SMITHSONIAN
PRESERVATION
QUARTERLY

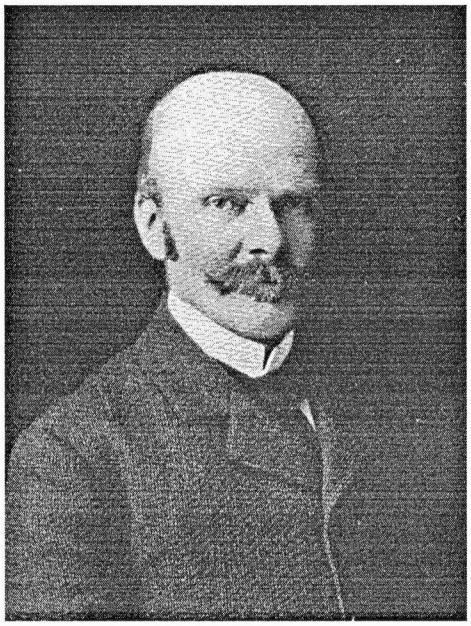
THE OFFICE OF ARCHITECTURAL HISTORY & HISTORIC PRESERVATION

SPRING *1995*

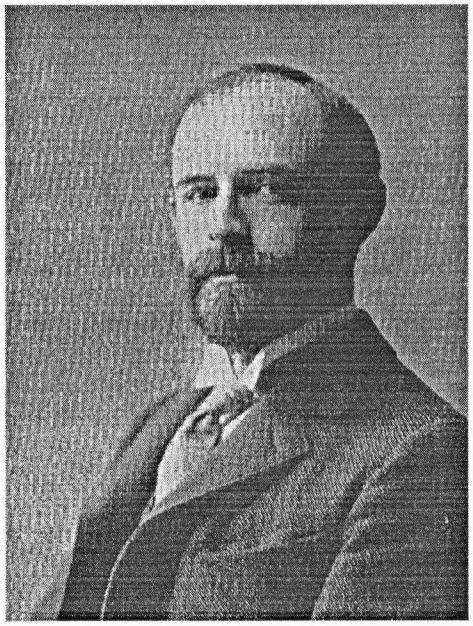
HORNBLOWER AND MARSHALL DOCUMENTS AT THE SMITHSONIAN

The Smithsonian holds the largest known collection of architectural drawings by the Washington architectural firm Hornblower and Marshall, according to Dr. Phillip Kent of Western Sydney University, Australia. This significant holding results from 9 major design commissions Hornblower and Marshall executed for the Smithsonian over 18 years.

The firm's first Smithsonian commission was modest. Despairing of receiving funding from Congress to erect a new museum building, Secretary Langley determined to make do with the existing National Museum building (now the Arts and Industries Building). Between 1893 and 1897 Hornblower and Marshall constructed balconies in 13 exhibition halls to expand floor space, enclosed two entrances for offices, created a lecture hall, and redecorated the public spaces of the 15 year old structure. Drawings for some of the decorative work exist in two Smithsonian collections: the Smithsonian Institution Archives and the Political History Collection of the Museum of American History.



Joseph Hornblower, photograph by F.B. Johnston. LOC



James Rush Marshall, photograph by F.B. Johnston. LOC.

The renovations had just been completed when Hornblower and Marshall were asked to complete two projects in the Smithsonian original Building (now called the Castle). Secretary Langley was not pleased with the progress of his new children's exhibition being developed in the South Tower nor successful in convincing Congress to provide funding for an outdoor monument for the body of James Smithson. The architects created

INSIDE:

and executed a new design for the Children's Room which would contain Langley's newly designed exhibition (1901) and converted a room at the north entrance to a modest crypt for Smithson's remains (1904). Two other projects Hornblower and Marshall did for the Smithsonian building were: the Art Library/ Print Room (1900) (now the Under Secretary's Office) and the unexecuted galleries for a National Gallery of Art (1907). They also designed furniture for the building. For each of these projects some traces remain among the Institution's archives.

Hornblower and Marshall were also active in this period at the National Zoological Park. They were quite logically first called to the Zoo, as Zoo architectural historian Heather Ewing has noted, to alter a building that was to function as an aquarium during the same period when they were installing three fish tanks in the Children's Room at the Smithsonian Building. Their other Zoo projects were the temporary Bird House or Great Eagle Cage, Sundial base, Elephant House, and Small Mammal House.

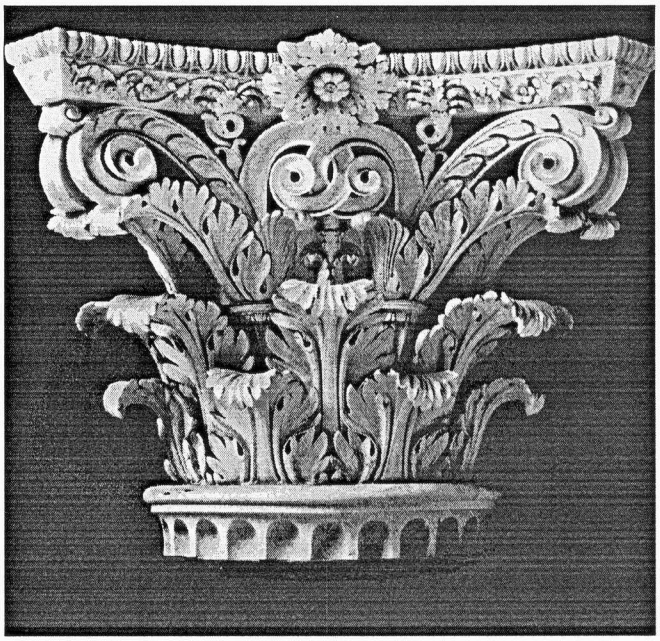
The first structure designed by Hornblower and Marshall for use by Natural History was the Workshop building in the south yard of the Smithsonian 1897, later known as the South Shed. The capstone of the firm's Smithsonian career was the building which now houses the National Museum of Natural History. There are 356 Hornblower and Marshall drawings for this single building, all in the collection of the Smithsonian Institution Archives. Although the firm made its reputation designing Washington town houses such as the Philips House, now the Philips Art Gallery, drawings have been found only for their work for the Smithsonian.

CRF

RATHBUN'S "DESCRIPTIVE ACCOUNT" OF NATURAL HISTORY

Less than two years after the completion of the Natural History museum building, Richard Rathbun, then Assistant Secretary in charge of the National Museum, published a thorough description of the structure in the 1913 Annual Reports. A response to "repeated inquiries regarding its construction and arrangement", this addendum, entitled *A Descriptive Account of the Building Recently Erected for the Departments of Natural History of the United States National Museum*, provided in-depth coverage of many facets of the design, from the precise dimensions of the exterior walls to the original appearance of the installed exhibits. For a broad overview, the text begins with the history of the building, highlighting the development of the museum and the intentions of its designers.

The impetus, Rathbun indicates, for the creation of the museum was the ever expanding natural history collections of the Institution. As early as 1883 Smithsonian officials had sought an appropriation from Congress for the construction of a third museum building. Finally, in 1902, Congress authorized planning for a natural history building, placing a 1.5 million dollar cap on the total cost of the project. After more detailed design work, Smithsonian officials realized that such a building would be too small for their needs. In 1903, they asked for and received an appropriation for more than twice that amount (3.5 million dollars) in order to construct a larger structure clad in stone, a material deemed more appropriate than the originally specified brick and terracotta. On June 15, 1904, six months after Secretary Langley approved the design by the architects Hornblower and Marshall, the official ground breaking ceremony

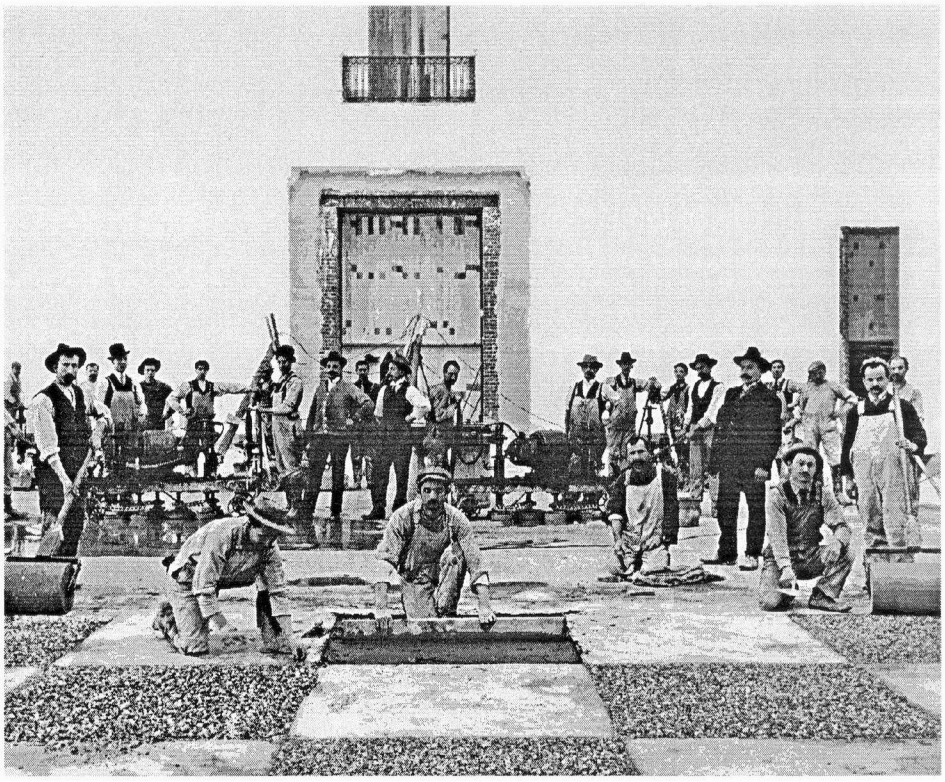


Rathbun's work contains many interesting footnotes about the building. For example, the capitals of the portico columns were patterned after those of the ancient temple of Jupiter Stator in Rome. Photograph of plaster model of a capital for the portico of the Natural History Building.

took place, signaling the commencement of construction. Though initial occupation of the building began as early as 1908, the museum did not open to the public until 1911.

Rathbun accented two principal objectives vital to the conception of the museum, "first, to secure the largest possible amount of available space and, second, to produce a substantial and dignified structure...." This desire for the maximum, highest quality exhibition space coupled with a monumental facade befitting a national museum guided many aspects of the design of the building. Rathbun noted that many of the interior rooms, planned as flexible exhibition space, contain few permanent division walls. He added that the exceptional width of the main mass increased the interior building volume. The absence of a monumental interior staircase and a reduction in dark spaces also contributed to the abundance of floor space available for exhibits and collections. The restriction of decorative elements on the interior in turn offered fewer details to detract from the exhibits. Rathbun concluded that the design objectives were "satisfactorily accomplished." Rathbun's writings presented a contemporary perspective on Natural History essential to an understanding of the building. The lavish descriptions, accompanied by a complete set of architectural drawings and copious photographs, captured the physical character of the structure at its inception. As significantly, however, the commentary in his introduction served as a benchmark in our appreciation of a building which has changed so much over time.

JO



Employees of the American Mosaic & Tile Co. laying terrazzo.

TERRAZZO: A CLASSIC FLOOR

At the time of its completion in 1911, the Natural History Building was hailed as embodying many new and important features in its construction. Special care was taken in the planning of every detail of the physical plant, from electric lighting to flooring material. Four different types of floors were installed throughout the building, each suited to the functions intended for the various rooms: marble for the entrances and public restrooms, wood for offices and laboratories, cement in the equipment and shop rooms, and terrazzo in the exhibition halls.

Terrazzo, a type of aggregate flooring thought to have been developed late in the eighteenth century, derives its name from the Italian word "terrassa," meaning terrace. It was intended as a substitute for traditional mosaic floors of the type seen in ancient Greek and Roman temples. Unlike mosaic floors, however, in which each tile was hand laid with mortar or grout filling the spaces between tiles, the terrazzo floor is comprised of crushed marble chips pre-mixed in a matrix of portland cement. This durable type of flooring was chosen to withstand the heavy use envisioned in the exhibition halls and the auditorium of the new museum.

Although terrazzo had been in limited use during the nineteenth century, the process was still somewhat experimental at the turn of the century. By 1923, however, it was "an established trade requiring skill and knowledge in preparing and installing it," according to a trade brochure of that date. The terrazzo floors of the Natural His-

tory Building were installed by the Washington DC based "American Mosaic and Tile Company," located at 912 I Street NW. Over sixty workmen were employed in the various stages of laying the floors; a process documented in 1913 by Richard Rathbun, Assistant Secretary in charge of the National Museum. His written account dovetails perfectly with a set of three photographs recently given to the Office of Architectural History and Historic Preservation by a descendent of one of the partners of the company.

Installation of the floors began by dividing the space into a checkerboard grid and constructing square wooden forms 1 1/2" thick to hold the mixture of marble chips and portland cement. The carefully measured mixture was first poured into alternate squares, rolled and troweled smooth and allowed to harden. After the forms were removed the other sections were filled in the same manner, usually with a contrasting color of marble chips. Two kinds of marble chips were used in the floors of the Natural History Building: one, a Sienna marble in shades of cream and deep yellow and the other, Verona marble having yellow and dark red tints. The entire floor was then polished smooth to a dull finish with machines specially built for the purpose. To brighten the colors and further polish the surface a special mixture was applied which consisted of wax, raw linseed oil, and turpentine. The floors were then scrubbed after drying with a weak solution of lye and warm water producing a color effect which, according to Rathbun, varied from "a brownish to a grayish yellow." The warm tones of the floors contrasted with the light grayish green and ivory tints chosen for the walls and ceilings respectively throughout the exhibition halls.

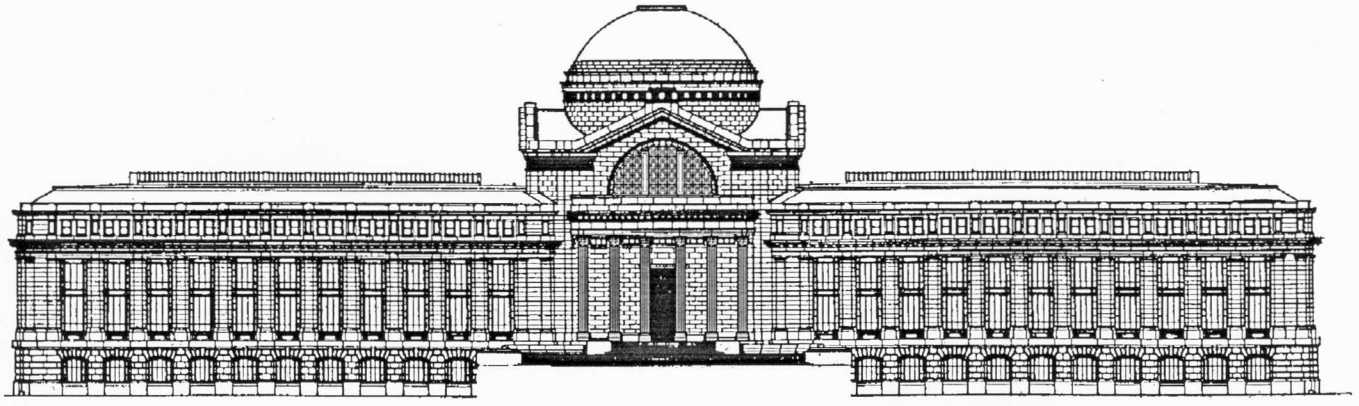
The choice of terrazzo for floors in the Natural History Building was not one born solely of practicality, but one which perfectly complemented the building's architectural style.

RS

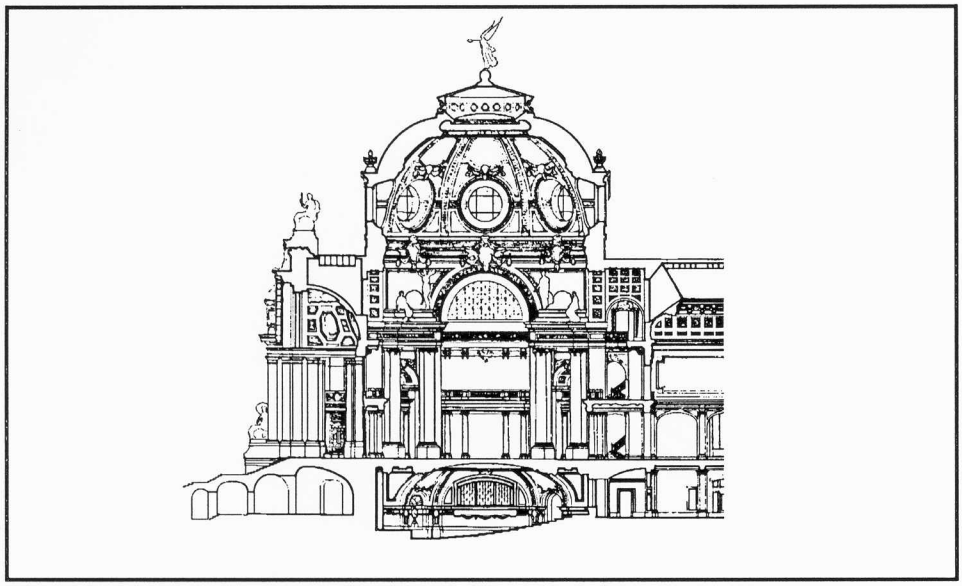
BEAUX-ARTS ON THE MALL

Originally called the United States National Museum, the Smithsonian's Natural History Building was the first evidence of the McMillan Commission on the Mall (see The Preservation Quarterly, Winter 1995). Designed by the architectural firm of Hornblower and Marshall, the plan changed often during construction (1904-11) but a grand neo-classical style was maintained. Indeed, the museum is an important example of Beaux-Arts architecture in America; but this classification deserves definition.

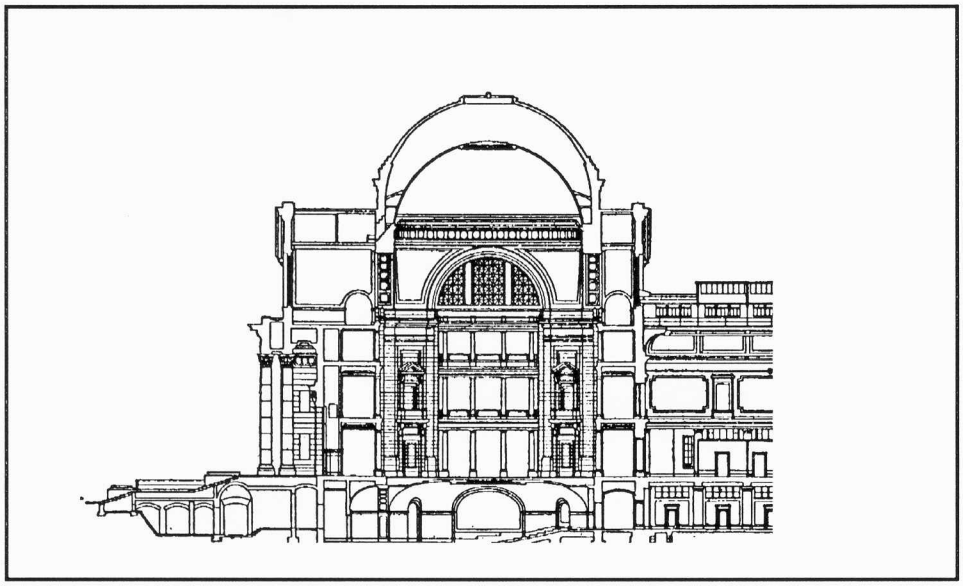
Strictly speaking, "les beaux arts" are the fine arts, which include painting, sculpture, music and architecture. "Beaux-Arts" (hyphenated, capitalized and pronounced "boh-ZAR") properly refers to L'Ecole des Beaux-Arts, the Parisian design school established in 1819. Perpetuating the tradition of French academic architecture, the Ecole taught its students a canonical design process based on spatial flow and architectural balance. Their buildings were then articulated in a free, but very conscious, mixture of Greek, Roman and other antique design elements. This new manipulation of revered architectural antiquities was considered a blending of rationalism with romanticism. Hence, the de-



South elevation of the Natural History Building.



Proposed dome of Natural History in the French Empire Style.



The "Roman" dome of Natural History as built.

scription of a building as "Beaux-Arts" defines the process of its design, as much as its architectural style.

Joseph Hornblower studied architecture in Paris, but according to the AIA's centennial history of its Washington chapter, "there is no evidence of his actual enrollment in the Ecole des Beaux-Arts." From the same source we know that he and his future partner, James Rush Marshall, "traveled separately several times to Europe to study the monumental capitals in 1902, seeking classical inspiritation for the Natural History Building commission. In *The Dilemma of Style*, J. Mordaunt Crook lists three elements endemic to Beaux-Arts buildings, which are easily seen in our museum: the reticulated facade, post-and-lintel construction, and an axial plan. Arthur Drexler states, in "The Architecture of the Ecole des Beaux-Arts", that other favorite themes are generosity of space and "the correspondence of a building's exterior to its internal organization." The facade is therefore allusive: we see a monumental portico leading to a ceremonial rotunda, and long wings housing extensive exhibition halls.

Early plans for the museum show a quite elaborate building. Many Beaux-Arts structures of the latter nineteenth century abound in gratuitous (albeit classical) ornament, betraying an *horror vacui*– a fear of the undecorated surface– which culminated in the Paris Opéra. Terra-cotta ornaments and rooftop statuary were originally specified for the museum's facade. Five years into construction, it was decided to forego a monumental staircase due to the space it would waste. Furthermore, an elaborate dome for the rotunda was designed in the style of the French Second Empire, with statuary, cartouches and enormous bulls-eye windows, surmounted on the exterior by a great winged statue. Shortly before his death in February 1906, Secretary Langley waived this design in favor of a simple "Roman" dome. Richard Rathbun was the Assistant Secretary in charge of the museum, and in describing the completed building, he said, "Other notable features are the absence of the customary monumental staircase, and the minimizing of dark spaces as also of distracting architectural details in the interior."

As a whole, the museum building evinces the monumental classicism of the Beaux-Arts school, subdued to an august, American composition. The architectural ornament is rich, but largely monochromatic. Despite its grandeur, the building does not "distract" from the national collections of museum objects for whose display it was conceived.

MCH

GUASTIVINO VAULTING: ANCIENT TECHNOLOGY IN A NEW WORLD

The National Museum of Natural History, with its large and exotic green-tiled dome, is a distinctive presence on the National Mall. The dome and rotunda of the museum, as well as the auditorium and vaulting of its lobby, were erected in the spring of 1907 in the "Guastavino method" of fire-proof construction.

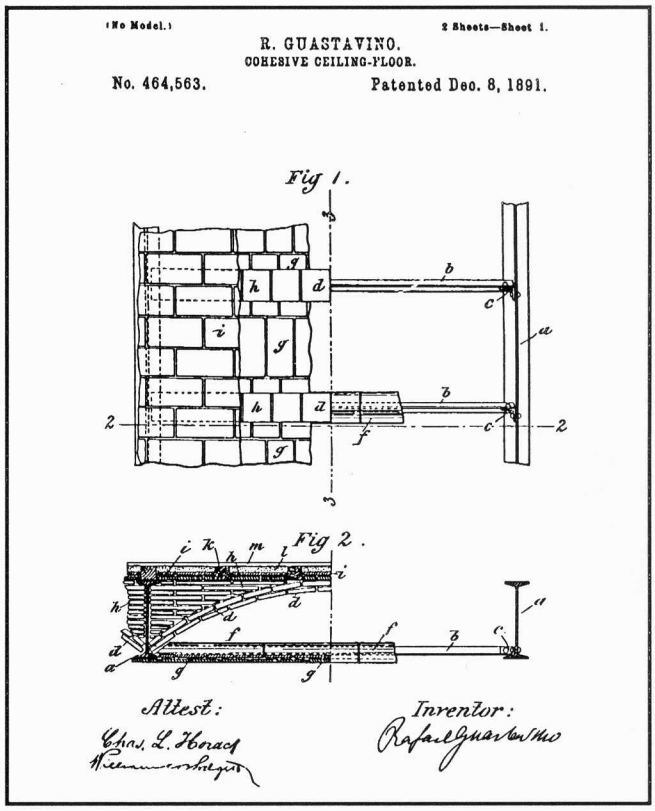
This method of vaulting space was unknown in this country until Rafael Guastavino and his son emigrated to the United States in 1881 from Barcelona, introducing the ancient technique of "timbrel" vaulting. The name timbrel implies the membrane of an ancient percussion instrument similar in form to a tambourine, and is a vernacular architectural tradition of the Catalonian region of northeastern Spain. Catalan vaulting is a cohesive system of layering ceramic tiles in mortar to form a solid shell.

The elder Guastavino (1842-1908), who was born in Valencia, studied and practiced architecture in Barcelona. In 1876 he received a medal of merit for architectural plans submitted to the Philadelphia Centennial Exposition. This favorable reception encouraged him to emigrate to the United States, where he expected to find a more standardized industry of building materials and greater professional opportunities. He resettled across the Atlantic five years after the exposition, with his youngest son, Rafael II (1872-1950).

Initially, Guastavino struggled to establish his reputation, finding it difficult to practice architecture, since his Catalan vaulting system was not understood in the United States. Guastavino redirected his practice in the mid-1880s to the exclusive construction of timbrel vaulting, collaborating with some of this country's most prominent architectural firms. The Guastavinos became greatly successful as contract-builders of large vaulted spaces, including some of North America's largest, blue- ribbon architectural commissions, between the 1880s and the 1940s. The Guastavinos' work always played a significant aesthetic role in these buildings, which included state capitols, churches, train stations, public libraries and museums, and the National Museum of Natural History.

In 1885 Rafael Guastavino secured the first of many U.S. patents on the traditional Mediterranean system of timbrel vaulting. Guastavino defended the patents of this antique process by emphasizing the superiority of high-fired tile vaulting as a fireproof system of construction. He incorporated his firm in New York in 1889 as the Guastavino Fireproof Construction Company.

The Guastavinos successfully improved an ancient technology for contemporary building with modern cement and standardized tiles. The timbrel vault is made by laminating flat courses of masonry tile in a bed of hydraulic cement, forming a highly ordered aggregate, with equal proportions of mortar and tile. The exposed mortar joints and colored tile create patterns of visual interest.


(No Model.) 2 Sheets—Sheet 1.

R. GUASTAVINO.

COHESIVE CEILING-FLOOR.

No. 464,563. Patented Dec. 8, 1891.

Fig 1.

Fig 2.

Attest: Chas. L. Horach

Inventor: Rafael Guastavino

Patent for "Cohesive Ceiling-Floor," by R. Guastivino, 1891.

The tiles are three-quarters of an inch thick, set in two or three layers, forming a thin membrane of light-weight masonry. The layers of tile are overlaid at different angles to "break" or cover the joints. A straight course of tiles is often followed by a diagonal course or herringbone pattern, creating a continuous membrane of great strength. This layered effect is roughly analogous to molded plywood. In the architectural history

of the United States, the timbrel vault is considered a transitional technology between the classical Roman method of concentrically piled, stone voussoirs, and the modern, steel-reinforced concrete dome. Roman vaulting, which may be constructed without mortar, consists of wedge-shaped stones, held together by the downward thrust of gravity, and the lateral resistance of friction. The timbrel vault is incredibly thin and strong, by comparison, and does not rely on gravity for its stability. The rigidity of the vault is not derived from its mass, but from the compressive strength of its curved geometry in a state of monolithic cohesion.

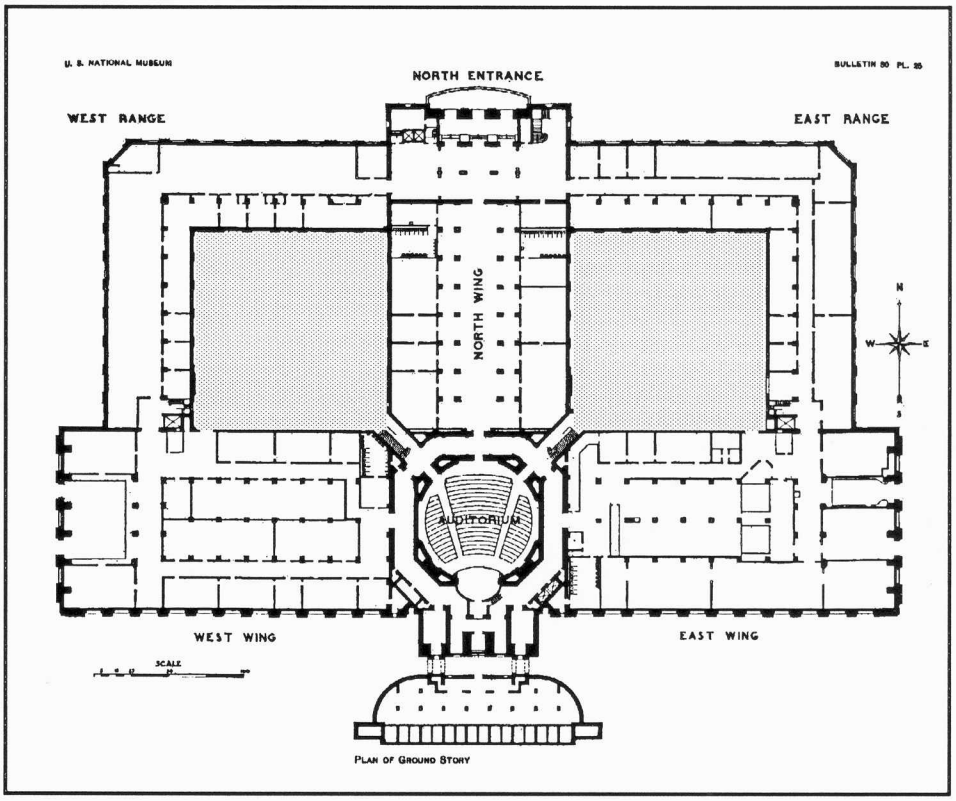
The technology of the timbrel vault had been used in the Mediterranean region since at least the Middle Ages, where it was favored in Byzantine and Moslem architecture. The terra-cotta dome and timbrel vaulting imparts a Mediterranean air to the Natural History building. The distinctive Catalan vaulting, used within the Beaux-Arts design of the Natural History building, achieves an eclectic synthesis of architectural ideas.

PLM

The primary research on Guastavino vaulting was conducted by the late Professor George Collins of Columbia University and published in an article, "The Transfer of Thin Masonry Vaulting from Spain to America" the Journal of the Society of Architectural Historians, Volume XXVII, Number 3, October 1968. Guastavino's patents are on record in the National Museum of American History and the Architectural drawings of his work at the Smithsonian are in the Smithsonian Archives.

THE EAST AND WEST COURT PROJECTS

Unbeknownst to most visitors to the National Museum of Natural History, there are two large interior courtyards surrounded by the three principal wings and architectural ranges of the building. These east and west interior courtyards were originally constructed to augment the dim electric lighting with ample natural light and to allow ventilation into the building in the days before air conditioning.



The east and west courts, shaded areas.

Due to changing exhibition views on lighting and the installation of central air and heat, the original purpose of the courtyards had altered. As the museum's programmatic needs evolved, more space was needed for new programs. The large, unused courtyards seemed ideal for the construction of additional buildings. During the past decades the two courtyards have been in-filled with a variety of structures ranging in size from the West Court building, completed in 1976, which houses the Associates Court dining area to a variety of small buildings in the East Court. These buildings include greenhouses, the craft services shop and the osteo-prep laboratory.

Today, with the increased emphasis on technology, customer service and expanding programs, the museum realized that it just may be possible to fill in the courtyards completely to create the maximum possible space. The east courtyard will be infilled with a new eight-story building which will house a child care center, collections, offices and support spaces.

The building will connect to the existing structure on various levels to provide for pedestrian traffic and will contain windows and skylights for light infiltration. The new infill building for the west courtyard, "The Discovery Center," will meet the changing programmatic needs of the visitor to Natural History. The design calls for an atrium, a 500 seat theatre for large-format 3-D films, a new Discovery Room, and the renovation of the public cafeteria and staff dining room. As with the east wing infill building, the "Discovery Center" will also connect to the original building for easy access.

Depending upon funding, construction for either structures may begin any time after 1996. The designs for both structures reflect the architectural integrity of the original Hornblower and Marshall building and help realize the museum's mission statement for its visitors and staff: "The National Museum of Natural History is dedicated to understanding the natural world and our place in it. The museum conducts research; develops, preserves and manages national collections; and presents educational programs so that the integrity, stability and beauty of our natural and cultural heritage can be valued, sustained and enjoyed."

AB

Your thoughts regarding the content of this publication are welcomed. Please call Amy Ballard at 357-2571, or E-Mail her at AHHPHIS1 with your comments.

CONTACTS IN OAHP

» Cynthia R. Field, Director, OAHP 357-2064

» Amy Ballard, Historic Preservation Specialist. 357-2571

» Richard Stamm, Keeper, OAHP "Castle" Collection 357-4986

» Peter Muldoon, Restoration Specialist, OAHP "Castle" Collection ... 357-1409

» Robert J. Orr, Architectural Historian 357-2064

» Michael Hendron, Restoration Specialist OAHP "Castle" Collection ... 357-1409

OAHP wishes to thank Aimee Hill, of the Office of the Director, Facilities Services, for serving as grammarian and final proof-reader for the Smithsonian Preservation Quarterly.

The Smithsonian Preservation Quarterly is produced entirely in-house on Ventura Desktop Publisher. Layout and design by Richard Stamm, 1995.

Smithsonian Preservation Quarterly
Office of Architectural History & Historic Preservation
Room A&I 2263 MRC 417
900 Jefferson Drive SW
Washington, D.C. 20560

Deliver To: