

# SPNH



## Program & Abstracts Building for the Future: Museums of the 21st Century

The 22nd Annual Meeting of the Society for Preservation of Natural History Collections

Science Museum of Minnesota  
Saint Paul, Minnesota  
21 – 26 May 2007

Sponsored by



### **Bentfield, Mark**

PCL Construction Services, Inc.  
John K. Jensvold  
12200 Nicollet Avenue South  
Burnsville, Minnesota 55337, USA

### **Art of the Start**

The design and construction of museums involves important choices from concept through ribbon cutting. The needed appeal and technical function of these spaces pose budgetary risk that can jeopardize projects or lead to unwanted results. The solution is to move upstream in the design process, armed with advanced tools for cost modeling.

24 PCL originally developed its “Art of the Start” cost modeling software for the high tech industry, where early design decisions have huge financial impacts later on. By making early decisions in the context of actual construction costs, in real time, you become a more informed buyer and you avoid 11<sup>th</sup> hour cuts that can damage the project’s integrity.

The concept behind “Art of the Start” is to step ahead of design and price a project by the room, rather than by the trade (like plumbing, electrical, drywall, etc.) Using cost modeling, you can quickly capture the price and details of any room. Then the cost

modeler allows you to profile the room “up and down” to achieve different levels of cost and quality. When you have similar profiles for every space (from exhibits to restrooms to lobbies), you have an array of great cost data to assemble the “real” project – all before any designs hits paper. This contributes financial sanity to the whole process.

Museums are high tech environments with specific programs and strict performance requirements. As such, they tend toward the complex and are often expensive. Still, funds are rarely unlimited, so the challenge becomes how to best spend money throughout the facility to yield the highest possible value. Instead of pursuing one or two solutions on paper, you have access to 50 or 100 virtual solutions in far less time. This approach is a tremendous innovation in the design and construction industry and is made possible through the creative utilization of existing, sophisticated computer technologies.

*Wednesday, May 23, Plenary Session 3, 4:30–5:00 pm*

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### **Envisioning the New Science Museum of Minnesota – New Strategies for Balancing Conservation and Public Exhibition for the 21st Century**

#### SITUATION:

A new building for a major collections-based institution is being planned. It will be on an urban riverfront site with great outdoor views and vistas. When stakeholders are asked to articulate their vision to the architect, a few minor disagreements come to light:

- The Museum President wants an open building, welcoming, full of natural light, with its contents spilling to the outdoors.
- The conservators desire an enclosed controlled environment without natural light to avoid damaging the rare and sensitive collections that will be displayed.
- The exhibit developers want the “real stuff” out in the open where the public can engage it fully.

- The scientists don’t want the public anywhere near the “real stuff” to keep them from damaging rare specimens.
- The exhibit developers’ greatest success has been in exhibits that were cross-disciplinary in approach, ignoring discipline. And now they want to do this everywhere.
- The science division heads want separate exhibit halls walled off, defined by their scientific discipline, and not anywhere near food and other potentially disastrous contaminants.
- Then the event marketers ask for every space in the new museum to be suitable for catered meals.

But all is not lost! There *is one point* on which agreement is universal... the directive: “OK now... Mr. Architect, design us such a building.”

This session examines the way the design of the Science Museum of Minnesota’s new museum building was strategized by the institution and the architect to address the various above conflicts common to so many museum projects. Session presenters all participated in the key conceptual work and will include a collections manager, an exhibit developer, and the building lead design architect. Following this will be a moderated panel discussion in response to audience questions about lessons learned. This discussion will not be about abstract theory, it will be about what the challenges were, what was actually done to address them, and a candid discussion of how things worked out. This session will provide those contemplating a similar new facility actionable knowledge about how to grapple with similar challenges. The session will close with a Q&A tour by panelists of the areas of the SMM’s building that were discussed.

*Thursday, May 24, Panel Session 3, 3:30–5:00 pm*

**Chapman, Eric Scott\***  
**Chin, Karen\***

\*UCB 265

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### **Curatorial Procedures for Anomalous Fossils: a case study of unusual cylindrical casts from the Two Medicine Formation (Late Cretaceous of Montana)**

Most paleontology collections house specimens that are unidentifiable because they are incomplete, lack sufficient detail, and/or have no recognizable extant analogues. These anomalous fossils might initially be placed in one taxonomic group, but further research may yield a completely different taxonomic assignment. Through a case study, we establish a recommended curatorial treatment for such enigmatic specimens.

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Unusual cylindrical casts from the Two Medicine Formation (Late Cretaceous) of Montana were discovered at a locality renowned for numerous dinosaur fossils and nesting traces. Although the origin of the casts was unclear, a decision was made to collect the specimens because they are highly distinctive and appear to represent previously undescribed structures. Since the specimens were only evident at a single site, we collected nearly all samples that were exposed by erosion. Field numbers assigned to the specimens allow for the collection of additional fragments which may attach to previously collected pieces. Also included within the field numbers are codes indicating specific regions where specimens were collected, as detailed locality information is essential for documenting their provenance. Based on laboratory analysis, the best possible

interpretation is that these structures are casts of large herbaceous plants. While exact taxonomic identifications could not be made, the specimens were catalogued in the plant fossil database.

It is important to make the effort to properly catalogue anomalous fossils even if their taxonomic position is unclear. Such specimens may contribute significant information about a field site, formation, or fossil assemblage. However, the curation and cataloguing of anomalous fossils must be flexible, allowing for relocation to a different database if warranted by new research. It is also important to make sure that all associated data is transferred. Although many of these procedures may apply to the treatment of most discoveries, the key is to avoid collection bias of specimens that cannot easily be identified. Often these types of discoveries are dismissed and not brought back for laboratory analysis. Furthermore, proper collection and cataloguing are crucial to avoid curatorial neglect. When anomalous fossils remain uncatalogued in a collection, the risk of data or specimen loss is greatly increased. Even without a confident identification, anomalous fossils need the same treatment and respect as the most identifiable fossils.

*Thursday, May 24, General Session 2, 3:45–4:00 pm*

### Coetzer, Willem

South African Institute for Aquatic  
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#### **Bridge Building: the SAIAB Information Portal**

The SAIAB Information Portal facilitates access to structured, scientific information originating in the National Fish Collection of South Africa. The portal became available online on 23 March 2007. The portal was designed to serve the needs of SAIAB scientists and scientists anywhere, but its contents will appeal to a public audience as well.

The portal's content is tool-oriented rather than textual. The two most important components are the web interface to the image collection (which includes scanned 35mm slides, photographs and digital images, line drawings and paintings) and the web interface to the collection database of the fish specimen collection.

Before the interface to the image collection became available online, scientists at SAIAB had no way of easily finding images in, or sharing access to, a central image repository, among themselves or with peers in other countries, or even of relating an image to a central, alpha-numeric specimen database-record. While there is a great need for more capacity in the Institute to capture newly acquired digital specimen images, which researchers accumulate at a very high rate, we have already improved the management of specimen- and image information a great deal. The images are available to the public and may be used with permission.

The web interface to the specimen collection database (Specify Biodiversity Collections Software, Biodiversity Research Center, The University of Kansas) will improve specimen information management in SAIAB. Because the web interface is easy to use, the feedback between scientists and catalogers will improve, and this will result in higher quality information. Institute staff will no longer need to execute specimen queries originating from outside the Institute, and the consistency of query results will improve. The Specify web interface to the National Fish Collection is simpler to use than large, internet biodiversity databases such as the GBIF portal, and is appropriate if the query is limited to the National Fish Collection.

SAIAB is exploring the possibility of publishing extensive online taxonomic keys using the Lucid range of software (Centre for Biological Information Technology, The University of Queensland). A few trial keys make their appearance on the SAIAB Information Portal: there is a key to goby subfamilies of the Western Indian Ocean and a key to genera in the subfamily Gobiinae, as well as a key to the fishes of the Orange River.

The SAIAB Information Portal includes access to the Rhodes University Library catalogue and online literature databases (The SAIAB Library is a branch library of the Rhodes University Library).

Future improvements to the portal will include a web interface to search the Institute publications and rare book collection, as well as online Geographic Information System capabilities to publish the significant holdings of georeferenced biodiversity information held by SAIAB.

*Thursday, May 24, General Session 2, 4:00–4:15 pm*

### **Coffey, Georgia A.**

PPQ Permit Services  
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#### **ePermits**

The United States Department of Agriculture, Animal and Plant Health Inspection Service continues to update and improve the ePermits system. ePermits, part of the Presidents Government initiative, is a web-based tool that allows permit applicants to fill out and submit permit applications, check application status, and receive APHIS permits, online. The system is now operational for all plant, plant product, soil, and plant pest permits. We encourage all applicants to apply through ePermits and this session will provide detailed information on navigating the ePermit application process.

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*Thursday, May 24, General Session 1, 10:30–10:45  
am*

**Cornish, Lorraine\***  
**Collins, Christopher\***  
**Huxley, Robert\***  
**Owens, Simon J.\*\***

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### **Assessing Standards in European Natural History Collections Museums: developing new risk methodologies for collections management**

SYNTHESYS is a five year project comprising 20 European natural history museums and botanic gardens aiming to create an integrated European infrastructure for researchers in the natural sciences. The project supports a series of networking activities of which Network activity C (NA\_C) focuses on identifying and improving standards of care and access to natural history collections. Ten museums and herbaria have been assessed using a standardised survey methodology. This system has been modified to include a risk assessment module and this new system tested in a survey of natural history collections at the Smithsonian Institution in November 2006. It is expected that all institutions in the network and beyond will become accredited at a baseline level and this will establish a uniformity of professional standard. The survey assesses the risk of not attaining a benchmark equivalent to accreditation. Many of the weaknesses detected by the surveys could be related to training needs and these have

been addressed by a series of workshops beginning in April 2007 aimed at middle management level staff.

The survey methodology is now being modified further to obtain a higher level of granularity. The NHM London is developing the methodology so that it can be used to assess individual collections and provide a more detailed assessment of an institution. This will be based on an amalgamation of the traditional Waller risk methodology and the newer SYNTHSEYS Risk Management protocols described. The NHM will use the results of this survey of its management performance and standards of collections care to target resources for improvement. In parallel a new standard for environmental and storage standards will be established aimed at becoming the industry standard. This will highlight areas of weakness where research needs to be undertaken.

The institutional level survey methodology will shortly be released in a web based form to allow institutions to assess themselves and once trialled, the more detailed collections level methods will also be distributed.

*Thursday, May 24, General Session 1, 11:15–11:30 am*

### **Crimm, Walter L., AIA, LEED AP**

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#### **Planning for Success: a guide for preparing museum directors, staff and boards for capital projects**

Nothing is riskier to an institution, a director or a Board, than a capital project, whether renewal, expansion, or a new building. Proper planning is critical for success, and success is elusive for many institutions because planning for capital projects is not a core competency of museum leadership, and often subject to significant board involvement. Since it is up to a museum's leadership to lead the process, knowledge is critical to success.

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This session will provide very practical guidelines for the process, from preparing and managing a board to identifying the complete scope of a project in very early stages. There will be an emphasis on practical tools, strategies and information on how to begin the process internally, work with consultants and know what to demand from them, where to find information, how to end up with a realistic assessment of your needs and the process to get there within

your institutional means. We will help you define and begin to assess collections needs, develop an architectural building program, determine who you need for support, and recommend where to get more information. A significant portion of the discussion will help you determine what you need to know when and how to determine how much it will cost.

Whether you are a large museum who has successfully executed projects or a smaller institution with no experience, you will come away with new and useful information to develop a successful process.

*Wednesday, May 23, Key Note, 9:30–10:00 am*

**Dietrich, Elizabeth\***  
**Gagnon, Jean-Marc\*\***  
**Hoskin, C. Julie\*\*\***  
**Sabin, Richard C.\*\*\*\***  
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### **Off-Site Collection Storage – A Panel Discussion on the Pros and Cons: perspectives from users and the audience.**

Off-site collection storage includes many variations, each with its own set of advantages and disadvantages. How well off-site storage works for an institution will depend on how the needs and resources of the institution are addressed in developing the plan for off-site storage.

Beyond the obvious physical/geographic separation that typically characterizes off-site collection storage facilities, there are

important economic and social aspects that should be considered. Off-site options are often presented as economically more affordable solutions for the institution. While this is usually true, considerations of the economic impact on staff are often neglected. Similarly, the staff's ability to adapt to change is rarely considered, even though many conflicts about and oppositions to the off-site approach result from the different perceptions and resistance to such change. Yet, there is a potential for many positive improvements, not just to the collections storage but also to the work environment.

In the end, an approach to off-site collection storage facility will be successful if the institution seriously takes into consideration all factors.

*Thursday, May 24, Panel Session 1, 8:00–10:00 am*

**Freeland, Chris**  
**Holland, Douglas**

Missouri Botanical Garden  
St. Louis, Missouri, USA

### **Botanicus.org: introducing a Web 2.0 interface to digitized taxonomic literature**

The Missouri Botanical Garden has been digitizing taxonomic literature since 1995, starting with rare monographic works presented to users as a collection of static HTML pages. Since that time we have changed our selection criteria to include large multi-volume journals and have radically changed how we manage and serve those digitized volumes to users. The culmination of this work is now available online at Botanicus.org.

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Translating the experience of using a physical bound object to an online display of that object is difficult and has been limited by technological gaps in supported browser functionality. MBG is not alone in this effort to digitize literature; many natural history museums and libraries have begun scanning materials individually. As large-scale scanning efforts like the Biodiversity Heritage Library emerge, a new interface into that digitized literature is required.

Web 2.0 is a term for the paradigm shift in web publishing from individual sites and static content to service-aware web applications that provide robust computing environments. Applications like Google Maps have shown how content can be integrated from disparate sources using open APIs and presented to users in a sophisticated interface within a standard web browser. Further, wikis and other editing systems have shown promise for how a community of users can edit, annotate, and interlink textual materials. Those users now expect the same rich environment for digitized scientific literature.

MBG is prototyping one such interface for scientific literature at Botanicus.org. Through integration of service-based applications, we are building a system that will allow users to view, edit and annotate scientific texts and interlink nomenclatural databases using taxonomic intelligence. The presentation will cover the system design in full, as well as demonstrate the components already deployed and in use at Botanicus.org.

*Thursday, May 24, General Session 1, 11:00–11:15 am*

**Garner, Heath J.\***  
**Bradley, Robert D.\*\***  
**Baker, Robert J.\*\*\***

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### **From Blueprint to Moving In: what worked, what didn't, and practical advice for designing your next building**

In any active natural history collection, work and specimen storage space becomes increasingly less each passing year. By the year 2000, the Museum of Texas Tech University, Natural Science Research Laboratory (NSRL) had to deal with this encroaching issue. At the time, without compromising on environmental and storage conditions for specimens, every room within the division had been structured as efficiently as possible to maximize the number of specimen cases and necessary work areas and the conclusion at the time was simply that we had run out of space! To address this concern and an additional objective of providing adequate space for projected collections growth, initial plans were designed for possible renovation or building additions in early 2002. Thanks to a large donation from the Ben E. Keith Foundation, by 2003 these plans turned into reality as architects sent the first set of blueprints back

for review. A year later, we broke ground on a new addition one-and-a-half times larger than the current building that nearly tripled collection and work areas, and by spring of 2007, the new building is well on its way to being broken in. Overall, we are thrilled with our new building. Having received it during a time when many natural history collections are closing their doors to incoming materials or shutting down altogether, we were fortunate to have the opportunity to build for the future. However, between the time of those first plan designs and fully moving into the building nearly five years later, we worked with a multitude of architectural, mechanical, security and collections storage issues that somehow were overlooked in not only initial planning stages but every part of blueprint review and construction as well. In most cases, we either worked closely with construction and designers to fix problems as we found them or we found ways to adapt. Our recent experiences may help other museum institutions avoid similar issues.

*Thursday, May 24, General Session 2, 4:15–4:30 pm*

**Huxley, Robert**  
**Paterson, Gordon L. J.**

The Natural History Museum  
Cromwell Road  
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### **A Competency Framework for Collections Managers and Conservators**

34 Competency frameworks are widely used in business, public organisations such as health care and many other spheres. They are a set of personal attributes, including skills and knowledge that enable people to do their jobs effectively. A competency framework has been introduced for collections management staff and conservators in the NHM London. The framework is comprehensive and covers areas from conservation through to access, scholarship and collections development. It also includes a number of management competencies. A set of core competencies is defined for collections management staff which can be attained through training and experience. As a result each member of the collections management staff will have a profile of core and specialist competencies which reflects their role in the organisation.. Additional competencies acknowledge development in specialist areas such as collections research or exhibition advice. They also reflect the increasing specialist roles undertaken by more experienced staff. There are four levels or grades from new

starters to departmental collections team leaders and specialist curators/conservators. Initially the Competency Framework will be used for staff personal development and as a guide to eligibility for personal promotions but when fully operational will allow staff to progress through grades fluidly as they achieve the necessary competency. Staff will demonstrate competency using evidence collated in a portfolio and through discussion with their managers. To work realistically the framework must take into account factors such as opportunity to attain a competency, how often the task is encountered and what level of performance was attained by the individual. The profile is also a guide to recruitment as it clearly defines what is expected of a particular role and level. A number of systems have been investigated for identifying degree of fit between departmental needs and the individual's level of attainment using spreadsheets and annual appraisals. The development of such a system was challenging and a number of strengths and weaknesses have been identified which will be addressed as the system is used in practice.

*Thursday, May 24, General Session 2, 4:30–4:45 pm*

### **Kociolek, Patrick**

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### **Integrating Sustainability at the New California Academy of Sciences.**

The California Academy of Sciences, including a new Steinhart Aquarium, Morrison Planetarium and Kimball Museum of Natural History along with Education and Research and Collections spaces, is currently being built in Golden Gate Park. The Academy will “get the keys” to the new facility in October 2007, and the exhibitions will open to the public in the last quarter of 2008. The entire facility is designed to achieve the highest level of sustainability, a rating of “platinum” by the U.S. Green Building Council. This talk presents the challenges and strategies of achieving this level of sustainability, balancing the needs for collection conservation, staff and public comfort, animal care and resource utilization. An update on the building’s progress is also presented.

*Wednesday, May 23, Plenary Session 1, 11:30 am–12:00 pm*

### Kubiatowicz, Rose

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#### ***Is That Curare Tipped Dart Really Dangerous? The Results of Chemical Testing for Pharmacological Activity in Arrow Poisons, Hallucinogenic and Other Ethnobotanical Materials Identified in the Oh No! Ethnobotany Program at the Science Museum of Minnesota***

*Oh No! Ethnobotany*, a hazard communication-training program that addresses health and safety issues inherent in the handling and storage of hazardous ethnobotanical artifacts, was designed, developed and prototyped at the Science Museum of Minnesota. The program, initially supported by the Society for the Preservation of Natural History Collections (SPNHC) 2001 Faber Grant, looks beyond the wide range of residual toxic chemicals present from the treatment of an ethnobotanical artifact to specifically address concerns raised by toxic chemicals inherent in the object itself. An outline of the *Oh No! Ethnobotany* program was presented at the 2002 Annual Meeting of the Society for the Preservation of Natural History Collections (SPNHC) in Montreal, Canada; the 2003 Annual Meeting of the American Association of Museums (AAM) in Portland, Oregon; and the 2004 Eastern Analytical Symposium in Somerset, New Jersey.

In spring 2006, twenty ethnobotanical samples of suspected hazardous and/or hazardous ethnobotanical artifacts were sent to Brendan Derham, Wellcome Trust Post-Doctoral Research Fellow in BioArchaeology at the University of Newcastle upon Tyne, Great Britain, for organic residue analysis using a chemical analysis approach, in particular gas chromatography-mass spectrometry and liquid chromatography-mass spectrometry. Pharmacologically active natural products and associated hazards to museum personnel were identified.

This talk will present a brief synopsis of the *Oh No! Ethnobotany* program and present results of the aforementioned chemical analysis using several interesting case studies to illustrate. It is hoped that the results of this analysis will impact the way natural history museums handle and store hazardous ethnographic materials in collections.

*Thursday, May 24, General Session 2, 3:30–3:45 pm*

## Notes

**Luce, Don\***  
**Miller, Dan\*\***  
**Harvey, Ronald\*\*\***  
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38 \*\*\*\*Conservator  
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### **Dinosaurs and Dioramas: they're big, heavy, fragile and you have to move them!**

Habitat dioramas and mounts of dinosaur fossils have been the hallmarks of traditional natural history museums for over a century. As these museums renovate their buildings and reinterpret their exhibitions to meet the needs of modern audiences and modern science, they have re-evaluated the role of these traditional displays. Some institutions have decided that these displays are outmoded and have replaced them. Others have seen them as important parts

of our cultural heritage and have sought to preserve and reinterpret them. In either case, the displays often need to be disassembled and moved. This session will present three case studies that will provide insight into the bigger issues involved in dioramas and dinosaur reinterpretation, as well as practical advice gleaned from first-hand experience with complex conservation and reinstallation projects.

The Bell Museum is in the planning phase for a new museum building on a new site. Don is in charge of developing plans for the moving, reinstallation and reinterpretation of the museum's classic dioramas dating from 1911 to the 1950s.

Dan will present the process of moving the Science Museum of Minnesota's collection of dinosaurs into a new museum building in 1999. The presentation will focus on the management and coordination challenges involved in the complex collaboration between outside contractors, curators, collection conservators, exhibit staff and volunteers.

As project director, Ron will present a brief outline of the removal and reinstallation of four ca. 1950's natural history dioramas by Klir Beck Dioramas in the State House, Augusta Maine. The dioramas were saved for reinstallation in the newly designed and expanded connector tunnel between the State house and the State Office Building.

The underlying decision to remove the dioramas, the citizen committee to save and relocate the dioramas and the complex political issues surrounding the preservation of the dioramas will be addressed in the Q & A section of this session as time permits.

## **Abstracts–Oral Presentations**

The Canadian Museum of Nature is in the midst of a massive program of renovation and renewal. All the museum's collections and exhibitions are being moved and reinstalled within an historic landmark while the building itself is undergoing major structural reengineering. Carolyn will discuss the conservation challenges and compromises faced in the relocation of a series of massive habitat dioramas.

*Thursday, May 24, Panel Session 2, 10:30 am–12:00 pm*

### **Mares, Michael A.**

Former Director, Research Curator, and  
Presidential Professor  
Sam Noble Oklahoma Museum of Natural  
History and Department of Zoology  
University of Oklahoma  
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### **The Development of the Sam Noble Oklahoma Museum of Natural History: a museum that was a century in the making**

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The University of Oklahoma was founded as the Territorial University in 1890, shortly after the first Oklahoma Land Run. Within nine years, a “geological cabinet, museum, apparatus, and library” had been established by the Territorial Legislature to “contain specimens of minerals, organic remains and other objects of natural history peculiar to this Territory and other states and countries.” The early days of the museum were difficult, with building fires repeatedly destroying the collections. The middle years of the museum’s existence were also challenging. Massive growth of the collections had occurred and these had been relegated to dilapidated buildings across campus that were of little use to academic programs and, in one case, not even of use to the horses of the ROTC. For 100 years the collections grew in importance, but always existed in the dark shadow of catastrophic loss due to fire or storm. In 1983 a new effort was undertaken to build a major museum facility for the then Stovall Museum. After a long and difficult struggle, a state-of-the-art facility was dedicated in 2000. The story of the development of the Sam Noble Oklahoma Museum of Natural History is a dramatic one and offers hope to all museums that struggle for recognition by their parent organization.

*Wednesday, May 23, Key Note, 8:45–9:30 am*

### **Meister, Nicolette**

Curator of Collections  
Beloit College  
Logan Museum of Anthropology  
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### **Planning and Implementing Anthropology Collections Rehousing Projects**

Planning and implementing collections upgrade and rehousing projects present challenges to museums of every type and size. Nicolette Meister, Curator of Collections at the Logan Museum of Anthropology at Beloit College, will discuss the museum's current two-year collections rehousing project funded by the National Endowment for the Humanities, Grants for Stabilizing Humanities Collections. Participants will learn about the preservation planning and proposal writing process, nuts and bolts information about rehousing methodology, and strategies for maintaining collections control and accountability throughout the process. Meister will provide tips on proposal writing, packing and rehousing materials and techniques, and for solving registration hurdles learned from what worked and what did not work to help better prepare other museums for similar projects.

*Wednesday, May 23, Plenary Session 2, 1:30–2:00 pm*

**Norris, Christopher A.  
Kelly, Jeanne**

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American Museum of Natural History  
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### **Refurbishment of Collections Facilities in the Childs Frick Building at the American Museum of Natural History**

42 The Childs Frick Building at the American Museum of Natural History was completed in 1973. In addition to providing office, library, and laboratory research space for the Division of Paleontology, the Frick Building (Building 3A in the AMNH facilities plans) provides nearly 40,000 square feet of collections space, which is used to house the Museum's extensive fossil mammal collection. Building 3A was constructed, in part, to address the problem of accommodating the vast fossil mammal collections of Childs Frick, which were donated to the Museum in 1968. The donation doubled the size of the already large AMNH fossil mammal collection, creating considerable housing issues. At the time of construction, the new building represented the very latest thinking in the design of a research collection facility. More than thirty years later, however, it is showing its age. In 2000, the AMNH began work on a major project to address health and safety issues in the building. Although no project funds were

available for collection recuration and refurbishment, the Division of Paleontology still was able to use this construction work, which necessitated moving the entire 400,000 specimen collection, to address some of its existing curatorial problems. By redeploying resources from elsewhere in the paleontology collections and using the opportunity provided by the collection moves to leverage additional funding, both from within AMNH and from external sources, the Division of Paleontology has managed to completely refurbish five of eight collection floors since 2003 and secure new resources to complete the renovation of the remaining floors, purchase new cabinetry, and enhance physical recuration and databasing of specimens.

*Wednesday, May 23, Plenary Session 3, 4:00–4:30 pm*

**Owens, Simon J.\***  
**Huxley, Rob\*\***  
**Collins, Chris\*\***  
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### **Can Effective Curation Be Measured?**

In a climate of performance indicators and impact factors what realistically could be used as measures to judge the effectiveness of curators and curation on a day to day, week to week basis? We will propose a series of potential curatorial performance indicators which could not only help museums and herbaria manage collections better but provide curators with measures equivalent to those of their scientific research colleagues.

*Thursday, May 24, General Session 2, 4:45–5:00 pm*

**Prather, L. Alan\***

**White, Tim\*\***

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### **Building a National Community of Natural History Collections**

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There are thousands of institutions with natural history collections (NHC) in the U.S. and the number of specimens is estimated to be 820,000,000 and the research and education potential of these collections is enormous. An NSF-funded Research Coordination Network will help natural history collections realize this potential through community building efforts and creating community resources. Three professional organizations, the Society for the Preservation of Natural History Collections, the Natural Science Collections Alliance, and the American Institute of Biological Sciences, will provide strong support as partners in the RCN. The RCN has the following objectives: 1) Identify the institutions and people that will define our community and facilitate dialogue among them about how to better serve the needs of researchers, 2) Identify major opportunities and challenges in the current environment and foreseeable future and develop a strategic plan for the future of collections research, 3) Determine how to strengthen and modernize the role of collections in education and outreach, and 4) Identify the primary needs of collections regarding care, curation, storage and accessibility. The objectives will be met with a series of workshops, symposia, internships, and a website, which will provide a forum for

interaction, host workshop reports, provide information on ways to become involved in the RCN and provide links to resources for NHC. Several major community resources will be developed, including a catalogue of NHC, a survey of the status of NHC, a register of curatorial expertise, and an inventory of innovative and successful educational programs.

SPNHC will play a major role by appointing a representative to the Core Participants, nominating individuals for workshop participation, helping to design and implement the register of curatorial expertise, and perhaps most importantly, in managing the aspects of the RCN that deal with development of best practices, including hosting a symposium at an annual meeting, organizing and coordinating a best practices working group, and overseeing a competition for student interns who will apprentice and research best practices in natural history collections management, care and conservation.

*Thursday, May 24, General Session 1, 11:30–11:45 am*

### Sabin, Richard C.

Mammal Group  
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#### **Refurbish and be Damned? The Development of the Natural History Museum's Collections Outstation at Wandsworth, London**

In July 1991, the Natural History Museum (NHM), London, purchased a complex of buildings from the London Residuary Body – the body set up to dispose of the assets of the former Greater London Council (GLC). The buildings had variously been used as a depot by the GLC, and as a stationery store by the Inner London Education Authority (ILEA) who kept the bulk of their stationery materials there. The NHM was in search of a convenient facility in or around London to address growing pressures on space, and to replace the old Ruislip Store, for which the lease was due to expire in March 1995. Ruislip contained collections belonging to life and earth sciences departments, together with a quantity of exhibition material, and the Publications mail order operation. With plans in the pipeline to reorganise collection spaces at the main South Kensington site, necessitating the relocation of thousands of large vertebrate specimens, a permanent home was needed.

Over a two-year period from 1992 to 1994, the Wandsworth complex was refurbished, and by 1995, the Museum's collections had been installed. Primarily occupied by the Departments of Zoology and Palaeontology, the collection spaces at Wandsworth were air-conditioned, clean and incorporated a considerable amount of expansion space. However, the next five years saw problems

with environmental control, a rising water table, unregulated storage of unsuitable materials, management and organisational issues which complicated the operation of the facility. The fabric of the main collections building proved to be prone to sporadic leaks after rain (flat-roof syndrome) and 'hidden' drainage pipes caused problems with flooding in collection spaces.

From 2001 to 2005, the facility saw further development, with the relocation from South Kensington of approximately thirty Entomology staff and millions of specimens, as part of the preparations for the construction of Darwin Centre phase 2. As a result, existing collections at Wandsworth had to be reorganised to accommodate Entomology, and part of the site was sold to release assets.

Now, in 2007, we believe that we have a facility that delivers what is required in the short-to-medium term, with a good operational infrastructure, well-managed collections, agreed levels of environmental and pest control, and a framework of understanding for the future.

So, how did we get there? What did we do right and what could have been done better? What have we learnt and would we recommend the purchase of a property for refurbishment?

*Wednesday, May 23, Plenary Session 2, 2:30–3:00 pm*

**Snyder, Alexandra M.\***  
**Platania, Steven P.\*\***

Museum of Southwestern Biology  
Division of Fishes  
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### **Case Study For Smaller University Research Museums: design for storage of fluid-preserved specimen collections**

46 The Museum of Southwestern Biology is a university museum of regional natural history located on the central campus of the University of New Mexico, Albuquerque. The MSB collections of fishes, amphibians, and reptiles have the largest holdings of fluid-preserved specimens. However, the traditionally “dry collections” of MSB birds, mammals, and insects have increased their holdings of “wet collections” presenting a challenge for museum design in a building with a restricted footprint. The solution was development of a wet collection facility capable of housing the fluid-preserved specimens from multiple museum divisions. From 1996 to 2002, the old UNM bookstore, located near the Department of Biology, underwent extensive renovation prior to incorporation of the growing collections of fishes, amphibians, reptiles, birds, mammals, insects, plants, and genomic resources. MSB staff worked closely with UNM Departments of Facility Planning, Physical Plant, Health and Safety, meeting weekly for three years with representatives from these UNM

departments and the local architectural firm and office equipment distributor. Although there were many problems encountered during the seven years of renovation (in two phases of construction) MSB staff persisted in guiding the design and construction of a room for storage of multiple museum divisions’ wet collections. This shared facility provides space for expansion of holdings and a physical environment that will ensure the long-term conservation of MSB fluid-preserved specimens.

*Wednesday, May 23, Plenary Session 3, 3:30–4:00 pm*

### **Szirtes, Bonnie**

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### **Business Transformation - Building the Museum of the 21<sup>st</sup> Century**

Canadian museums, more than ever before, are responding to the challenges of adapting to an ever-changing environment to remain relevant to their communities, stakeholders and funders. They are responsible for engaging new audiences, dealing with repatriation issues, looking for new funding opportunities, competing with other venues for visitors and visitor dollars, and creating experiences for these visitors. New and emerging technology opportunities can help museums transform their business practices to adapt to this new environment. This session will examine what business transformation is and why it is important to museums. The results from two research studies commissioned by CHIN will be presented: 1) Transformational Technology Opportunities in the Next Decade and 2) Competitive Environment Scan.

*Thursday, May 24, General Session 1, 11:45 am–12:00 pm*

**Trock, Debra K.\***

**Rabeler, Richard K.\*\***

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### **Permits: they're not just for animals anymore**

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Natural history museums that house and loan animal specimens have long grappled with the issues surrounding permits from government agencies. Collection Managers and curators in herbaria that are associated with museums benefit from that experience and often have at least some knowledge of what permits may be required. However, many university herbaria are located not in museums but often in botany or biology departments or at botanical gardens and may be less aware of all of the recent changes in federal laws that pertain to the import/export and even interstate movement of some plant specimens. Regulations pertaining to plant specimens originate both from the U.S. Fish and Wildlife Service and from the USDA-APHIS - Department of Plant Protection and Quarantine (PPQ). Historically, most attention has focused on regulations which protect threatened or endangered species; CITES and individual state permits are good examples. Increasingly the emphasis is on

plants which are potentially invasive, noxious weeds, plant pests, and plant pathogens; this is a major focus of PPQ efforts at US ports. We will review our knowledge of the current regulations that may affect transport of herbarium specimens, offer advice on navigating the government bureaucracy, and make a case for why this should be important to curators and collection managers alike.

*Thursday, May 24, General Session 1, 10:45–11:00 am*

## NOTES

**Valentine, Clare\***  
**Fitton, Mike\*\***  
**Huxley, Rob\*\*\***

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### **The Darwin Centre: evolution of a building in two phases**

Discussions about new buildings for the Departments of Zoology and Entomology at The Natural History Museum, London, began in the early 1990's. The idea grew into developing an integrated life sciences proposal, for west end of NHM site. The first phase was driven a pressing need to replace the "Spirit" building, based on advice from the local Fire Authority. The Museum therefore undertook to build a replacement for the Spirit building from its own budget with a small amount of additional funding from the Heritage Lottery Fund (HLF) and the concept

of the Darwin Centre grew. The Centre, which will be completed in 2009, will allow for increased interaction among the Life Sciences departments of Botany, Entomology and Zoology, protecting the collections in a pest resistant, close-controlled environment. Flexible working spaces encourage team working and provide laboratories, including specialist 'molecular' laboratories.

Phase One (DC1) which housed the Museum's wet collections of an estimated 22 million specimens opened in 2002. Government initiatives and the requirements for HLF funding applications led to the late incorporation of public access in to the DC1 design. The idea being to provide a 'shop window on science', integrated seamlessly into the public galleries making the behind-the-scenes work of the scientific staff visible and understandable to the public.

Government regulations meant a second open competition had to be held to select the architects for Phase 2. The subsequent discontinuity of design has led to constraints on the design of DC2, such as linking in floor levels. It also meant changes to the functionality of DC1 such as external access to the Dissection Room, and the overall Centre concept to accommodate new ideas.

For the Zoology Department the move to DC1 was relatively straightforward, decanting across from the old building via a bridge-link. While, for Entomology the preparations to

move meant decanting the entire collection and staff into various spaces across the Museum and dissociating the department for the five years until DC2 is finished. There were also serious repercussions for Zoology which had to create space in a number of areas for the entomologists to move to.

The DC2 site impacts on three sides on existing Museum buildings, especially the listed Waterhouse building. The knock-on effect for other Departments in those areas has been enormous with offices becoming uninhabitable and rerouted drainage causing flooding in collections areas. For anyone considering building next to existing premises this is a cautionary tale of issues, compromises and constraints that should be taken into account. You may not end up where you thought you were going, but the end result may still be a thing of beauty!

*Wednesday, May 23, Plenary Session 2, 2:00–2:30 pm*

### **Weatherston, Jeff**

Principal of WeatherstonBruer Associates  
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### **Planning Facilities for Natural History Collections**

Our work with collection managers, researchers and curators over the last decade and a half has evolved a process for planning collection storage, management and research facilities for natural history collections. This presentation is an overview of that process including an exploration of two recent projects, the Environmental Science Center (ESC) at the Peabody Museum, Yale University and the Northwest Building, Museum of Comparative Zoology at Harvard University. This presentation will also outline a methodology for actively involving collection managers and curators in planning their new facilities.

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We approach any facility planning exercise from the perspective of the collection requirements. In establishing the specifics of these requirements, in terms of how collections should be housed, the size of collections, environmental requirements, conservation concerns and research methodologies we also establish planning criteria, equipment requirements, floor area requirements, zoning and facility requirements. This presentation provides an overview of this process from collection assessment to the implementation of the established planning principles in final design solutions. With specific reference to the work at the ESC and the Northwest Building there will be a demonstration of how these principles have been implemented.

*Wednesday, May 23, Plenary Session 1, 10:30–11:00 am*

### Weintraub, Steven

Art Preservation Services  
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#### **The Key to Successful Control of RH Microclimates in Exhibition Cases and Storage Units: a hands-on tutorial on leakage measurement and detection**

A wide variety of methods for controlling relative humidity (RH) in sealed exhibition cases and storage units have been successfully used in museums over many decades. The one thing that all successful methods have in common is that the case or storage unit must be adequately sealed to limit the exchange rate of RH to the external environment. If a unit is well sealed and has an adequate amount of RH buffering materials within, it will stabilize the interior RH, regardless of external conditions. It becomes the first line of defense against unstable RH conditions.

The method for determining the rate of leakage uses carbon dioxide as a tracer gas and is measured with inexpensive commercially available equipment. The loss of carbon dioxide is tracked with a data logger, and the raw results are converted to a leakage rate or half-time leakage value. This information allows the user to determine whether the unit is adequately sealed, and, if so, how much RH buffering material is required to stabilize RH over a given period of time.

It is equally important to detect the location of leakage if it is necessary to reduce the leakage rate. This is accomplished utilizing refrigerant leak detection equipment commonly used by refrigeration technicians and compressed gas cans used to remove dust, available from most office supply stores.

In this session, the techniques, equipment and calculations used for determining the rate of leakage and detecting the source of leakage will be described and demonstrated.

*Wednesday, May 23, Technical Session 2, 3:30–5:00 pm*

### Weintraub, Steven

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#### **From Macro to Micro: a performance enhancing experience**

54 New plans for the construction or renovation of a museum should be an exciting moment. It provides a unique opportunity for the creation or improvement of environmental conditions to enhance the preservation of collections. And yet, all too often, the final results fall short of the initial dream. To succeed in designing and building a museum, it is important to understand the planning process and the role that the collections manager, curator or conservator should play. Specifically, when it comes to providing environmental specifications, is it sufficient to provide a rigid set of numbers at the outset, and wait with great anticipation to find out if it has been achieved at the end of the job? Or should it be a more interactive process, allowing for more flexibility, and ultimately a better chance of success?

At the level of overall building design, collections specialists are usually limited to providing environmental and other specifications and are not actively involved in discussions about how these specifications will or will not be implemented. As the planning process moves into more detailed issues and focuses on storage spaces, collections specialists are allowed to play a more active role in such aspects as space design and layout. Finally, at the level of showcase and storage furniture design and selection, there is an opportunity for collections specialists to take the lead in detailing both functional requirements and how they will be achieved. In essence, as the

focus narrows from the macro to the micro, the role of the collections specialist within the planning process becomes more critical and interactive.

Ideally, the collections specialist should have a major and interactive role throughout the planning process. The key to achieving this level of participation is to recognize that the conventional role of providing fixed prescriptive specifications at the outset of the project is not the correct approach. It tends to result in solutions that are either inadequate or not cost-effective. Specifications should be performance-based, with the ultimate goal for collections of minimizing risk and maximizing preservation using the most cost-effective means. In the realm of environmental specifications, this requires some level of specialized knowledge regarding climate control and lighting systems at the macro level, and a more detailed knowledge of storage and exhibition case design at the micro level. While it is impossible to become an expert in all things, some knowledge in these areas is essential to effectively work with other specialists as part of a team, in order to achieve performance based goals. Otherwise, we are restricted to the more limited role of providing abstract, prescriptive-based requirements that may not provide the most appropriate solution.

*Wednesday, May 23, Plenary Session 1, 11:00–11:30 am*

## NOTES

**Barringer, Kerry**  
**Harwood, Paul**

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### **Common Errors in Specimen Databases and How to Avoid Them**

Errors can appear in specimen databases due to mistakes in data entry and interpretation of the data on the specimen. These errors can be minimized by including a few safeguards in the structure of the database and in the data entry protocol. Records must be reviewed as part of any entry protocol and the original specimens must be available for comparison during review. Using forms that enforce data entry rules, using selection lists on forms, and avoiding defaults can prevent many simple entry errors. Ample fields for notes tied to specific data fields should be built into data tables to allow for detailed comments. Indicators of original label content separate the primary data from later interpretations. Finally, when data are made available, there should be an easy way for the user to contribute corrections.

**Berg, Holly L.**  
**Adrain, Tiffany S.**

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University of Iowa  
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### **Making the Best of a Bad Lot: improving collection facilities on a small budget**

The University of Iowa Paleontology Repository contains over 1 million fossil specimens from all geological ages with worldwide coverage. The collections are stored in 3 different storage facilities. The main collection storage area is a "room-in-room" arrangement in an air-conditioned building with minimal temperature fluctuations and seasonal humidity changes. This room contains a range of specimens, from pyritized fossils to sub-fossil bone. The specimens are housed in cabinets that further ensure a stable environment for their preservation. The second storage area is a basement room with no air-conditioning, and steam-pipe heating with no thermostat control. This room contains the paleobotany collection and has problems with temperature and humidity control, pests, water leaks, steam pipe leaks and access. The third storage area, an offsite facility previously determined to be unsuitable for collections in a conservation assessment, continues to be used due to a lack of alternative space. Specimens are housed in three separate storage rooms on open shelving or in old pine and oak cabinets. Agents of deterioration that put the collections at risk include extreme climate fluctuations, pests, and water and fire hazards. Other problems include a lack of security, and safety hazards for Repository staff. Also, small disasters

have occurred, including a pipe burst and roof leaks that caused water damage to several boxes of specimens. Steps to remedy these problems are in progress, but with no capital budget in place improvements to the buildings and storage of the specimens must be small scale and low budget. Safety inspectors have assessed the storage areas to bring fire exits and equipment up to code. Improvements have been made in collections management including environmental monitoring, integrated pest management, and survey of the collections. Repository staff is working with University conservators, facilities management, and space planning to remedy problems without major building reconstruction or renovation.

**Carrera, Juan P.**  
**Baker, Robert**

National Science Research Laboratory  
Museum of Texas Tech University  
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**Collaborations Among Natural History Museums for Free World Wide Access: development of a centralized database for Ecuadorian mammals**

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Natural history museums play an essential role in preserving biological collections and their associated information. Because of the great number of collections, the historic information of every specimen, and the diverse locations of museums around the world, a considerable variety of data collection systems are available. Due to this decentralized nature of the records some problems arise at the moment in quantifying how many specimens have been collected inside every country, what institutions hold those collections and how easy it is to obtain the information associated with the specimens. Utilizing collections of Ecuadorian mammals as an example, we created a centralized relational database from which data could be accessed and used through the World Wide Web. In 2006, an extensive survey was made on the scientific literature, natural history museum websites, and personal communications with curators and collection managers. This research allowed us to recognize 37 institutions in South America, North America, and Europe that hold Ecuadorian mammal specimens. An effective collaboration with 28 of these 37 institutions made it possible to compile more than 20,000 records, resulting in the creation of a centralized database. The information is organized by geographical and taxonomical criteria allowing queries without limitations.

Due to its basic design and relatively low cost, these centralized systems are applicable in other fields and in third world countries, where poor record keeping of collecting events and lack of funds limit the sharing of data information. The scope of this project demonstrates effective collaboration among natural history museums in the 21st century.

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### **Operating Without Anaesthetic - Building Around The Collections**

The refurbishment of the Palaeontology Building of The Natural History Museum to counter problems of building behaviour was designed and executed around the collections and staff. The option to decant both for the duration of the project was ruled out early in the design process as too costly, financially, and too risky for the collections. The removal of collections during refurbishment or build projects - putting them to sleep or accessible at distance - is often considered essential. In the case described here the project design, specific refurbishment goals, and collections care procedures were brought together in the planned work. Refurbishment proceeded on a floor-by-floor basis with staff staying one step ahead as they vacated and occupied spaces. Experimental models gave confidence that the collections would be adequately protected during the project. While the operation was, eventually, a more limited refurbishment than originally envisaged, the patient is expected to function at a significantly improved level.

### DeMouthe, Jean F.

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#### **Moving Collections in the Drawers: a case study**

Dry specimens stored in wooden or metal drawers may be safely moved those drawers if certain precautions are taken prior to and during the move. In some instances, entire cabinets can be moved with the specimens inside. This is only possible if the specimens are secured within the drawers, the drawers are held in place by a door or other device, and the cabinet can be moved without tipping.

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Many types of cabinets must be moved empty, either because they are not strong enough to be moved full of specimens, or because they must be laid down in order to negotiate corridors, doorways, and/or elevators. In these instances, the drawers must be moved separately. This can be done by constructing a series of moveable cabinets that can accept the drawers, and be secured with doors.

Before the move, specimens in each drawer should be secured or padded so that they can travel safely. The drawers are then placed in specially-constructed rolling cabinets. If needed, additional padding is added between the drawers to prevent specimens from bumping out of their trays. A door is put on the case, and it can then be shrink-wrapped or locked for security. Each cabinet is equipped with a label pocket for coded information about the contents, and a unique

cabinet number. Collections staff prepares the drawers and packs the rolling cabinets, and the actual movers never need to see the specimens.

After the empty cabinets have been moved to the new location, the rolling cabinets full of drawers follow them, and can be unloaded back into their original cases. The empty rolling cabinets then return to the museum for another load.

After the move is completed, the rolling cabinets can be made into storage cabinets, or left on their wheels and used for transport or temporary storage.

The examples shown are from the recent move of the dry recent invertebrates, minerals, and fossil collections at the California Academy of Sciences.

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**The Invertebrate Type Collection at  
the Museum of Texas Tech University:  
arrangement, barcoding, database, and  
digitization.**

Because the type specimens are crucially important for the scientific community as they are standards of reference in scientific nomenclature, the purpose of this project was to organize the Invertebrate Type Collection, providing suitable management and care. Currently, the Invertebrate Type Collection at the Museum of Texas Tech University holds 841 specimens that include 11 orders, 37 families, and 128 species. The type collection consists of 504 pinned/pointed specimens, 13 fluid-preserved specimens, and 324 slide mounted specimens which have accumulated since the 1970's. At the beginning of this project, we transferred the types from the main general collection to a dedicated special cabinet for types. We barcoded all of the specimens and catalogued them using FileMaker Pro 7.0v3 database which we developed for this project. This database will be used for cataloguing the remainder of the Invertebrate Collection. At the moment, we are evaluating the time and cost needed to

digitize the types. Additionally, we compiled all of the type descriptions in PDF format to facilitate and make them available for research. To complete this project we will make our searchable database with images accessible to the public through internet at the Natural Science Research Laboratory website (<http://www.nsrll.ttu.edu/collections/invertebrates/database>).

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### **Computerization of the Kansas State University Herbarium: digitizing a critical biodiversity collection for the Great Plains**

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The Kansas State University Herbarium (KSC) is a collection of ca. 200,000 plant specimens with a regional focus on the central Great Plains and a noteworthy strength in historical (pre-1900) material. Full-scale databasing of specimen label data was undertaken beginning in May 2006, and approximately one-third of the holdings have been databased to date (including the vast majority of Kansas vascular plants). An overview of this databasing initiative is presented, including presentation of data entry forms (on the Specify platform), breakdown of data entry task analysis and synopsis of a GIS-based web mapping application under development. Analysis of the current data reveals composition of the Kansas collection and confirms the significance of this museum to efforts to track floristic changes over time. Recent findings enabled by the databasing initiative are highlighted (e.g., "discovery" of noteworthy collections, such as a large number of specimens of F. J. Lindheimer; revision of pre-settlement range distributions of particular native taxa).

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### **Building a Museum: the role of the collections manager**

The process of building a new museum is complicated and involves many different kinds of people, as all parts of the plan evolve. There are the designers, architects, and planners who determine the building's size and appearance. Within that group are multitudes of staff with approval rights to various aspects of the project, ranging from members of the board to project managers and space coordinators. The organization's Board, directors, staff, and other support groups contribute information about how the building will be used, and raise funds.

Unfortunately, collections managers are often overlooked when important decisions need to be made during the planning, design, and construction processes. It is crucial that collections staff be involved in the planning and design processes, since they can provide invaluable information and insight for the rest of the project team.

The California Academy of Sciences in San Francisco, California is currently constructing a multi-million dollar museum for the future. Collections managers have provided input from the early planning stages to the present construction phase, and have played an important role in the design and building of collection space and laboratory facilities. This survey of research department collection managers from the Academy summarizes the dos and don'ts of involvement in the design and outfitting of a new museum. We

will offer helpful advice gained through our participation in the design and construction of this new museum as well as our recent experience moving to and working within a transitional facility.

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### **An Improved Approach to Fossil Mammal Type Collection Housing**

The American Museum of Natural History (AMNH) houses the world's largest collection of fossil mammals, consisting of an estimated 400,000 specimens that are actively used by both in-house and visiting researchers. Around 2,000 of these specimens are type specimens, which are used as the basis of new species (holotype) and genus (genotype) descriptions. Type specimens are among the most heavily-used objects in the collection and are a critical resource for current and future research. For this reason, measures to protect the integrity of the type specimens in the AMNH fossil mammal collections were identified as a priority for preventive conservation work.

As one element of a larger National Science Foundation funded project, the fossil mammal type collection at the AMNH was inventoried and protocols were developed for rehousing specimens in a manner that was efficient concerning both time and cost while also maintaining the highest conservation standards. Prior to rehousing, the fossils were overcrowded, poorly-supported and oftentimes stored in inadequately- sized boxes using non-archival materials, such as acidic tissue and cotton batting. Standardized, conservation quality storage supports were designed and created to rehouse small to medium-sized specimens, while larger fossils required customized blue-board boxes or drawer protection to accommodate for height and/or size. Simple yet effective supports and bumpers for specimens were created from materials such as, Ethafoam®, Tri-Rod shaped Ethafoam®, Tyvek® and Volar®. Over the course of twenty days (~110 hours in total), roughly 190 specimens were collected, rehoused, photo-documented, and returned to the collections. Lastly, condition reports for specimens were created and entered into an Access database to monitor the project's progress, identify rehoused specimens and summarize the type and extent of rehousing. Training materials and protocols were developed, and are currently used to guide and instruct collections staff and volunteers who are continuing with the rehousing project.

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**White, Tim**  
**Joyce, Walter**

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### **Collections Collaborative Initiative: bridging Yale University's Peabody Museum and Manuscripts and Archives**

The challenge of providing access to special resources, including museums and libraries, is a common problem for many institutions. Yale University was awarded in 2005 an Andrew W. Mellon Foundation grant to fund a collaborative pilot program, Mellon Collections Collaborative initiative. The goal of this project is to enhance access to and use of library and museum collections across the University by awarding several collaborative grants to Yale repositories. In 2006 the Peabody Museum's Divisions of Paleobotany and Vertebrate Paleontology and Yale Library's Manuscripts and Archives applied for and were awarded one of these collaborative grants to digitally image the archives of paleontologists Othniel Charles Marsh and George Reber Wieland. Marsh and Wieland are of particular importance because their collecting inaugurated the Peabody's collections in Anthropology, Invertebrate Paleontology, Paleobotany, Vertebrate Paleontology and Vertebrate Zoology. Much of the wealth of information amassed by these two scientific pioneers is in their large archives, most of which are stored at Yale University Library's Manuscripts and Archives. This collaborative project incorporates the digital imaging and text capture through optical character recognition (OCR), preservation, archiving and electronic publication of approximately 40,000 pages

of correspondence, maps, monographs and pictures available only through painstaking browsing of microfilm and generalized finding aides.

The majority of the archives for this project are stored in 62 file boxes. These boxes are transported from Manuscript and Archives storage to the Peabody Museum in a series of fifteen boxes. The boxes are immediately wrapped in plastic and frozen for three days in a walk-in freezer at -30°. They are then moved to the Paleobotany Division, thawed for 24 hours and stored in a locked case in the Division's environmentally controlled collections storage room. Using state-of-the art digital camera equipment housed in the Peabody Museum's Botany Division adjacent to the Paleobotany Division, the technician digitally images and archives approximately 200 pages a day. Images are stored on a RAID volume and are backed up to a tape library. After imaging, OCR is used for text capture enabling full text searching of the archive. Efforts are also underway to explore the potential use for text recognition of hand written documents. When the technician has completed the imaging of this series of fifteen boxes, arrangements are made with Manuscripts and Archives for pick-up and another series of file boxes is delivered. This collaborative project serves as model for similar projects that exist throughout Yale University's museums and libraries and will be completed in April 2008.

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**Data Deficient to Data Rich: revisiting  
museums collections and uses**

Museum collections are valuable resources for the numerous communities that we serve. Some collections—particularly older ones—have little information or incorrect data records. These data deficient collections often languish deep within museum storage facilities and rarely see the light of the exhibit floor. Administrators can question the value of holding large collections that are perceived as under-utilized and under appreciated.

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Curators should revisit these data deficient collections, and think creatively about how we might effectively use them—turning data deficient collections in to data rich ones.

Methodologies for creating data rich collections include reexamining facts surrounding objects, reinterpreting their stories using multiple and diverse perspectives, and effectively using newly discovered information and current technology. SMM works closely with descendent communities and scholars from multiple disciplines paired with traditional documentation of physical and historical aspects of objects. Acknowledging that there are multiple ways of “knowing” expands our understanding of collections and enables us to interpret old collections in new ways.

Two of SMM’s current projects, the Ethnobotany Initiative and Changing Gardens through Time are good examples of curators thinking broadly about collection use.

SMM’s Ethnobotany Initiative is unique because we create a public exhibit in partnership with an American Indian gardener who germinates, grows, and harvests seeds from the Museum’s permanent collections. This strategy of public exhibition gardens doubles as a way to keep our accessioned seed stock viable while also educating visitors about American Indian agriculture. The 167 seed species from the Hiller collection rested, largely unused, in SMM’s storage for nearly 30 years before a community and SMM staff initiated this innovative project. Some of the seeds are believed to be of unaltered strains that extend deep into the past.

Changing Gardens through Time is a new exhibition concept that will illustrate the time depth for Native American agriculture in the Upper Mississippi River Valley and illustrate that native crop production has been a socially and technologically dynamic process over time. Gardens will be planted using seeds grown through the Ethnobotany Initiative and informed by data from current archaeological and paleoethnobotanical research, ethnohistoric records, and community advisors. The exhibition will demonstrate, in a timeline fashion, changes in the varieties of crops that Native communities living along the upper Mississippi River grew. Finally, the harvested seeds will be added to the Ethnobotany Initiative seed stocks for either long-term curation or to be planted in another year.

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pected 'leakiness' of the structure, compounded by an inherently inadequate HVAC system and other factors, such as inappropriate solar gain, all added to the building's failure. An understanding of these elements fed the design process for a major refurbishment programme. Completed in 2004, that spanned 3 years at a cost of £7.5 million (c. \$14.5 million).

### **Diagnosing a 'Sick' Building**

Buildings that may cause sickness in humans have been identified for many years. Museum buildings bring their own kinds of illness to the health of the collections they contain, but the symptoms of a 'sick' museum building require concerted and interdisciplinary study to diagnose the causes. The Palaeontology Building of London's Natural History Museum was welcomed as a major advance when opened in 1977 but the conditions provided for specimens were soon in doubt. A study of the design parameters, records of environmental and specimen condition, and anecdotal accounts identify the general malaise of the building. Experimental pressurised testing of the building envelope confirmed that the sus-

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### **Taxidermy Woes, Wows, and Results at the Museum of Texas Tech University**

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During the recent expansion and subsequent reorganization of the Natural Science Research Laboratory, Museum of Texas Tech University, we faced the challenge of bringing the care of the taxidermy mount collection into line with current museum collections standards. This historic collection includes many endangered species from unique localities that are not represented elsewhere in the collection. Much of the collection had been stored on shelves in the basement, laid on the tops of cases, or hung in the hallways, resulting in damage to ear-tips, noses, horns, and fur from insects, dust, and/or mechanical breakage. We sought to determine the best method to care for the collection within budget constraints. An initial assessment of the specimens, in addition to information collected from other institutions, aided in designing our storage solution. We constructed artificial walls from heavy-gauge galvanized metal "cattle panels" attached with mounting brackets to metal shelving and then lined the cattle panels with ethafoam to protect the specimens. This method provided a vertical surface for mounting specimens designed to be

hung, while providing shelf space to house those objects mounted in a stable standing position. The entire shelving system was covered with Tyvek® to aid in protecting the specimens from light, dust, and pests. Throughout the process we were concerned for the safety of the staff as many of the older specimens potentially were treated with arsenic, mercury, formaldehyde, etc. Thus, we tested both the specimens and the air for possible hazards to determine proper safety techniques for handling the specimens. We are currently preparing an exhibit that will utilize some of these specimens, but each item now has a permanent storage location within the collection. As future funding permits we will hire a taxidermist as a consultant to make appropriate repairs to the specimens. Until that time, the specimens are housed in a stable environment, protected from further degradation, but easily accessed for research and educational purposes.

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### **Implications of Taxonomic Rearrangements in Natural History Collections: a study case with mammals**

Increasing development of phylogenetic methods based on molecular and morphological data have generated significant changes in the taxonomy of different groups and has helped to increase our knowledge about biological diversity. In the case of mammals, the last edition of "Mammal Species of the World: a taxonomic and geographic reference" (Wilson and Reeder 2005) recognized more than 700 new species and numerous taxonomic changes over the previous 1993 edition. This significant number brings a problem to natural history collections: the need for an organized process capable of updating all collections materials. In terms of increasing specimen use and value, the present work analyzes the implications updating mammalian taxonomy have on the maintenance, organization, and preservation of the specimens deposited at the National Sciences Research Laboratory (NSRL), Museum of Texas Tech University. Updating databases to maintain a standard and current nomenclature involved considerable effort. Accordingly, 849 taxonomic changes were made to the NSRL mammal database to comply with taxonomy changes made in "Mammals Species of the World" 3rd edition. While more than 100,000 records have

been updated and the majority of mammal specimens reorganized, not all the aims could be achieved to date. Considering that taxonomical rearrangements are done with more frequency than the physical reorganization of the specimens in the museums, more time and human resources are needed to complete the work. Updating specimen identifications on tags and placing new labels on skeletal material storage containers are an additional part of this reorganization effort. We conclude that two points need to be stressed in management plans for systematic collections when facing taxonomic updates: i) Technical expertise to assimilate the new taxonomic changes, and ii) enough human and economic resources required to rearrange the systematic collections. Specially, if we consider that molecular studies suggest that mammalian diversity has been underestimated, and a 40% of the mammals still remain unnamed, future taxonomic revisions with greater impact on collections curation and organization is inevitable. Are museums ready to face these taxonomic changes and future reorganizations to increase the use of their collections?

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### **Conservation or Education: are they mutually exclusive within interactive museum exhibits?**

The TNSC Hall of Geology and Paleontology wanders through geologic time in Texas providing the visitor with a diversity of vertebrate, invertebrate and plant fossils. Small invertebrate fossils lack the visual impact of large and dramatic vertebrates and to encourage curiosity about these invertebrates, we provide a series of 98 drawers, termed Discovery Drawers. Specimens in these drawers are selected from the general collection, selected as good examples of the species with good provenance data. Use of such specimens raises issues for both conservation and security. Unlike a traditional exhibit these drawers are subject to movement and the visitor is much closer to the specimen.

Monitoring of the drawer conditions began as soon as the exhibit opened in 2004. Current monitoring, with the support of SPNHC, addresses conservation with climate dataloggers, closer observation of wear and tear on specimens and cabinetry, along with observation and questioning to assess the educational effectiveness of this type of exhibit.

Early results indicate adequate temperature control within the drawers. The larger humidity swings encountered in the exhibit hall are buffered inside the drawers. Constant upkeep includes cleaning of the screwed down Plexiglas drawer covers, knob tightening, wood treatment, and waxing of runners. The deeper foam drawer inserts into which wells are cut for each specimen is preventing movement of most but no all specimens. Some limited physical specimen damage is evident but is confined to separation of previously glued samples.

The drawers are used by a wide range of visitors; each group shows diverse behaviors. Physical stress on the drawers depends on the age of the visitor, type and size of group, and whether or not they are docent led. Curiosity to open and study the drawer contents is highly variable across and within age groups. Within the stratigraphic section of the drawers, mental connection between the fossils to geology map to visitors home is difficult without explanation. This use of the drawers appears more effective with return visitors and family groups.

Effectiveness of this type of exhibit may rely heavily upon the educational environment outside of the Museum. Can we, in the Museum, mitigate such learning barriers? Are the limited conservation issues justifiable? These and many other questions emerging from this study may help us develop a viable model for this interactive exhibit.

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### **Digital Taxonomy in the 21st Century: an example from the University Of Minnesota Insect Collection**

Taxonomic identifications, descriptions, and systematic classifications are vital to the use and curation of zoological collections. Obtaining this information can be difficult for groups where taxonomic expertise is scattered and knowledge is incomplete. The rapid decline of biodiversity brought about through human activities makes the need for taxonomic information even more urgent. Yet, traditional taxonomy is a slow and labor intensive process and its products are often inaccessible to non-specialists. Fortunately, a host of new digital tools are available to taxonomists that greatly increase the speed of species descriptions and improve the dissemination of taxonomic information. Taxonomists at the University of Minnesota Insect Collection are now employing specimen-level and museum accession and loan management databases (Biota and the collection's in-house accession database), data capture and retrieval tools (barcode technology), electronic illustration- and imaging (Adobe Illustrator and Photoshop), taxonomic tools for constructing semi-automated species descriptions and dichotomous keys (DELTA), interactive web-based keys (Lucid), and rapid web-based publications (Zootaxa).

Insects, with nearly one million described species and perhaps millions more undescribed, are particularly prone to the taxonomic impediment. Consequently, entomological research has greatly benefited from advances in digital taxonomy. We will use examples from ongoing research based at the University of Minnesota Insect Collection to summarize the steps involved in processing thousands of specimens and hundreds of species from their collection in the field to their description and availability on the museum's website at <http://www.entomology.umn.edu/museum/> and through other Internet resources.

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### **Coming Out of the Cabinet: Herbarium Outreach Programs at Rancho Santa Ana Botanic Garden**

72 Many natural history museums struggle to find balance between serving the needs of researchers and preservationists and providing a worthwhile and educational experience for their visiting public. Often, guests pass through quickly and while they may be impressed with exhibits and displays, leave still completely unaware of the work behind the scenes. Rancho Santa Ana Botanic Garden (RSABG) is focused on the native plants of California and has the largest ex-situ collections in the state with 86 acres of native plants, a seed bank, and a herbarium amongst the ten largest in the United States. The RSABG Herbarium (RSA-POM) is a leading repository of plants from southern California and Baja California with total holdings in excess of 1.1 million specimens. However, the majority of the families and visiting groups that come to explore the institution's botanic garden are hardly aware of the herbarium's existence. We have recently increased our efforts to be more visible to the public in hopes that they will gain a new perspective on the value of natural history collections, and we are exploring multiple ways of bringing new information to our visitors. We have always offered short tours through the herbarium to visiting teachers, college-level botany classes, and other groups of scholars, but we are now providing a more holistic context and visitors may see the herbarium on the same day they visit our seed house, nursery and living collection. When viewed

in this context, we can introduce the idea of a herbarium as a historic record and highlight it as one of a suite of botanical collections that together provide an enormous unified resource. We have also developed a tri-fold pamphlet that details the work being done in the herbarium as well as in other areas of the institution, and how they connect to one another. When placed in our gift shop next to the maps of the grounds, they are easily found by casual visitors and families. Our gift shop has also been the site of our newest form of outreach. We recently collected several plants from our garden and mounted them with the same archival techniques used for a herbarium specimen, then framed them to be offered for sale in the gift shop. Our hope is that buyers gain insight into archival collections and learn from the species-specific information provided with each plant, and perhaps feel a connection to the Garden, its living collection, and its herbarium specimens. Drawing public interest to natural history specimens can be difficult if the collection is portrayed in a vacuum; outreach efforts that seek to educate by demonstrating relationships and connecting diverse collections provide a much greater context and a better overall experience for the museum visitor.

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#### **Freeze-Drying Protocol of Squash for Long-Term Preservation**

Natural history museums acquire complete botanical and zoological specimens for their collections. With the advent of sophisticated analytical methods, such as DNA profiling, preservation methods must be as non-interventive and not contaminate the specimens in any way. The Science Museum of Minnesota, St. Paul, MN, has established a research garden based on American Indian seeds and growing methods. Over the past 4 years, several plant specimens were accessioned into the collections for future research purposes. The four specimens involved in this project were too large to fit into the freeze-drying unit at the SMM Research Station, which is intended for processing soil and sediment samples. The Daniels Objects Conservation Laboratory (DOCL) owns a larger freeze-drying system (Freeze-Dry Specialties, Inc.; Ultra-Dri 1800) that can accommodate three-dimensional objects. The freeze-dryer is controlled by a programmable microprocessor and has a thermal probe to allow for checking the internal temperature of the objects being dried. The drying protocol for this set of specimens was determined by the mass of the squash and on previous experience. The freeze-drying method and the particular protocol used in this project will be presented.

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#### **Nineteen Seasons of Collecting: managing the Burgess Shale Collection at the Royal Ontario Museum**

The Burgess Shale, in Yoho National Park, British Columbia, Canada, is probably the world's best known and most significant Konservat Lagerstätte deposit. Discovered in 1909 by Charles Doolittle Walcott, it has been the subject of collecting and research for close to 100 years, with major repositories in Harvard University (~1,500 specimens), the Geological Survey of Canada (~15,000 specimens), the Smithsonian (~65,000 specimens), and the Royal Ontario Museum (~150,000 specimens on over 43,000 field lots).

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The specimens at the ROM were collected between 1975 and 2001 under the terms of successive cooperative agreements with Parks Canada, which aimed primarily to increase knowledge of the Burgess Shale. The specimens remain the property of Parks Canada. The first collections (1975) were made from talus material for display purposes. Desmond Collins, Curator of Invertebrate Palaeontology, collected fossils during 19 field seasons in twelve different localities, yielding the largest and most diverse collection of Burgess Shale specimens in the world. This collection now occupies about 25% of our total storage capacity. The challenges in managing the collection include preparation, sorting

and databasing of a very large number of slabs containing numerous specimens and species; floor loading capacity; and the challenge of arranging the physical storage of the collection to optimize accessibility for the diverse research interests of numerous scholars.

## NOTES