesy Cornell University Archives.

ently never received more than a token salary as Director, Palmer went on to become one of the leading paleontologists of Cenozoic mollusks in the world (Caster 1983). She retired in 1978 at age 83; a modest (in both size and tone) history of PRI was her final publication (Palmer 1982).

Yet there was no public side to this institution. Although hundreds of paleontologists around the world knew of PRI, almost no one in Ithaca, New York did. The journal was widely respected within the discipline, however, and the collections were among the 10 largest in the U.S., but there were no educational programs and no significant public exhibits. In 1991, the Institution's Board of Trustees took the dramatic step of voting to change course. They did not know exactly what they wanted, but they knew they wanted to take PRI out to a broader constituency — to share it with a wider world.

It quickly became clear that the way to do this most effectively was with a new permanent exhibit facility — a “museum” in the public sense of that word — which would showcase the collections and, it was hoped, attract a broader base of financial support, public and private, to the Institution as a whole. It was also immediately clear, however, that such a project was a major opportunity in several respects. There was no other major natural history museum for at least 150 miles, a region inhabited by more than 3 million people. The Finger Lakes region of central New York State is an area of unparalleled paleontological and geological richness and beauty (Kurtz 1883; von Engeln 1961; Linsley 1994; Doeffinger 1997; Allmon and Ross 1998). Finally, a truly

interdisciplinary museum could be designed from the ground up to reflect the true nature of paleontology today — solidly integrated into the other Earth and life sciences — an integral part of what is now called “Earth systems science” (e.g., Stanley 1998; Kump et al. 1999). Coincidentally, Cornell was in the process of adding an undergraduate major in “Science of Earth Systems” and of changing its Department of Geological Sciences to a more interdisciplinary Department of Earth and Atmospheric Sciences. And so was born the idea for the Museum of the Earth — a public exhibit facility that would bring the wealth of PRI’s collections to an under served audience in an area of magnificent local geology — a national-class museum about the entire world that would take as its primary examples the geology of the northeastern U.S., particularly New York State.

A working group of staff and Board members, assisted at various times by outside consultants, eventually developed a core of central tenets or “major messages” for the Museum:

- 1) the Earth is a set of interconnected systems (atmosphere, hydrosphere, lithosphere, biosphere);
- 2) paleontology/Earth science is not something done only by professional scientists; it is accessible to everyone, and you (the visitor) can do it yourself;
- 3) humans have a major impact on the Earth;
- 4) the Earth has a history.

In addition, we developed a set of philosophical “rules” that would guide our development of public programs and exhibits in the Museum:

- 1) specimens are paramount and should be used to illustrate every idea when at all possible;
- 2) exhibits should have multiple points of intellectual access; not everything should be accessible to everyone, but each and every visitor, regardless of age or background, should be able to take away something of value from almost every exhibit;
- 3) exhibits should strive to achieve a middle path between the classical specimen-rich approach of the best traditional natural history museum with the hands-on dynamism of the best interactive science center;
- 4) exhibits should emphasize how we know, as well as what we know.

Money was of course a crucial issue, as PRI had almost no significant previous history of fundraising. The project appeared to have little hope of success until a Board member coordinated two matching \$1 million gifts, one from the State of New York, and the other from the Park Foundation of Ithaca. Both of these lead gifts were focused on the potential of a new natural history museum in Ithaca to attract tourists and therefore contribute to local economic development. Although neither of these gifts were focused on the content of the proposed exhibits, they came about because a credible case could be made that high quality exhibits could be produced because of the size and national caliber of the PRI specimen collections.

When PRI set out to find an architect who could realize our vision, we had at least two primary ideas in mind: we wanted a building that, within the very tight constraints of our budget, would be a noted regional landmark, and we wanted a building that “made sense” as a geology museum; that is, we wanted the building to be part of the visitor experience and not just a box to hold the exhibits. We eventually chose Weiss/Manfredi of New York, previously best known for designing the Women’s War Memorial at Arlington National Cemetery (Weiss and Manfredi, 2000). They designed a visually striking building that was part of the site itself — a “museum of the Earth coming out of the Earth” (Fig. 2).

Exhibit design began with staff visioning and eventually came to involve several groups of outside consultants, designers, and fabricators. The 10,000 or so square feet of permanent exhibits include a chronological tour through the history of the Earth and its life, with a strong emphasis on the northeastern U.S., and featuring more than 650 specimens from the collections. The exhibits



FIGURE 2. The Paleontological Research Institution's recently completed "Museum of the Earth" building. Photo by Phoebe Cohen.

focus on three "worlds" or moments in time particularly well-represented by the rocks of the northeastern U.S.: the Devonian of New York; the Triassic-Jurassic Newark Series of the Connecticut, Hudson, and Newark Basins; and the Pleistocene of New York. Object theaters take visitors through the intervening time intervals with mixtures of actual specimens and audio-visual presentations. There is a working preparation lab visible to the public, as well as three interactive "discovery labs" (one in each "world"), in which visitors can sit and manipulate and explore real specimens with the assistance of a docent.

Because Cornell never had a tradition of vertebrate paleontology, PRI's collections were almost completely invertebrate. Initially, staff and Board maintained that compelling public exhibits could be concocted featuring only invertebrate specimens. Formal and informal discussions with the public, however, quickly convinced us that we needed "charismatic megavertebrates" to anchor the exhibit experiences, which could then include numerous invertebrates and other specimens (Fig. 3). We therefore acquired the skeleton of a modern North Atlantic right whale (*Eubalaena glacialis*), which died in 1999 off New Jersey tangled in fishing gear (Allmon 2004) (Fig. 4), and a complete skeleton of an American mastodon (*Mammuth americanum*) excavated by PRI in New York's Hudson River Valley in 2000 (Fig. 5) (which was the subject of an hour-long documentary by the Discovery Channel, *Mastodon in Your Back Yard: An Ultimate Guide*) (Allmon et al. 2004). Through a series of fortuitous events, we also acquired a new 500-foot mural, *Rock of Ages Sands of Time*, by Ithaca area artist Barbara Page, which illustrates the history of the Phanerozoic Eon (Page and Allmon 2001) (Fig. 4).

Both staff and Board were also committed to connecting the past, present, and future via exploration of the modern biodiversity crisis, which has become a topic of active discussion among paleontologists in recent years (e.g., Ward 1994; MacPhee 1999). The final exhibit in the



FIGURE 3. One of several exhibits in the Museum of the Earth. Photo by Paul Warchol.

Pleistocene world suggests to visitors that the current biodiversity crisis may well have begun 10,000 years ago, when mastodons and other large mammals disappeared, perhaps as a result of human over-hunting.

The Museum of the Earth (Fig. 3) opened to the public on September 27, 2003 (<http://www.museumoftheearth.org>).

CONCLUSIONS

Natural history museums are under increasing pressures today to “redefine themselves”, to “adapt to changing markets”, or to move in new directions, such as “edutainment” (e.g., Mintz 1994). One might argue that to do otherwise — to stay put — would be anachronistic and suicidal in a rapidly changing world. It may be useful at such times of rapid change, however, to look back at what you really are, and to reaffirm what you are not. Natural history museums are not vaults or places of dead storage; they are not research institutes, or societies of scholars or science centers or universities, colleges, or public schools. They are not theme parks or theater multiplexes. There are already many other organizations that fill these roles. Natural history museums are unique cultural institutions that serve scientists, students, teachers, and the general public by making natural history objects and knowledge based on them available to as wide an audience as possible. The history of the nation’s major natural history museums shows that this unique status has a long tradi-



FIGURE 4. Rock of Ages mural with North Atlantic right whale in background. Photo by Paul Warchol.

tion and that few if any institutions have been able to stray far from it and continue to be relevant.

This is not a recipe for stagnation, but an affirmation of the unique value and services that only natural history museums can provide to society. Few if any museums have survived or even been established without being public institutions and benefitting from the financial support of either government or individuals that is drawn by such a role. At the same time, however, few have persisted purely for purposes of public education or entertainment. Successful natural history museums in America have historically walked a fine line between maintenance of their collections for the benefit of scholarship and scientific research and presentation of a portion of those collections and that research and scholarship to the paying public. Natural history museums by their very nature have always been, are and must be both “inner” and “outer” museums (*sensu* Humphrey, 1991); there cannot be a choice between one and the other. History suggests that movement too far in one direction destroys this delicate balance and the institution does not continue. Those that focus too much on research and collections risk losing public and private financial support; those that focus too much on the public risk losing scientific credibility and connection to authenticity. Natural history museums continue to be unique and to play a unique and successful role in society when they do what they do best: provide venues and opportunities for people of all backgrounds to interact with and learn from the actual objects of the natural world.

Although the natural history museum was invented two centuries ago in a very different time and social setting, its value persists today. Natural history museums are windows into the natural



FIGURE 5. A complete skeleton of an American mastodon (*Mammot americanum*) excavated by PRI in New York's Hudson River Valley in 2000. Photo by Phoebe Cohen.

world — interpreters, libraries, venues for inspiration, knowledge and insight — and they are distinctive from all other human institutions in these respects. They have changed somewhat — or rather society changed around them — but this distinctiveness persists.

PRI's history is "quirky and improbable" (Rhodes, 1996), but in some respects we found comfort and confidence in our journey from knowing that, although we were trying to be innovative, fresh, and new, we were not really striking out into new territory. Rather, we are joining a noble and long-standing fraternity whose value to society has never been greater.

PRI had a collection of national importance. This was the basis for everything. It gave us credibility, it provided a basis for exhibits and education. It separated us from other science museums in our region. More broadly, it was the "back end" of a major natural history museum. By building the Museum of the Earth, we were simply adding the "front end" — completing an entity — the modern natural history museum — that is unique among human enterprises.

According to the website of the American Association of Museums, there are around 16,000 museums in America. Does this nation, or the northeast region, or New York State need one more? We believe that it does. For people who already know something about the Earth and want to learn more. For people who have never thought about the Earth and its history and need to learn more. For everyone who wants to think about our place in the world — and that should be all of us.

I once had a friend who was thinking about writing a book about the environment, but she said there was no point because there were already so many books out there on the subject. I asked her

whether there were still people out there who did not know or believe what she wanted to say about the environment. She said, "Of course." I said, "Then there's room for at least one more book."

REFERENCES

- ACKERMAN, D. 1990. *A Natural History of the Senses*. Random House. 331 pp.
- ALEXANDER, E.P. 1979. *Museums in Motion. An Introduction to the History and Function of Museums*. American Association for State and Local History. Nashville, Tenn. 308 pp.
- ALEXANDER, E.P. 1988. The American Museum chooses education. *Curator* 31(1):61–80.
- ALEXANDER, E.P. 1997. *The Museum in America. Innovators and Pioneers*. AltaMira Press, Walnut Grove, Calif. 224 pp.
- ALLMON, W.D. 1993. In defense of paleontology. *Geotimes* 38(11):5.
- ALLMON, W.D. 2004. *A Leviathan of Our Own: The Tragic and Amazing Story of North American Right Whale #2030*. Paleontological Research Institution, Ithaca, New York. 78 pp.
- ALLMON, W.D., and R.M. ROSS. 1998. *Ithaca is Gorges. A Guide to the Geology of the Ithaca Area*. Paleontological Research Institution, Ithaca, New York. 18 pp.
- ALLMON, W.D., P.L. NESTER, AND J.J. CHIMENT, EDS. 2004. Mastodon paleobiology, taphonomy, and paleoenvironment in the Pleistocene of New York State: studies on the Chemung, Hyde Park, and Java sites. *Bulletins of American Paleontology* (in press)
- AMERICAN ASSOCIATION OF MUSEUMS. 1973. *Museum Accreditation: Professional Standards*. AAM, Washington, D.C. 39 pp.
- ANONYMOUS. 2001. Digitized history. *New York Times*, editorial page, April 22.
- ASMA, S.T. 2001. *Stuffed Animals and Pickled Heads. The Culture and Evolution of Natural History Museums*. Oxford University Press, New York. 302 pp.
- BARBER, L. 1980. *The Heyday of Natural History, 1820–1870*. Doubleday, New York. 320 pp.
- BARRINGER, T., AND T. FLYNN, EDS. 1998. *Colonialism and the Object: Empire, Material Culture, and the Museum*. Routledge, London, UK. 256 pp.
- BATES, M. 1950. *The Nature of Natural History. A Study in the Approach of Science to the Living World of Which We Form a Part*. Charles Scribner's, New York. 309 pp.
- BECKER, C., J. CLIFFORD, AND H.L. GATES. 1992. *Different voices: A Social, Cultural, and Historical Framework for Change in the American Art Museum*. The Association of Art Museum Directors, New York. 148 pp.
- BODRY-SANDERS, P. 1991. *Carl Akeley. Africa's Collector. Africa's Savior*. Paragon House, New York. 298 pp.
- BOWLER, P. 2003. *Evolution. The History of an Idea*, 3rd ed. University of California Press, Berkeley. 464 pp.
- BOYER, B.H. 1993. *The Natural History of the Field Museum*. The Field Museum, Chicago, Illinois. 123 pp.
- BRICE, W.R. 1989. *Cornell Geology through the Years*. Cornell Engineering Histories, vol. 2. Cornell University, Ithaca, New York. 230 pp.
- BRICE, W.R. 1994. Charles Frederick Hartt (1840–1878); the early years. *Earth Sciences History* 13(2):160–167.
- BRICE, W.R. 1996. Gilbert Dennison Harris: a life with fossils. *Bulletins of American Paleontology* 109(350): 1–154.
- BROWN, E.H., E.V. FUTTER, J. APT, P.R. CRANE, K.L. GOLDSTEIN, M.W. HAGER, AND R.W. FRI. 1997. Toward a natural history museum for the 21st century. *Museum News* 76(6):39–49.
- BRUCE, R. 1987. *The Launching of Modern American Science 1846–1876*. Knopf, New York. 446 pp.
- BURT, N. 1977. *Palaces for the People: A Social History of the American Art Museum*. Little, Brown Co., Boston, Massachusetts. 446 pp.
- BUTLER, D. 1998. Briefing: museums. *Nature* 394:115–119.
- CASTER, K. 1983. Memorial. Katherine Van Winkle Palmer. 1895–1982. *Journal of Paleontology* 57(5):1141–1144.
- COLE, D. 1985. *Captured Heritage: The Scramble for Northwest Coast Artifacts*. University of Washington Press, Seattle, 373 pp.

- CONN, S. 1998. *Museums and American Intellectual Life, 1876–1926*. University of Chicago Press, Chicago. 305 pp.
- CRACRAFT, J., AND F.T. GRIFO, EDs. 1999. *The Living Planet in Crisis. Biodiversity, Science, and Policy*. Columbia University Press, New York. 311 pp.
- DANIEL, M. 1985. Introduction. Pages x–xx in *The Essential Gilbert White of Selborne*. Godine, Boston.
- DARWIN, C.R. 1962. *The Voyage of the Beagle. Annotated and with an Introduction by Leonard Engle*. Anchor Books, Doubleday & Co., New York. 524 pp.
- DE MONTEBELLO, P. 2004. How museums risk losing public trust. *The Chronicle of Philanthropy* March 18:61–63.
- DOEFFINGER, D. 1997. *Waterfalls and Gorges of the Finger Lakes*. McBooks Press, Ithaca, New York. 128 pp.
- FINDLEN, P. 1989. The museum: its classical etymology and Renaissance genealogy. *Journal of the History of Collections* 1(1):59–78.
- FINDLEN, P. 1994. *Possessing Nature: Museums, Collecting, and Scientific Culture in Early Modern Italy*. University of California Press, Berkeley. 449 pp.
- FISHER, H. 1995. *Anatomy of Love: A Natural History of Mating, Marriage, and Why We Stray*. Ballantine Books, New York. 432 pp.
- GAY, P. 1984–1998. *The Bourgeois Experience: Victoria to Freud*. 5 volumes. Oxford University Press and W.W. Norton, New York.
- GERSTNER, P.A. 1976. The Academy of Natural Sciences of Philadelphia, 1812–1850. Pages 174–193 in A.Oleson and S.C. Brown, eds., *The Pursuit of Knowledge in the Early American Republic: American Scientific and Learned Societies from Colonial Times to the Civil War*. Johns Hopkins University Press, Baltimore, Maryland.
- GOODE, G.B. 1888. Museum-history and museums of history. *Smithsonian Institution Annual Report for 1897*, pt. II, pp. 63–81.
- GOODE, G.B. 1895. The principles of museum administration. *Proceedings of the Sixth Annual Meeting of the Museums Association* (Newcastle, 1895), pp. 69–147.
- GRIFFIN, D. 1996. Previous possessions, new obligations: a commitment by Australian museums. *Curator* 39(1):45–62.
- HARTH, M.L. 1999. Learning from museums with indigenous collections: beyond repatriation. *Curator* 42(4):274–284.
- HARVEY, P.H., AND M.D. PAGEL. 1991. *The Comparative Method in Evolutionary Biology*. Oxford University Press, Oxford. 239 pp.
- HELLMAN, G. 1968. *Bankers, Bones, and Beetles: the First Century of the American Museum of Natural History*. The Natural History Press, Garden City, New York. 275 pp.
- HUMPHREY, P.W. (1991). The nature of university natural history museums. Pages 5–12 in P.S. Cato and C. Jones, eds., *Natural History Museums: Directions for Growth*. Texas Tech University Press, Lubbock, Texas.
- IMPEY, O., AND A. MACGREGOR, EDs. 1985. *The Origins of Museums: The Cabinet of Curiosities in Sixteenth and Seventeenth-century Europe*. Clarendon Press, Oxford. 335 pp.
- JAFFE, M. 2000. *The Gilded Dinosaur. The Fossil War between E.D. Cope and O.C. Marsh and the Rise of American Science*. Crown Publishers, New York. 424 pp.
- KEMP, L.W. 1990. Biography and the museum. Pages 263–298 in M.S. Shapiro, ed., *The Museum. A Reference Guide*. Greenwood Press, New York.
- KIMMELMAN, M. 2002. An enduring elitist and his popular museum. *New York Times*, Nov. 3.
- KOERTGE, N., ED. 1998. *A House Built on Sand. Exposing Postmodernist Myths about Science*. Oxford University Press, New York. 322 pp.
- KOHLSTEDT, S.G. 1980. Henry A. Ward: The merchant naturalist and American museum development. *Journal of the Society for the Bibliography of Natural History* 9:647–661.
- KOHLSTEDT, S.G. 1991. George Brown Goode, 1851–1896. Pages 1–22 in S.G. Kohlstedt, ed., *The Origins of Natural Science in America. The Essays of George Brown Goode*. Smithsonian Institution Press, Washington, D.C.

- KOHLSTEDT, S.G. 1995. Essay review: Museums: Revisiting sites in the history of the natural sciences. *Journal of the History of Biology* 28:151–166.
- KOPPER, P. 1982. *The National Museum of Natural History*. Harry N. Abrams, Inc., New York. 496 pp.
- KUMP, L.R., J. F. KASTING, AND R.G. CRANE. 1999. *The Earth System*. Prentice Hall, Englewood Cliffs, New Jersey. 368 pp.
- KURTZ, D.M. 1883. *Ithaca and Its Resources. Being an Historical and Descriptive Sketch of the "Forest City" and Its Magnificent Scenery, Glens, Falls, Ravines, Cornell University, and the Principal Manufacturing and Commercial Interests*. Ithaca, New York. 122 pp. (Reprinted 1977 by the DeWitt Historical Society, Ithaca, NY)
- LEVIN, M.R. 2002. Museums and the democratic order. *Wilson Quarterly* 26(1):52–65.
- LEVITON, A.E., AND M.L. ALDRICH. 1997. *Theodore Henry Hittell's The California Academy of Sciences, 1853–1906*. California Academy of Sciences, San Francisco, 623 pp.
- LIGHTMAN, B., ED. 1997. *Victorian Science in Context*. University of Chicago Press, Chicago, 490 pp.
- LINSLEY, D.M. 1994. *Devonian Paleontology of New York*. Paleontological Research Institution, Special Publication no. 21. 472 pp.
- LOWRY, G.D. 1999. The state of art museums: ever changing. *New York Times*, January 10.
- LURIE, E. 1960. *Louis Agassiz: A Life in Science*. University of Chicago Press, Chicago, Illinois. 449 pp.
- MACDONALD, S., ED. 1998. *The Politics of Display: Museums, Science, Culture*. Routledge, London, 264 pp.
- MACPHEE, R.D.E., ED. 1999. *Extinctions in Near Time. Causes, Contexts, and Consequences*. Kluwer Academic/Plenum Publishers, New York. 394 pp.
- MAYR, E. 1982. *The Growth of Biological Thought*. Harvard University Press, Cambridge, MA, 974 pp.
- MCCULLOUGH, D. 1991. *Brave Companions*. Simon and Schuster, New York. 240 pp.
- MCMILLAN, J. 2002. *Reinventing the Bazaar: The Natural History of Markets*. W.W. Norton, New York. 256 pp.
- MEHRHOFF, L.J. 1997. Museums, research collections, and the biodiversity challenge. Pages 447–466 in M.L. Reaka-Kudla, D.E. Wilson, and E.O. Wilson, eds., *Biodiversity II. Understanding and Protecting our Biological Resources*. Joseph Henry Press, Washington, D.C., pp. 447–466.
- MERRILL, F.J.H. 1903. *Natural History Museums of the United States and Canada*. New York State Museum Bulletin 62. 233 pp.
- MERRILL, L.L. 1997. *The Romance of Victorian Natural History*. Oxford University Press, New York. 308 pp.
- MILLER, R.C. 1942. The California Academy of Sciences and the early history of science in the West. *California Historical Society Quarterly* 21(4):363–371.
- MILLER, R.C. 1953. Highlights of a hundred years. *Pacific Discovery* 6(2):18–25.
- MINTZ, A. 1994. That's edutainment! *Museum News* 73(6):32–36.
- MÜLLER, K. 2002. Museums and virtuality. *Curator* 45(1):21–34.
- NATIONAL RESEARCH COUNCIL (NRC). 1996. *The National Science Education Standards*. National Academy Press, Washington, D.C. 272 pp.
- NORDENSKIÖLD, E. 1928. *The History of Biology. A Survey*. Knopf, New York. xv + 629 pp.
- NOVACEK, M.J. 2001. The role of natural history museums in the stewardship of biodiversity. Pages 47–56 in M.A. Mares, ed., *A University Natural History Museum for the New Millennium*. The Sam Noble Oklahoma Museum of Natural History, Norman.
- OSBORN, H.F. 1912. The state museum and state progress. *Science* 36(929):493–504.
- OROSZ, J.J. 1990. *Curators and Culture. The Museum Movement in America, 1740–1870*. University of Alabama Press, Tuscaloosa, 304 pp.
- PAGE, B, AND W.D. ALLMON. 2001. *Rock of Ages. Sands of Time*. Paintings by Barbara Page. Text by Warren Allmon. University of Chicago Press, Chicago, 347 pp.
- PALMER, K.V.W. 1982. *The Paleontological Research Institution.— Fifty Years: 1932–1982*. Paleontological Research Institution Special Publication no. 18. 29 pp.
- PLAYFAIR, J. 1802. *Illustrations of the Huttonian Theory of the Earth*. Wm. Creech, Edinburgh, Scotland. 552 pp. (Facsimile reprint, 1956, University of Illinois Press, Urbana.)
- PORTER, C.M. 1990. The natural history museum. Pages 1–30 in M.S.Shapiro, ed., *The Museum. A Reference Guide*. Greenwood Press, New York.

- PRESTON, D.J. 1986. *Dinosaurs in the Attic. An Excursion into the American Museum of Natural History*. St. Martin's Press, New York. 244 pp.
- RAINGER, R. 1991. *An Agenda for Antiquity. Henry Fairfield Osborn and Vertebrate Paleontology at the American Museum of Natural History, 1890–1935*. University of Alabama Press, Tuscaloosa. 360 pp.
- RAINGER, R. 2001. The museum in America: historical and cultural perspectives. Pages 9–26 in M.A. Mares, ed., *A University Natural History Museum for the New Millennium*. The Sam Noble Oklahoma Museum of Natural History, Norman.
- REA, T. 2001. *Bone Wars. The Excavation and Celebrity of Andrew Carnegie's Dinosaur*. University of Pittsburgh Press, Pittsburgh, Pennsylvania. 276 pp.
- REGAL, B. 2002. *Henry Fairfield Osborn. Race and the Search for the Origins of Man*. Ashgate Publishing, Burlington, Vermont. 219 pp.
- REINGOLD, N., ED. 1964. *Science in Nineteenth-Century America. A Documentary History*. University of Chicago Press, Chicago, Illinois. 339 pp.
- REXER, L., AND R. KLEIN. 1995. *American Museum of Natural History. 125 Years of Expedition and Discovery*. Harry N. Abrams, Inc., New York. 255 pp.
- RHODES, F.H.T., 1996, Foreword to Gilbert Dennison Harris: a Life with Fossils, by W.R. Brice. *Bulletins of American Paleontology* 109(350):5–7.
- RIVINUS, E.F., AND E.M. YOUSSEF. 1992. *Spencer Baird of the Smithsonian*. Smithsonian Institution Press, Washington, D.C. 228 pp.
- SCHPELERN, H.D. 1989. The Museum Wormianum reconstructed. *Journal of the History of Collections* 2(1):81–85.
- SCHUCHERT, C., AND C.M. LEVENE. 1940. *O.C. Marsh. Pioneer in Paleontology*. Yale University Press, New Haven, Connecticut. 541 pp.
- SCHWARZER, M. 2002. Turnover at the top: are directors burning out? *Museum News* 81(3):42–49, 67–69.
- SELLERS, C.C. 1980. *Mr. Peale's Museum: Charles Willson Peale and the First Popular Museum of Natural Science and Art*. W.W. Norton, New York. 370 pp.
- SEMONIN, P. 2000. *American Monster. How the Nation's First Prehistoric Creature Became a Symbol of National Identity*. New York University Press, New York. 482 pp.
- SHEETS-PYENSON, S. 1988. *Cathedrals of Science: The Development of Colonial Natural History Museums During the Nineteenth Century*. McGill-Queens University Press, Toronto, Canada. 144 pp.
- SHIPMAN, P. 2002. *The Evolution of Racism. Human Differences and the Use and Abuse of Science*, 2nd ed. Harvard University Press, Cambridge, Massachusetts. 320 pp.
- SIMPSON, M.G. 1996. *Making Representations: Museums in the Post-colonial Era*. Routledge, London. 294 pp.
- SOKAL, A., AND J. BRICMONT. 1998. *Fashionable Nonsense. Postmodern Intellectuals' Abuse of Science*. Picador USA, New York. 300 pp.
- STANLEY, S.M. 1998. *Earth System History*. W.H. Freeman, San Francisco, California. 615 pp.
- STROUD, P.T. 1992. *Thomas Say. New World Naturalist*. University of Pennsylvania Press, Philadelphia. 340 pp.
- TASSEL, J. 2002. Reverence for the object. Art museums in a changed world. *Harvard Magazine* (October 2002):48–99.
- THOMAS, N. 1991. *Entangled Objects: Exchange, Material Culture, and Colonialism in the Pacific*. Harvard University Press, Cambridge, Massachusetts. 259 pp.
- VON ENGELN, O.D. 1961. *The Finger Lakes Region. Its Origin and Nature*. Cornell University Press, Ithaca, New York. 156 pp.
- WALLACE, D.R. 1999. *The Bonehunters' Revenge. Dinosaurs, Greed, and the Greatest Scientific Feud of the Gilded Age*. Houghton Mifflin, New York. 366 pp.
- WARD, P.D. 1994. *The End of Evolution. On Mass Extinctions and the Preservation of Biodiversity*. Bantam, New York. 302 pp.
- WIESS, M., AND M. MANFREDI. 2000. *Site Specific: The Work of Weiss/Manfredi Architects*. Princeton Architectural Press, New York. 125 pp.
- WEST, S., ED. 1996. *The Victorians and Race*. Scholar Press, New Haven, Connecticut. 249 pp.

- WHEELER, Q.D. 2004. Taxonomic triage and the poverty of phylogeny. *Philosophical Transactions of the Royal Society of London*, ser. B, 359:571–583.
- WILCOVE, D.S. AND T. EISNER. 2000. The impending extinction of natural history. *The Chronicle of Higher Education*, Sept. 15.
- WILSON, A.N. 2003. *The Victorians*. W.W. Norton, New York. 544 pp.
- WILSON, E.O., 1992. *The Diversity of Life*. Harvard University Press, Cambridge, Massachusetts. 424 pp.
- WILSON, E.O. 1994. *Naturalist*. Shearwater Books, Washington, D.C. 392 pp.
- WILSON, E.O. 1998. *Consilience. The Unity of Knowledge*. Knopf, New York. 352 pp.
- WILSON, E.O. 2001. *The Future of Life*. Knopf, New York. 229 pp.
- WINSOR, M.P. 1991. *Reading the Shape of Nature. Comparative Zoology at the Agassiz Museum*. University of Chicago Press, Chicago, Illinois. 324 pp.
- YANNI, C. 1999. *Nature's Museums. Victorian Science and the Architecture of Display*. Johns Hopkins University Press, Baltimore, Maryland. 199 pp.