Program & Abstracts

17th Annual Meeting of the
Society for the Preservation of Natural History Collections

May 8-13, 2002

At the
Redpath Museum
McGill University
Montréal, Québec
Canada

Co-hosted
by the
Canadian Museum of Nature
and the
Redpath Museum

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Introduction to our Co-Hosts

The Redpath Museum

The Redpath Museum is one of the most visible and remarkable buildings on the McGill University campus. Established in 1882 as the first public natural history museum in Canada, the Redpath is McGill's teaching and research museum with valuable collections in the fields of botany, malacology, ornithology, mammalogy, paleontology, geology, mineralogy and ethnology. In its origin, the Museum was founded to preserve and display the precious collections of Sir William Dawson, famous Canadian naturalist. The most noteworthy collections include the Fossil Types (approximately 1000 fossils) and the country's second largest Egyptian collection. In the last decade the Redpath has significantly developed its collections care and management practices as well as public programmes and services. Most of the collections are housed in environmentally stable conditions and automated documentation accounts for over 60% of the 2 1/2 million catalogued specimens and artifacts. The museum attracts about 16,000 visitors annually, including over 6000 university students and staff.

The Canadian Museum of Nature

The Canadian Museum of Nature, our national natural history museum, is currently housed in two buildings. The Natural Heritage Building (NHB) is the science and administration centre, officially opened in the spring of 1997. The building is situated on 73 hectares of land in Aylmer, Quebec. The facility incorporates leading-edge building technologies in a custom design to provide the standards of safety, security and preservation necessary to safeguard Canada's collection of 10 million natural history specimens.

The Victoria Memorial Museum Building in Ottawa, Ontario, which remains the site of Nature's exhibitions and galleries, was designated a national heritage building in 1995 and offers displays, popular science programs, travelling exhibits and more. We are now in the early stages of an exciting renewal program that will renovate the entire internal structure to allow for the use of new technology and better conditions to display the collections and research being done by museum staff and others.

Acknowledgements

SPNHC 2002 Local Committee
Chair: Ingrid Birker

Jean-Marc Gagnon
Joan Kaylor
Judith Price

Redpath Museum
Dr. Graham Bell, Director
Canadian Museum of Nature
Joanne DiCosimo, President

Workshop: Chemical and Biological Emergency Preparedness and Response in Natural History Museums
Wayne Wood
Jean-Marc Gagnon

Financial Assistance

Museums Assistance Program, Heritage Canada

Sponsors

Montel Corporation

Vendors

Advertisers

Program: Schedule and Highlights

Wednesday May 8	8:30am – 6:00 pm	Committee meetings	Various places
	6:30 pm – 10:00 pm	First Council Meeting	Hodgson Seminar Room, 2nd floor
Thursday May 9	8:00 am – 5:00 pm	Pre-Conference Field Trips - gather in front of Redpath Museum for buses	Canadian Museum of Nature's Collection Facility (Ottawa)
			Mont St-Hilaire UNESCO Biosphere Reserve
			Fossil Hunting around Montreal
			Historical Montreal Harbour Cruise and Walking Tour
		Vendor set up	Redpath Lab, Rm. 103
		Poster installation	Hodgson Gallery, 2nd floor
	7:00 – 10:00 pm	Registration and Icebreaker	Entrance Hall
Friday May 10	8:30 am – 5:00 pm	Registration	Entrance Hall
		Poster installation	Hodgson Gallery, 2nd floor
		Vendor set up	Redpath Lab, Rm. 103
	9:00 – 9:45 am	Welcome and Opening Remarks	Auditorium
	10:00 – 11:00 am	Keynote Address	
	11:00 am – 3:00 pm	Technical Sessions	
	12:00	Group photo	front steps of Redpath Museum
	3:30– 5:00 pm	Poster Session	Hodgson Gallery, 2nd floor
		Vendor Trade Show	Redpath Lab, Rm. 103
	3:30 – 4:30 pm	Special Interest Groups	Various places (TBA)
	5:30 – 8:00 pm	VIP Tour and Cocktails	Biodôme de Montréal
Saturday May 11	8:30 am – 12:00 pm	Registration	Entrance Hall
	9:00 – 5:00	Posters	Hodgson Gallery, 2nd floor
		Vendor Trade Show	Redpath Lab, Rm. 103
	9:00 – 10:15 am	Technical Sessions	Auditorium
	10:30 am – 12:00 pm	Annual General Meeting of Members of SPNHC	
	1:00 – 1:30 pm	SPNHC Canada Meeting	
	1:30 – 4:30 pm	Technical Sessions	
	6:00 – 10:00 pm	Multicultural Banquet and Jazz	McCord Museum
Sunday May 12	9:00 am – 5:00 pm	Posters take-down	Hodgson Gallery, 2nd floor
		Vendor Trade Show take-down	Redpath Lab, Rm. 103
	9:00 am – 3:00 pm	Technical Sessions	Auditorium
	3:00 – 3:30 pm	Closing remarks	
	3:30 – 6:00 pm	Second SPNHC Council Meeting	
	7:00 – 9:00 pm	Reception and Introduction for Workshop participants	Entrance Hall and Auditorium
Monday May 13	9:30 am – 4:30 pm	Workshop: Chemical and Biological Emergency Preparedness and Response in Natural History Museums (Stewart Biology Building, Room W4/3)	

Detailed Program

Wednesday May 8, 2002 **Committee meetings**			
A.M.	8:30 – 10:00	Publications Committee	Hodgson Seminar Room, 2nd floor
	10:00 – 10:30	Health break	Entrance Hall
	10:30 – 12:00	Conservation Committee	Auditorium
Lunch	12:00 – 1:00	Committee Chairs and Council	Thomson House, McGill Univ.
P.M.	1:00 – 2:00	Membership Committee	Hodgson Seminar Room, 2nd floor
		Documentation Committee	Redpath Lab, Rm. 103
	2:00 – 3:00	Conference Committee	Hodgson Seminar Room, 2nd floor
		Finance Committee	Redpath Lab, Rm. 103
		Elections Committee	Auditorium
	3:00 – 3:30	Health break	Entrance Hall
	3:30 – 4:30	Sessional Committee: Best Practice	Redpath Lab, Rm. 103
		By-laws Committee	Hodgson Seminar Room, 2nd floor
	3:30 – 5:00	Education Committee	Redpath Lab, Rm. 103
	4:00 – 5:00	Executive Committee	Auditorium
EVENING	6:30 – 10:00	First Council Meeting	Hodgson Seminar Room, 2nd floor

Thursday May 9, 2002 **Pre-Conference Field Trips**			
ALL DAY	8:00 - 6:30	Option 1: Canadian Museum of Nature's Collection Facility (Ottawa) Come and visit the 20,478 square-metre Natural Heritage Building, near Ottawa, and see how improved workspace configuration and security features provide protection to the collections from both human and natural hazards. The collection area houses 42 individual collection rooms and nine documentation rooms. Catered lunch provided.	
	8:30 – 6:30	Option 2: Mont St-Hilaire UNESCO Biosphere Reserve A full day trip to Canada's first biosphere reserve. Located on a remarkable tract of vestigial primeval forest, this site is used both as a public recreational facility and as McGill's ecological research and field station. The day includes a guided tour by the naturalists, picnic lunch around a glacial lake and hiking to a belvedere that overlooks the St. Lawrence Lowlands.	
	9:30 – 6:30	Option 3: Fossil Hunting around Montreal A full day trip to 3 local collecting sites within a 90 km radius of the city. Led by local paleontologists, participants will visit Cambrian, Ordovician and post-glacial outcrops and quarries. Sample bags, hammers and bag lunch provided.	
	10:00 – 6:00	Option 4: Historical Montreal Harbour Cruise and Walking Tour A full day trip to old Montreal with an historical interpretor and harbour cruise. Catered lunch provided.	
	8:30 – 5:00	Vendor set up	Redpath Lab, Rm. 103
		Poster installation	Hodgson Gallery, 2nd floor
EVENING	7:00 – 10:00	Registration and Icebreaker	Entrance Hall

Friday May 10, 2002 **Technical Sessions** (in Auditorium unless otherwise noted)			
ALL DAY	8:30 – 5:00	Registration	Entrance Hall
		Poster installation	Hodgson Gallery, 2nd floor
		Vendor set up	Redpath Lab, Rm. 103
A.M.	9:00– 9:45	Welcome and Opening Remarks, Dr. Graham Bell, Director, Redpath Museum	
	9:45 – 10:45	Keynote Address – Kathryn Makos M.Ph, C.I.H., Senior Industrial Hygienist, Office of Safety and Environmental Management, Smithsonian Institution. Title: *Protecting the Priceless: Public Health and the Museum Community*	
	10:45 – 11:15	Health Break	
	11:15 – 11:30	Technical Sessions	
	11:30 – 11:45		
	11:45 – 12:00		
	12:00	Group photo	front steps of Redpath Museum
Lunch			
P.M.	1:30 – 1:45	Technical Sessions	
	1:45 – 2:00		
	2:00 – 2:15		
	2:15 – 2:30		
	2:30 – 2:45		
	2:45 – 3:00		
	3:00 – 3:30	Health Break	
	3:30 – 5:00	Poster Session	Hodgson Gallery, 2nd floor
		Vendor Trade Show	Redpath Lab, Rm. 103
	3:30 – 4:30	Special Interest Groups: Zoology, Botany, Geology/Paleontology, Anthropology, Conservation	Various rooms (TBA)
EVENING	5:30 – 8:00	VIP Tour and Cocktails	Biodôme de Montréal

Saturday May 11, 2002 **Technical Sessions** (in Auditorium unless otherwise noted)			
ALL DAY	9:00 – 5:00	Posters	Hodgson Gallery, 2nd floor
		Vendor Trade Show	Redpath Lab, Rm. 103
A.M.	8:30 – 12:00	Registration	Entrance Hall
	9:00 – 9:15	Technical Sessions	
	9:15 – 9:30		
	9:30 – 9:45		
	9:45 – 10:00		
	10:00 – 10:30	Health Break	Entrance Hall
	10:30 – 12:00	Annual General Meeting of Members of SPNHC	
	Lunch		
P.M.	1:00 – 1:30	SPNHC Canada Business Meeting	Hodgson Seminar room, 2nd floor
	1:30 – 1:45	Technical Sessions	
	1:45 – 2:00		
	2:00 – 2:15		
	2:15 – 2:30		
	2:30 – 2:45		
	2:45 – 3:00		
	3:00 – 3:30	Health Break	Entrance Hall
	3:30 – 3:45	Technical Sessions	
	3:45 – 4:00		
	4:00 – 4:15		
	4:15 – 4:30		
EVENING	6:00 – 10:00	Multicultural Banquet and Jazz	McCord Museum

Sunday May 12, 2002 **Technical Sessions** (in Auditorium unless otherwise noted)			
ALL DAY	9:00 – 5:00	Posters take-down	Hodgson Gallery, 2nd floor
		Vendor Trade Show take-down	Redpath Lab, Rm. 103
A.M.	8:30 – 8:45	Technical Sessions	
	8:45 – 9:00		
	9:00 – 9:15		
	9:15 – 9:30		
	9:30 – 9:45		
	9:45 – 10:00		
	10:00 – 10:30	Health Break	Entrance Hall
	10:30 – 10:45	Technical Sessions	
	10:45 – 11:00		
	11:15 – 11:45		
	11:45 – 12:00		
	Lunch		
P.M.	1:30 – 1:45	Technical Sessions	
	1:45 – 2:00		
	2:00 – 2:15		
	2:15 – 2:30		
	2:30 – 2:45		
	2:45 – 3:00		
	3:00 – 3:30	Closing remarks	
		Health break ? General or just for Council? Most people will be leaving	
	3:30 – 6:00	Second SPNHC Council Meeting	Auditorium
EVENING	7:00 – 9:00	Reception and Introduction for Workshop participants	Entrance Hall and Auditorium

Monday May 13, 2002		
	Workshop	
ALL DAY	9:30 – 4:30	Workshop: Chemical and Biological Emergency Preparedness and Response in Natural History Museums (Stewart Biology Building, Room W4/3)

Anoxic pest control of herbarium and insect collections

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With funding from European Community (project "Save Art"), Dalarna University and the Swedish National Heritage Board, PRE-MAL has performed anoxic treatment with the VELOXY nitrogen generator and the oxygen scavenger Ageless Z on botanical and entomological collections.
Small plastic boxes with larvae of Trogoderma angustum (Solier) and Attagenus woodroffei (Halsted &Green) were placed inside cardboard boxes (510x337x175 mm) with herbarium material. Each box was enclosed in "gas tight plastic film" The oxygen level was reduced to 0.3% with nitrogen and 8 sachets of Ageless Z 200 were added into the enclosure. Room temp. was about 24,5 º C. and RH 40-45%. The boxes were treated one and two weeks. 100% mortality of both species occured already after one week. Three kinds of wooden insect cases with glass lids were tested. (Old and new cases with one groove and new cases with two grooves). Test insects were larvae of Anthrenus verbasci (L) and Trogoderma angustum. Temperature 22ºC, RH 28%. With 2 Ageless Z200, both species survived after two weeks. One week with 4 Ageless gave 21% survival of T. angustum in double-grooved cases. One week with 8 Ageless, 100% mortality. Trogoderma angustum Attagenus woodroffei and Reesa vespulae (Milliron) were tested with 4 Ageless Z200 in cases with one and two grooves during 4, 7, 10, 14 days. Temperature 22ºC, RH 21- 32%. In one-grooved cases, Trogoderma and Reesa were killed after 7 days, in double-grooved cases after 10 days. Attagenus woodroffei was killed after 14 days in double-grooved cases.

Can I Touch This? - Moving Potentially Contaminated Collections at the National Museum of the American Indian

Arenstein, Rachael Perkins; Kaplan, Emily; Merritt, Scott; Williamson, Leslie
National Museum of the American Indian, Cultural Resources Center, Smithsonian Institution, 4220 Silver Hill Road, Suitland, MD, 20746 USA

The National Museum of the American Indian is currently mid-way through the move of the entire collection of approximately 800,000 objects from the old storage warehouse in the Bronx, New York to a new, custom-built storage and research facility in Suitland, Maryland. This talk will outline the measures taken since the start of the move project in 1999 to ensure the health and safety of staff members handling the collections by:

· Identifying contaminants in the building and on the objects
· Developing safe operating procedures for the move project
· Confirming that staff are not exposed to dangerous levels of hazardous substances

Contaminants were first identified by testing the physical environment of the storage facility in New York. Wipe tests and a rented portable x-ray fluorescence unit were used to develop a 'map' of heavy metal (arsenic and mercury) hot spots found in old storage cabinets and shelving. An outside consultant identified the presence and sources of lead dust. Additional information gleaned from archival research indicates that, in the past, the museum has widely used organic fumigants including napthalene, paradichlorobenzene, dichlorvos, and sulfuryl fluoride.

Based on the above hazards, procedures for the move project were devised to protect the health of collections staff while safeguarding the collection. A continued monitoring program is in place to check that employees in the Bronx and Suitland are not exposed to hazardous levels of contaminants when following proper safety precautions. Practical tips on analysis, testing, handling, morale and hazardous material disposal will be presented for institutions planning safe moves.

Evaluation and Control of Workers' Exposures in the Collection and Preservation of Artifacts and Specimens

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Makos, Kathryn A.
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Hawks, Catharine
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NIOSH, the Smithsonian Institution, and several other partners are conducting a study of the exposures of museum employees to toxic substances in the collection and preservation of artifacts and specimens. Based on recommendations from knowledgeable individuals, professional associations, prior studies and internal research interests, three categories of exposures were selected for investigation. These categories include heavy metal pesticides, silica and dust, and solvents. The professional societies and experts mentioned above not only provided support in defining the scope of the study, but also assisted in selecting sampling sites based on criteria developed cooperatively, and subsequently aided in establishing contacts within those sampling sites to facilitate testing. In many instances the facilities in which the evaluations were conducted also provided valuable assistance in the collection of data, a resource found to be of great significance when it was determined that even in large museums it was common for a small number of employees to be performing the tasks of interest at any given time.

Data developed in this work indicate:
· a high degree of variability in the duration of exposures, ranging from a few minutes to several hours per day
· a generally low level of exposure to substances investigated, in many instances <10% of established standards
· some short duration high level exposures
· biological measures of dose less than half of the accepted level for pesticides

Results indicate that this type of cooperative planning and testing provides several organizational and financial benefits, and the employees' exposures were shown to be well controlled in most of the testing conducted.

Radiograph and Digital Photograph Records of Primary Types in the Ichthyological Collections of the California Academy of Sciences

Catania, David B.
California Academy of Sciences, Department of Ichthyology, Golden Gate Park, San Francisco, CA 94118-4599 ,USA

Primary, or name-bearing, types are unique and irreplaceable specimens that are vital to the discipline of systematics. Those charged with the care of these invaluable specimens must strike a balance between allowing access to them (often through loans), and protecting them for future generations of systematists. It was felt that by providing researchers with good quality images of these types, we could reduce the number of times they were placed at risk by being loaned. If a loan proved necessary, the images would serve as documentation should the type be damaged or lost.

The California Academy of Sciences Department of Ichthyology, with funding from National Science Foundation grant DBI-9876822, x-rayed and digitally photographed representatives of almost 1,900 primary type lots in their collections. These images are freely available to researchers via the Academy's web site (www.calacademy.org). Early indications are that the project is succeeding in its goal of reducing the number of primary type loans.

This presentation provides background information, details of the project and its evolution as we gained experience with digital technology, and how selected images have become the basis for a new public floor exhibit at the Academy. Finally, we will consider some potential contributions of imaging technologies to the field of systematics.

U.S. Regulatory Enforcement of Health and Safety Standards Applicable to Museums

Coulehan, William F.
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The U.S. Occupational Safety and Health Administration (OSHA) promulgates and enforces health and safety standards for the protection of employees in all work environments, including museums and galleries. OSHA standards are generally written for the "typical industrial setting", and may not be easily applicable to the unique workplace scenarios involved with collections management. However, museums are subject to compliance inspections and fines, and it is incumbent on the museum to comply with these regulations. The hierarchy of hazard control (engineering, administrative controls, and personal protective equipment (PPE)) must also be considered. Federally funded resources administered by state agencies offer assistance in hazard evaluation and exposure monitoring, including the initial exposure determination required by substance-specific standards, i.e. Arsenic, Lead, Cadmium and Formaldehyde. These consultative resources can also assist museums with implementing Hazard Communication training, and outline pratical ways to alert staff and researchers to hazards hidden in their collections. Finally, OSHA can help sponsor workshops for area museums and art galleries similar to the March, 2002, Health in the Arts/Museum Collections Hazards Conference co-sponsored with the Art Institute of Chicago and the University of Illinois School of Public Health.

Digital photomicroscopy documentation for the preservation of microscopic collections

DeMouthe, Jean F.
California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118 USA

With the recent advances in digital photomicroscopy, it is possible to create high-quality images of microfossils and other small, delicate specimens. These images can be used in a variety of ways, including research, publishing, and teaching. They can be reproduced on paper or as 35-mm slides, sent through electronic mail, and posted on the web. They can be an important addition to the documentation of a collection, and may aid in the preservation of that collection by reducing the amount of handling the specimens receive in the course of normal use.

Collections of diatoms, foraminifera, and other microscopic organisms often contain type and historically important specimens mounted on microcope slides. While it is crucial for these specimens be available for research, their fragile and vulnerable nature suggests that alternatives be found to the traditional forms of use, including sending them out through the mail as loans. Digital images offer a way to make the irreplaceable specimens available for research and publication without putting them physically at risk.

Critical input to collections facilities planning

DeMouthe, Jean F.
California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118 USA

Many institutions are planning for projects that involve moving and/or re-housing natural history collections. It is crucial for the safety of these collections, and for their continued accessibility and usefulness, that collection staff have continuous and meaningful input into the planning and implementation processes. Collections need strong advocates during these times of change, and there are ways for collections professionals to participate without creating friction (i.e. screaming, yelling, getting fired, etc.).

In order to provide the administration and other decision-makers with consistent advice, the collections managers at the California Academy of Sciences have formed the Conservation Committee, a body that can speak as one voice in these and other matters pertaining to collections. In the early stages of planning for the Academy's major renovation project, each department was asked to provide information about the nature of their collections, their size, and their ideal environmental and storage conditions. Forty-eight individual collection units were identified, and this information was organized in a FileMaker database. Collection "clumps" were then formed (on paper), where collections having similar needs were combined for planning purposes.

This process goes on toward the Academy's proposed closing date in late 2003. Ongoing input will be provided by individual collections staff and by the Collections Committee, using the data gathered for this purpose.

A Hazard to Collections: Budget Cuts

Golden, Julia, and **Adrain, Tiffany**
Department of Geoscience, University of Iowa, Iowa City, IA 52242 USA

Collections at the University of Iowa are dispersed among several departments, and are the responsibility of different administrative units. Although the collections cover a broad spectrum of disciplines including natural history, archaeology, art and medicine, the University of Iowa Collections Coalition provides a very important platform of support. Most recently, this has included responding to collection disasters, and administrative threats to collections (such as withdrawal of support). This ad hoc group also encourages exchange of ideas, reinforces professional standards, and promotes of collections to the university community. The presence of this group has created a new awareness of collections and their value to the university, in a way that individuals might find more difficult.

An Inexpensive Method to Detect Mercury Vapor in Herbarium Cabinets

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Mercuric chloride solutions were common pest and mold control treatments for herbarium specimens throughout the past two centuries. Unfortunately, the residues from the treatments permit mercury vapor to accumulate inside cabinets on a continuous basis, contaminating untreated specimens and posing a threat to those who maintain or use the collections. Standard methods to monitor for mercury vapor involve the use of expensive instruments that are not readily available to the staff of most herbaria. A commercially available mercury indicator powder can be adapted for use in herbarium cabinets to provide an inexpensive, selective and very sensitive detector for mercury vapor. It is adapted by mixing it as a slurry in deionized or distilled water and then painting the slurry on a microscope slide that is placed inside each cabinet. Reliable results, as indicated by color changes in the dried slurry, can be obtained in 7 days. The color changes (from yellow to peach to gray) correlate well to instrumental monitoring results. Within broad ranges, the color changes are indicative of the amount of vapor present in the cabinets.

Biological monitoring programs for exposures to metal-containing pesticides in the museum setting.

Hinkamp, MD, MPH, David Lee
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Metal-containing pesticides including mercuric chloride and arsenic-containing compounds have been used historically for the preservation of museum specimens. These substances, like other heavy metal-containing compounds, can remain hazardous for long periods of time. As a result, they may pose serious health risks to museum staff members who handle pesticide-treated objects at much later dates.

Metal pesticides can be absorbed through inhalation of airborne residues and unintentional hand to mouth or eye transfer. Appropriate hygiene precautions can reduce exposures, but unrecognized exposures can occur as a result of practice or equipment irregularities. For these reasons, biological monitoring can offer another tool for detecting and characterizing exposure. Biological monitoring for metal pesticides usually relies on easily obtained samples such as blood, urine and hair or nails. Caution must be exercised in the use of these testing methods to assure that testing is appropriate and results are meaningfully interpreted. Occupational and non-occupational intake and other factors must be considered in interpretations of results.

Occupational medicine services for museum-related health issues.

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Museums are faced with a growing recognition that materials and practices in the workplace may be hazardous to the health of staff members. Control of these hazards is the most effective way of preventing exposure, but medical advice, evaluation and treatment are important parts of an effective prevention program.

Most physicians are not trained in the evaluation of these workplace exposures, therefore finding this expert medical advice can be difficult. Occupational health associations of residency-trained occupational health physicians and clinics throughout North America (such as the Association of Occupational and Environmental Clinics) are available for consultation on work-related health concerns.

Museum staff should consider associations with these occupational health groups and should encourage physicians and staff to visit the museum facilities regularly. Through exchanges of health hazard information, museum staff and occupational health physicians can craft appropriate health surveillance, evaluations, treatment and prevention strategies.

Repatriation and Pesticides at the National Museum of the American Indian

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

The use of chemical pesticides was a common practice by museums to control insect infestations of ethnographic collections. The advent of repatriation legislation mandating the re-introduction of certain culturally sensitive items to their Native American cultures of origin has created a volatile situation for both the tribal and museum communities. The ritual and ceremonial use of repatriated objects contaminated with pesticides may pose serious health hazards for the recipients of these items, and presents a legal and ethical dilemma for museums. This paper addresses the Smithsonian Institution's National Museum of the American Indian's approach to recognizing and addressing the concerns of its Native constituency, and understanding and resolving the issues related to contaminated cultural collections under its stewardship.

Oh No! Ethnobotany

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Oh No! Ethnobotany, a hazard communication-training program that addresses health and safety issues inherent in the handling and storage of hazardous ethnobotany, was designed, developed and prototyped at the Science Museum of Minnesota. Oh No! Ethnobotany looks past the wide range of residual toxic chemicals present from treatment of the object to specifically addresses concerns raised by toxic chemicals inherent in the object iteself. A written plan that lists hazardous ethnobotany describes how requirements for labels and other forms of warning, ethnobotany material safety data sheets (EMSDS) and training are met.

A commitment to biological collections at the Academy of Natural Sciences, Philadelphia: A success story.

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The Academy of Natural Sciences, Philadelphia has been highly successful at securing funds for collection conservation and upgrade. The Academy houses over 15 million specimens including approximately 3 percent of the world's type specimens. The main source of funding for upgrades has come from the National Science Foundation's (NSF) Biological Research Collections grant along with matching funds raised by the Academy. Currently, upgrades are progressing in Botany, Entomology and Ornithology. These funds are being primarily used for re-housing these collections in new cabinetry on compact shelving.

The recent funding of two Save America's Treasures proposals has highlighted the important historical collections housed at the Academy. The first grant provides conservation of the plant specimens from the Lewis and Clark expedition, through custom housings, cabinetry, and a climate controlled 'Special Collections Room.' The second grant provides conservation, research and photographic documentation of the Titian Peale Butterfly and Moth collection.

Ongoing database development and input of collection records fulfils the Academy's mission to provide metadata for use by the scientific community. The Entomology department recently received NSF funding to database its type collection. Existing databases are presently being upgraded to modern software to promote stability and archival permanence. This presentation outlines each of the projects above, emphasizing the Academy's continuing commitment to collection conservation and metadata sharing.

Protecting the Priceless: Public Health and the Museum Community

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The balance between cost and productivity versus worker safety and benefits has been the classic struggle of industrialized nations. Since the mid-20th Century advent of labor unions and regulatory agencies, occupational health professionals have made great progress in convincing workplace management that safety investments are not just a legal requirement but also a positive factor in productivity. Reductions in lost-time injuries, higher worker morale, and improved public image are ultimately more cost-effective. Museums and universities are no exception to this rule, but to date, still are not well served by the public health community. Collections management offers workplace exposure scenarios that are unique and well below the professional radar screen of most industrial hygienists. Therefore, museums need to be aware of the well-established public health resources at their disposal, and how best to explain their operations to health professionals. Likewise, industrial hygienists need to be aware of the alterations that must be made to established monitoring methods to accommodate conservation concerns in testing sensitive objects and specimens, as well as in exposure assessments of this non-traditional workforce. More importantly, museum management needs to be aware that the technologies of hazard control are well developed, often inexpensive, and easily accessible once the commitment is made to developing a proactive safety program. Resources directed at managing risk to worker and the visiting public can and must be consistent with the cost and effort expended toward managing risk to the collections themselves: each is a priceless commodity that deserves to be protected.

GIS as a Method for Improving IPM

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Integrated Pest Management (IPM) is a method of pest control that concentrates on blocking access of harmful pests to the collections rather than using toxic chemicals to eliminate pests after they may have infested the collection. Major components of any IPM program are monitoring and record keeping. In order to make record keeping simpler, a database was developed to store not only daily records of any pests found in the building, but also other data such as weather conditions and events that occur in the building. A Geographic Information System (GIS) application also was developed to utilize the aforementioned database to visualize invasion patterns by "mapping" them on a floor plan of the building. This results in the ability to view areas of the building that consistently may be problematic as well as the ability to relate infestation events with other activities in the museum such as bringing specimens from the field or special events (often involving food and drink) in adjacent public areas of the museum. The strength of this approach is that it makes IPM more objective, less subjective, thereby increasing the value of the data.

The continuing search for a safe working environment.

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The National Museums and Galleries of Wales (NMGW) is aware that hazardous pesticides were applied to many botanical collections before their acquisition and incorporation into the Welsh National Herbarium. Analytical research has conclusively shown that high concentrations of heavy metals (mercury, arsenic and barium) are present on some herbarium sheets, despite the lack of accompanying documentation referring to the techniques or the nature of the chemical applied. Subsequent health surveillance suggested that those working with the collections had experienced no ill health effects although biological testing revealed that heavy metal accumulation had occurred in some staff. Safe standard procedures were implemented and the contamination was effectively reduced.

Nevertheless, since then, anecdotal evidence has suggested that certain staff members are experiencing common health complaints. As the safety procedures had shown to be effective against the ingestion, absorption and inhalation of heavy metals, it was possible that another unidentified chemical within the herbarium environment was contributing to these symptoms. Organic analysis identified naphthalene as the only other possible contaminant. Past health and safety literature has not identified naphthalene as a hazardous chemical, which explains its world-wide usage in natural history collections. Recently however, naphthalene has been withdrawn from the Health and Safety Executives occupational exposure guidelines (EH/40 1999) for review, and it has been given a Chemical health alert notice.

This paper will discuss the measures taken by the NMGW to monitor the present situation and address the present status of naphthalene as a hazardous substance.

Moving the University of Michigan Herbarium: My "Design/Build" Experience

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The move of the University of Michigan Herbarium to temporary quarters was recently completed. Forced to vacate its central campus location to make way for the construction of a multi-building Life Science Institute complex, the planning for this move took over 16 months and included preparing two very different facility plans. Initially, the Herbarium was to be the temporary occupant of a new building at the Matthaei Botanical Gardens. Budgetary considerations canceled that project and space was then secured in the UM Food Stores Warehouse which would be renovated to our specifications.

Besides presenting details on the move of the collection (which included disassembling a compact storage shelving system), I also will focus on my experience with the "Design-Build" construction concept. Many details in a design-build project are left for the builder to define, a situation that can lead to many problems. I will provide a number of tips to deal with such a project and bring it to a successful conclusion.

Regulatory Requirements for the Disposal of Toxic Waste Materials Generated at Natural History Museums

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One of the main purposes / missions of Natural History Museums is to acquire and maintain collections. Activities performed in support of this mission, such as specimen preparation, collections deaccessioning, and building maintenance/renovation, generate toxic materials that require off site disposal. In both the United States and Canada, Federal, State/Provincial and local regulations apply for off site disposal. Applicable U.S. Federal regulations covering disposal of these materials include the Resources Conservation and Recovery Act (RCRA), the Superfund Amendments and Reauthorization Act (SARA), the Clean Air Act (CAA) and the Toxic Substance Control Act (TSCA). Canadian waste disposal regulations are Province based with limited requirements at the Federal level.

A number of the U.S. state waste disposal programs have promulgated regulations that are more stringent than the Federal requirements. These programs also apply to wastes not covered by the Federal program. Non-compliance with these regulations can result in both civil and criminal sanctions.

This talk will present an overview of the waste disposal regulatory framework, strategies for compliance, and examples of waste disposal from museums.

Alternative Materials for Replacing Wood in Storage Furniture and Mounts

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In 1999, the Denver Museum of Nature & Science received an Institute of Museum and Library Services Conservation Project support grant to rehouse osteological specimens including oversize skulls, marine mammals, and the skeletal material of large game animals. One of the primary goals of the grant was the elimination of wood and other potentially harmful materials that are prone to off-gassing hazardous volatile organic compounds. Building on the mount designs developed for the grant, we have moved forward in using other products to replace hazardous materials that were being employed for storage mounts for taxidermied specimens and storage furniture, such as drawers for the Museum's bird skin collection. Products such as corrugated polycarbonate sheet, high-density polyethylene sheet, polyethylene foam, a commercial polyethylene wood substitute, and Tyvek ® helped to achieve this goal. This presentation will illustrate the use of the products and discuss the pros and cons of working with the materials.

Mineral Collection – The Radiation Hazards

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Natural-occurring radioactive elements are present in a wide variety of minerals. In response to questions raised by a museum visitor, a mineral display was evaluated to determine if radiation levels were worthy of concern and what controls may be necessary.

The evaluation consisted of determining radon gas concentrations inside display cases, performing wipe tests for radioactive surface contamination, and measuring radiation exposure rates of individual specimens.

This presentation includes a summary of the results of the evaluations and a description of the steps taken to ensure that the public and museum personnel are protected from risk.

Quantitative estimation of Loss in Value to environmentally damaged collection objects - Part 1 eliciting audience estimates

Waller, R. Robert and **Muething, Garnet**
Canadian Museum of Nature, P.O. Box 3443, Station D, Ottawa, Ontario, K1P 6P4, Canada

In recent years risk assessments have proven to be an effective means of quantifying rates of damage and loss from collections and for determining collection preservation strategies and priorities. The effectiveness (quality) of a risk assessment depends on the reasonableness of the risk model for describing reality and the uncertainty of quantitative data entered as parameters in the model. In this presentation we intend to work interactively with the audience to determine the distribution of estimates of Loss in Value for a selection of natural history specimens having suffered varying extents of damage from a variety of agents of deterioration. Difficulties in framing the question will be explored through discussion. At the conclusion of this presentation participants will have recorded their estimates for a range of extents of damage, to a selection of specimens. Entering those values in the table below will enable participants to compare their responses with response distributions to be presented later in the conference.

Specimen \ Extent	A	B	C
Specimen 1			
Specimen 2			
Specimen 3			
Specimen 4			
Specimen 5			

Quantitative estimation of Loss in Value to environmentally damaged collection objects - Part 2 distributions of audience estimates and review of issues

Waller, R. Robert and **Muething, Garnet**
Canadian Museum of Nature, P.O. Box 3443, Station D, Ottawa, Ontario, K1P 6P4, Canada

In this presentation the results of the Part 1 elecitation of audience responses will be presented as distributions. We anticipate that expert and lay estimates will be similar for some types of objects and kinds of damage but different for others. Discussion will touch on the reasons for and consequences of divergence between expert and lay estimates, variability of estimates, and the form of the damage versus the loss in value curve. Beside the technical problems of quantitative estimate elicitation, there are conceptual difficulties in estimating Loss in Value. These include questions of uniqueness or duplicity of objects and non-linearity of exposure-damage rate curves. The consequences of alternate means of dealing with these issues will be compared with the variabilities in elicited estimates. Means of improving our ability to estimate Loss in Value and hence risk to collections will be discussed.

Developing a Field Manual for Hantavirus Mitigation and the Salvage of Cultural Materials for National Park Service, Midwest Region

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Hantavirus causes Hantavirus Pulmonary Syndrome (HPS), a life threatening pulmonary infection that presents human health and safety concerns during field projects carried out by National Park Service staff. During the summer of 1996, an interdisciplinary team developed Hantavirus mitigation protocols and salvage strategies to protect the preservation team against a documented threat of Hantavirus contaminated materials. Salvage materials consisted of historic fabric from a three-room frame cabin at Agate Fossil Beds National Monument in northwestern Nebraska. The Harold J. Cook Homestead Cabin is nationally significant for its association with early 20th century paleontological investigations of fossil deposits in the Niobrara River Valley. Mitigation efforts impacted all aspects of the project, from decontamination, removal, and storage of architectural and artifact samples, to structural stabilization and exterior restoration. The preservation and mitigation treatment strategies represent a synthesis of traditional preservation and field conservation practices, standardized documentation, and health and safety concerns.

The results of our initial effort laid the foundation for continued inter-disciplinary historic structures stabilization projects, and raised issues regarding the curation needs of those materials that were disinfected as part of the salvage design.

In preparation for the project, the cultural resources staff conducted a literature search; contacted public health services officials and disease prevention agencies that produced a field manual and a Behavioral Job Analysis (BHA) protocol. This presentation discusses mitigation and salvage strategies in concert with the agency's health and safety interim guidelines.

Posters

The Paleobotanical Collections of the Department of Geology at The Field Museum

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Home to one of the top 10 Paleobotany collections in North America, the Field Museum, in Chicago, Illinois, is one of the most active centres for paleobotanical research in the mid-west. The Paleobotany Collections at the Field Museum range in age from the Pre-Cambrian to the Quaternary, and represent almost every state, province and territory in North America.

Of particular significance are the approximately 6,000 specimens from the Early Tertiary of the Rocky Mountains and Great Plains, as well as the over 15,000 specimens from the Middle Pennsylvanian of the Mazon Creek region of Illinois. The Mazon Creek specimens at the Field Museum constitute the largest such collection in the world.

In recent years, fieldwork in Eastern North America by former curator, internationally renowned paleobotanist Dr. Peter Crane (present director Kew Gardens) and his associates greatly increased collections holdings of exceptionally well-preserved angiosperms, gymnosperms and pteridophyte material from the Middle and Late Cretaceous of North America.

A full-scale inventory of the Collections is currently underway, in order to completely digitize the Paleobotany holdings, in the form of a computerized database.

Over the next few years, the Paleobotany Collections will be moved into a new state-of-the-art facility, built by the Field Museum specifically to house museum collections. The Paleobotany section of this new Collections Research Centre, larger than the Collections' current location, will serve to accommodate future expansion of the Collections, and will provide a world-class research facility for paleobotanists from around the globe.

Internet access for work and play

Adrain, Tiffany, and **Golden, Julia**
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The Natural History Collections at the University of Iowa are accessible through a variety of internet databases. As well as traditional specimen catalogs such as the Paleontology Repository Catalog, these databases cover biodiversity (NMITA, Fragile Flora Database) and historical geology (Calvin Photographic Collection). Different software packages such as Specify, Oracle, FileMaker Pro and Access, are used according to the requirements of the database. On-line databases are useful for highlighting university collections and making them more accessible both to the scientific community and the public.

Cabinets of Curiosities: Participation in a Cross-Discipline Exhibition

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University museum collections are some of the best-kept secrets on American campuses. In the absence of an umbrella museum they can be too well-kept. Sometimes university collections become marginalized and their value can be threatened. Many university collections are actively searching for ways to increase their worth and defend their existence, especially in the face of budget cuts and space allocation. When the University of Wisconsin (Madison) Zoological Museum was invited to participate in a cross-discipline campus art exhibition, it marked a new, exciting possibility for this small, natural history museum to reach new audiences, increase awareness of its existence on campus, and emphasize its scientific and conservation efforts to protect the database of knowledge its collections represent. Other university collections including the Department of Physics, Medical Sciences, the rare books collection, and the Department of Art History also participated in the exhibition, and several concurrent exhibits and events around campus complimented the theme of the exhibition, culminating in a cross-discipline event. In her talk U.W. Zoological Museum Registrar Holly McEntee will discuss the significance of the participation of a small university natural history museum in a campus-wide collaborative exhibition and the benefits and drawbacks of such a collaboration.

University Courses Using Collections: Connecting across Colleges

Sharp, S. Llyn and **Rosenzweig, Michael S.**
Virginia Museum of Natural History at Virginia Tech, Blacksburg, VA, USA

The Virginia Tech Museum of Natural History has been an "early adopter" of using collections in non-traditional ways in order to establish their relevance to multiple audiences. We recognized that one of the greatest risks to research collections in the University environment is abandonment, as systematics faculty members retire and shrinking budgets are redirected towards more technological pursuits. However, we still believe that the primary data sources represented in collections will ultimately be of increasing, not decreasing, value. We have chosen to establish a strong link with the broader University curriculum and with faculty members outside our expected scope.

One of the ways we have done this is through active recruitment of faculty members. Combining our understanding of object-based learning with their course objectives, we have been able to enhance their teaching. This may not sound new to those of us who work with collections on a daily basis, but it does represent innovation in other fields. These faculty become recognized as innovators and collaborators with the Museum. This has led to increased appreciation of collections as a university-wide teaching and research resource.

We share here representative courses using our Museum collections, examples of student projects, and an outline of our faculty development model. We will explain some strategies for protecting specimens, as well as incorporating concerns for safety and hazardous materials.

One tie fits all: A universal clamp-system for sealing glass jars with glass lids.

Van Dam, Andries J. and **Brandenburg, Oskar**
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Due to excessive evaporation and acidification, 500 specimens of the pathology collection had to be changed to a fresh preservative solution. The evaporation and acidification were caused by the fact that the specimens were stored in cylindrical glass jars with a ground flange and loose glass plates on top without any sealant between the jars and the lids. In such a case, the glass container looses a great part of its function as a vapor- and oxygen-barrier.

To provide the jars with better closures, it was decided to use petroleum jelly as a sealant in combination with a clamp to secure the lid. With such closures the specimens remain easily accessible. However, due to the large variety in diameter of the openings of the jars, commercially available clamps were not a suitable solution. For this reason, the Leiden Museum of Anatomy developed a universal clamp-system that can be fitted on any flange type jar. The clamp-system consists of two polypropylene pipe clamps and an adjustable strap made of highly durable ethylene propylene diene monomer (EPDM).

Effectively reducing exposure to formaldehyde following the Strategy of Occupational Hygiene.

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Embalmers are exposed to formaldehyde at concentrations averaging up to 9 parts per million (ppm) during embalming. Short-term exposures to this strong-smelling gas cause eye, nose, and throat irritation at levels up to 5 ppm. At levels from 10 to 20 ppm, it causes cough, chest tightness, and unusual heartbeat; and from 50 to 100 ppm, fluid on the lungs, followed by death. Exposure to formaldehyde over a long time may also cause cancer.

Following the strategy of occupational hygiene, exposure to hazardous chemicals can be reduced to acceptable levels. The strategy involves five steps. The first step, which is most effective and preferable, is to take interventions at the source level. Examples are replacing the hazardous component or to reduce the strength. With respect to formalin preserved specimens, replacement of the fluid (containing up to 5% formaldehyde) by Kaiserling III (which contains only 0.2% formaldehyde) is an effective measure at the source level.

The second step in the strategy is trying to isolate the source, mostly by means of (local) ventilation. Performing the conservation activities in a chemical fume hood is an effective way to isolate the source. However, not all activities can be performed in a standard chemical fume hood. In consideration with the employer, a standard chemical fume hood was effectively modified to facilitate both the preparation of large quantities (up to 60 litres) of preservative fluids, the distribution of it, and the manipulation of specimen containers. The outcome of the modification is that most of the work can be performed within the protective environment of the chemical fume hood.

The third step is to reduce exposure to the source by means of room ventilation. Ventilation is a well-established and widely used engineering method of hazard control in the chemical, metallurgical and mineral industries. In our situation the installed fume hood increases the total room ventilation of the laboratory. The increased number of air changes per hour can be effective for reducing airborne contamination by rapid dilution and evacuation of hazardous gases and aerosols containing formaldehyde.

The fourth step is to isolate man. In general, laboratories are restricted areas. Measures to isolate the employee are not applicable in this situation.

The last step, which is less preferable, is to use personal protection. To prevent accidental exposure to hazardous chemicals disposable gloves can be used. Because of the measures taken in first three steps in reducing exposure, the use of breath protection is not necessary and can be omitted.

Mobile Storage and Aeration Cabinet

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Mammal material from private collections or the field is often housed with naphthalene (moth balls) to reduce the threat and extent of insect damage. Study skins, stuffed with cotton, absorb this volatile and aromatic chemical, and off-gassing persists long after the pesticide is removed. A donation including about 4,000 study skins needed to be "aired out" to reduce the health hazard to staff exposed to the specimens, and remove the strong and unpleasant odour. The author designed and built a mobile cabinet in which specimens could be aired out. Study skins were placed on plastic-mesh drawers built to facilitate air circulation past specimens. An opening on the top of the cabinet permitted the attachment of an outtake "elephant trunk". Two 1/2 x 10" slots in the bottom of the unit permitted air intake and production of a draft of air past the specimens. All three openings were covered with screen adhered to the inner cabinet surface with silicone sealant. Specimens were generally aired for a 2-3 week period, after which a low-tech-but-sensitive nose test was performed to determine whether the material was ready to be moved to permanent, air-tight storage cabinets.