

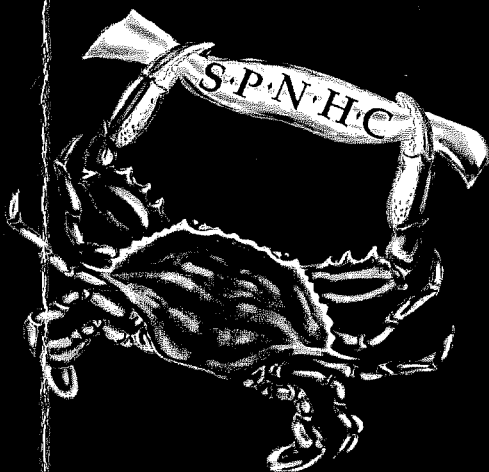


Program and Abstracts

14th Annual Meeting
of the

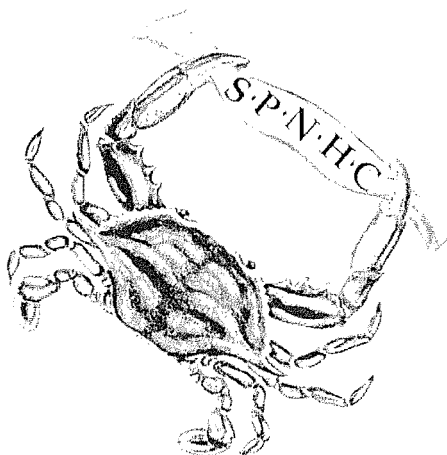
Society for the Preservation
of
Natural History Collections

June 27-July 2, 1999
Washington, DC



Sponsored by the
*Smithsonian Center
for Materials Research and Education
and the
National Museum of Natural History*

Program and Abstracts



"For the increase and diffusion of knowledge..."

Society for the Preservation of Natural History Collections

14th Annual Meeting

June 27 - 2 July 1999

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Smithsonian Center
for Materials Research and Education



Smithsonian Institution
National Museum of Natural History

Welcome to the Smithsonian Institution

The Smithsonian Institution, through the Smithsonian Center for Materials Research and Education (SCMRE) and the National Museum of Natural History (NMNH), is pleased to host the 14th Annual Meeting of the Society for the Preservation of Natural History Collections, June 27- July 2, 1999.

Welcome from SCMRE

It is with pleasure that I take this opportunity to welcome everyone attending the Annual Meeting of SPNHC and to invite you to visit the Smithsonian Center for Materials Research and Education. SCMRE is one of the Smithsonian's research institutes, and is dedicated to research on museum collection and related materials using modern physical and natural science techniques. One focus of this research is to answer compelling questions in archaeology, anthropology and the history of technology. Another focus is to provide new, relevant information concerning the conservation and preservation of museum objects. Among these studies, SCMRE has given a high priority to research concerning the preservation of the physical structure and molecular information content of natural history specimens. Of course, dissemination of information to the appropriate constituencies is equally important, and SCMRE has committed itself to serving as an educational source both for the museum profession and for the public at large concerning the study and preservation of museum objects and collections. We have arranged times for you to tour our facilities and learn more about us, and we sincerely hope you will do so. SCMRE is proud to be a sponsor of this conference. I look forward with you to an interesting and informative meeting.

Lambertus van Zelst, *Director, SCMRE*

Welcome from NMNH

The National Museum of Natural History, one of the largest natural science museums in the world, contains more than 120 million specimens. On behalf of the Museum, I welcome members of the society dedicated to preserving the collections that comprise the holdings of this museum. As the repository of a significant portion of the natural heritage of our earth, we at NMNH feel a special responsibility to carefully use these collections for research, and to just as carefully preserve them for future study. The theme of this year's meeting, Research and Collections, thus is a fitting one that represents some of the major priorities of this museum. I invite each of you to participate in one of the collection tours that members of our staff are conducting during the conference. These tours will illustrate the scope and diversity of the collections themselves, as well as what is being done for their preservation. Though we are undergoing renovation, many of our exhibits are also open. I invite you to take some time to explore these as well. It is also a pleasure for the Museum to be able to serve as co-sponsor of this, the fourteenth annual meeting of Society for the Preservation of Natural History Collections.

Robert Fri, *Director, NMNH*

Welcome from the Local Organizing Committee

We welcome everyone to the Washington, DC area for the SPNHC99 annual meeting. Washington, DC is a wonderful venue for a collections care conference. The Smithsonian Institution, the world's largest museum and research complex, encompasses over 17 museums, 10 research centers, and the National Zoo, caring for over 140 million artifacts and specimens (with another 128 million in the libraries and archives). From the response to this year's specialty sessions and other special events, it would seem that collecting, preserving and accessioning genetic resources, health and safety issues in collections, and repatriation are important topics for many institutions. We hope that you enjoy the program, as well as the trips, tours, workshops, and other events. Planning for this conference has been an interesting process and quite an opportunity to learn. We are happy to have you join us for an exciting program. Thanks to everyone who so generously gave of their time, experience, and efforts to making this conference happen.

David von Endt, *Conference Chair, SCMRE*

Welcome from the President of SPNHC

The Society for the Preservation of Natural History Collections, the Smithsonian Center for Materials Research and Education, and the National Museum of Natural History welcome you to the 14th annual SPNHC meeting. This meeting has attracted the largest number of SPNHC delegates ever, and the local committee has put together an exciting program. This year's theme, "Research and Collections," has drawn researchers, curators and collections managers together for a 6-day presentation of workshops, seminars, talks, posters and demonstrations.

We are grateful to many people for bringing this program together, but most of all we are grateful to you for your enthusiastic support of SPNHC and our hosts for this meeting. You are the real reason for all of this. On behalf of all of us who have brought the 1999 meeting to you, I hope that your time in Washington this week is exciting, productive, and challenging, and that you come away from the meeting with new ideas and approaches.

On to the meetings!

Sally Shelton, *President, SPNHC*

ACKNOWLEDGMENTS

Local Organizing Committee

David von Endt, Conference Chair, *SCMRE*

Committee Members

Debbie Bell, *Botany, NMNH*

Janie Burkett, *Move, MSC*

Kerry Button, *Move, MSC*

Liz Dietrich, *Move, MSC*

John Frost, *Move, MSC*

Linda Hollenberg, *Botany, NMNH*

Jeremy Jacobs, *VZ, NMNH*

Jessie Johnson, *National Park Service*

Matthew Kane, *NMNH Molecular Systematics*

Emily Kaplan, *NMAI CRC*

Geoff Keel, *IZ, NMNH*

Jane MacKnight, *Cincinnati Museum Center*

Kathryn Makos, *OEMS*

Elizabeth Merritt, *Cincinnati Museum Center*

William Moser, *IZ, NMNH*

Ann N'Gadi, *SCMRE*

Lisa Palmer, *VZ, NMNH*

Ann Pinzl, *Nevada State Museum*

Deb Quilligan, *Cincinnati Museum Center*

Carolyn Rose, *Anthropology, NMNH*

Lori Schlenker, *Move, MSC*

Sally Shelton, *NMNH*

Camie Thompson, *SCMRE*

Robert Wilson, *VZ, NMNH*

Hosts

Smithsonian Center for Materials Research and Education (SCMRE)

National Museum of Natural History (NMNH), Smithsonian Institution

Artwork

Marcia Bakry, *NMNH Anthropology*

John Frost, *MSC Move*

Sponsors

Delta Designs, Ltd.

OTD

Rock Bottom Brewery

Smithsonian Institution Office of Fellowships and Grants, Short-Term Visitor Program

Viking Metal Cabinet Co. Inc.

Workshop Instructors

Kerry Button, *Move, MSC*

John Rorer, *The New York Botanical Garden*

Trudi Hayden, *American Museum of Natural History*

Bill Vartorella, *Craig and Vartorella Inc.*

Roger Machin, *Methods and Materials*

Tom Strang, *Canadian Conservation Institute*

Jeremy Jacobs, *Smithsonian Institution, NMNH, Department of Vertebrate Zoology, Division of Mammals*

Moderators

Elana Benamy, *Academy of Natural Sciences*
Michael Braun, *NMNH Molecular Systematics*
Greg Brown, *Univ. of Nebraska State Museum*
Robert Fisher, *USGS PWRC/NMNH*
Iris Hardy, *Geological Survey of Canada*

Rob Huxley, *The Natural History Museum*
Jane MacKnight, *Cincinnati Museum Center*
Kathryn Makos, *Smithsonian Institution, OEMS*
Linda Thomas, *Pratt Museum of Natural History,*
Amherst College
Tim White, *Yale Peabody Museum*

Poster Session Coordinators

Rose Gullledge, *NMNH - IZ & Botany*

William Moser, *NMNH - IZ*

Tour Hosts

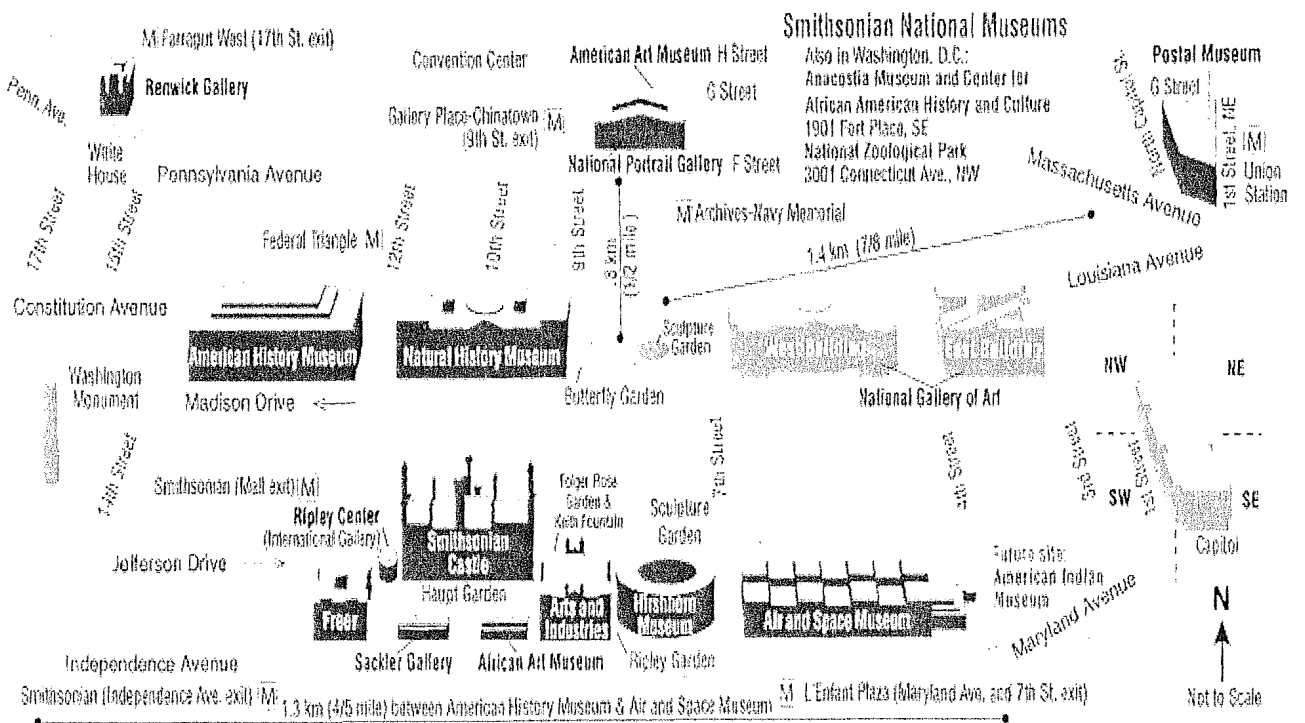
Larry Baukin, *SI Libraries MSC Branch*
Dave Bohaska, *NMNH Paleobiology*
George Bolden, *MSC OFM*
Cheryl Bright, *NMNH Invertebrate Zoology*
Jim Dean, *NMNH VZ - Birds*
Sunae Park Evans, *NMNH Anthropology*
Maria Faust, *NMNH Botany*
David Furth, *NMNH Entomology*
Linda Gordon, *NMNH VZ - Mammals*
Leslie Hale, *NMNH Mineral Sciences*
Greta Hansen, *NMNH Anthropology*
Linda Hollenberg, *NMNH Botany*
Deb Hull-Walski, *NMNH Anthropology*
Matthew Kane, *NMNH Molecular Systematics*
Emily Kaplan, *NMAI CRC*
Ida Lopez, *NMNH Botany*
Kathryn Makos, *OEMS*

John Ososky, *NMNH VZ - Marine Mammals*
Leslie Overstreet, *SI Libraries Special Collections*
Lisa Palmer, *NMNH VZ - Fishes*
Paul Pohwat, *NMNH Mineral Sciences*
Charley Potter, *NMNH VZ - Marine Mammals*
Linda Prince, *NMNH Botany*
Katherine Rankin, *NMNH Botany*
Rusty Russell, *NMNH Botany*
Staff of SCMRE
Bryan Stemen, *OEMS*
Alice Tangerini, *NMNH Botany*
Gil Taylor, *SI Libraries MSC Branch*
Jann Thompson, *NMNH Paleobiology*
Linda Welzenbach, *NMNH Mineral Sciences*
Addison Wynn, *NMNH VZ - Amphibians & Reptiles*
Stan Yankowski, *NMNH Botany*
George Zug, *NMNH VZ - Amphibians & Reptiles*

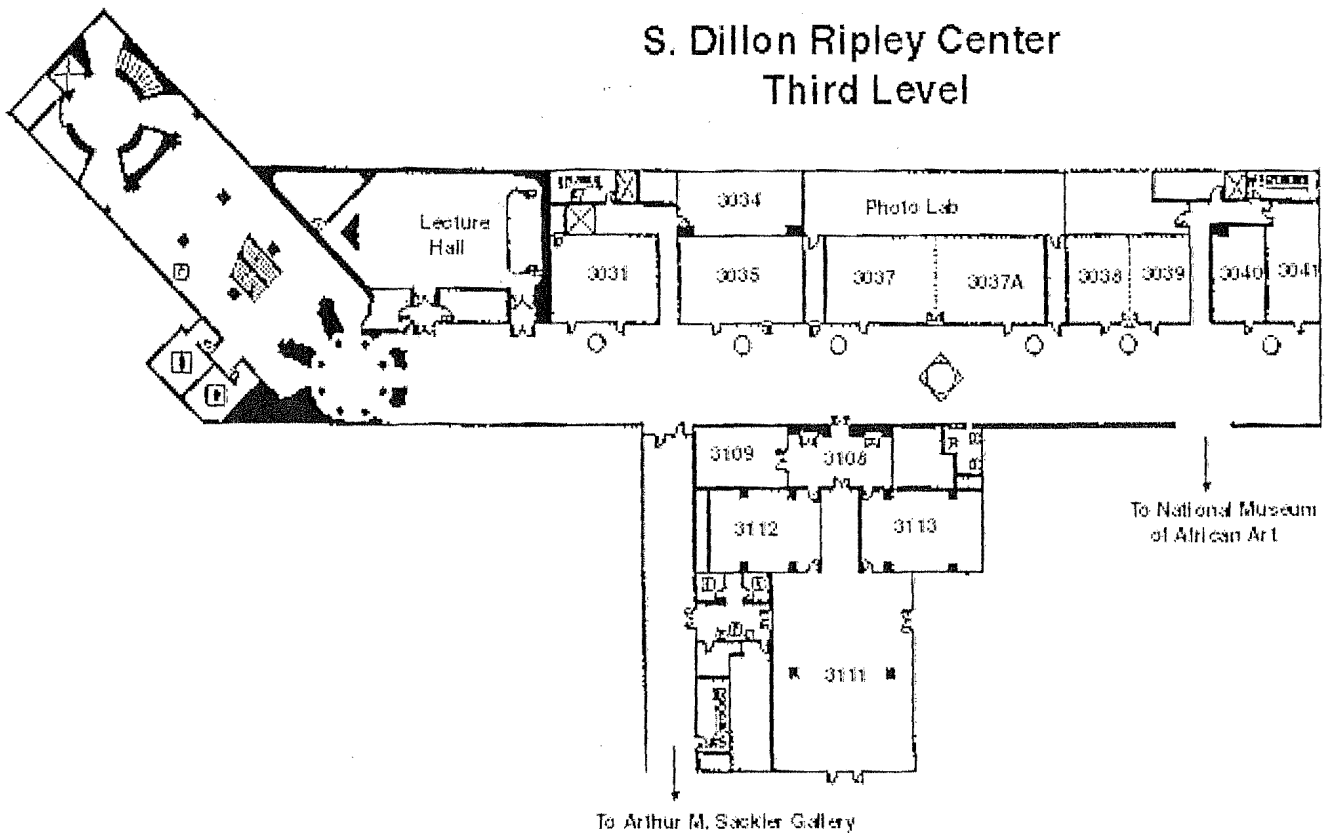
Alexandria Archaeology
Calvert County: Brownie Beach and Matoaka Beach Cabin
Smithsonian Institution Naturalist Center
U.S. Fish & Wildlife National Conservation Training Center

In Addition -

We would also like to acknowledge the support of the administration of the Smithsonian Institution; the SPNHC Executive Committee; the SPNHC Publications Committee; the SPNHC Conference Committee; the Smithsonian Institution Laboratory of Molecular Systematics; Jerry Conlon, Deputy Assistant Director/Special Project, NMNH; Raye Germon, NMNH - IZ; the Office of Special Events and Conference Services; the Office of Physical Plant - Division of Transportation and Division of Horticulture; the Office of the Provost Accessibility Program; the Office of Exhibits Central; the OCIANA Group; and the Local Organizing Committees of past SPNHC meetings.



S. Dillon Ripley Center Third Level



Program at a Glance

Sunday, June 27	7:30am-4:30pm	Registration, Ripley Center
	8:45am-5:45pm	Pre-Conference Trip to the Naturalist Center and the National Conservation Training Center
	9:00am- 5:00pm	Finance and Funding Workshop - Day 1, Ripley Center
Monday June 28	7:30am-4:30pm	Registration, Ripley Center
	8:00am-4:00pm	Pre-Conference Trip Fossils Collecting in Calvert County
	8:45am-4:15pm	Rigging Workshop: Lifting & Moving Large Objects, Monday, Garber Facility, Suitland, MD
	9:00am-5:00pm	Finance and Funding Workshop - Day 2, Ripley Center
	1:00pm-5:00pm	National Museum of Natural History (NMNH) Collection Tours
	7:00pm-10:00pm	1st Council Meeting
Tuesday, June 29	8:00am-4:00pm	Registration, Ripley Center
	8:00am-4:00pm	Committee Meetings, NMNH & MSC
	8:00am-1:00pm	Pre-Conference Trip to Alexandria Archaeology
	8:45am-12:30pm	CO2 Fumigation Workshop - Session I, Garber Facility, Suitland, MD
	9:00am-12:00pm	National Museum of Natural History (NMNH) Collections Tours
	11:45pm-4:00pm	CO2 Fumigation Workshop - Session II, Garber Facility, Suitland, MD
	1:00pm-5:00pm	Registration, Museum Support Center, Suitland, MD
1:00pm-5:00pm	Open House at the Smithsonian Centers in Suitland, MD	
	4:30pm-7:30pm	Icebreaker Reception, Museum Support Center, Suitland, MD
Wednesday, June 30	8:00am-4:30pm	Registration, Ripley Center
	9:00am-5:00pm	Exhibitors Showcase, Ripley Center
	9:00am-9:30am	Welcome and Opening Remarks, Ripley Center
	9:30am-12:00pm	Health & Safety Issues in Collections Session, Ripley Center
	1:30pm-2:15pm	Welcome and Address, Ripley Center
	2:15pm-5:00pm	Technical Session, Ripley Center
Thursday, July 1	8:00am-4:30pm	Registration, Ripley Center
	9:00am-12:00pm	Special Interest Groups (SIG), Ripley Center
	9:00am-5:00pm	Exhibitors Showcase, Ripley Center
	9:00am-12:00pm	Collecting, Preserving and Accessioning Genetic Resources Session, Ripley Center
	1:30pm-3:00pm	General Business Meeting, Ripley Center
	3:00pm-5:00pm	Poster Session, Ripley Center
	3:30pm-5:00pm	Technical Session, Ripley Center
6:00pm-10:00pm	Banquet and Dance - Odyssey Cruise	
Friday, July 2	8:00am-10:00am	Registration, Ripley Center
	9:00am-12:00pm	Repatriation Session, Ripley Center
	9:00am-12:00pm	Special Interest Groups (SIG), Ripley Center
	1:30pm-4:00pm	Technical Session, Ripley Center
	4:00pm-6:00pm	Final Council Meeting

Program Highlights

Sunday, June 27

7:30-4:30 **Registration, *S. Dillon Ripley Center 3108***

8:45-5:45 **Pre-Conference Trip to the Smithsonian Institution Naturalist Center, Leesburg, VA & the U.S. Fish and Wildlife National Conservation Training Center, Shepherdstown, WV**

In 1995, the Naturalist Center (NC) relocated from the Smithsonian's National Museum of Natural History (NMNH) to a temporary location in , Leesburg, VA. The NC is a unique public study center, featuring 30,000 objects from the different collections at NMNH. Visitors have the opportunity to bring in their own natural history collections to identify and to study the NC's collections, thus receiving a unique behind-the-scenes museum experience. The NC offers specialized programs for school groups, nationally recognized teacher workshops, and specialty workshops on particular collections.

The National Conservation Training Center (NCTC) opened in the fall of 1997. On its campus of 16 buildings, the NCTC offers conference facilities and training to various wildlife conservation and natural resource management related Federal agencies. In addition to a small biological teaching collection, the facilities include aquatics, computer, and GIS laboratories. The NCTC is located two miles from Shepherdstown, which is the oldest town in West Virginia. This field trip will include a stop in "old town" Shepherdstown, allowing participants time to purchase lunch in one of several restaurants and time to visit the historic district or a few shops.

9:00-5:00 **Workshop - Finance and Funding: Linking Collections Care Needs to Money in the Museum - Day 1 of 2, *S. Dillon Ripley Center 3111***

This two-day workshop will provide a "financial primer" on operating statements, budgeting, fundraising, and on linking long range plans for collections care needs to the budgeting and fundraising process. It will help staff to integrate funding needs into grant writing and capital campaigns, and broaden staff understanding of the development and use of financial information in institutional decision making. Knowledge is power, and even if you are not a financial planner or decision maker in your institution, understanding how the system does work, can work, or should work will help you leverage the resources you need to do your job. Instructors for this workshop will be John Rorer, Executive Vice President at The New York Botanical Garden, Trudi Hayden, Director of Foundation and Government Support for the American Museum of Natural History, and Bill Vartorella of Craig and Vartorella Inc. Made possible with the generous support of Delta Designs Ltd.

Monday, June 28

7:30-4:30 **Registration, *S. Dillon Ripley Center 3108***

8:00-4:00 **Pre-Conference Trip Fossils Collecting in *Calvert County, MD***

Participants will tour and collect from two Miocene localities in Calvert County, Maryland that are rich in fossil marine life including mollusks, sharks, and marine mammals. Dave Bohaska, from NMNH's Paleobiology Department, has volunteered to act as our tour guide. Participants will travel by bus from Washington, DC to our first stop at Matoaka Beach Cabin, then back on the bus to Chesapeake Beach for lunch on your own at a local restaurant, followed by additional exploring and collecting at nearby Brownie Beach. Be prepared to get damp and/or muddy.

8:45-4:15 **Workshop-Rigging: Lifting & Moving Large Objects, *Garber Facility, Building 26, Suitland, MD***

This one-day workshop is designed to cover the principles of rigging. Topics will include the proper rigging tools and equipment to use, safety issues, teamwork and the roles within a rigging team, communication, and how to choose a rigger if you lack the skills or equipment to do the job yourself. Demonstrations of lifting different types of natural history objects will examine techniques, problems, and the placement of straps, bracing, and padding to avoid weak areas of an object.

The instructor for this workshop is Roger Machin, founder of Methods and Materials, a Chicago-based fine art rigging and installation company. Roger has a variety of experience moving, handling, and solving unique problems associated with large sculpture, natural history specimens and anthropology museum collections. Shuttle service leaves from NMNH Constitution Avenue entrance at 8:00am.

9:00-5:00 **Workshop - Finance and Funding: Linking Collections Care Needs to Money in the Museum - Day 2 of 2, *S. Dillon Ripley Center 3111***

This will be a continuation of Day 1.

1:00-5:00 **National Museum of Natural History (*NMNH*) Collections Tours**

NMNH houses over 121.6 million artifacts and specimens. NMNH staff will lead tours through selected collections, including Mammals, Birds, Amphibians and Reptiles, Botany, Fishes, Entomology, and the Dibner Library. Because of various construction and renovation projects at NMNH, not all of the collections will be accessible. For final schedule and sign-up sheet, please check the registration desk.

7:00-10:00 **1st Council Meeting**

Tuesday, June 29

- 8:00-4:00** **Registration, *S. Dillon Ripley Center 3108***
- 8:00-1:00** **Pre-Conference Trip to Alexandria Archaeology, *Alexandria, VA***
Participants will visit Alexandria Archaeology, a city operated archaeology program, in Old Town Alexandria. The laboratory and museum are located in the Torpedo Factory Art Center, and renovated collection storage space housed at the City Incinerator. After the tour, participants may return to Washington, DC by SPNHC bus or remain in Old Town for shopping and lunch, and return via Metrorail.
- 8:00-10:00** **Finance Committee Meeting, *NMNH East Court Building, Room CE 334***
- 8:45-12:30** **Workshop - CO₂ Fumigation: Atmospheric Treatment of Museum Objects for Pest Control - Session I, *Garber Facility, Building 26, Suitland, MD***
Carbon Dioxide is a non-toxic alternative to pesticides commonly used in the museum environment. CO₂ leaves no residue and, unlike freezing or heat treatments, can be safely used for many composite materials. Currently only one vendor in North America can supply enclosures with sufficiently low permeability and large size. This _ day workshop will address CO₂ efficacy in museum pest control, possible chemical interactions with museum specimens, and humidity concerns using a dry gas in an enclosed system. The workshop offers hands-on demonstrations of several systems for running and maintaining CO₂ bubbles as well as problem solving and modification of existing systems. The workshop will also offer practical tips for purchasing and setting up your own CO₂ treatment system. Instructors: Tom Strang, Canadian Conservation Institute; Jeremy Jacobs, Department of Vertebrate Zoology, Division of Mammals, National Museum of Natural History; and Kerry Button, MSC Move, National Museum of Natural History. Shuttle service leaves from NMNH Constitution Avenue entrance at 8:00am
- 9:00-12:00** **National Museum of Natural History (*NMNH*) Collections Tours**
NMNH houses over 121.6 million artifacts and specimens. NMNH staff will lead tours through selected collections, including Birds, Amphibians and Reptiles, Invertebrate Zoology, Mineral Sciences, Paleobiology, and the Dibner Library. Because of various construction/renovation projects at NMNH, not all of the collections will be accessible. For final schedule and sign-up sheet, please check the registration desk.
- 9:00-10:00** **Membership Committee Meeting, *NMNH East Court Building, Room CE 340***
- 9:00-11:00** **Documentation Committee Meeting, *NMNH East Court Building, Room CE 307***
- 10:00-12:00** **Conference Committee Meeting, *NMNH East Court Building, Room CE 334***
- 10:00-12:00** **Conservation Committee Meeting, *NMNH East Court Building, Room CE 340g***

- 11:45-4:00 Workshop - CO2 Fumigation: Atmospheric Treatment of Museum Objects for Pest Control - Session II, Garber Facility, Building 26, Suitland, MD**
 Carbon Dioxide is a non-toxic alternative to pesticides commonly used in the museum environment. CO2 leaves no residue and, unlike freezing or heat treatments, can be safely used for many composite materials. Currently only one vendor in North America can supply enclosures with sufficiently low permeability and large size. This 2-day workshop will address CO2 efficacy in museum pest control, possible chemical interactions with museum specimens, and humidity concerns using a dry gas in an enclosed system. The workshop offers hands-on demonstrations of several systems for running and maintaining CO2 bubbles as well as problem solving and modification of existing systems. The workshop will also offer practical tips for purchasing and setting up your own CO2 treatment system. Instructors: Tom Strang, Canadian Conservation Institute; Jeremy Jacobs, Department of Vertebrate Zoology, Division of Mammals, National Museum of Natural History; and Kerry Button, MSC Move, National Museum of Natural History. Shuttle service leaves from NMNH Constitution Avenue entrance at 11:00am.
- 1:00-3:00 Publications Committee Meeting, SCMRE Seminar Room, MSC**
- 1:00-5:00 Registration, Museum Support Center, Suitland, MD**
- 1:00-5:00 Pre-Conference Open House at the Smithsonian Centers in Suitland, MD**
 Staff of SCMRE and NMNH will be on hand to show off the laboratories and the collections storage areas of the Museum Support Center facility. The storage facility houses over 30 million natural history specimens, and a number of associated laboratories. Move staff will offer discussions of “packing big things” throughout the day. Also open will be labs and storage areas located in some nearby facilities, including the Osteopreparation facility, the Botany Greenhouse, and the National Museum of American Indian Cultural Resources Center.
- 3:00-4:00 Education & Training Committee Meeting, SCMRE Seminar Room, MSC**
- 4:30-7:30 Icebreaker Reception, Museum Support Center, Suitland, MD**
 Join us at the Museum Support Center Patio for an informal evening of appetizers, beverages and dinner to renew acquaintances and meet new colleagues following a day of tours of the facilities in Suitland, MD. Beverages made possible through the generosity of the Rock Bottom Brewery, Bethesda, MD. Co-sponsored by the National Museum of Natural History, the Smithsonian Center for Materials Research and Education, and Viking Metal Cabinet Co. Inc.

Wednesday, June 30

- 8:00-4:30 Registration, *S. Dillon Ripley Center 3108*
- 9:00-5:00 Exhibitors Showcase, *S. Dillon Ripley Center 3111*
- 9:00-9:30 Welcome and Opening Remarks, *S. Dillon Ripley Center Lecture Hall and Room 3037*
1. Welcome
Sally Shelton, President, *SPNHC*
 2. Opening Remarks
Lambertus van Zelst, Director, *SCMRE*
Robert Fri, Director, *NMNH*
- 9:30-10:30 Health and Safety in Collections Technical Session, *S. Dillon Ripley Center Lecture Hall and Room 3037*
- Moderator: Kathryn Makos, Smithsonian Institution
1. Introduction
Kathryn Makos, *Smithsonian Institution*
 2. Report on the National Institute for Occupational Safety and Health Study of Health Hazards and Control Technologies in Museum and Conservation Work
Kathryn Makos, *Smithsonian Institution*
 3. Biological Testing for Toxic Exposures
G. Edward Burroughs, *NIOSH*
 4. Report on Attempts to Develop Consensus on Analytical Methods, Risk Assessment Models, and Safe Handling Procedures for Museum Collections with Residual Pesticides
Jessica Johnson, *National Park Service*
 5. Environmental Protection Agency Resources Available to Small Laboratories
Karen V. Brown, *Small Business Ombudsman, U.S.E.P.A.*
- 10:30-11:00 Coffee Break, *S. Dillon Ripley Center 3113*
- 11:00-12:00 Health and Safety in Collections Technical Session, *S. Dillon Ripley Center Lecture Hall and Room 3037*
6. The Smithsonian Institution Museum Support Center - Fire Protection Strategy for Upgrade to Wet-Collections Rack Storage Array
Bryan Stemen, *Smithsonian Institution*
 7. The Analysis and Detection of Hazardous Pesticide Residues Present on Herbarium Material
Victoria Purewal, *National Museums and Galleries of Wales*

8. Exposure Monitoring for Inorganic Arsenic and Mercury Vapor During Various Move and Collections Management Tasks

Kathryn Makos, Elizabeth Dietrich, Deborah Bell, *Smithsonian Institution*

9. Radiological Survey of Paleontological Specimens

David M. Peters, *Smithsonian Institution*

12:00-1:30 Lunch

1:30-2:15 Welcome and Address, *S. Dillon Ripley Center Lecture Hall and Room 3037*

Sally Shelton, President, *SPNHC*

Bobbie Faul-Zeitler, *Executive Director, Association of Systematic Collections*

2:15-3:00 Technical Session, *S. Dillon Ripley Center Lecture Hall and Room 3037*

Moderators: Jane MacKnight and Tim White

1. Natural History and Anthropology Collections in the National Museums of Kenya: Current Status

Michael Mungai, *National Museums of Kenya*

2. Tocuila, An On-Site Paleontological Museum

Joaquín Arroyo-Cabrales, *Laboratorio de Paleozoología, INAH*

3. A National Archaeological Collections Management Conference

Robert C. Sonderman, *National Park Service*

3:00-3:30 Coffee Break sponsored by OTD, *S. Dillon Ripley Center 3113*

3:30-5:00 Technical Session, *S. Dillon Ripley Center Lecture Hall and Room 3037*

4. Federally Funded Partnerships Support Collection Management Programs in the Department of Invertebrate Zoology, National Museum of Natural History

Cheryl Bright, *Smithsonian Institution, National Museum of Natural History, Department of Invertebrate Zoology*

5. Progress in Establishing a New Natural History Collection

Jennifer Paduan, *Monterey Bay Aquarium Research Institute*

6. Interdisciplinary Uses of Natural History Collections

Jean DeMouthe, *California Academy of Sciences*

7. The Biological Voucher Specimen and Its Benefits to Scientific Research

James Cordeiro, *American Museum of Natural History, Department of Invertebrates*

8. The Concentration Shift IndicatorR: A Simple Instrument to Monitor the Preservation Quality of Ethanol Preserved Specimens

Andries van Dam, *Leiden Museum of Anatomy*

9. The JLB Smith Institute National Fish Collection: A New, Exciting Future

Andy Bentley, *JLB Smith Institute of Ichthyology*

Thursday, July 1

- 8:00-4:30 Registration, *S. Dillon Ripley Center 3108*
- 9:00-5:00 Exhibitors Showcase, *S. Dillon Ripley Center 3111*
- 9:00-10:00 Anthropology Special Interest Group (SIG), *S. Dillon Ripley Center 3037A*
- 9:00-10:05 Collecting, Preserving and Accessioning Genetic Resources Technical Session,
S. Dillon Ripley Center Lecture Hall and Room 3037
*This symposium was supported, in part, via travel stipends from the Short-Term
Visitor Program of the Smithsonian Office of Fellowships and Grants.*
Moderator: Michael Braun, *Smithsonian Institution, National Museum of Natural
History, Laboratory of Molecular Systematics*
- 1. Introduction and Overview**
Michael Braun, *Smithsonian Institution, National Museum of Natural
History, Laboratory of Molecular Systematics*
 - 2. Collection, Storage and Preservation of Vertebrate Genetic Resources: A
Perspective From the Burke Museum**
Scott Edwards and Sharon Birks, *University of Washington, Burke Museum
of Natural History and Culture*
 - 3. The Teachings of the Beasts: Assessing Molecular Information in Natural
History Collections**
Noreen Tuross, *Smithsonian Center for Materials Research and Education*
- 10:00-11:00 Geology Special Interest Group (SIG), *S. Dillon Ripley Center 3037A*
- 10:05-10:20 Coffee Break, *S. Dillon Ripley Center 3113*
- 10:20-12:00 Collecting, Preserving and Accessioning Genetic Resources Technical Session,
S. Dillon Ripley Center Lecture Hall and Room 3037
- 4. Maintaining the Link Between Traditional and Genetic Collections:
Databasing, Loans, and Proprietary Use**
Mark Engstrom, *Royal Ontario Museum, Centre for Biodiversity and
Conservation Biology*
 - 5. DNA Banking - Legal Implications and Conservation Activities**
Michael Fay, *Royal Botanic Gardens, Department of Conservation Genetics*
 - 6. Issues Concerning Loan Policies for Destructive Analysis of Museum Based
Frozen Tissue and DNA Samples**
Robert Baker, *Texas Tech. University, Department of Biological Sciences and
Museum of Natural History*
 - 7. Brief Discussion**
All Participants

11:00-12:00 Conservation Special Interest Group (SIG), *S. Dillon Ripley Center 3037A*

12:00-1:30 Lunch

1:30-3:00 General Business Meeting, *S. Dillon Ripley Center Lecture Hall*

3:00-3:30 Coffee Break, *S. Dillon Ripley Center 3113*

3:00-5:00 Poster Sessions, *S. Dillon Ripley Center 3112*

3:30-5:00 Technical Session, *S. Dillon Ripley Center Lecture Hall and Room 3037*

Moderators: Elana Benamy and Greg Brown

1. An Instructional Design Approach to Collections Online: Who Cares?

Llyn Sharp, *Virginia Tech Museum of Natural History*

2. Conserving the Data in Natural History Collections: Approaches for Automatic Scanning and Digitizing

Arthur Andersen, *Virtual Surfaces Inc.*

3. Reverse Engineering Museum Specimens

Colleen Wivell, *Materialise*

4. Conserving the Data in Natural History Collections: Using Technology to Minimize Wear and Damage on Specimens During Research

Ralph Chapman, *Smithsonian Institution, National Museum of Natural History, ADP*

6:00-10:00 **Banquet and Dance**

The annual banquet and dance will be held on the cruise ship *Odyssey*. Experience our nation's capital from a fun and unique point of view with a dinner cruise on the Potomac River. This three-hour river boat cruise includes a dinner buffet, unlimited beverages (beer/wine and non-alcoholic), live music, dancing, and monumental views. Boarding and open bar start at 6:00pm, with the cruise from 7:00pm to 10:00pm. Dinner attire/jackets are recommended. The closest Metrorail station is the Waterfront stop on the Green line (about 1.5 blocks from the ship boarding area). There is complimentary parking at the 6th and Maine Street parking lot.

Friday, July 2

- 8:00-10:00 Registration, *S. Dillon Ripley Center 3108*
- 9:00-10:00 Paleobiology Special Interest Group (SIG), *S. Dillon Ripley Center 3037A*
- 9:00-10:30 Repatriation of Anthropology Collections Technical Session, *S. Dillon Ripley Center Lecture Hall and Room 3037*
Moderators: Bob Fisher and Rob Huxley
1. **Introduction**
Dennis Stanford, *Chairman, Department of Anthropology, National Museum of Natural History, Smithsonian Institution*
 2. **“Traditional Care” at the National Museum of the American Indian: Building Lasting Relationships with Indigenous Communities**
Jim Pepper Henry and Terry Snowball, *Smithsonian Institution, National Museum of the American Indian*
 3. **When Objects are More Than Objects: Living Objects in Natural History Collections**
Chuck Smythe, *Smithsonian Institution, National Museum of Natural History, Repatriation Office*
 4. **Object Documentation as Virtual Preservation: Archival and Literature Research into the Herbert W. Krieger 1934 Collection From the Lower Columbia River**
Gayle Yiotis, *Smithsonian Institution, National Museum of Natural History, Repatriation Office*
 5. **The Return of Funerary Objects: Handling, Storage and Analysis of Collections**
Laurie Burgess, *Smithsonian Institution, National Museum of Natural History, Department of Anthropology, Office of Repatriation*
- 10:00-11:00 Zoology Special Interest Group (SIG), *S. Dillon Ripley Center 3037A*
- 10:30-11:00 Coffee Break, *S. Dillon Ripley Center Lecture Hall 3113*
- 11:00-12:00 Botany Special Interest Group (SIG), *S. Dillon Ripley Center 3037A*
- 11:00-12:00 Repatriation of Anthropology Collections Technical Session, *S. Dillon Ripley Center Lecture Hall and Room 3037*
6. **Preservation by Mutual Agreement: the NMNH and Nunivak Island, Alaska, Repatriation Experience**
Stuart Speaker, *Smithsonian Institution, National Museum of Natural History, Repatriation Office*

7. Legal Definitions and Concepts in Repatriation

Lauryl Grant, *Smithsonian Institution, Office of the General Counsel*

8. Implementing a “True Compromise”: The Native American Graves Protection and Repatriation Act

Tim McKeown, *National Park Service, Archeology & Ethnography*

9. Impacts of NAGPRA: Dealing with Culturally Sensitive Material at the Denver Museum of Natural History

Ryntha Johnson, *Denver Museum of Natural History*

12:00-1:30 Lunch

1:30-3:30 Technical Session, *S. Dillon Ripley Center Lecture Hall and Room 3037*

Moderators: Iris Hardy and Linda Thomas

1. A Survey of the Adhesives and Consolidants Used by Bryozoan Researchers and the Implications for Natural Science Collections

Caroline Buttler, *The National Museums & Galleries of Wales*

2. Storing Oversized Objects in the Department of Anthropology: Aluminum Pallets with Open Framing

Sunae Park Evans, *Smithsonian Institution, National Museum of Natural History, MSC Move Office*

3. Plaster Specimens: A Conservation Challenge

Jean DeMouthe, *California Academy of Sciences*

4. Recovering Microfossil Specimens from Deteriorating Mounting Media

Julia Golden, *University of Iowa, Department of Geology*

5. The Texas Cooperative Wildlife Collection and the Flood: Recovery - Past, Present, and Future

Kathryn Vaughan, *Texas Cooperative Wildlife Collection, Dept. Of Wildlife & Fisheries Sciences, Texas A&M University*

6. Adventures with Moving Dinosaurs: The Diplodocus is Burning

Gretchen Anderson, *Science Museum of Minnesota*

3:00-3:15 Closing Remarks, *S. Dillon Ripley Center Lecture Hall and Room 3037*

7. Closing Remarks

Sally Shelton, President, *SPNHC*

4:00-6:00 Final Council Meeting, *NMNH*

Bus and Shuttle Bus Information

Buses for the Field Trips will be leaving from the east side of the Smithsonian Castle Building on Jefferson Drive, SW at the listed times. Please arrive about 15 minutes early.

Shuttle buses to the Museum Support Center (MSC) and the Garber Facility leave the Constitution Avenue entrance of the NMNH building every hour on the hour, Monday through Friday, 7:00am to 6:00pm. On Tuesday, June 29, there will be a second bus between NMNH and MSC *only* from 11:00am through 8:00pm. It takes about 20 minutes to get from NMNH to MSC/Garber on the shuttle bus.

Pertinent Addresses

S. Dillon Ripley Center
Smithsonian Institution
1100 Jefferson Drive, SW
Washington, DC 20560

Odyssey Cruises
Gangplank Marina
600 Water Street, SW
Washington, DC 20024

Smithsonian Castle
Smithsonian Institution
1000 Jefferson Drive, SW
Washington, DC 20560

National Museum of Natural
History (NMNH)
Smithsonian Institution
10th & Constitution Avenue, NW
Washington, DC 20560

Museum Support Center (MSC)
Smithsonian Institution
4210 Silver Hill Road
Suitland, MD 20746

Garber Facility/Silver Hill
Smithsonian Institution
3904 Old Silver Hill Road
Suitland, MD 20746

Metro

Washington, DC and the metro area is easily accessible by the clean, safe Metro service. Metrorail and Metrobus are convenient to just about all of Washington's most popular places. Metro stations open at 5:30 am weekdays and at 8:00 am weekends. Metro closes at midnight. Fares depend on when and how far you travel, with the base fare being \$1.10. One day passes with unlimited rides cost \$5.00.

Abstracts

Conserving the Data in Natural History Collections: Approaches for Automatic Scanning and Digitizing

Andersen, Arthur and Chapman, Ralph E.

Virtual Surfaces Inc. 832 E. Rand Rd., Suite 16, Mt. Prospect, IL 60056 USA; ADP, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560-0136 USA

Museums are responsible for maintaining and preserving specimens, although wear and damage are inevitable through time. Some specimens, however, are more susceptible to damage than most either due to their extreme fragility or extremes in their size or shape. Whenever special handling is required, the amount of damage that occurs during handling can increase significantly. Museum specimens provide data, however, in a broad range of contexts and it is important that we extract as much of it as possible before it is lost to the inevitable wear and damage that will occur. Recent developments in modern technology allow us to extract morphological data in three-dimensions with relatively little damage to specimens. This is done primarily through three-dimensional digitization and scanning using a broad range of technologies. Point digitizers extract the coordinates of selected points, often through touching the specimen with a probe, or focusing a light beam on the point. Scanners automate the process and typically use non-contact technology. Computerized Tomography (CT) and related scanners, generate accurate, three-dimensional models and can provide details on internal structure. Surface scanners provide very detailed data for the exterior of objects. Each device fills a unique niche in three dimensional work and no single unit fills all needs. Once these data are available, digital editing prepares it for further use, including manipulation in virtual space, producing animations and other graphical representations, or generating three-dimensional hard copy, called prototypes. Three-dimensional data can easily be sent through the Internet rapidly, even for very large specimens.

Oral Presentation

July 1, Afternoon

Adventures with Moving Dinosaurs: The Diplodocus is Burning

Anderson, Gretchen

Science Museum of Minnesota, 30 E. 10th St., St. Paul, MN 55101, USA

The Science Museum of Minnesota holds approximately 1.75 million collections in paleontology, biology and anthropology. The collections and the museum programs have outgrown the current facilities and a new improved facility was recently completed. It is located on the banks of the Mississippi River, ten blocks from the current buildings. The formal public opening is December 11, 1999. One of the featured exhibits is a new paleontology hall that includes mounted dinosaurs and Oligocene mammals. Planning the move for collections and exhibitions has been an ongoing activity for the past several years. It has been both extensive and stressful. The first collections moved and re-installed were the dinosaurs in the paleontology hall. The first into the new building was a mounted *Camptosaurus*. The paleontology move was planned in two phases to facilitate disassembly, moving and reassembly of the mounted dinosaurs and other exhibit components. This presentation summarizes the process of getting large, awkward, and fragile specimens, ranging from articulated skeletons to individual objects, out of the old building and into the new. It includes examination of the overall process, ongoing planning and coordination with other packing and move schedules, and a look at what has been successful and what has not.

Oral Presentation

July 2, Afternoon

Tocuila, An On-Site Paleontological Museum

Arroyo-Cabrales, Joaquín¹, Morett A., Luis², and Polaco, Oscar J.¹

(1) Laboratorio de Paleozoología, INAH, Moneda 16, Col. Centro, 06060 México, D.F.; (2) Museo Nacional de Agricultura, UACH, 56230 Chapingo, Edo. México.

The paleontological site Tocuila is located about 40 km east from México City, downtown at the village of Tocuila, State of México. Construction of a cafeteria in 1996 brought to light one of the most important Quaternary sites in México. The excavated area spread over 30 m², in which there are a large number of bones (around 800), mainly pertaining to at least five individuals of the plains mammoth *Mammuthus columbi*.

The initial decision was to undertake a complete standard excavation. It was also decided that most of the materials were left on the site. Such decision was due to both the heavy loads that it could imply to bring the bones into laboratory conditions, as well as the requirements of the landowners and the community people to continue studies there. Later, it was chosen to continue the research activities as a museum project, meaning that any research activities would be carried on along with those activities designed to enhance the educational significance of the site.

The activities in the past three years have allowed to temporarily preserving the site, trying to carefully follow any conservation change that has produced from the start. Temporal and permanent museographic materials have been developed, and will form the basis of the future on-site museum.

Oral Presentation

June 30, Afternoon

Issues Concerning Loan Policies for Destructive Analysis of Museum Based Frozen Tissue and DNA Samples

Baker, Robert, Hager, Britney, and Monk, Richard

Museum of Texas Tech University and Department of Biological Sciences, Texas Tech University, Lubbock, TX 79409-3191, USA

Frozen tissue collections consist of unique samples that are time, geographic and taxon specific, which have the potential to document such biological issues as biodiversity, disease, pollution, etc. The cost of accumulating and maintaining such archives is substantial and is usually born by a broad array of funding sources. Because use is consumptive, there must be a balance between the need for current research and a need for conservation for future use. These issues are most intense when exceptionally rare and taxa are archived. Therefore loan policies must insure wise decisions. Critical information on which such decisions are made should include potential for significant new knowledge, experimental design, skill of the researchers, site of proposed research, proposed quantity of tissue to be consumed, quantity of tissue available for loan, legal issues that relate to the requested tissues, past or planned contribution to frozen tissue collections, collaboration with contributors to collection, other possible benefits to the collection, issues that relate to patent and potential for economic development, etc. At Texas Tech, the following basic restrictions on loan materials include 1) acknowledgment of loan in all resulting publications 2) reprints of work 3) deposit of sequenced data in GenBank or comparable database 4) return of all unused tissues or DNA 5) transfer of materials to another lab without written permission is prohibited 6) tissues can be used for only the proposed study 7) cannot patent any results from tissues without approval from country of origin of the tissues and from Texas Tech University. The future of frozen tissue collections and issues that relate to such materials is discussed.

Oral Presentation

July 1, Morning

The JLB Smith Institute National Fish Collection: A New, Exciting Future

Bentley, Andrew C.

JLB Smith Institute of Ichthyology, Private Bag 1015, Grahamstown, 6140 South Africa

The JLB Smith Institute of Ichthyology, a museum affiliated to Rhodes University, was founded after the death of JLB Smith in 1968. In 1980 the Institute was proclaimed a Declared Cultural Institution and is accredited with the Southern African Museums Association. In 1999 it was declared a National Facility and now falls under the auspices of the National Research Foundation (NRF). The fish collection at the JLB Smith Institute represents the largest collection of southern African fish in the world. It is the largest ichthyology collection in Africa and the second largest in the southern hemisphere. The collection consists of over 60 000 lots encompassing well over 750 000 specimens. The collection consists primarily of an alcohol preserved wet collection but includes a dry collection of skeletons and shark jaws, x ray plates, photographic slides and art material. The collection contains marine, freshwater and estuarine fish from southern Africa and beyond. The collection is housed in the basement of the Institute on approximately 2 kilometres of shelving and is protected by a Halon gas fire detection unit. The collection is undergoing rapid change and employing new and exciting collection procedures. Four problem areas will be highlighted and discussed - these being space, collection database, storage bottles and tissue sample facilities.

Oral Presentation

June 30, Afternoon

Federally Funded Partnerships Support Collection Management Programs in the Department of Invertebrate Zoology, National Museum of Natural History

Bright, Cheryl F.

Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington DC 20560

The National Museum of Natural History has a long history of collection-related partnerships with other federal agencies and organizations. Beginning with the collections of the US Exploring Expedition (1838-1842) and continuing with today's collaborations with the Department of the Interior, the National Science Foundation and the National Cancer Institute, the archiving and management of major programmatic collections are a significant part of the collection management activities in the Department of Invertebrate Zoology. Typically these collections resulted from biodiversity surveys or environmental impact studies, but properly archived and documented they are of significant future research value. Most of these programmatic collections are taxonomically and geographically redundant - a significant strength that permits innovative uses of these collections that cannot be supported by the more limited or restricted holdings typical of natural history collections. Before committing scarce resources to the long-term maintenance of these programmatic collections, careful consideration must be given to the potential research and educational value of the collections and an analysis of the expected archiving costs must be done. Realistically, these costs cannot be covered by a museum through its general collection management budget. It is critical that natural history museum administrators and collection managers work to educate the government agencies involved with amassing collections that they (the agencies) have a responsibility to insure the long-term care of these collections, and that they must fund collection archiving as a fundamental cost of a survey program.

Oral Presentation

June 30, Afternoon

Environmental Protection Agency Resources Available to Small Laboratories
Brown, Karen V.

Small Business Ombudsman, U.S. Environmental Protection Agency, 401 M Street, S.W., Rm. 3423-M (2131), Washington, D.C. 20460

Regardless of whether a museum or botanical garden already has an established hazardous waste disposal program, the regulations and paperwork often seem overwhelming and frustrating for most collections research and management staff. The EPA Small Business Ombudsman assists small laboratories, businesses, and small quantity hazardous waste generators in cutting through the "red tape" by:

- * Providing a convenient way to access EPA through a hotline, publications, and audio-visual materials;
- * Working with EPA technical experts to respond to your regulatory questions;
- * Tracking EPA policies and regulations affecting for you, and advocating your concerns inside EPA;

An important function of this office is maintaining open communication with professional organizations, such as SPNHC. This presentation will focus on the resources and contact points available to help museums understand hazardous waste regulations, including waste minimization and treatment options.

Oral Presentation

June 30, Morning

A Portrait of Southern California's Plant Diversity: The Riverside Municipal Museum's Clark Herbarium

Bryant, James and Neitzel, Dana

Riverside Municipal Museum, 3580 Mission Inn Avenue, Riverside, CA 92501, USA

Currently housing close to 10,000 dried and pressed specimens, the Clark Herbarium is equipped to provide scholars, educators and naturalists with information on the plant diversity from ten counties in southern California. As a whole, the state of California possesses a greater variety of animal and plant species than just about any other comparable geographic area, outside of a tropical rainforest. And of this diversity, the Riverside region is endowed with a considerable share, in large part due to the enormous variation in topography and climate that occurs over a relatively small horizontal distance.

The Clark Herbarium serves as a "reference library" of evidence of that plant diversity; what species may be lost and what might yet be saved. To date, over 5,000 Clark Herbarium specimens have been fully inventoried and cataloged with over 1,000 of these reproduced and archived in digital format. Step by step procedures employed in the current inventory include detailed field data records and condition reports recorded in Argus for Windows [Questor Systems, Inc.], plus creation of specimen images using a flatbed scanner and QScan [Questor Systems, Inc.] imaging software. Utilization of this digital information involves public access via the Internet. Through use of an interactive image map, lists of flora by plant community are displayed on the Riverside Municipal Museum's web site at <http://www.ci.riverside.ca.us/museum>.

Poster

July 1, Afternoon

The Return of Funerary Objects: Handling, Storage and Analysis of Collections

Burgess, Laurie

Smithsonian Institution, National Museum of Natural History, Department of Anthropology, Repatriation Office, Washington, DC 20560

The repatriation of funerary objects has raised a number of collections issues for the museum community. Central to these concerns are the storage and handling of the collections, the degree to which they should be studied prior to return, the standardization of analysis, the use of an inventory system used to record data and track objects, and the photographing of objects. The Repatriation Office at the Smithsonian Institution's National Museum of Natural History has created a set of protocols for this process. Currently, the protocols are being followed for a large collection of Northwest Coast funerary objects being studied prior to being returned. Containing thousands of objects, the collection consists predominantly of historic materials such as metal, historic ceramics, and glass, including over 50,000 glass trade beads. The Repatriation Office hired a historical archaeologist as a contractor to work full-time on the analysis of this collection. The study of these objects provides an example of one museum's approach to handling, storing, and identifying funerary objects. But, in the midst of preserving cultural information, the analysis of funerary collections also raises issues involving the sensitive and appropriate treatment of objects.

Oral Presentation

July 2, Morning

Biological Testing for Toxic Exposures

Burroughs, G. Edward

National Institute for Occupational Safety and Health, 4676 Columbia Pkwy., Cincinnati, OH 45226

Biological testing is a concept familiar to anyone who has ever had a breath test for alcohol by their friendly law enforcement officer. Biological monitoring techniques were also used in recent years to investigate the hypothesis that Napoleon Bonaparte was murdered by arsenic poisoning, although different biological specimens were used since it had been over 150 years since Napoleon had last breathed. Biological monitoring is also one of the techniques currently being used by the National Institute for Occupational Safety and Health to investigate workers' exposures in the restoration and preservation of artistic and historic artifacts. By measuring solvents in exhaled breath or metals in urine, it is possible to estimate a persons' exposure to those substances by inhalation, skin absorption, and ingestion. An aim of this investigation will be controlling those exposures and improving the health of workers in these professions.

Oral Presentation

June 30, Morning

A Survey of the Adhesives & Consolidants Used by Bryozoan Researchers and the Implications for Natural Science Collections

Buttler, Caroline¹ and Spencer Jones, Mary²

1. Department of Geology, The National Museums & Galleries of Wales, Cathays Park, Cardiff, CF1 3NP, Wales, U.K.; 2. Department of Zoology, The Natural History Museum, Cromwell Road, London, SW7 5BD, U.K.

Museum professionals working with natural science collections are now increasingly aware of conservation issues and ethics. The products used for remedial conservation are generally chosen with care and recorded on conservation reports. However a large percentage of new natural science acquisitions are research collections. Do researchers choose adhesives and consolidants with conservation implications in mind? To answer this question, researchers were surveyed to identify which adhesives and consolidants they used, what they were used for and why they were used. The survey also asked if any information was given to museums about the products used in the preparation of the specimens.

The survey group was the International Bryozoological Association researching living and fossil bryozoans (aquatic colonial metazoans). The group surveyed included zoologists and palaeontologists from five continents and ranging in age from 22-92.

The results of the survey indicated that the majority of the researchers were unaware of current conservation procedures. The adhesives and consolidants employed were commonly used either because they were the traditional method or were easily bought locally. Very few of the survey respondents gave information about products used to the museums when the collections were donated. This could have serious consequences for the long-term preservation of the collections. Effort must be focused on educating natural science researchers in basic conservation issues, perhaps by beginning with natural science graduate students.

Oral Presentation

July 2, Afternoon

Conserving the Data in Natural History Collections: Using Technology to Minimize Wear and Damage on Specimens During Research

Chapman, Ralph E. and Andersen, Arthur

ADP, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560-0136 USA; Virtual Surfaces Inc., 832 E. Rand Rd., Suite 16, Mt. Prospect, IL 60056 USA

Conservation occupies a critical position between research and collections. While research provides the main context where most natural history collections have their greatest use and meaning, the act of doing research on specimens can cause wear and damage to the specimens. It is important to minimize this damage and, when specimens need to be used and, inevitably, some damage and wear will occur, it is important to extract the maximum amount of data possible. Proper use of modern technology can do just this. Where measurement data need to be taken physically from specimens, the use of three-dimensional, point digitizers and digitizing landmark points will provide vastly more data and damage specimens far less than the taking caliper measurements. The landmark coordinates also allow other forms of analysis, such as geometric shape analysis. At a higher level, surface and CT scanning enable virtual specimens to be constructed at very low risk to them. This allows subsequent and repeated mensuration of specimens in virtual space with no further wear or damage. The virtual data also allow a great array of further research opportunities, including detailed animation, biomechanical analysis, and taxonomic and evolutionary studies. These data also can be directly used for educational and/or exhibition uses, also with no further risk. Finally, these three-dimensional models allow the bonus of non-destructive casting using prototypes, which can save significant damage to many specimens, and allow variation in the scale of the results (e.g. big things made smaller or small things made bigger).

Oral Presentation

July 1, Afternoon

The Biological Voucher Specimen and Its Benefits to Scientific Research

Cordeiro, James (Jay) R.

Department of Invertebrates, American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024 USA

Examination of natural history collections has always been the basis for scientists undertaking studies of systematic nomenclature of extinct and extant animals and plants. A link between the non-taxonomist and the natural history collection exists in the voucher specimen. Voucher specimens are scientific specimens preserved and subsequently deposited into a research collection to support the results of a particular piece of research or analysis. Taxonomists are well-aware of the importance of depositing voucher specimens into natural history collections. In disciplines other than taxonomy, voucher specimens are frequently not deposited and their benefits to the scientific community are lost. It is the responsibility of the taxonomist to stress the necessity of including voucher material in every study of natural history involving any biological specimens, living or dead. The merits of keeping voucher specimens are reviewed and the benefits to the scientific community outlined. Guidelines the deposition of vouchers are provided including the nature of the voucher, donor responsibilities, and voucher preparation. Steps in the curation and storage of vouchers upon receipt by the repository are also described briefly.

Oral Presentation

June 30, Afternoon

Preserving a Giant Squid in New York City

Cordeiro, James (Jay) R. and Hussaini, Bushra

Department of Invertebrates, American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024, USA

On June 10, 1998, the American Museum of Natural History (AMNH) received its first specimen of giant squid, *Architeuthis kirki* Robson, 1887, in its 130-year history. The specimen arrived from the Chatham Rise off New Zealand where it was accidentally caught in December, 1997, by commercial fishermen. The eight meter, ca 250 kg squid was donated to the Museum from the New Zealand National Institute of Water and Atmospheric Research (NIWA). Transport of the squid halfway around the world from Wellington to New York involved refrigerated trucks and air cargo. Prior to transport, plans were underway for the arrival of the squid in New York. Accession paperwork was completed and import/export permits obtained. A 1500-liter stainless steel storage tank was secured for fixation, preservation, and storage. Upon arrival, the still-frozen squid was transported by freight elevator to a preparation area with fume hood. Fresh tissue samples were taken and the beak and radula removed and preserved in 95% ethyl alcohol. A mature spermatophore was discovered in the mantle cavity. The specimen was injected with and fixed in a bath of 10% saline formalin solution and maintained for two weeks with careful buffering in the first four days (ultimately with sodium bicarbonate) to conserve the delicately toothed sucker rings. It was then bathed in repeated freshwater washes for five days and transferred to 75% ethyl alcohol. The result is a highly intact specimen and one of few males on record. The excellent state of preservation will likely provide valuable scientific insights into the morphology and life history of these mysterious and elusive creatures.

Poster

July 1, Afternoon

**History, Statistics, and Collection Management for the National Museum of Natural History,
Department of Invertebrate Zoology's Department of the Interior's Collection Archiving Project
Dearie, Thomas M., Gutknecht, Michael F. and Nickens, Tyjuana**

*Department of Invertebrate Zoology, The National Museum of Natural History, Smithsonian Institution,
Washington DC 20560-0163, USA*

The Smithsonian Institution and the Department of the Interior, Mineral Management Service (MMS)/ Biological Research Division (BRD) reached an agreement in October 1979 for the National Museum of Natural History (NMNH), Department of Invertebrate Zoology (IZ) to carry out the sorting, cataloging, curation, and archiving of a collection of marine invertebrate specimens taken from US coastal waters (primarily the East and Gulf Coasts) during various oil and gas lease site baseline surveys. These studies sampled existing biological communities along the continental shelf to determine the impact that prospective oil/gas explorations might have on these areas. The impetus for this agreement was for NMNH to acquire a valuable and substantial marine invertebrate collection.

As of April 1999, 165,060 specimen lots from the 17 collection areas in the study have been cataloged and curated by IZ museum technician staff. 167,951 lots remain to be cataloged. The current MMS/BRD staff at NMNH has focused on crustacean and worm specimens from the Panama collection area. This display presents a brief account of the 17 MMS/BRD collection programs, including locality and statistical data, with an emphasis placed on the 20 stations comprising the Panama collection. A procedural account followed by the MMS/BRD staff will also be presented, including data capture, data entry, specimen preservation, and curation of specimens into the museum collections.

Poster

July 1, Afternoon

Interdisciplinary Uses of Natural History Collections

DeMouthé, J.F.

California Academy of Sciences, Golden Gate Park, San Francisco, California 94118, USA

Non-traditional use of natural history collections held by museums and universities has increased dramatically in recent years. Exhibit, teaching, and research within a single field of science are still the principle uses of specimens. But cross-subject utilization of specimens is becoming more common. For example, as technology in all fields of science has improved, the potentials for using natural inorganic compounds (minerals) in research has expanded to include fields such as medicine, chemistry, physics, astronomy, archaeology, and botany. Research and teaching opportunities arise for geologists as a result of these alternative uses of collections; collaborative efforts among scientists, students, and teachers involving more than one field of science.

Multi-disciplinary use of collections are mutually advantageous to all involved. There may also be financial and administrative reasons to seek out non-traditional users for a collection. In these days of tight budgets and restricted staff time, it is often necessary to explain and justify the existence of collections. By demonstrating the benefits and possibilities of multi-disciplinary uses of specimens, the worth of a collection may be reinforced in the minds of administrators and other decision-makers.

Oral Presentation

June 30, Afternoon

Plaster Specimens: A Conservation Challenge

DeMouthé, J.F.

California Academy of Sciences, Golden Gate Park, San Francisco, California 94118, USA

Plaster has been used for many years to model and cast natural history specimens. In some cases, plaster casts represent the only record of original specimens that have now been lost for one reason or another (fire, war, stupidity, etc.). Most natural history collections contain at least a few old casts, as well as newer, recently-made plaster specimens. Plaster or gesso may also be found in other places in a museum, such as exhibit mounts, picture frames, repairs or mounts on specimens, or as part of art or anthropological objects. The conservation challenges of plaster involve its variable composition and the subsequent variability of its properties. It is susceptible to a range of potentially damaging environmental factors, including humidity, pH, and temperature.

For the most part, plaster specimens may be treated like any other potentially unstable material in a collection. If protected from extremes of heat and temperature, from rapid environmental changes, from water, and from contact with other reactive compounds, plaster specimens may last indefinitely. Unfortunately, many older plaster objects have been mistreated and may now show the effects in the form of dehydration, cracking, expansion, or discoloration. When remediation is necessary, a little conservation work goes a long way. Often, simple cleaning and rehousing may be all that is needed. If massive amounts of work are necessary to preserve a plaster specimen, it might be easier (if possible) to just make another one.

Oral Presentation

July 2, Afternoon

Collection, Storage and Preservation of Vertebrate Genetic Resources: A Perspective From the Burke Museum

Edwards, Scott V. and Birks, Sharon

Burke Museum of Natural History and Culture, University of Washington, Box 353010, Seattle, WA 98195

There are a variety of methods for collection and storage of vertebrate blood and tissues samples for DNA analysis, including storage in non-cryogenic buffers, ethanol and storage in ultracold freezers or liquid nitrogen. Here we review the advantages and disadvantages of each of these methods with particular reference to our experience with the Burke Museum Genetic Resources Collection. With about 14,000 vertebrate individuals represented (mostly birds), this collection is among the top five such collections for birds in the U. S., and is actively growing at a rate of about 1,500 individual vertebrates represented per year from all continents except Antarctica. We have made use of both non-cryogenic and cryogenic (liquid nitrogen) methods of field storage, and, for reasons of expense and convenience, plan to house all tissue samples in ultracold freezers regardless of method of field collection. The particular method of field collection and long-term storage used will often dictate the range of biochemical analyses that can subsequently be carried out on the samples. In addition there is a need for special field collection and storage methods for particular genetic resources from exemplar species that can be used to conduct a wide arrange of molecular analyses. For example, current methods of field collection and storage make it highly unlikely that RNA can be used as a molecular systematic marker, yet RNA can be extremely valuable for certain questions in evolution and systematics. We suggest that the range of possible molecular analyses can be widened by rapid field freezing and possibly even establishment of cell lines for key exemplar species of particular scientific value.

Oral Presentation

July 1, Morning

Maintaining the Link Between Traditional and Genetic Collections: Databasing, Loans, and Proprietary Use
Engstrom, Mark

Royal Ontario Museum, Centre for Biodiversity and Conservation Biology, Toronto, Ontario, Canada

Abstract not available at press time.

Oral Presentation

July 1, Morning

Packing for Repatriation: Issues and Choices

Eubanks, Beth, Bruemmer, Betsy, and Makseyn-Kelley, Stephanie

Repatriation Office, The National Museum of Natural History, Washington, DC 20560-0138, USA

The collections at the National Museum of Natural History which are subject to repatriation fall into the following categories: human remains, associated and unassociated funerary objects, sacred objects, and objects of cultural patrimony. The sensitive nature of these remains and objects influences the manner in which they are packed for shipment to the tribes. In addition to providing physical protection for objects in transit, packing choices offer an opportunity to communicate respect for tribal traditions and improve the relationship between the museum and the tribal community.

Beyond the standard factors of time, expense, mode of transport and related regulations, the choice of packing materials is influenced by the nature of the object, the wishes of the tribe, related cultural traditions and the final disposition (reburial or preservation).

Since the inception of the 1989 NMAI Act, the NMNH has returned the remains of over 3,000 individuals and approximately 1,000 objects. Drawing on a number of repatriation cases, this poster will illustrate a variety of packing methods which have been employed and the reasons these choices were made.

Poster

July 1, Afternoon

Storing Oversized Objects in the Department of Anthropology: Aluminum Pallets With Open Framing

Evans, Sunae Park and Hansen, Greta

Smithsonian Institution, National Museum of Natural History, MSC Move Office; Smithsonian Institution, National Museum of Natural History, Department of Anthropology, Anthropology Conservation Laboratory

At Completion, Pod 4 of the Smithsonian's Museum Support Center will provide palletized storage for oversized and heavy objects coming from various departments within the National Museum of Natural History - Mineral Sciences, Paleobiology, and Anthropology. After completing the transfer of its two million archeological and ethnographic objects to high-density storage in the summer of 1997, the Department of Anthropology began investigating options for its 600 oversized objects that were destined for the palletized storage system. While palletized storage of objects is not new to some museums, it represented a new set of challenges for the Department of Anthropology. Objects to be palletized included plaster casts, wooden and lacquered furniture, stone sculptures, stone mortars, metates, bronze statuettes, large porcelain vases and over 100 watercraft of varying construction. Many of these objects had been stored in the poorest of conditions - without humidity and temperature controls, collapsed storage systems, and limited pest management - and were damaged as a result. Primary requirements for storage for the Department of Anthropology included accessibility to collections due to researcher interest in the collections and the use of inert materials used in long-term contact with objects. Protection from dust, light and water also were important considerations. After evaluating various storage options, we selected a textile-draped, aluminum pallet with open framing constructed of aluminum. Preliminary efforts at palletization of badly damaged plaster casts have validated our choice of this storage solution.

Oral Presentation

July 2, Afternoon

DNA Banking - Legal Implications and Conservation Activities

Fay, Michael

Royal Botanic Gardens, Department of Conservation Genetics, Jodrell Laboratory, Kew, Richmond, Surrey, TW9 3DS, United Kingdom

Abstract not available at press time.

Oral Presentation

July 1, Morning

Moving Small Articulated Skeletons

Geer, Christine

*National Museum of Natural History, Smithsonian Institution, MSC Move Office, Room CE 325 MRC
117, 10th & Constitution Ave., Washington, DC 20560 USA*

The Museum Support Center Move Office of the Smithsonian Institution's National Museum of Natural History specializes in the preparation, packaging, transport, unpacking and storage of natural history collections. In the ongoing move of collections from the Natural History building located on the National Mall in downtown Washington, DC to the Museum Support Center in Suitland, Maryland a collection of small articulated bird skeletons had to be moved.

Moving articulated skeletons presents a special challenge. Extremely fragile pieces and awkward shapes require careful, cushioned packing to prevent damage. The packing method developed by the Move team for this project used existing supplies, such as plastic bags, ethafoam planks, blue board and polyurethane foam, and allowed us to safely move over 50 bird skeletons with no damage to the specimens.

Poster

July 1, Afternoon

The Role of Natural History Museums in Taking Care of Materials of Endangered Species Involved in Trials

Gisbert, Julio

Museo Nacional de Ciencias Naturales, C/ J. Gutiérrez Abascal, 2, Madrid, 28006, SPAIN

The progressive hardening of legislation on environment and wildlife conservation has originated a growing number of juridical processes. In many of these trials, animal and plant remains are involved as key proofs to clarify potential crimes. Related to animals, proofs are usually the remains resulting from analyses and/or necropsies. Often, additional tests of these remains are necessary to verify previous analyses, and absence of them may lead to the revocation of the indictment because of the lack of proof. These facts suggest that an adequate preservation of animal remains is necessary. All kind of tissues: skeleton, skin, muscle, blood, and so on, should be correctly stored for potential tests until the trial is over. Remains should be also correctly preserved to ensure that after the trial they can be preserved following standard museum techniques. This is the most difficult requirement, because necropsies usually damage the specimens in such a way that their utility as museum specimens is dramatically lessened. We have prepared 32 birds belonging to endangered species, dead under differing circumstances. We comment on the different problems faced and questions posed during the process, and several solutions are offered. The role of natural history museums to take care and develop these activities is discussed.

Poster

July 1, Afternoon

Recovering Microfossil Specimens From Deteriorating Mounting Media

Golden, Julia

University of Iowa, Department of Geology, Iowa City, IA 52242, USA

Deteriorating mounting media, seen under a microscope as a fine network of black cracks, can completely obscure specimens from view. Fusulinids, rice-sized microfossils, are prepared as oriented thin sections. It is not uncommon for two or more different mounting media to be used. Historically Canada Balsam, a natural resin, was used, and slides 200 years old show no signs of deterioration. However, synthetic resins, less than 50 years old, are beginning to crack and become opaque.

Before attempting to remount the type specimens, each visible specimen was documented photographically on film and digitally in case releasing the planchettes from the mounting media proved impossible. Identifying the appropriate solvent for the resins was a matter of trial and error. Test planchettes have been remounted successfully. Remounting the type specimens awaits the decision of which medium to use, Canada Balsam or a modern adhesive cured by ultraviolet light. Attempts to identify unknown mounting media by chemical or spectroscopic methods are in progress but have not proved successful.

Paleontology collections are not the only ones affected. The number of different mounting media used in biological collections is staggering. I hope this preliminary effort to document the conservation problems of mounting media will spur others to expand the investigation to biological materials.

Oral Presentation

July 2, Afternoon

Legal Definitions and Concepts in Repatriation

Grant, Lauryn Guttenplan

Smithsonian Institution, Office of the General Counsel, 1000 Jefferson Drive, S.W., Washington, D.C. 20560-0012

The National Museum of the American Indian Act, which governs repatriation at the Smithsonian, and the Native American Graves Protection and Repatriation Act, NAGPRA, which governs repatriation at all federal agencies and entities that receive federal funds, contain several definitions of types of Native American property eligible for repatriation. By defining terms such as "sacred object" and "cultural patrimony," the repatriation laws confer legal status on what are primarily concepts of anthropology and religion. Until these laws were passed, traditional concepts of western property law had not been applied to tribal or communally owned property of this type. This transformation of cultural property concepts into legal definitions creates interesting problems for those trying to interpret and apply the law to repatriation claims. In this discussion, the legal definitions and their application to specific repatriation cases, will be discussed and analyzed.

Oral Presentation

July 2, Morning

Slides: Getting Them There in One Piece

Harrison-Nelson, Elizabeth

Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560-0163, USA

The Department of Invertebrate Zoology receives many glass slides of small specimens, or parts of specimens, each year. Unfortunately, many of them arrive broken or damaged in other ways. At times identification of individual slides in large shipments is difficult because of unclear labeling.

This poster presents methods and materials for preparing slides for shipment, and offers suggestions for labeling.

Poster

July 1, Afternoon

Digitizing, Conserving and Rehousing a 17th Century Plant Collection

Huxley, Robert

Department of Botany, The Natural History Museum, Cromwell Road, London SW7 5BD, UK

The Natural History Museum, London, UK holds many important historical collections from the 17th and 18th centuries including those of Sir Hans Sloane, Joseph Banks, John Clayton and George Clifford. These collections are currently held in far from ideal conditions and parts of the Sloane herbarium in particular are in need of remedial conservation. Furthermore due to their fragility and value access is restricted and the material rarely loaned. A project was set up in 1997 to carry out a survey of the condition of these collections, to rehouse them in a suitable environment, repair damage and make the collections more accessible via the world wide web and on CD ROM. A campaign was launched to find funding for this project and more than (Pounds)200,000 has been raised to date.

The condition survey and environmental monitoring identified serious risks from low security, fire, light and fluctuations in temperature and humidity. Environmental pollutants were surprisingly relatively low. Whilst the general condition of those collections in bound volume is fair to good a number of bindings were in a poor state, more than 1000 thousand of the 50,000+ specimens were in need of consolidation and many illustrations required interleaving to reduce abrasion.

A purpose built special collections room has been designed and is now under construction to house these collections with appropriate environmental control, security and reduced fire risk. New cabinets have been designed to store the collections horizontally. In parallel with this work there is a rolling programme to replace and restore damaged bindings and to consolidate specimens.

Protocols have been established for the concurrent digitization of the collections and a digital camera is being used to capture images. A pilot project has been completed and the 18th century North American John Clayton Herbarium is now available for viewing on the World Wide Web. The project is now concentrating on the scientifically and culturally important 17th century Jamaican collections of Sir Hans Sloane and a database of associated taxonomic and other data compiled.

The aim is to have the collection rehoused and priority areas digitized and repaired by the middle of 2000.

Poster

July 1, Afternoon

Report on Attempts to Develop Consensus on Analytical Methods, Risk Assessment Models, and Safe Handling Procedures for Museum Collections With Residual Pesticides

Johnson, Jessica

National Park Service, Museum Management Program, 1849 C. St. NW (NC230), Washington, DC 20240, USA

The problems of residual chemical pesticide treatments on museum objects (archaeological, ethnographic, and natural history) have been known for some time. These residues are especially problematic with archaeological and ethnographic objects that are being repatriated by tribes and returned to individuals in local communities. Recently a variety of research projects and educational resources have been developed by a number of people working on the project from different perspectives including: tribes, conservators, collections managers, industrial hygienists and toxicologists. This report will describe several on-going research projects, outline the various preliminary resources that are available thus far, and describe a cooperative initiative that is being developed to coordinate the dissemination of information to make it widely available to a non-technical audience.

Oral Presentation

June 30, Morning

Health Hazards in Collections: Testing for Arsenic Contamination

Howe, Shelley, Johnson, Ryntha and Southward, Jude

Denver Museum of Natural History, 2001 Colorado Blvd, Denver, CO 80205-5798, USA

This poster presentation will briefly examine the history of pesticide use in museum Anthropology collections, summarize the selection of 512 objects from the Denver Museum of Natural History's collections and illustrate the procedures and set up for the testing process. Three areas of concern represented in this project are: health risks from handling contaminated objects; health risks from performing the tests; cultural sensitivity of the materials being tested.

During their 1997 NAGPRA consultation with DMNH, the Hopi voiced concerns about the possible use of toxic chemicals as pesticides on their Kachina masks. Contamination is of particular concern because the repatriated objects may be used and the wearer would be at risk through direct skin contact with the masks. DMNH used federal grant money to fund a project testing for possible arsenic contamination on selected ethnographic objects. Arsenic was a commonly used pesticide; it remains toxic over a long period of time and it is difficult to remove from objects. There is a simple commercially available test kit which is generally accepted as reliable. The final results of the project were as follows: 512 objects tested. 473 tested negative. One object was found to have a significant level of contamination. 38 tested at very low levels, equivalent to a level commonly found in tap water. All 38 were retested; 25 still resulted in low positives and 13 were found negative. In addition to the report filed with the National Park Service NAGPRA office, a report will be sent to each Native American group that is represented in the testing sample.

Poster

July 1, Afternoon

Impacts of NAGPRA: Dealing with Culturally Sensitive Material at the Denver Museum of Natural History

Johnson, Ryntha

Denver Museum of Natural History, 2001 Colorado Blvd., Denver, CO 80205-5798, USA

The Denver Museum of Natural History has a major collection of Native American material representing most regions within the United States. Following the 1990 legislation (Native American Graves Protection and Repatriation Act - NAGPRA), we have sent out summaries of our collections to over 400 federally recognized tribal governments. In 1994, we began consultations resulting from those contacts and have received 2 federal grants to help pay for travel expenses for 19 tribal delegations. In addition, we have had many other on site visits and numerous requests for information. DMNH views the NAGPRA consultations as an opportunity to exchange information and establish better relationships.

In this presentation, I will address some collection management issues, loans for ceremonial use of objects and insights resulting from our consultations. During the 1980's, our Curator of Ethnology began to identify culturally sensitive materials which we segregated in a separate storeroom. We carefully restrict access to these collections and in many ways treat them differently. The delegations help us determine if these materials are correctly identified and whether they are possibly subject to NAGPRA. We also view objects in the general collections and exhibit areas and discuss recommendations regarding appropriate display or storage. We have completed repatriations to the Hopi and the Tlingit and have allowed objects to be used in related ceremonies. Working with the delegates, especially the elders, has been an extremely rewarding experience.

Oral Presentation

July 2, Morning

Alcoholic Archival Polyester Specimen Labels

Keel, William G. and Moser, William E.

Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, D.C., 20560-0163, USA

A major problem of computer automated specimen labels is their archival quality degradation in long term alcohol storage. Many methods to generate archival quality labels are problematic, as parts are no longer available (daisy-wheel printers) or are not practical for generating large numbers of labels (handwritten). Other readily available methods (dot-matrix and laser printers) have been ineffective as fading, bleeding, or general lack of cohesiveness of ink to paper occurs frequently. The use of a Thermal Printer to generate plastic labels have solved many of these problems. The plastic "ink" is fused into the polyester "paper" at a high temperature and the resulting rigid, yet flexible label is less prone to abrasion and tearing, and highly resistant to fading. The printer also has a highly flexible format and allows for the use of bar-coding. The Thermal Printer generated polyester specimen label is a better option for effective alcoholic archival storage.

Poster

July 2, Afternoon

Exposure Monitoring for Inorganic Arsenic and Mercury Vapor During Move and Collections Management Tasks

Makos, Kathryn A.¹, Dietrich, Elizabeth C.², and Bell, Deborah A.³

1 Smithsonian Institution, Office of Environmental Management and Safety, 490 L'Enfant Plaza, Room 4202, Washington, DC, 20560; 2 National Museum of Natural History, Move Office, 10th & Constitution Ave., NW, Washington, DC 20560; 3 National Museum of Natural History, Department of Botany, 10th & Constitution Ave., NW, Washington, DC 20560

Workplace surveys were conducted to determine the exposure risks to staff from handling collections treated with inorganic arsenic and mercuric chloride. Data indicated that the most likely route of exposure to inorganic arsenic, during routine handling, was dermal absorption or ingestion, not inhalation. Skin and clothing protection, and personal hygiene practices, were employed to control these risks. Work practices were established to minimize particulate generation. Mercury vapor accumulation was significant inside cases with mercuric chloride treated specimens and mounting sheets. However, preliminary results indicate that mercury vapor dissipates rapidly upon case opening, resulting in a much lower inhalation risk. Sufficient area ventilation appears critical to reducing exposures to mercury vapor in general collections areas. Future studies will examine the practicality and effectiveness of various scavenger and vapor removal systems as a preventive maintenance method.

Oral Presentation

June 30, Morning

Report on the National Institute for Occupational Safety and Health Study of Health Hazards and Control Technologies in Museum and Conservation Work

Makos, Kathryn A.

Smithsonian Institution, Office of Environmental Management and Safety, 490 L'Enfant Plaza, Room 4202, Washington, DC 20560

The National Institute for Occupational Safety and Health (NIOSH), part of the Centers for Disease Control and Prevention (CDC), is the premier organization in this country for conducting research into the prevention of work-related illnesses and injuries. NIOSH has begun a comprehensive study to evaluate health risks and develop control technologies related to the use of hazardous substances in museums, art galleries, and other restoration, preservation, and conservation work. Three areas have been identified for initial investigation:

- 1) silica exposure among paleontologists during excavation and fossil specimen preparation;
- 2) heavy metal exposures, specifically to inorganic arsenic on preserved organic specimens, mercury vapor and salts on herbarium specimens, and lead pigments in painting and textile conservation work.
- 3) solvent exposures, particularly chronic and low-level, throughout selected conservation specialty groups.

The end products will be a combination of technical publications documenting the risk assessments, fact sheets with recommendations for cost-effective and practical engineering and work practice control technologies, presentations at related professional association conferences, and development of training programs to meet priority needs of the museum and conservation community (such as respirator training and fit-testing). The study will be ongoing through 2000. Proposed sites for study and results of initial monitoring will be discussed.

Oral Presentation

June 30, Morning

Pampering Crustacean Shipments

Manning, Raymond B. and Reed, Karen J.

Dept. of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, D.C., 20560-0163, U.S.A.

One of us (R.B.M.), while studying geryonid crabs borrowed from other collection, encountered problems in packing these large crabs for return to their owners. One method that was tried, using disposable diapers, proved to be very effective. The benefits of using diapers are numerous: they retain moisture, generally without leaking; the adhesive tabs are waterproof and hold even when moistened by alcohol; they protect outer plastic bag or other wrapping from punctures; sharp parts, like long spines and dactyls, do not get entangled as they often do when specimens are wrapped in cheesecloth; their padding protects large, fragile animals; and they are easily obtainable almost anywhere. They have proved useful for packing large crustaceans, e.g., geryonids, xanthids, lithodids, majids, as well as for packing large samples of smaller decapods, e.g., shrimps and stomatopods.

Poster

July 1, Afternoon

Implementing a “True Compromise:” The Native American Graves Protection and Repatriation Act

McKeown, C. Timothy

National Park Service, Archeology & Ethnography, 1849 C Street NW NC340, Washington, DC 20240

Senator John McCain described the Native American Graves Protection and Repatriation Act (NAGPRA) as a “true compromise” between archaeological, museum, and Native American interests. Taken together, the system of subject parties, parties with standing, purview, and processes outlined in the statute provide a workable compromise for resolving the complex and potentially contentious issues surrounding the disposition of Native American human remains and cultural items.

Oral Presentation

July 2, Morning

The US Antarctic Program at the Smithsonian Institution

Moser, William, Bright, Cheryl and Reed, Karen

Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, D.C., 20560-0163, USA

The National Science Foundation's Office of Polar Programs (NSF-OPP) awarded a grant to the Smithsonian Oceanographic Sorting Center (SOSC) in 1963 to serve as a national archiving and distribution center for natural history specimens and associated data collected by scientists working in the Antarctic and sub-Antarctic Oceans. More than 40 million specimens were processed and in 1992, the SOSC was dissolved as a separate administrative unit and the USAP program, including collections and staff, was transferred to the Department of Invertebrate Zoology. Under a cooperative agreement with NSF-OPP, the NMNH continues its USAP partnership mission.

Large collections of Antarctic and sub-Antarctic natural history specimens [including 74,996 lots of uncataloged and/or unidentified specimens, 97,599 cataloged specimens, and an additional 213,492 specimens currently on loan] are archived at NMNH. Accession and station data for the specimens are readily available and accessible in electronic databases, including a database on the world wide web (<http://www.nmnh.si.edu/iz/usap/>). All USAP specimen and associated data are available for loan to qualified researchers, and funding is available (through an annual competitive review program) to support Antarctic and/or sub-Antarctic collections based research.

Poster

July 1, Afternoon

Natural History and Anthropology Collections in the National Museums of Kenya: Current Status **Mungai, Michael N.**

National Museums of Kenya, P.O Box, 40658, Nairobi, Kenya

There are 11 departments at the National Museums of Kenya (NMK) that hold collections, including: invertebrate zoology, ornithology, herpetology, ichthyology, mammalogy, ethnography, osteology, herbarium, archeology, paleontology, and palynology. With an estimated total collections of 4 million specimens, this is one of the largest tropical museums in the tropics.

The collections represent tropical fauna and flora with a few exotic specimens acquired through exchanges.

Some of the collections are almost 100 years old, donated to the museum (Coryndon Museum) by private European-settler collectors when the Museum was established in 1909. Later the collections were taken over by a new body, the National Museums of Kenya established at independence in 1963.

NMK collections are famous mainly due to the many primate fossil remains that have been discovered in Kenya, some of them so well preserved in the rich volcanic ash of the Rift Valley and in such abundance that you often come across this caption, "East Africa, the cradle of man." There are other collections at the NMK that are perhaps equally important; The herbarium, has probably one of the largest collections of botanical material in Africa and the department of invertebrate Zoology has probably one of the best collections of tropical butterfly fauna in Africa.

These collections at NMK, good as they may be, in our standards, have not reached even half their full potential. A lot of work needs to be done to collect more from the virgin habitats that are disappearing at an alarming rate. NMK has put in place the basic infrastructure for what could be a great Museum in tropical Africa but due to having to choose what our priorities are in a developing economy the full potential at NMK is as yet to be realized.

Oral Presentation

June 30, Afternoon

Progress in Establishing a New Natural History Collection

Paduan, Jennifer

Monterey Bay Aquarium Research Institute, PO Box 628, Moss Landing, CA 95039, USA

The MBARI Sample Archive was established in 1997 to manage at an institutional level the specimens collected for individual marine research projects. Since then, improvements to the ways specimens are stored and their data are managed have been implemented. A wet-collections storage and lab facility has been constructed, specially designed to comply with strict local codes for earthquake and hazardous material safety. A collections policy and curation procedures have been drafted and are on the web. Finally, a data management system has been developed to capture specimen collecting event information, manage the archive inventory, and make this information available over the web. These improvements provide the framework to operate the archive and the tools that enable research teams to participate in the curation and documentation of the specimens.

Oral Presentation

July 1, Afternoon

“Traditional Care” at the National Museum of the American Indian: Building Lasting Relationships with Indigenous Communities

Pepper Henry, Jim and Snowball, Terry

The National Museum of the American Indian, Cultural Resources Center, 4220 Silver Hill Road, Suitland, MD 20746-2863

In support of the Smithsonian Institution’s stated goal “for the increase and diffusion of knowledge,” the National Museum of the American Indian (NMAI) seeks to ensure the appropriate care, handling, treatment and disposition of human remains and culturally sensitive materials in the museum’s ethnographic, archival and photographic collections. This goal is accomplished through the establishment of a “Traditional Care” policy. This policy is implemented with regard to the wishes and concerns of indigenous communities and traditional leaders, and structured within the boundaries of the obvious and reasonable limitations of the museum. This presentation will describe the formulation of the NMAI Traditional Care Policy and the establishment of a committee to oversee traditional care activities. Issues concerning the handling and treatment of culturally “sensitive” objects will be discussed, including the balancing of standard museum practices with tribal traditions, and the disposition of human remains and funerary objects.

Oral Presentation

July 2, Afternoon

Radiological Survey of Paleontological Specimens

Peters, David M.

Smithsonian Institution, Office of Environmental Management and Safety, 490 L’Enfant Plaza, Room 4202, Washington, DC 20560

A radiological survey was conducted on paleontological specimens from the Glens Ferry (Hagerman site) and Morrison formations, which contain naturally occurring radioactive minerals. The survey examined removable contamination and exposure measurements. Personnel dosimetry measurements of staff assigned to pack and move these specimens were within applicable established health standards.

Oral Presentation

June 30, Morning

**The Analysis and Detection of Hazardous Pesticide Residues Present on Herbarium Material
Purewal, Victoria**

Department of Biodiversity and Systematic Biology, National Museum and Galleries of Wales, Cathays Park, Cardiff, South Glamorgan, CF1 3NP

Herbaria have been a major source for botanical research and reference for centuries. Libraries, museums and universities have acquired substantial collections through donation, bequest, collecting and purchase from individual collectors. The nature of the material may be varied and the manner in which it has been prepared may also differ from one collection to the next. Past methods of preservation favoured applications of chemical pesticides and fungicides to the specimens. Pesticide applications have invariably not been documented, therefore identity, quantity and date of application is unknown. This could also suggest that multiple applications have been made to the specimens. It is now apparent that the residues of some of these chemicals have not degraded and therefore still pose a risk to health and safety through working with and handling the material.

A research project was undertaken to detect the presence of chemical residues on herbarium sheets. Once the contamination was detected it was necessary to identify the main chemical species present within the residue, thus determining the pesticide originally applied. The aim was to provide qualitative and quantitative results and to develop a health and safety strategy that would ensure the collections were still accessible without placing staff members or visitors under unnecessary risk.

Oral Presentation

June 30, Morning

Seven Years of Integrated Pest Management (IPM) in the Division of Birds, National Museum of Natural History: The Past Trends and the Future

Schmidt, Brian

National Museum of Natural History, Division of Birds, MRC-116, Washington, DC 20560-0116, USA

For seven years (1991-1997) the Division of Birds at the National Museum of Natural History has been actively involved in a Integrated Pest Management (IPM) program. The program was started in January 1991 by Carla Dove and J. Phillip Angle as a result of the prohibition of the long used prophylactic fumigation agent (Vulcan Formula 72™; 29.8% carbon tetrachloride, 72.2% ethylene dichloride). The target pest of the program is the odd beetle (*Thylodrias contractus*; Family Dermestidae). Since the inception of the IPM program, monitoring for this pest by using sticky traps has been continual until January 1998 when the Division had to vacate for HVAC renovation. The results of the monitoring show trends in the life cycles of the odd beetle, and other insects, which help the staff become more efficient in their efforts to control and revise strategies for dealing with this and other pests.

Poster

July 1, Afternoon

An Instructional Design Approach to Collections Online: Who Cares?

Sharp, Lynn¹, Eriksson, Susan¹, and Cennamo, Kathy²,

1. Virginia Tech Museum of Natural History, 2. Virginia Tech Department of Teaching and Learning, Blacksburg, VA 24061

Many institutions are making the transition from in-house digital collections data on various platforms to having parts of these databases available over the web. This represents a considerable investment. Institutions are under increasing pressure to justify such large expenses by "numbers served" in short (1-2 year) time frames. Expanding the audiences who use collections in a digital, on-line format is a way to garner broader support for collections in general.

The Virginia Tech Museum of Natural History and the Virginia Tech Instructional Technology Division received funding from University Outreach to develop a web-based environment that helps a variety of audiences use collections data. The museum serves multiple audiences including researchers, university students, K-12 education, state agencies, and others. We selected three for this pilot project: discipline-based researchers, K-12 teachers, and undergraduate students in a systematics course.

Previously, the museum developed a schoolyard natural history guide for K-12 teachers to use object-based inquiry in science teaching. It contains the stages in "scaffolding": demonstrating a process, providing enough support for practice, and providing tools for independent performance. That object-based inquiry model has been translated into an online environment to assist novice users in exploring collections data. This scaffold for K-12 contrasts with one for researchers who have vast knowledge of natural history relationships and can go directly to an online index. This instructional design model provides a theoretical and practical pedagogical base for people to interact with objects and their associated information. One database then can be accessed through a variety of scaffolding strategies for research, education, extension, and outreach.

Oral Presentation

July 1, Afternoon

When Objects Are More Than Objects: Living Objects in Natural History Collections

Smythe, Charles W.

Repatriation Office MRC-138, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560-0138, U.S.A.

The quality of being alive is not something that is associated with objects in Euro-American culture and it is not a concern that is usually considered in the preservation, treatment and care of natural history collections. Yet there are items in collections which can be described as "objects which have life." Using examples drawn from consultation visits with Native Americans, this paper discusses several objects in the collections of the National Museum of Natural History that are of this kind. The examination of these cases illustrates the shortcomings of the term 'sensitive objects,' and in other generalized referents such as 'sacred and ceremonial objects,' 'religious objects,' or 'spiritual objects.' Modifications of standard storage and preservation practices for these objects will also be discussed.

Oral Presentation

July 2, Morning

A National Archaeological Collections Management Conference

Sonderman, Robert C.

National Park Service National Capital Region, National Capital Area, Office of Stewardship & Partnerships, 1100 Ohio Drive SW, Washington, DC 20242

Over the past 20 years there have been myriad federal reports, professional papers, and monographs articulating a crisis in the management of our nation's archaeological collections. Despite the introduction of professional guidelines in 36 CFR Part 79, (Curation of Federally Owned and Administered Archaeological Collections) the crisis still exists. A National Archaeological Collections Management Conference was held in November 1998 with invited experts in the fields of collections management, conservation and archives management. These experts addressed issues central to the long-term care of our archaeological heritage with the goal of proposing a plan that could be implemented on a national level. Although this plan addresses archeological issues, it has practical applications to the membership of the Society for the Preservation of Natural History Collections.

Oral Presentation

June 30, Afternoon

Preservation by Mutual Agreement: The NMNH and Nunivak Island, Alaska, Repatriation Experience

Speaker, Stuart

National Museum of Natural History, Repatriation Office, MRC-138, Smithsonian Institution, Washington, DC 20560-0138

The NMNH successfully completed the repatriation of the human remains of the ancestors of the Ch'upik people of Nunivak Island, Alaska, in 1996. This came about following consultations between the museum and the Nunivak Islanders which resulted in a series of agreements regarding the documentation, curation, and preservation of the collections. First, the museum arranged to have the skeletal remains inventoried and documented in detail at the University of Alaska. This arrangement allowed the Islanders to monitor the process closely and did not delay the final return. Second, the museum and the Islanders are close to finalizing an agreement for joint custody of the funerary objects; under the agreement the artifacts will remain at the museum and will be available for research and other uses subject to mutual agreement. During the consultations, a delegation of Ch'upik elders visited the museum to examine the entire collection. This visit was highly successful and resulted in substantial information sharing between both groups. From the elders' memories, the Islanders were able to obtain a great deal of vocabulary and lore related to traditional material culture which is no longer in use on the island. This information is being incorporated into a Ch'upik dictionary project underway to help preserve their language. The museum was also able to add a great deal of data to its catalog records from the identification, names, and descriptions of the artifacts.

Oral Presentation

July 2, Morning

The Smithsonian Institution Museum Support Center - Fire Protection Strategy for Upgrade to Wet-Collections Rack Storage Array
Stemen, Bryan

Smithsonian Institution, Office of Environmental Management and Safety, 490 L'Enfant Plaza, Suite 4202, Washington DC 20560-0932

POD 3 of the Museum Support Center, is a 36,000 square foot, 28 foot high-rack storage facility, designed for wet-collections storage. The facility is located in Suitland, Maryland. A portion of the POD incorporates high-rack storage while the greater portion is still open floor storage. Currently, a project is in the design stages that will expand the rack storage throughout most of the POD, as well as provide for the installation of recessed tanks into the floor, for larger collection items. The presentation summarizes the fire protection aspects of the project. It including the National Fire Protection Association requirements for protection of flammable liquid storage areas, the approach taken for protection of the area, and an overview of the complexity related to integration of the fire protection requirements, while meeting the needs for collections.

Oral Presentation

June 30, Morning

The Teachings of the Beasts: Assessing Molecular Information in Natural History Collections
Tuross, Noreen

The Smithsonian Center for Materials Research and Education, Smithsonian Institution, 4210 Silver Hill Road, Suitland, MD 20746

In the 1700s a Jeffersonian belief in the uniqueness of North American species together with a type specimen taxonomic approach were the foundations upon which natural history collections were made in the United States. Later, Victorian enthusiasm for the unusual and grotesque coupled with a love of big game hunting contributed to the expansion of these collections. Today, the bulk of natural history collections are still made and stored to fit narrow scientific constraints that are largely out of touch with current research agendas such as global change or biocomplexity. In order to assess the value and utility of fluid stored collections for two important experimental approaches, PCR amplification of DNA and light stable isotope analyses were applied to 1) two sets of experimental fish, 2) recently formalin-fixed cichlids collected in Panama, 3) formalin-fixed museum collections (NMNH) and 4) ethanol stored, formalin-free cichlids from the collections of NMNH, NHM and MCZ. The results can be summarized as follows: 1) The addition of formaldehyde can render a fish specimen useless for both PCR amplification of DNA and bulk $\delta^{13}C$ tissue measurements, 2) The amount of time spent in formalin is critical to the above application, and a dramatic affect on PCR amplification is seen with buffering, 3) Most successful PCR amplifications of formalin-fixed tissue are found in fairly recent collections, 4) A triage of museum stored fish specimens indicates that those collections made prior to the use of formalin fixation are a special and unique repository of both genetic and isotopic information. Charles Wilson Peale was correct when he wrote on early admission tickets to the Philadelphia Museum that "The Birds and Beasts will teach thee!" We need to move expeditiously to allow past and future natural history collections to participate in the full expanse of scientific exploration.

Oral Presentation

July 1, Morning

The Concentration Shift Indicator®: A Simple Instrument to Monitor the Preservation Quality of Ethanol Preserved Specimens

van Dam, A.J.

Leiden Museum of Anatomy, Leiden University Medical Center, Box 9602, 2300 RC Leiden, Netherlands

In collaboration with the Lab Shop Company, the Leiden Museum of Anatomy has developed the so-called Concentration Shift Indicator®; an instrument that monitors the ethanol concentration in fluid preserved specimens. When the indicator is placed inside a specimen jar, it continuously shows if the ethanol concentration is above or below a specified level that for instance relates to the minimal required antiseptic properties of the preservative. There is no longer need for time-consuming conventional density measurements, in which case each jar has to be opened and a fluid sample has to be extracted for weighing. Consequently, the Concentration Shift Indicator® can give a major contribution to a constant and high preservation quality of ethanol preserved specimens. In addition, the use of the indicator considerably simplifies the maintenance routine and cuts back the maintenance costs. Stability tests in ethanol 75% at ambient temperature (20-25°C) and elevated temperature (60°C) predict that the instrument will function properly over an extended period of time (>10 years).

Oral Presentation

June 30, Afternoon

The Texas Cooperative Wildlife Collection and the Flood: Recovery - Past, Present, and Future

Vaughan, Kathryn, Schlitter, Duane A. and Baumgardner, George D.
Texas Cooperative Wildlife Collection, Dept. of Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX 77843-2258, USA (KV and DAS); Department of Natural History, Nevada State Museum, 600 N. Carson, Carson City, NV 89701, USA (GDB)

In the fall of 1992 the Texas Cooperative Wildlife Collection at Texas A&M University was flooded by warm, silt-laden water, to a depth of 1.1 m. Subsequently, this entire collection of vertebrate specimens and associated materials were moved to a renovated, 14,000 square-foot climate-controlled facility. Recovery efforts for the collection have been quite labor intensive with their duration depending on the material. Paper catalogs, tags, and supportive materials which got wet survived virtually intact. Specimens preserved in fluids appear to have suffered little long-term damage with only 0.25% of the material that was inundated being permanently damaged. Owing to their nature, the skins of mammals and birds suffered most. At present, only an estimated 5% of this material shows moderate or heavy damage; however, inundated specimens are undoubtedly more fragile than those that remained dry. With time, the inundated specimens will likely degrade faster, as evidenced by several examples. At present, the general operations of the TCWC equal, if not exceed, those prior to this flood. All divisions are processing loan and information requests and cataloging new material. The fluid preserved collections have completely recovered and are embarking on new programs of recuration and computerizing of cataloged data. The mammal and bird collections are back in their original order; however, the documentation of damage and conservation of specimens continues. Despite the accomplishments occurring in the TCWC since this flood, recovery and monitoring efforts should continue well into the future.

Oral Presentation

July 2, Afternoon

Planning for the Reorganization, Move and Integration of Two Major Fossil Invertebrate Collections

Wetmore, Karen

Museum of Paleontology, 1101 Valley Life Sciences Building #4780, University of California, Berkeley, CA 94720-4780, USA

A major collection of fossil invertebrates was recently transferred to the University of California Museum of Paleontology (UCMP) by the U.S. Geological Survey, Menlo Park. This collection comprises over 250 cases containing over 16,000 samples of invertebrate fossils from the western United States, including the only fossil specimens ever collected from many regions of Alaska. Unfortunately, the collection is currently very disorganized as a result of a move into storage followed by a hurried move to the current location with no opportunity to plan or arrange the material. This makes it very time-consuming and frustrating to use these collections for research. To correct this problem, a major project is underway to record the current location of all samples, create a database of sample locality information, move about 100 cases of unique material into the main collection building and reorganize the remaining samples to improve accessibility for research. In addition to work on the Menlo Park Collection, this will require moving the UCMP collections to create space for the new material at appropriate locations in the collection's stratigraphic sequence. Strategies for planning the new collection organization and tracking movement of samples are based on the successful move of the UCMP collections into a new building in 1995. That move required correctly estimating space requirements for portions of the collection that had to be moved out of sequence relative to the final organization of the collection. This presentation summarizes the planning process for this project and the progress to date.

Poster

July 1, Afternoon

Reverse Engineering Museum Specimens

Wivell, Colleen

Materialise, 6111 Jackson Rd., Ann Arbor, MI 48103

When Museum Specimens have been scanned using Computerized Tomography (CT), the resulting data can provide a new world of information. For example, you can take a dinosaur skull encrusted in rock and do a CT scan of it. The data generated can be read into a computer program where you can separate the bone from the rock while the original specimen is virtually untouched. A model of the skull can be visualized in 3D on the computer and files can be sent via the internet to share with other people. You can work with computer models to perform analysis or you can export a file for rapid prototyping to make a 3D plastic model. These models can be used to restore damaged specimens or for displaying and teaching purposes.

Once you have a model of the dinosaur skull, the brain cavity can be explored though it is not accessible in the original artifact. This same technique can be used for uncovering the insides of a mummy without unwrapping the covering. Fragile specimens can be documented in this way before deterioration occurs. Many copies of a specimens can be quickly made with high accuracy and shipped all over the world for research purposes.

Oral Presentation

July 1, Afternoon

Object Documentation as Virtual Preservation: Archival and Literature Research into the Herbert W. Krieger 1934 Collection From the Lower Columbia River

Yiotis, Gayle

Repatriation Office - MRC 138, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560, USA

Using archival records to document Native American objects subject to repatriation is a way to preserve those objects in a virtual form. At the National Museum of Natural History, information about a collection of objects is gathered from various sources: the Registrar's Office, the National Anthropological Archives, the Smithsonian Institution Archives, National Archives and Records Administration, other museum archives, the Library of Congress, Smithsonian Institution and Bureau of American Ethnology Annual Reports, Bureau of American Ethnology Bulletins, catalog cards, and information found with or on the objects themselves. Also, Native Americans are consulted about their knowledge of the history of the objects, collectors and/or donors. Once all of the information is organized, generally we then have a good picture of the object's provenance and purpose.

How well information was kept on a collection determines how well we are able to document it for future preservation. When essential data are lacking, further documentation is difficult or impossible. One such collection derives from Herbert Krieger's 1934 salvage excavations associated with the construction of the Bonneville Dam on the Lower Columbia River. The large collection which Krieger sent to the Smithsonian lacked essential documentation. This collection provides a good case study in the problems of archival documentation encountered in repatriation research.

Oral Presentation

July 2, Morning

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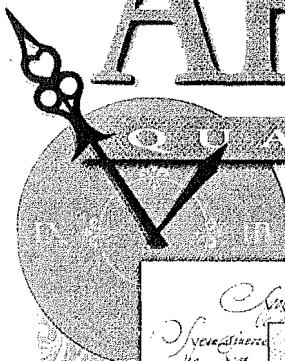
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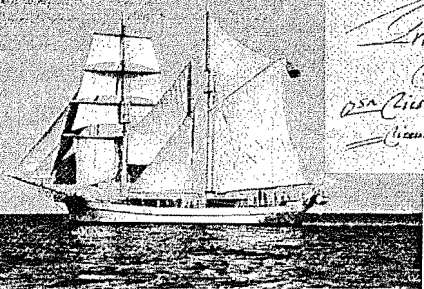
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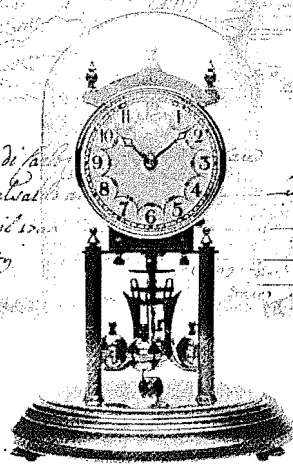
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The museum hoped to attach identification tags to the specimens which were legible to anyone throughout the world. The challenge was to design tags that could be submerged in jars of preservation solution and last at least 120 years.

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While the identification tagging application itself is fairly common, the project posed challenges because of the vast number of specimens. The tags had to survive long term submersion in alcohol or formaldehyde based solutions. Previously an individual would hand write the tag using linen rag paper with India Ink. Some samples were of such minimal size that the text identifying them became illegible. Problems then arose when samples were distributed worldwide because the handwriting of the scientists became unreadable.

Alpha Systems provided custom tags utilizing special resin ribbons and 5 mil Ident-A-Shield tag stock. The resin ribbon forms a molecular bond with the tag stock making the image part of the tag itself. Alpha Systems installed four Datamax Prodigy Max thermal transfer printers in the Invertebrate Zoology department. WordPerfect provided a 6 point Arial font and drove the printers using a Datamax Windows driver.

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"The challenge was to design tags that could be submerged in jars of preservation solution and last at least 120 years."

Benefits:

The Smithsonian Institution has benefited from improved legibility and durability with these identification tags. Legible samples are sent worldwide giving scientists the ability to read critical information.

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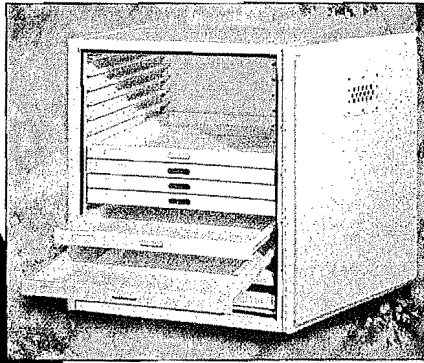
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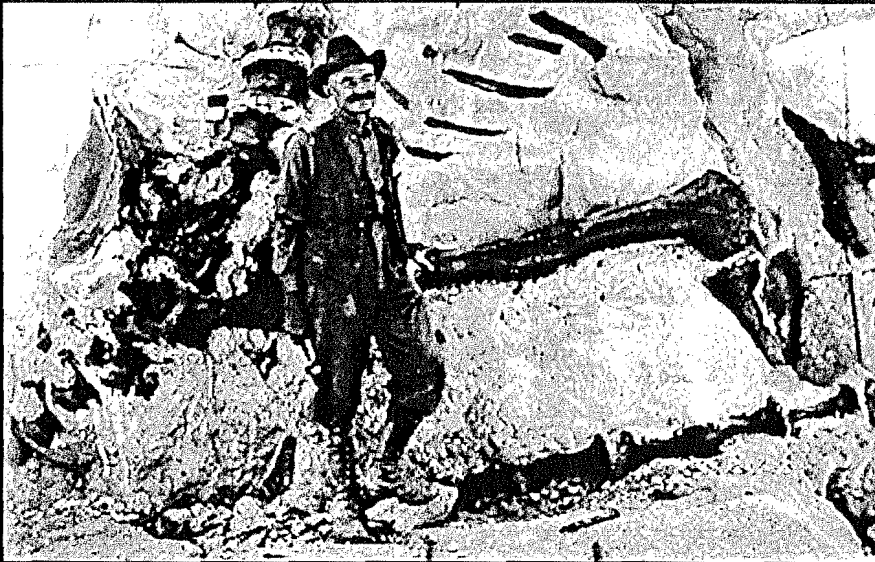
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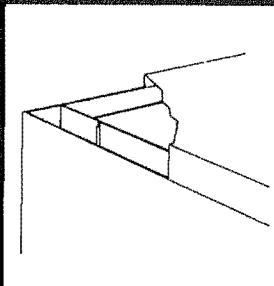
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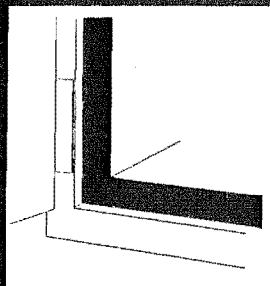
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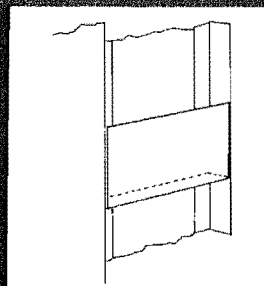
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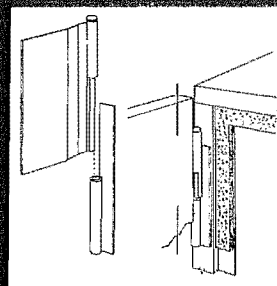
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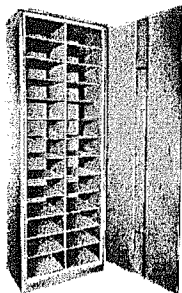
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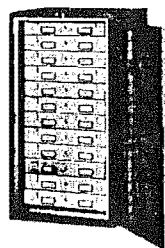
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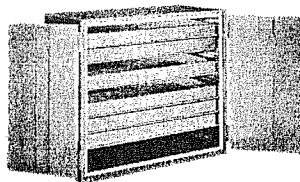
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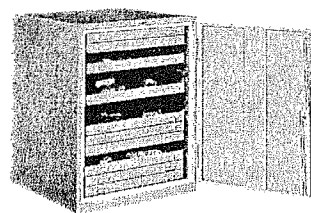
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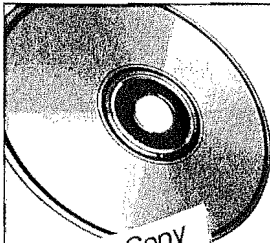
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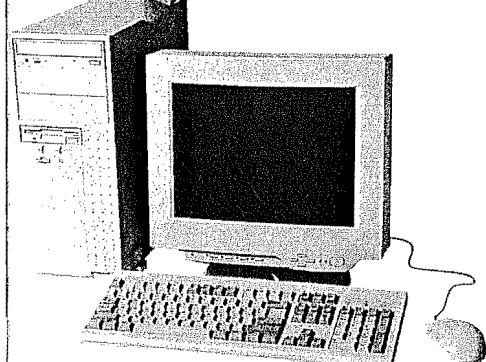
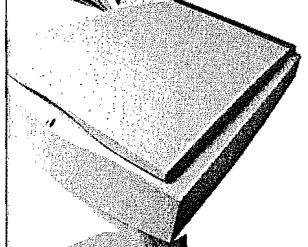
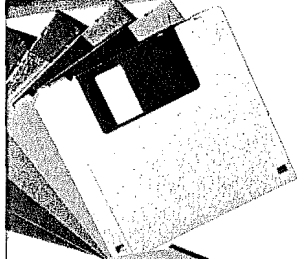
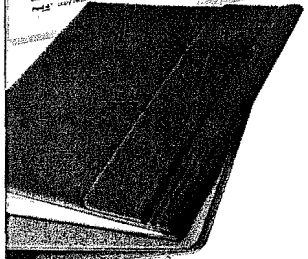
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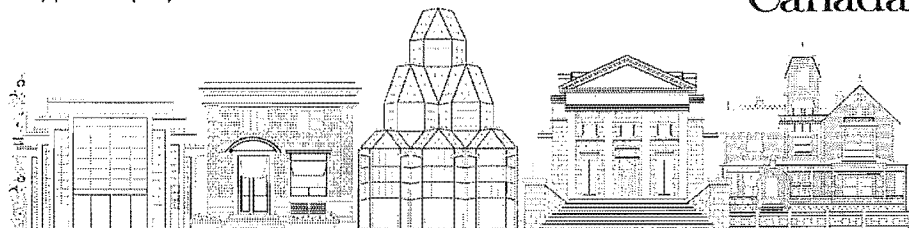
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