

PROGRAM AND ABSTRACTS

SPNH C

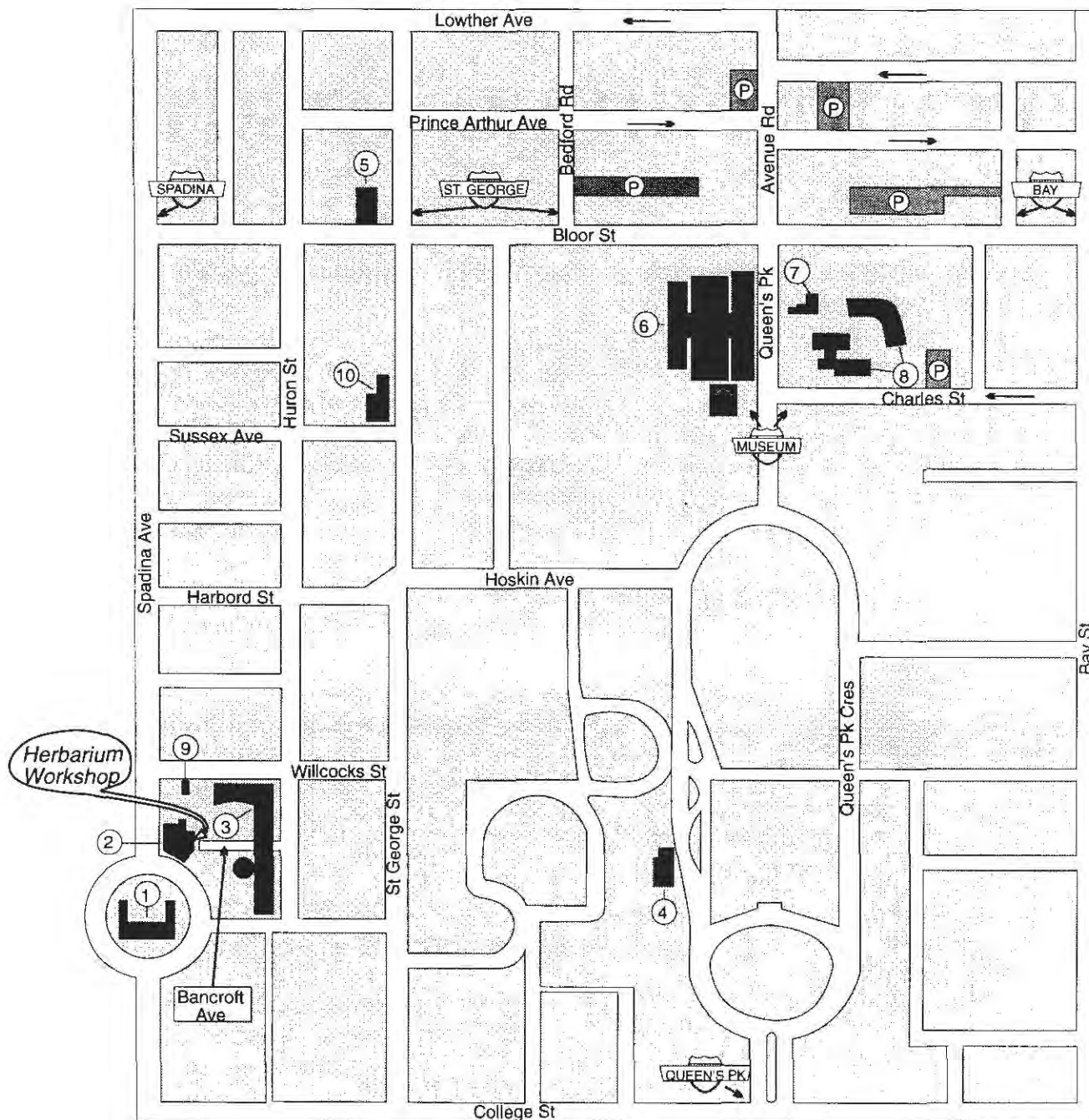
**SOCIETY FOR THE PRESERVATION
OF
NATURAL HISTORY COLLECTIONS**

10th ANNUAL MEETING
2-6 JUNE 1995

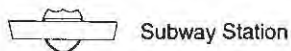


Royal Ontario Museum
TORONTO, ONTARIO
CANADA

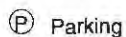
Map of Conference Area



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|--|--|
| ① ROM Botany Dept. Cryptogamic Herbarium,
1 Spadina Crescent | ⑥ Royal Ontario Museum, Main Building,
100 Queen's Park |
| ② Koffler Institute for Pharmacy Management,
575 Spadina Avenue | ⑦ Gardiner Museum,
111 Queen's Park |
| ③ U of T Botany Dept., Earth Sciences Centre,
25 Willcocks Street | ⑧ Victoria University residences |
| ④ Sigmund Samuel (Canadiana) Building,
ROM Botany Dept. Vascular Plant Herbarium,
14 Queen's Park Crescent | ⑨ Faculty Club,
41 Willcocks Street |
| ⑤ Quality Hotel by Journey's End,
280 Bloor Street West | ⑩ Innis College,
2 Sussex Avenue |



Subway Station



Parking

ACKNOWLEDGEMENTS

SPNHC '95 Local Committee

Chair: Janet Waddington

Cathy Ayley
Ken Barbour
Ronnie Burbank
Sheila Byers
Helen Coxon
Karen Ditz
Peter Fenton
Gary Friedman
Isabella Guthrie-McNaughton
Erling Holm

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Diane Wolstenholme
Susan Woodward

Royal Ontario Museum

John McNeill, Director
David Brose, Associate Director-Curatorial
Department of Museum Volunteers

Many others contributed ideas and assistance, and their efforts are greatly appreciated!

"Managing the Modern Herbarium" Workshop

Sheila Byers
Deborah Metsger
University of Toronto, Botany Department

Financial Assistance

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The Royal Ontario Museum Foundation Endowment Fund

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Programme Summary

THURSDAY, JUNE 1

9:00 am - 5:00 pm	Long Range Planning Committee
2:00 pm - 4:00 pm	Resources and Publications Committees
7:00 pm - 9:00 pm	Second World Congress Planning Committee

FRIDAY, JUNE 2

10:00 am - 4:30 pm	Registration
9:00 am - 12:00 pm	Committee Meetings
2:00 pm - 5:00 pm	Exhibits/Poster Set-up
2:00 pm - 5:00 pm	Council Meeting
9:30 am - 4:30 pm	Field Trip to Metro Toronto Zoo
12:30 pm - 4:30 pm	Field Trip to Ontario Science Centre
7:00 pm - 10:00 pm	Icebreaker and Registration

SATURDAY, JUNE 3

8:15 am - 4:30 pm	Registration
8:15 am - 5:00 pm	Posters
8:45 am - 10:15 am	Oral Presentations
10:15 am - 10:45 am	Break
10:45 am - 12:00 pm	Oral Presentations
12:00 pm - 2:00 pm	Lunch Break
2:00 pm - 3:00 pm	Keynote Address by Stephen Jay Gould
3:00 pm - 3:30 pm	Break
3:30 pm - 5:00 pm	Oral Presentations
7:00 pm - 11:30 pm	Dinner - Dance at Ellas Restaurant

SUNDAY, JUNE 4

8:30 am - 12:00 pm	Registration
8:30 am - 5:00 pm	Posters
8:45 am - 10:00 am	Oral Presentations
10:00 am - 10:30 am	Break
10:30 am - 12:00 pm	SPNHC Annual General Meeting
12:00 pm - 1:45 pm	Lunch Break
1:45 pm - 3:15 pm	Oral Presentations
3:15 pm - 3:45 pm	Break
3:45 pm - 5:00 pm	Oral Presentations
5:00 pm - 6:00 pm	Exhibits/Poster Take-down
5:00 pm - 7:00 pm	Final Meeting of Council

MONDAY, JUNE 5

9:00 am - 12:00 pm	Discipline Discussion Groups
1:30 pm - 3:00 pm	ROM Tours of Collections and Facilities
8:30 am - 5:00 pm	Workshop Symposium: Preventive Conservation in the Herbarium
5:00 pm - 7:30 pm	Workshop Dinner
7:30 pm - 9:30 pm	Herbarium Information Bazaar

TUESDAY JUNE 6

8:30 am - 5:00 pm	Workshop Symposium: Contemporary Issues Facing Herbaria
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Detailed Programme

THURSDAY, JUNE 1

- 9:00 am - 5:00 pm Long Range Planning Committee (Gardiner Museum of Ceramic Art-classroom)
2:00 pm - 4:00 pm Resources Committee (ROM Curatorial Centre Level 2B -Ichthyology & Herpetology Classroom)
2:00 pm - 4:00 pm Publications Committee (ROM Curatorial Centre Level 2B - Mammalogy Classroom)
7:00 pm - 9:00 pm Second World Congress Planning Committee (Quality Hotel by Journey's End)

FRIDAY, JUNE 2

- 10:00 am - 4:30 pm Registration (ROM Front Rotunda)
9:00 am - 12:00 pm Committee Meetings (Meet in Planetarium Lobby)
2:00 pm - 5:00 pm Exhibits Set-up (ROM SE Atrium)
2:00 pm - 5:00 pm Poster Set-up (ROM Lower Rotunda)
2:00 pm - 5:00 pm Council Meeting (Planetarium Multiroom)
9:30 am - 4:30 pm Field Trip to Metro Toronto Zoo (meet at front entrance to ROM)
12:30 pm - 4:30 pm Field Trip to Ontario Science Centre (meet at front entrance to ROM)
7:00 pm - 10:00 pm Icebreaker and Registration (ROM SW Atrium: cash bar)

SATURDAY, JUNE 3

- 8:15 am - 4:30 pm Registration (ROM Lower Rotunda)
8:15 am - 5:00 pm Posters (ROM Lower Rotunda)
8:15 am - 5:00 pm Exhibits (ROM SE Atrium)

Oral Presentations (ROM Theatre)

Session Chair: Grant W. Hughes

- 8:45 am **Welcoming Address**
McNeill, John - Director, Royal Ontario Museum
- 9:00 am **The Evolution of Natural History Museums**
Fitzgerald, Gerald R.
- 9:15 am **Moving a Major Collection: Crustaceans at the Natural History Museum of Los Angeles**
Pettit, Gary A.
- 9:30 am **Collections on the Move: A Case History of the Peregrinations of a Federal Collection of Vertebrates.**
Ramotnik, Cindy A.
- 9:45 am **The Stability of Bone: Experiments at High Temperature**
Von Endt, D. W., P. E. Hare, and J. Kokis
- 10:00 am **Preserving and Cataloguing Fish Illustrations as Unique Natural History Records**
Palmer, Lisa
- 10:15 am BREAK (ROM SE Atrium)

Session Chair: Ross MacCulloch

10:45 am **An Investigation into the Composition of Botanical Wax Models With a View to their Conservation**

Purewal, Victoria

11:00 am **Solutions in Foam: Storing Unusual and Oddly Shaped Objects**

DeMouthe, Jean F.

11:15 am **Conservation and Re-mounting of a Skull, Lower Jaw and Antlers of *Megaceros giganteus*, the Giant Irish Elk - an Award Winning Project Undertaken on Behalf of Kendal Museum**

Andrew, Katherine J.

11:30 am **Some Experiments Concerning the Stability of Keratin**

Yourd, E. R., D. W. Von Endt, and P. E. Hare

11:45 am **The Control of Acidity in Formaldehyde Solutions Being Used for Preservation of Fish Parasitology Material**

Carter, Julian D.

12:00 pm LUNCH (on your own)

2:00 pm **The Glory and Importance of Natural History Collections**

Gould, Stephen Jay (Keynote speaker)

3:00 pm BREAK (ROM SE Atrium)

Session Chair: Erling Holm

3:30 pm **A Role for Natural History Collections in Land Use Planning**

Hughes, Grant W.

3:45 pm **Categories of Specimens: A Collection Management Tool**

Price, Judith C., and Gerald R. Fitzgerald

4:00 pm **Natural History Collections and Conservation Biology**

Jesse, Andrea

4:15 pm **Museum Collections, Research and Community Computing Systems: Getting Our Message to the Public**

Sumpter, Paula M.

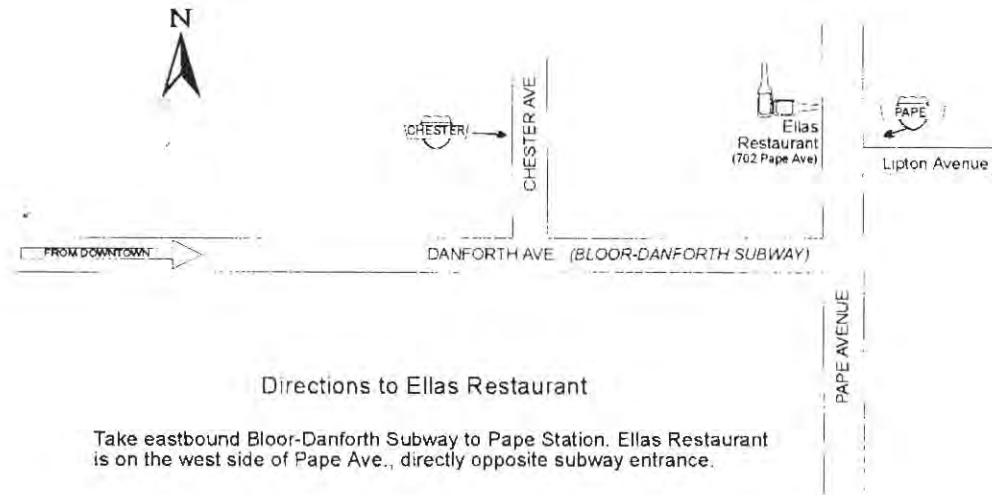
4:30 pm **Interesting Public Programs on Collections Management: Not an Oxymoron!**

Sharp, S. Llyn

4:45 pm **Natural History Collections - A Resource for the Future. Second World Congress on the Preservation and Conservation of Natural History Collections, August 20th -24th, 1996**

Collins, Chris

7:00 pm DINNER - DANCE AT ELLAS RESTAURANT



SUNDAY, JUNE 4

- 8:30 am - 12:00 pm Registration (ROM Lower Rotunda)
- 8:30 am - 5:00 pm Posters (ROM Lower Rotunda)
- 8:30 am - 5:00 pm Exhibits (ROM SE Atrium)

Oral Presentations (ROM Theatre)

Session Chair: John E. Simmons

- 8:45 am **The Centre for the Study of Biological Diversity at the University of Guyana - Challenges of Managing a Herbarium in the Tropics**
MacKnight, Jane
- 9:00 am **Humidity Control and Building Systems**
Lull, William P.
- 9:30 am **Non-Destructive Analysis for Investigating the Stability of "Victorian-Style" Mounted Fossil Vertebrates** - *Bosnia Museum - Bot.*
Collins, Chris
- 9:45 am **Safe Storage: Reassessing Plastics for Display and Storage**
Fenn, Julia
- 10:00 am BREAK (ROM SE Atrium)
- 10:30 am SPNHC ANNUAL GENERAL MEETING (ROM Theatre)
- 12:00 pm LUNCH (on your own)

Session Chair: David W. Von Endt

- 1:45 pm **We Can't Keep it All! Selecting Material for Permanent Storage and Cataloguing**
Holm, Erling, and Marty Rouse
- 2:00 pm **Disaster Recovery of Natural History Collections: A Case Study (Video)**
Mellon, Kelly, Lori Schlenker, and Kerry Button
- 2:30 pm **Restoration Efforts and Current Operational Status of the Texas Cooperative
Wildlife Collections**
Baumgardner, George D., and R. Kathryn Vaughan
- 2:45pm **Preparing for "The Big One"**
Casjens, Laurel
- 3:00 pm **Disaster Planning for a Sceptical Museum**
Pickering, J.

- 3:15 pm BREAK (ROM SE Atrium)

Session Chair: Susan M. Woodward

- 3:45 pm **A Program for International Conservation of Fossiliferous Concretions**
Lemay, Stephen
- 4:00 pm **Toward a National Collection Strategy: A Review of Holdings in Canadian Natural
History Collections**
Gagnon, Jean-Marc
- 4:15 pm **Natural History Conservation in the Netherlands**
Brokerhof, Agnes
- 4:30 pm **Electronic Collections Data: People and Prerogatives**
Dibben, Martyn J., and Paula M. Sumpter
- 4:45 pm **Resurrecting a 19th Century Herbarium and a Collector's Career**
Bryant, James M., and Gordon Tucker

- 5:00 pm FINAL MEETING OF COUNCIL (ROM Education Classroom 1 - Level 2B)

MONDAY, JUNE 5

9:00 am - 12:00 pm Discipline Discussion Groups (Meet in ROM SE Atrium)

Education Collections: Strategies for Management and Care from the "Back Room"

Co-chairs: S. Llyn Sharp and Jeff Stephenson

Earth Sciences

Chair: Julia Golden

Entomology & Invertebrate Zoology

Chair: David Barr

Ethnology & Anthropology

Chair: Trudy Nicks

Mammalogy & Ornithology

Co-chairs: Susan M. Woodward and Kimball Garrett

Ichthyology & Herpetology

Chair: John E. Simmons

1:30 pm - 3:00 pm Tours of ROM Collections and Facilities
(Meet in ROM SE Atrium at 1:30 Sharp!)

**Education and Training Committee Workshop
"Managing the Modern Herbarium"**

MONDAY, JUNE 5

8:30 am - 5:00 pm **Symposium: Preventive Conservation in the Herbarium.** University of Toronto, Koffler Institute for Pharmacy Management.

5:00 pm - 7:30 pm **Workshop Dinner.** University of Toronto, Faculty Club.

7:30 pm - 9:30 pm **Herbarium Information Bazaar.** University of Toronto, Earth Sciences Centre, Botany Labs.

TUESDAY JUNE 6

8:30 am - 5:00 pm **Symposium: Contemporary Issues Facing Herbaria.** University of Toronto, Koffler Institute for Pharmacy Management.

Poster Session

Minimizing Earthquake Damage to Fossil Collections

Ambrose, Peter D.

Furs on Ice: The Cold Storage Project at the Royal Ontario Museum

Burbank, Ronnie, and Shannon Elliott

Rare Breeds Canada: Conservation of Canada's Agricultural Heritage

Chiperzak, Jy, and Jim Lawrence

A Video Series on Preventive Conservation

Dignard, Carole, Jacques Bussière, and Laurier Lacroix

Ten Years of SPNHC (Society for the Preservation of Natural History Collections) Productions and Relevance: Facts and Figures

Gisbert, Julio

Models for Assembly of Small Mammals Study Skins

Gisbert, Julio, and Solis Fernandez

Problems with Storage of Entire Mycological Specimens

Moore, Simon J.

International Accord on the Value of Natural Science Collections

Pettitt, C. W., J. R. Nudds, M. V. Hounsome, and S. R. Edwards

A Protective Hardboard Folder for Storing Valuable Herbarium Specimens

Shchepanek, Michael J.

Fast Elevated Temperature Control of Insects in Vascular Plant Specimens

Strang, Tom, and Michael J. Shchepanek

Developing a Museum Resource and Education Curricula

Young, Daniel K., Steven J. Krauth, and Hedi Baxter

Putting it All Together: Portrait of a Department's Automated Systems

Woodward, Susan M.

Team-building: The Collection Managers' Group at the Royal Ontario Museum

Woodward, Susan M., and Sheila C. Byers

Abstracts

Minimizing Earthquake Damage to Fossil Collections

Ambrose, Peter D.

Fossil Butte National Monument, P. O. Box 592, Kemmerer, WY 83101, USA

All organizations having responsibility for the display and storage of scientific or cultural collections should assess the potential for seismic activity in their geographic area and take appropriate precautions to prevent damage to irreplaceable items. A number of paleontological resources are maintained by museums in earthquake zones. This presentation will summarize and describe efforts to prevent damage prior to earthquakes, assess and document damage subsequent to such events, and develop measures to prevent damage from future seismic activity.

Conservation and Re-Mounting of a Skull, Lower Jaw and Antlers of *Megaceros giganteus*, the Giant Irish Elk - an Award Winning Project Undertaken on Behalf of Kendal Museum

Andrew, Katherine J.

59 The Common, Abberley, Worcestershire WR6 6AY, UK

A large specimen of the antlers, skull and lower jaw of a Giant Irish Elk were re-discovered in storage at Kendal Museum. Field collected in 1859 in Ireland, they had been on display in the museum until the early 1980's. The specimen as re-discovered was very dirty, six tines were broken and many teeth damaged.

A condition report was made and an estimate prepared; grant aid was successfully sought for conservation and re-display. The project was carried out over the period of a year, working on site during three week-long visits.

The specimen was cleaned using a combination of wet and dry methods. The old repairs, consisting of rusted steel rods, organic adhesive and Plaster of Paris, were removed and replaced with light-weight aluminium rod set in epoxy putty spacers and filled with glass microballoons and Paraloid B72. Re-mounting for display used an aluminium pole and braided steel support wires.

The project was awarded a special commendation in 1994 in the first ever UK Conservation Awards.

Restoration Efforts and Current Operational Status of the Texas Cooperative Wildlife Collection

Baumgardner, George D., and R. Kathryn Vaughan

Department of Wildlife & Fisheries Sciences, Texas A&M University, College Station, TX 77843, USA

Much has been accomplished in restoration of the Texas Cooperative Wildlife Collection (TCWC) since its devastating inundation in October 1992. All holdings of this collection have been checked and stabilized. Late in 1993, a 14,000 square foot space on University property was obtained and modified to serve as a new permanent facility for the TCWC, and from January to April 1994 the specimens, records, and equipment of this collection were packed and moved to this new area. All specimens of fish, amphibians, reptiles, and birds have been arranged in proper order. All large mammal pelts have been sorted and placed in proper storage and most of the large skeletal material has been reshelved. Approximately 50% of the mammal skins that were inundated have been sorted into proper order. The fish, amphibian, reptile and bird collections are fully accessible. All mammal specimens that remained dry and nearly all of the skeletal materials that got wet are available for examination and loan. Ease of examination of mammal skins that were submerged varies depending on the taxon. Cataloguing of backlogged material has resumed for the fish, amphibians, reptiles, and birds. Information requests can be filled as normal for the fluid collections and the birds. Requests for information regarding mammals can be filled for about 93% of this collection using printouts made prior to the flood. Searches of the computerized data archived in the Texas A&M University mainframe computer will not be possible until these data can be downloaded and a new data management system is developed.

Natural History Conservation in The Netherlands

Brokerhof, Agnes W.

Central Research Laboratory for Objects of Art and Science, Gabriel Metsustraat 8, 1071 EA Amsterdam, The Netherlands

The Central Research Laboratory (CL) is a government institution which provides service, advice and assistance to the museums, galleries, libraries and archives in the field of conservation and restoration in The Netherlands. In response to international developments CL set up a survey of conservation problems in Dutch natural history collections (NHC's). Literature study provided an international context and some solutions. Furthermore, it became clear in which areas research is required.

A matrix was designed in which conservation problems can be arranged as combinations of specimen material and cause of damage. The most common problems are: prevention and control of biodeterioration; lack of standards for preventive conservation such as climate control, light, transport, storage and handling; damage due to volatile compounds; evaporation in spirit collections; cleaning of specimens; consolidation of fragile material.

Subsequently, a working group was formed in 1994 in which all NH disciplines are represented. Its aim is to generate knowledge, to exchange information, to set up standards for preservation and to come to uniformity in use and application of methods and materials in conservation.

Resurrecting a 19th Century Herbarium and a Collector's Career

Bryant, James M., and Gordon Tucker

Pember Museum of Natural History, 33 West Main Street, Granville, NY 12382, USA ; New York State Biological Survey, New York State Museum, Empire State Plaza, Albany, NY 12230, USA

In prior centuries, large natural history collections were primarily the result of efforts of private individuals. In only a very few cases have these collections survived intact into the present, even more rarely with their accompanying data. Such a survivor is the Pember Museum, in particular the plant collection assembled by Franklin Pember and co-workers. Recently, the Museum began the computer cataloguing of this collection with the objective of assisting scholars with research into the history of collecting, collectors and 19th century plant populations in the northeastern U.S. This work has led to increased communication with other institutions holding old collections and promises to bring new usefulness to the Pember herbarium, while at the same time shedding light on Franklin Pember's career.

Furs on Ice: The Cold Storage Project at the Royal Ontario Museum

Burbank, Ronnie, and Shannon Elliott

Department of Ethnology and Textile Department, Royal Ontario Museum, 100 Queen's Park, Toronto, ON, Canada M5S 2C6

The Cold Storage Project is an ongoing collaboration of the Collections Management, Ethnology, and Textile Departments for the care of the museum's fur garment collections. During a three-month project in 1994, nearly 600 Ethnology Arctic and Subarctic and Textile costume fur garments underwent off-site freezing treatment, after the discovery of live dermestid activity in a cold storage facility. During the project, storage units were reconfigured to improve support for fragile parkas and coats, and database locations were updated to generate improved, computerized shelflists. Human, material, and financial resources were documented, and procedures to handle large-scale infestations were drafted. Represented in this poster are photographs and descriptive text illustrating stages of the project, and statistics indicating the resources utilized.

The Control of Acidity in Formaldehyde Solutions Being Used for the Preservation of Fish Parasitology Material

Carter, Julian D.

National Museum of Wales, Zoology Department, Cathays Park, Cardiff, South Glamorgan
CF1 3NP, UK

Problems in acidity were being encountered in a research fish parasitology collection preserved in various concentrations of formaldehyde solutions. Initial conservation work failed to correct this problem despite using some form of buffering control in the replacement formaldehyde solutions. As a result, work was carried out to look into more effective means of buffering this material by choosing a range of suitable buffering agents, monitoring the pH levels over a period of time and comparing their ability to control acidity through acid titrations. The buffers chosen were all sodium based and their action was compared when used with 4% formaldehyde solutions made up in both saline and de-ionised water. The final results suggested that using SodiumBphosphate in solutions made up in de-ionised water was the most effective means of buffering the fish parasitology material.

Preparing for "The Big One"

Casjens, Laurel

Utah Museum of Natural History, University of Utah, Salt Lake City, UT 84112, USA

The Utah Museum of Natural History, located about 100 meters from the Wasatch Fault, is at significant risk of damage from an earthquake. The Museum is working to minimize damage should a seismic event actually happen. Activities underway include installation of seismic braces on open racks to keep trays from jiggling out, rehousing individual artifacts to keep them from rolling and bouncing, and transferring specimens to closed cabinets. Some collections areas are well protected; others remain at risk, although plans have been written and grant proposals submitted. We are also active in a committee representing university museums and libraries that is developing disaster response plans. The Museum has an active education program which includes "earthquake kits" for teachers, docent outreach and workshops on earthquake preparedness.

Rare Breeds Canada: Conservation of Canada's Agricultural Heritage

Chiperzak, Jy, and Jim Lawrence

Rare Breeds Canada, Joywind Farm Rare Breeds Conservancy Inc., General Delivery, Campbellford, ON, Canada K0L 1L0

Living heritage museums should be aware of the specific breeds indigenous to specific time periods. Many of our domestic farm animals that were important in the development of agriculture in this country and the rest of North American, are now facing extinction. Rare Breeds Canada is Canada's domestic livestock conservation organization with many programs designed to promote and preserve heritage breeds of farm animals and poultry.

When dealing with farm animals the term "breeds" is specific within species. Many of these breeds have developed through centuries of selection for desirable characteristics such as mothering ability or milk or beef production. In today's economically-driven agricultural industry many of the heritage breeds of animals and poultry that played an important role in the development of modern breeds of livestock, are no longer considered commercially viable and in many cases have been allowed to decline in numbers or even disappear.

Breeds such as the Canadienne cow, developed from stock brought to Canada by Jacques Cartier and Samuel de Champlain (and once touted as the dairy cow of the future), have suffered with the import of other animals like the Holstein cow. The Canadienne, once found in great numbers in Quebec and Ontario, is now reduced to fewer than 1,000 pure-bred animals in the Lower St. Lawrence basin. Its status is insecure.

Rare Breeds Canada has developed programs to conserve and protect many important heritage breeds through its: Satellite Breeding Network - a series of host farms across Canada on which rare breeds are nurtured by RBC members; Heritage Hatchery Network - a breeding program for endangered breeds of heritage poultry; Joywind Farm - an educational demonstration farm park on which more than 40 breeds of livestock will be shown - opening May 20, 1995 near Springbrook, Ontario; Rare Breeds Publications - books, brochures and educational material designed to provide information for the breeder and rare breeds enthusiast; Information Centre - a central location for information on specific breeds and breeders; International Networking with similar groups around the world; Student Intern Program - to involve students in rare breed conservation; Canadian Gene Resource Collection - long term frozen semen as a genetic resource for the future.

The poster explores the development of Canada's agricultural heritage through the domestic animals involved.

Non-Destructive Analysis for Investigating the Stability of 'Victorian-Style' Mounted Fossil Vertebrates

Collins, Chris

Geological Conservation Unit, Dept. of Earth Sciences, University of Cambridge, Madingley Rise, Madingley Road, Cambridge CB3 0EZ, UK

Dismantling the frames and backing boards of 'Victorian-style' mounted vertebrates to investigate the support mounting materials is often necessary to check their stability, especially if deterioration is occurring on the specimen. This will always result in damage to the specimen and the mount.

Conservation ethics plus the increasing historical, research and financial value of these specimens and mounts, mean that it is becoming more important to develop techniques to investigate the stability of these specimens without dismantling them.

The Geological Conservation Unit, University of Cambridge is developing a program of non-destructive tests to establish the stability of 'apparently' stable and unstable mounted specimens.

Techniques using low powered x-rays, have been found to be successful in studying the supporting mounts of specimens. This, supported with UV and IR photography and surface spot tests, has been used to build a 'stability picture' of these fossils which can be used to evaluate long term storage and environmental effects, and also the need for remedial conservation work.

We are hoping to develop the use of other techniques such as ultrasonic scans and CAT scanning to look at the 3-dimensional structure of specimens.

Natural History Collections - A Resource for the Future: Second World Congress on the Preservation and Conservation of Natural History Collections, August 20th-24th, 1996

Collins, Chris

Geological Conservation Unit, Dept. of Earth Sciences, University of Cambridge, Madingley Rise, Madingley Road, Cambridge CB3 0EZ, UK

The Geological Conservation Unit, and the Dept. of Earth Sciences, University of Cambridge are hosting the Second World Congress on Natural History Collections. This is the follow up to the very successful first International Symposium held in Madrid in 1992.

The aim of the Congress is to consolidate and carry on the work carried out in Madrid and specifically to look at developing the following areas:

1. The use and development of collections in industry, research and education.
2. Accessibility of collections using information technology, databases and international data exchange.
3. Current techniques in the care and management of collections.
4. Conditions of collections in the developed and developing countries.
5. The image of Natural History Collections worldwide.
6. Economic and fund-raising aspects.
7. Developing and Implementing strategies for the future including the establishment of a World Council on Collections Resources (WCCR). This body will act as an umbrella organisation for collections based institutions and groups with the aim of promoting world-wide:
 - international co-ordination between groups and institutions;
 - standards in collection management;
 - communication between workers in the field;
 - the public understanding of the value and importance of these collections.

We look forward to seeing you in Cambridge.

Solutions in Foam: Storing Unusual & Oddly Shaped Objects

DeMouthe, Jean F.

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

Natural history museum collections include objects of unusual shape, dimensions and materials. Some of these specimens are also fragile and/or susceptible to damage from pests, humidity, light or heat.

Using ethafoam and other archival materials, it is possible to create simple, inexpensive and secure storage for such items. Although each specimen must be treated individually, the flexibility of the storage materials available today, such as ethafoam, make it possible to create safe environments within the space restrictions of available cabinets and facilities.

Several departments at the California Academy of Sciences have developed a number of efficient and cost-effective storage solutions for such objects as baskets, ceramics, beads, carvings, delicate mineral specimens, gemstones and a variety of other odd things. Each object is housed as efficiently as possible within existing cabinetry.

Through common-sense planning and a little trial-and-error experimentation, the costs and time involved in these projects can be kept to a minimum.

Electronic Collections Data: People and Prerogatives

Dibben, Martyn J. , and Paula M. Sumpter

Botany Section, Milwaukee Public Museum, Inc., 800 W. Wells Street, Milwaukee, WI 53233, USA; Information Services, Milwaukee Public Museum, Inc., 800 W. Wells Street, Milwaukee, WI 53233, USA

The Milwaukee Public Museum has been creating databases from its biological collections for more than a decade. Technological advances have now made it possible and affordable for MPM to begin providing access to these datasets via the Internet. To accommodate availability for the scientific community and the public, the museum is pursuing several strategies.

Restricted public access is to be provided through the museum's affiliation with the community computing system Omnifest. The needs of the scientific community are being addressed two-fold. A MPM World Wide Web home page will provide limited access to biological data in a format that allows users to obtain preliminary research information on their own. More specific data will be available only through contact with an appropriate curator.

MPM has also begun information sharing with the State of Wisconsin Department of Natural Resources. Data from the MPM Wisconsin Herpetological Atlas and from the museum's botanical databases will be merged with data from throughout Wisconsin in a controlled electronic environment. These projects are compatible with the proposed goals of the National Biological Service and are being planned with that program in mind.

A Video Series on Preventive Conservation

Dignard, Carole, Jacques Bussière, and Laurier Lacroix

Canadian Conservation Institute, Department of Canadian Heritage, 1030 Innes Road, Ottawa, ON, Canada K1A 0M5; Centre de Conservation du Québec, 1825 rue Semple, Québec, QC, Canada G1N 4B7; Museum Studies Programme, Université du Québec à Montréal, Montreal, QC, Canada H3C 3P8

The Centre de conservation du Québec (CCQ), the Canadian Conservation Institute (CCI) and the Université du Québec à Montréal (UQAM) have produced jointly a video series entitled "Preventive Conservation in Museums". The 7 hour long series, available in English or French, is divided into 19 units, each between 15 and 25 minutes long. Twelve units cover preventive conservation topics for general museum collections: introduction to preventive conservation, condition reporting, protecting objects on exhibit, storage, handling, packing and transportation, lighting, climate control, integrated pest management, pollutants, emergency contingency planning and closing a seasonal museum. The remaining topics cover care of specific types of collections: paintings, sculptures, furniture, metals, objects, works of art on paper and textiles. There are many cross-references between units, but care was taken to make each unit stand on its own. The videos are intended to be used by a wide audience for basic training in preventive conservation, including: staff and volunteers of large or small cultural institutions; conservators who need audio-visual assistance in training staff and volunteers or in giving basic care of collections seminars; and students in museum studies programmes.

Safe Storage: Reassessing Plastics for Display and Storage

Fenn, Julia

Collections Management, Royal Ontario Museum, 100 Queen's Park, Toronto, ON, Canada M5S 2C6

Damage to the collections caused by emissions given off by storage and display materials is a well known phenomenon and many museums check products before they are used with the collections. However once they have been selected they can remain in use for many years without further thought. This is especially true of plastic materials which are often more durable and expensive than paper products.

Unfortunately these materials are not necessarily resistant to contamination. Polymers such as polymethylmethacrylate (Plexiglas), which are normally considered safe, have been found to have a disturbingly tenacious retention of common museum pollutants such as dichlorvos which is a risk to staff and collections alike.

National Heritage: The Evolution of Natural Science Museums

Fitzgerald, Gerald R.

Canadian Museum of Nature, P.O. Box 3443, Station "D", Ottawa, ON, Canada K1P 6P4

Museums have evolved in philosophy and structure following a natural progression that can be characterized by three models: The Curio Model; the Data Model; and the Information Model. Most natural history museums can be located somewhere along this continuum that has served society's interests for many years. The evolution has depended on an expanding resource base so that the aspirations of individuals and the needs of society could be met. Like many species that have become extinct because their environment changed, museums now find themselves in crisis facing increasing demands from society and decreasing resources. The progression along the continuum has become too expensive and often fails the test of relevance to society. A new model has been proposed, the Knowledge Model. This new model is not a natural progression from the comfortable past into a secure future. Rather it represents a disjunct relationship with the past and a leap into the future. It requires a thorough self-examination, a change in culture, and a step into an uncomfortable unknown. This, it is proposed, is the challenge of the future.

Toward a National Collection Strategy: A Review of Holdings in Canadian Natural History Collections

Gagnon, Jean-Marc, and Gerald R. Fitzgerald

Canadian Museum of Nature, P.O. Box 3443, Station "D", Ottawa, ON, Canada K1P 6P4

Results from surveys and indexes of natural history collections in Canada produced since 1978 were compiled and analyzed to obtain a global picture of what is presently represented by these collections. A total of 650 collections were found in 264 different institutions throughout Canada. About 33 million specimen lots are reported for all collections; probably at least 5 million more have been added since (not considered in this study), primarily in the Entomology Collections of Agriculture Canada. Twenty-two institutions with more than 200 thousand specimen lots account for more than 83% of all Canadian collection holdings. The flora and fauna of some provinces or territories are poorly represented in their regional collections but tend to be covered by collections in other geographic regions, including national institutions. Although it is not possible to determine from the reported information how well-represented the Canadian flora and fauna are, a comparison of discipline-specific holdings with estimated number of new species to be found (Canada Country Study of Biodiversity) indicates that groups such as plants, birds and mammals are fairly well represented in Canadian collections. Present and future directions in collection development should prioritize microscopic groups, invertebrates and fish. Such a strategy should take advantage of provincial and territorial collaborations to limit duplication of efforts while maintaining and/or developing a taxonomic expertise in these fields.

Ten Years of SPNHC (Society for the Preservation of Natural History Collections) Productions and Relevance: Facts and Figures

Gisbert, Julio

Museo Nacional de Ciencias Naturales, J. Gutierrez Abascal 2, 28006 Madrid, Spain

The Society for the Preservation of Natural History Collections production is shown from the scientific, educational and international relationships point of view. The differences between theory and practice are evaluated.

Models for Assembly of Small Mammals Study Skins

Gisbert, Julio, and Solis Fernandez

Museo Nacional Ciencias Naturales, J. Gutierrez Abascal 2, 28006 Madrid, Spain

Stuffing is the most used method to prepare mammals for the study of skins. This method is the best to show coat features. The stuffing material most often used is water-repellent cotton assembled on wire rack. Different conservators use this method in different ways, thus affecting the interpretation of the coat pattern, moult stages, mammae position, etc. We propose the use of manufactured models as stuffing material to standardize the study series. The use of this new method is evaluated.

We Can't Keep It All! Selecting Material for Permanent Storage and Cataloguing

Holm, Erling, and Marty Rouse

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Natural history collections may receive a large volume of specimens which result from a variety of field studies and surveys. These specimens and the associated data which accompany them are important records of the fauna with information on the status, habitat, and distribution of species. Unfortunately, the volume of material often exceeds the resources available to curate it. Therefore, it is advisable for curators and collections managers to use discretion when deciding what should be kept and catalogued into their collections.

Only a portion of fishes which come into the Department of Ichthyology and Herpetology, Royal Ontario Museum, from external sources and staff collections are catalogued. The basis for decisions on what is kept has changed over the last 15 years and computerization of the collection has resulted in the ability to make more informed decisions. Data for some specimens which are not kept are entered on computer making data easily available for zoogeographical or ecological analyses and environmental impact studies. Computer summaries are used by field staff and other collectors, so that voucher specimens for new records can be saved or, alternatively, easily identified specimens not needed can be released alive. Collections not catalogued are disposed of in a variety of ways to maximize their usefulness.

A Role for Natural History Collections in Land Use Planning

Hughes, Grant W.

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Museum-based information about natural history may contribute to decision making for land use planning. However, land use planning agencies may not know the extent of the valuable information contained in museum collections. Three possible roles exist for the Royal B.C. Museum: 1) to provide strategic advice to government planning agencies; 2) to form working level partnerships with agencies conducting biodiversity and environmental sustainability assessments where the research closely aligns with museum research priorities; and 3) to serve as a supplier of curators and collection managers on contract to agencies that have received funds to prepare land use options. Option 2 is recommended and will be discussed in the context of making natural history collection information more accessible for the relevant issues of today's society.

Natural History Museum Collections and Conservation Biology

Jesse, Andrea

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Conservation Biology is concerned with the preservation of species and their natural habitats. For the general public visiting a natural history museum, the role of preserved specimens in conservation efforts might not be apparent. Conservation Biology is in fact dependent on natural history museum collections in many ways. Six natural history collections at the California Academy of Sciences are a case in point. Tissue samples have been extracted from specimens of endangered birds to determine diversity within and conformity between subspecies through DNA analysis of populations extinct and extant. Herbarium seeds may prove useful in regeneration of extinct plant species. Conservation biologists often use location data from specimens to compare distributions of species past and present. There are many ways in which collections can support conservation efforts. It is important that we as museum workers help convey our role in these efforts to all people in order to ensure the continued use and preservation of natural history museum collections.

A Program for International Conservation of Fossiliferous Concretions

Lemay, Stephen

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This project started with an attempt to locate all type and figured specimens of the entire biota from the Mazon Creek area of Illinois, USA. This world-famous biota has been known since the mid 1800s; the flora since 1855, the fauna since 1864. This biota is significant for the large number of new forms of Pennsylvanian Age life described and resulting type specimens. From preliminary studies it became clear that these specimens, in both museum and university collections, need much work to update records. It is also clear from investigations to-date that private collections need to be recorded. It is easier to locate specimens described between 1855 and 1970 than those described from 1970 to 1980 because many of the latter specimens are now in private collections. Fifty-five types described in this time interval are currently lost or their location unknown to professionals. One solution to this problem is for all amateur collectors to maintain a detailed record of specimens collected, similar to accession records maintained by museums. Records should include description of the specimen, date collected and locality. If specimens were numbered and accurate records kept, collectors would be protected from loss through theft and loaned specimens being unreturned. Changes of administration or death of a professional scientist can result in failure to return specimens borrowed from collectors by institutions. A further step would be to institute a fossil collection registration, with records being maintained by an institution with computer data facilities and connections to internet. This registration would solve many problems now existing with important specimens, including type specimens, in private collections. Illinois alone has more than 67 privately-owned collections containing type and figured specimens from the Mazon Creek biota. Many specimens from this locality are located in other states and in many foreign countries. If all fossiliferous concretions are recorded in a centralized data-base, with names of the original collector and current owner, as specimens are sold, traded, or passed to heirs a record would be maintained. In future years, researchers would have access to data on type and figured specimen locations. Such records should also assist private collectors in cases of theft and other loss.

Humidity Control and Building Systems

Lull, William P.

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The issues and complexity of humidity control in museums, libraries and archives have been confused or misunderstood by many. This presentation discusses basic characters of building HVAC systems required to achieve the conventional 50% RH and 70°F conditions sought for many collections, and typical system construction and operating costs.

Many labor under the myth that some sort of special, obscure, "precision" type of system is required for humidity control at 50% RH. The systems and elements to do this are not precise nor necessarily expensive, and are based on typical commercial equipment used in buildings. Good environmental control consists mostly of avoiding common mistakes in equipment selection, location and installation. Only a few primary functional aspects to a system are needed above a system to provide human comfort. Except for unusual challenges that may be posed architecturally, an HVAC system for good humidity control around 70°F and 50% RH is quite simple: a modulating pressurized steam manifold humidifier, a cooling coil sufficiently cold to provide the needed dew point, a reheat coil, and a good control system. Examples are cited in museums dating to the 1930s.

Typical project costs are given for recent projects, giving a breakdown between total project cost and costs for HVAC equipment. Cost control and recent attempts at "value engineering" on projects are also covered. Typical annual operating costs for projects are given. The paper also discusses possible construction and operating cost savings due to more relaxed humidity criteria.

The Centre for the Study of Biological Diversity at the University of Guyana - Challenges of Managing an Herbarium in the Tropics

MacKnight, Jane

605 Ray Drive, Silver Spring, MD 20910, USA

Guyana, like many developing nations, wants to maintain a complete collection of its biological heritage in a national institution. In 1992, the Centre for the Study of Biological Diversity (Centre) was established to provide a modern repository for biological collections. This repository houses over 25,000 specimens of the Guyana National Herbarium and several hundred specimens of the University of Guyana's Zoological Museum. The primary purpose of the Centre is to document the country's biological heritage.

The Biodiversity Centre was created through the collaborative efforts of the University of Guyana and the Smithsonian Institution with support from World Wildlife Fund and the Royal Bank of Canada. It consists of a newly constructed two-story building located on the University campus in Georgetown, Guyana. The Smithsonian Institution has a long history of research in Guyana and views the Centre as part of its commitment to assist the university and enhance its capacity to care for herbarium specimens.

The challenges of managing the herbarium are several: environmental conditions are extreme, facilities are not ideal, problems of budgetary shortfalls, and lack of trained staff are some of the major areas with which the Centre must cope.

Disaster Recovery of Natural History Collections: A Case Study

Mellon, Kelly, Lori Schlenker, and Kerry Button

Smithsonian Institution, National Museum of Natural History, E-501 MRC 117, Tenth & Constitution, Washington, D.C. 20560, USA

In the past decade, more and more museums have started disaster preparedness initiatives to minimize a disaster's devastation to collections and maximize response and recovery efforts. However, disaster preparedness is not a fail-safe guarantee that a museum's collections will be spared or that museum personnel can enter the damaged site to initiate response and recovery efforts. What happens when a tornado strikes an off-site storage facility leaving the structure without electricity, water, or a roof, and recovery efforts are complicated by the gross contamination of collections with asbestos? This is the scenario that faced the Smithsonian Institution's National Museum of Natural History (NMNH). This presentation is a case study of the NMNH's disaster recovery project and will be presented as a video documentary of the recovery of natural history collections in conjunction with handouts of equipment used, vendors, progress maps, and a recovery time-line followed by a question and answer session.

Problems with Storage of Entire Mycological Specimens

Moore, Simon J.

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Museum staff are always aware of problems associated with storage of atmospherically-sensitive material. Although freeze-drying can produce morphologically exact and stable specimens of fungi, specimen deterioration can be especially rapid if the correct storage conditions are not adhered to. This poster shows typical deterioration of freeze-dried fungi due to variation in relative humidity, temperature, light levels, even ingress of insect pests. Although some simple remedies are suggested the author is still seeking advice to set up and ameliorate the maintenance of a mycological herbarium in Hampshire, a county with a remarkable mycota.

Preserving and Cataloguing Fish Illustrations As Unique Natural History Records

Palmer, Lisa F.

Smithsonian Institution, National Museum of Natural History, Division of Fishes, MRC 159,
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Over 10,000 fish illustrations consisting of pen and ink line drawings, watercolors and oil paintings reside at the Smithsonian Institution Division of Fishes. Most of the illustrations in the collection were prepared in the mid-1800's to early 1900's for United States scientific explorations but contemporary illustrations are regularly added to the collection. The illustrations, an invaluable supplement to the specimen collections, detail morphological features such as color and scale patterns that often fade or are lost on preserved specimens, or are poorly depicted on film. Interspersed among the illustrations are prints, negatives and other assorted visual representations.

Illustrations deteriorate due to the inherent vice of paper but when coupled with factors such as inappropriate housing materials and exposure to adverse environmental conditions the rate of breakdown accelerates. Uncatalogued objects limit intellectual use of the collection and may lead to unnecessary physical handling of materials. This presentation describes a unique natural history collection and outlines rehousing and inventory strategies developed to improve both preservation and access of the collection.

Moving a Major Collection: Crustaceans at the Natural History Museum of Los Angeles County

Pettit, Gary A.

Natural History Museum of Los Angeles County, Invertebrate Zoology/Crustacea, 900 Exposition
Blvd., Los Angeles, CA 90007, USA

The Natural History Museum of Los Angeles County (LACM) is the repository of the second largest collection of Crustacea in the United States. This collection, which includes the former Allan Hancock Foundation Crustacea collection, is the largest collection of eastern Pacific crustaceans in the world. The holdings are estimated at 103,000 lots and between 2 and 3 million specimens. In 1985 a two-phase transfer of the AHF crustacean collection to LACM was agreed upon and implemented.

This presentation will summarize the current status of the LACM Crustacea collection move and the physical status of this valuable collection.

International Accord on the Value of Natural Science Collections

Pettitt, C. W., J. R. Nudds, M. V. Hounsome, and S. R. Edwards

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The International Conference on the Value and Valuation of Natural Science Collections, was held at Hulme Hall, Manchester University, UK, from 19-21 April 1995.

One hundred and thirty-five delegates from 31 countries discussed 34 papers and 13 posters from scientists, users, and accountants.

Natural science collections have scientific, cultural and monetary values. The conference explored the nature of these various values, and reflected the experience of those involved in the care and use of such collections.

It is often said that natural science collections are undervalued (in all senses of the word) when compared with humanities-based collections, particularly those of fine art objects. Is this true? If so, is it a consequence of the way society views the arts and the sciences? Or is it because art collections can have such high financial values? What can be done to increase society's appreciation of the many values of natural science collections? What pressures are there upon museums and other holding institutions to put financial values on their natural science collections, and should such pressures be welcomed or resisted? In responding to such pressures, is there a risk that the intrinsic scientific and cultural value of natural science collections is at best undermined, and at worst sold out?

Reflecting the aims of the Conference, three major themes were pursued during the three days, examining the **scientific value** and **cultural value** of natural science collections, and addressing the question of the **financial value** of these collections.

The final debate drew together all these disparate threads, and produced an accord embodying six recommendations that should guide governments when making policy decisions about natural science collections. The accord will be included in the conference proceedings, to be published in the Autumn of 1995.

Disaster Planning for a Sceptical Museum

Pickering, J.

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The Oxford University Museum has prepared a number of forward plans covering parts of collection management which will eventually become components of a full collection management plan. The impetus behind such planning has come from the Museum and Galleries Commission registration requirements and support from our local Museums Service. Disaster planning was part of the procedure and a Museum disaster plan, to an extent based on the East Midlands Museums Service document, was produced last year. It is important that the process of producing the plan shows some immediate practical benefits. Procedures must be simple and the document should be short - not everything in the "ideal" disaster plan will be relevant to each institution. Apart from the document itself there were a number of useful points which came out of the process of producing the plan, principally raising staff awareness of the issues, practical staff training, purchase of materials and tighter procedures for contacting staff out of hours.

Categories of Specimens: A Collection Management Tool

Price, Judith C., and Gerald R. Fitzgerald

Canadian Museum of Nature, P.O. Box 3443, Station "D", Ottawa, ON, Canada K1P 6P4

The Canadian Museum of Nature has defined five Categories of Specimens to be used as an aid in collection management. Levels reflect specimen value based on scientific, cultural and monetary considerations and thus clarify a museum's intellectual and monetary investment in collections. Categories have multiple applications in collections management. As indicators of value they can assist in controlling specimen use; in conjunction with risk assessment they can guide allocation of limited resources.

An Investigation into the Composition of Botanical Wax Models with a View to their Conservation

Purewal, Victoria J.

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The Botany Department of the National Museum of Wales has a valuable collection of wax plant models which have been modelled for the collection since 1908.

Wax conservation data is quite limited but certain recommendations have been made concerning environmental conditions for storage. The temperature should be 13-20°C and never exceed 25°C with a relative humidity of 50-60%. However, as the properties of waxes vary, effective research into the properties of each wax used in model making was necessary to develop specific guidelines to aid wax conservation.

A condition survey carried out in 1993 on the collection of models disclosed that the recommended conditions were not necessarily ideal. Part of the collection was housed within a cool, dry environment and the other in a room with a constant temperature of 25°C with a relative humidity of 20-30% lower than recommended. The results were confusing as the collection in the warmer environment was of a more stable condition. This therefore raises the problem that wax requirements may be specific depending on its age and composition.

Samples of the wax models were analyzed using Gas Chromatography Mass Spectrometry comparing the spectra with wax standards to establish their content and composition.

It is hoped that this research will lead to a greater understanding of the typical compositions used by wax modellers and how these mixtures degrade over time.

Collections on the move: A Case History of the Peregrinations of a Federal Collection of Vertebrates

Ramotnik, Cindy A.

National Biological Service, Museum of Southwestern Biology, University of New Mexico, Albuquerque, NM 87131, USA

The recent relocation of the Biological Survey Collection in Fort Collins, Colorado, to the University of New Mexico in Albuquerque provided an opportunity to document details of a collection move. During its 65-year history, this Federal collection of vertebrates has moved several times; in the past 20 years it has moved an average of once every five years. While the first move in 1975 involved the relocation of 2,000 specimens of birds and mammals over a distance of 60 miles, the latest move included 25,000 specimens over a distance of almost 600 miles. As the numbers and types of specimens, associated materials, and distance increased, so did the concerns and costs. In preparation for our latest relocation, we found little information on techniques for collection moves. With the successful completion of the move we want to share our experiences. I will provide details of the move including planning, packing, moving, and unpacking. Specific topics will include costs, selection of personnel (museum staff versus professional movers), packing material, packing and transporting of "special" or "unusual" items, damage inventory, and how to get everything back in the same place (if you want to).

Interesting Public Programs on Collections Management: Not an Oxymoron!

Sharp, S. Llyn

Virginia Tech Museum of Natural History, 428 North Main Street, Blacksburg, VA 24061-0542, USA

Need to give a public program on collections management/care issues? The topic is huge--don't know where to start? Come to this presentation for a quick instructional design solution!

Part of the current work of the natural history community is to increase public appreciation for collections. It is no longer enough to rely on the traditional view of the inherent value of these objects to assure continued funding for their support, development or even survival: collections are expensive to maintain, and even more expensive to develop. Because natural history collections often represent a public trust, support can be built from unexpected audiences if they are made aware of these collections resources and needs in a personal way.

People of all ages love to "collect" things: insects, rocks, little pewter skunks, coins, newspapers, family mementos, art, antique tools, baseball cards, trophies, quilts, etc. People often recognize that they would like to know how to take better care of their own collections. Museums and collections-holding institutions have centuries of experience at this; many of the general issues in natural history collections management can be applied directly to these diverse personal collections. Combined with specific experience of the institutional collection, this can lead to better understanding of the institutions' situation and greater support for collections activities. Exploring these issues through an inquiry-based program creates personal impact, increases the likelihood of retention, and has greater affective power. A simple, adaptable interactive program outline will be presented.

Education Collections: Strategies for Management and Care from the "Back Room"

Sharp, S. Llyn, and Jeff Stephenson (co-chairs)

Virginia Tech Museum of Natural History, 428 North Main Street, Blacksburg, VA 24061-0542, USA; Denver Museum of Natural History, 2001 Colorado Blvd., Denver, CO 80205, USA

Museums are in a unique position to offer very special resources (both material and human) to all those interested in the natural world or other cultures. To a post-doc or pre-schooler, we can make available artifacts and specimens to enhance learning. Whether a research collection for a graduate student or an education collection for a youngster, similar management problems need to be solved. Quite different concerns also arise. Educators and outreach personnel caught up in daily programming may not be explicitly working on managing collections. Yet, their exhibits, teaching collections, and educational kit materials are essential to their excellent work.

Some simple suggestions from research collections management can dramatically improve the conditions and strategies used with education, outreach and exhibit collections--collections which do not usually fall under the supervision of a collections curator or manager. This interactive workshop provides an opportunity for outreach professionals and collections professionals to work together on understanding the special needs of educational collections and suggest some realistic ways of addressing those needs. We hope to be able to make SPNHC's base of knowledge and expertise directly useful to these other museum colleagues, while expanding collections professionals' appreciation of another kind of collection. This new vision can then be carried back to participants' home institutions along with a model for involving additional staff in this kind of discussion.

As a special attraction, the Royal Ontario Museum Discovery Centre has graciously offered participants in this group a tour of their facility.

A Protective Hardboard Folder for Storing Valuable Herbarium Specimens

Shechepanek, Michael J.

Botany Section, Canadian Museum of Nature, P.O. Box 3443, Station "D", Ottawa, ON, Canada K1P 6P4

Most herbaria store their valuable specimens, such as types, mounted on herbarium paper, within closed or semi-closed soft cardboard folders. In handling or shipping these folders, the specimens within are susceptible to damage. In order to alleviate this problem, an archival hardboard folder was designed and constructed that would provide maximum protection to valuable specimens both in storage and in handling. The design is versatile so that herbarium sheets of different sizes and specimens of various thickness can be accommodated. These folders can be easily made from materials available from art supply stores.

Fast Elevated Temperature Control of Insects in Vascular Plant Specimens

Strang, Tom, and Michael J. Shchepanek

Canadian Conservation Institute, Department of Canadian Heritage, 1030 Innes Road, Ottawa, ON, Canada K1A 0M5; Botany Section, Canadian Museum of Nature, P.O. Box 3443, Station "D", Ottawa, ON, Canada K1P 6P4

Clients often have less than one day to compare their specimens with those held by herbaria. This poses a challenge to collection managers who wish to protect their collection from the introduction of damaging pests. This poster describes the geometry and utility of a method to safely kill insect pests on herbarium specimens. Suspect material is exposed to 60°C heat for about one hour, thus allowing clients to begin their research soon after their arrival at the herbarium.

Museum Collections, Research and Community Computing Systems: Getting our Message to the Public

Sumpter, Paula M.

Information Services, Milwaukee Public Museum, Inc., 800 W. Wells Street, Milwaukee, WI 53233, USA

Over the years, museums have had difficulty communicating information about the collections and research areas of the institution to administrators, board members and the public. Exhibits and high-profile programming capture attention, while the work of collections acquisition, care, research and study go largely unnoticed by the general public.

The Milwaukee Public Museum has begun to employ the new technology that has become available in a community computing (free-net style) system to reach a new audience with these low-profile aspects of museum work. The Milwaukee Omnifest System is a new information provider in the Milwaukee area that reaches the public in a variety of ways. MPM became involved as an information provider on this system while it was still in the pilot stage over a year ago. It has now become a public resource where institutions like MPM can post a variety of information aimed at specific audiences or the general public.

Currently textual information is provided. When the MPM World Wide Web home page is completed it will be accessible from Omnifest and offer an even more complete view of the Collections and Research area.

The Stability of Bone: Experiments at High Temperature

Von Endt, D. W., P. E. Hare, and J. Kokis

Smithsonian Institution, Washington D.C. 20560, USA; Geophysical Laboratory, Carnegie Institution of Washington, 5251 Broad Branch Road N. W., Washington, D.C. 20015, USA

If fresh bone is stored under conditions of 30-50% relative humidity, it is stable for hundreds of years. However, many specimens found in museums have been buried, or chemically treated or cleaned. To follow some of the chemical reactions of bone deterioration, we have heated bone under conditions of 100% RH and 220°C for 12 time periods. At the end of four days, the bone had lost 50% of its weight and the amino acids of the bone proteins had been altered to varying degrees. Aspartic acid, threonine and serine were destroyed, while glutamic acid and glycine were the most stable. Hydrolysis, deamination and decarboxylation reactions also occur as evidenced by the production of organic acids and amines. Heating bone dry at the same times and temperatures produced a 20% loss of weight and less destruction of the protein as evidenced by amino acid patterns. Dry-heated bone also releases a series of volatile deterioration products under these conditions. These data are connected to the longevity of bone by projecting the experimental conditions to room temperature "museum" conditions.

Putting it All Together: A Portrait of Automated Collection Management

Woodward, Susan M.

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Virtually all collection functions are automated in the Mammalogy Department at the Royal Ontario Museum. The system has grown and evolved over the last eight years as the individual databases have been developed. Common fields in the different databases share a standardized format and syntax. An Accession Database serves to track the location and status of specimens through processing and treatment activities prior to the specimens being installed into the main research collection. Individual specimen data pertaining to tissues and voucher specimens are housed in a transitional database. Once specimen preparation is complete, curatorial staff verify identifications and data documentation. Automated records are then edited. Voucher specimen data are transferred to the Specimen Database from which cards and skeleton labels are printed. Once specimens are installed into the main collection, tissue records are transferred to a permanent Tissue Database. In-house voucher specimen records are converted and uploaded to CHIN, Canadian Heritage Information Network. The Accession Database is edited to indicate the "complete" status of the collection that has been curated and installed. Finally, these records are transferred and archived to the Complete Database.

Team-building: The Collection Managers' Group at the Royal Ontario Museum

Woodward, Susan M., and Sheila C. Byers

Department of Mammalogy and Department of Invertebrate Zoology, Royal Ontario Museum, 100 Queen's Park, Toronto, ON, Canada M5S 2C6

The Collection Managers' Group (CMG) was initiated at the Royal Ontario Museum in May 1992. The group developed out of a need of the collection managers for a forum in which information could be dispersed and discussed effectively. Presently, the CMG includes:

1) 20 collection managers from natural science, art and archaeology departments, 2) Head of Collection Management, conservators, preparators, and 3) representatives from other departments such as the Discovery Centre, Purchasing, Security, Facilities, and Senior Management as required. The initial focus of the group addressed issues on the preservation and maintenance of collections as advocated by the Society for the Preservation of Natural History Collections and database management issues arising from membership in the Canadian Heritage Information Network. Information gathering included tours of collection facilities, discussions of collection and database management practices, and consultations with Conservation staff. The CMG has broadened its approach to address Institution-wide concerns such as pest management; standardization of the use of archival products; development of an in-house resource database of conservation-tested materials and supplies; and development of disaster preparedness plans. It has also initiated group purchases and grant applications. This proactive group meets on a monthly basis to discuss issues and promote joint collaboration of activities to ensure the long term safe-keeping of the Museum's most-treasured asset - its collections.

Developing a Museum Resource and Educational Curricula

Young, Daniel K., Steven J. Krauth, and Hedi Baxter

Insect Research Collection, Department of Entomology, University of Wisconsin, 1630 Linden Drive, Madison, WI 53706-1598, USA

The primary mission of Insect Research Collection (IRC) at the University of Wisconsin is to serve as a resource for research in insect systematics. In addition the IRC has space dedicated to educational exhibits of unusual and exotic insects open to the public. Recently, display packets were developed to meet requests made by K/12 educators and other user groups for resources to support educational curricula. Packets were developed in three categories: 1. entomological techniques associated with developing an insect collection; 2. insect biodiversity and identification; and 3. special demonstrations. The appropriateness of these displays has been demonstrated by their heavy loan schedule.

Some Experiments Concerning the Stability of Keratin

Yourd, E. R., D. W. Von Endt, and P. E. Hare

Geophysical Laboratory, Carnegie Institution of Washington, 5251 Broad Branch Road N.W.,
Washington, D.C. 20015 USA; Smithsonian Institution, Washington, D.C. 20560, USA

The keratins are a closely related family of chemically stable proteins composing mammalian hair, horn, hooves and avian feather. Sheep hair (wool) has been much studied chemically because of its economic value. To our knowledge, no studies have been conducted on the long-term stability of the keratins from a museum perspective. We present here the differences in the stability of feather and hair under simulated aging conditions. Feather and hair were heated in 70% ethanol at 100° and 150° C for 15 time periods ranging from hours to days. Feather keratin was approximately 50% less stable than hair keratin as evidenced by the amount of amino acids appearing in the ethanol solution. To contrast these data, feather and hair were heated for the same periods of time under dry conditions. The same pattern of stability was found. As a corollary, the amino acid patterns of fresh hair and feather from different species were found to be distinct, and indicative of their originating taxon.

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- The herbarium of J. Sibthorp

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Illustration from: Marschall von Bieberstein, F.A. Herbarium, St. Petersburg.

OTHER TIPS FROM SD:

PRODUCT FOR GENUS COVER AND SHELF LABELS

On a tip from one of the artists in our exhibits department, we use Rayven Repro Film, an adhesive-backed film available in white or clear, matte or gloss. Can be printed on a laser printer or Xerox machine. Archival qualities unknown. We use their type 320. Similar products are made by other manufacturers. Rayven, Inc., 431 N. Griggs St., St. Paul, MN 55104

Sample:

Lamiaceae

SALVIA CLEVELANDII

MARKING DAMAGED SPECIMENS

We use a rubber stamp to mark damaged specimens as we notice them (and treat them, if necessary). This lets us know, for example, that the damage does not represent a new infestation when we encounter it again. It also protects borrowers of our specimens from the suspicion that they might have caused the damage.

Sample:

INSECT DAMAGE
NOTED — SD

INSECT DAMAGE
NOTED — SD



JAN 2

TO
A Carolyn Leckie
Conservation Consultant

FROM
DE Jane Down
Conservation Scientist

SUBJECT
OBJET Nail Polish and Glue Sticks for Natural History Collections

SECURITY - CLASSIFICATION - DE SÉCURITÉ <i>PAR 54780</i>
OUR FILE - N / RÉFÉRENCE LE920212
YOUR FILE - V / RÉFÉRENCE
DATE February 14, 1992

This is in response to our conversation of January 16, 1992 in which you requested recommendations for:

1. A polymer topcoat over accession numbers for Natural History Collections (i.e. nail polish versus Acryloid B-72)
2. A glue stick for adhering labels to Herbarium sheets and comparison with Poly(vinyl acetate).

1. In a report written by Dave Grattan, Conservation Processes Research, CCI, in 1980, he identified Cellulose Nitrate as the major component in four nail polishes analyzed (1). Cellulose Nitrate is not recommended for use in conservation (2). Nail polishes containing Cellulose Nitrate would not be suitable for topcoats for accession numbers. If, however, an acrylic nail polish could be found, this would be more suitable. Ingredients in nail polishes can usually be obtained from the cosmetic counter in a drug or department store. Alternatively, Acryloid B-72 made up in Ethanol or Acryloid F-10 would be suitable as well. The former has been used in conservation for many years.

2. Three glue sticks were analyzed by Scott Williams, Analytical Research Service, CCI, in 1982 (3). These were Pritt Glue Stick, UHU Stic and Dennison Glue Stick. All contained Poly(vinyl pyrrolidone) (PVP) with some Poly(vinyl alcohol) and an amine or amide. cursory analysis suggested they exhibited a pH of about 9 when dampened. This pH is not within the recommended limits for adhesives for paper conservation (see Table 1).

Davidson in the Handbook of Water Soluble Resins (4) suggests that PVP has some good qualities such as excellent adhesion to a wide variety of surfaces; clear, glossy and hard films at low humidity; solubility in water and many organic solvents; and retention of solubility even after heating to 130°C. However, this latter condition produced some yellowing (4). Indeed, films of glue

sticks made up in our lab in 1982 and aged naturally since then have yellowed. At the present time, we do not know if labels adhered with a glue stick will remain attached over extended time periods. The long term stability and strength retention of PVP is unknown and needs further investigation. This coupled with the high pH suggests these glue sticks cannot be recommended to adhere labels to Herbarium sheets. It would be better to use Jade No.403 or Mowilith DMC2, both Poly(vinyl acetate) Copolymers. These adhesives exhibit good pH, flexibility and strength properties and retain these properties after aging in the dark and under lights for about 4 years.

I hope the above will be useful to you. If you should require further information, please do not hesitate to contact me anytime.

Handwritten signature

References

1. Gratton, David, "Analysis and Recommendations Concerning Clear Nail Polishes as Labelling Supports," CCI, CPR Report #64, March 6, 1980.
2. Koob, Stephen P., "The Instability of Cellulose Nitrate Adhesives," The Conservator, Number 6, 1982.
3. Williams, Scott, "Pritt Glue Stick", "UHU Stic", "Dennison Glue Stick", CCI ARS Reports 2011, 2012, 2017, November 1982.
4. Davidson, Robert L., "Handbook of Water-Soluble Gums and Resins, McGraw-Hill Book Company, Chapter 21, 1980.

Suppliers

Mowilith DMC2: Sold in large quantities under #685773 by Nacan Products Ltd., 50 Marie Victorin Blvd., Boucherville, Quebec, Canada, J4B 1V5; (514) 655-2220. Small quantities available from Archival Aids, Unit 29, Trent Lane Industrial Estate, Castle Donnington, Derby DE7 2ND, UK or Trubond Adhesives, Unit 2a, Grovebell Industrial Estate, Wrecclesham Road, Franham, Surrey GU10 4PL, UK or Carr McLean Ltd., 461 Horner Ave., Toronto, Ontario M8W 4X2; (416) 252-3371 (talk to Frank Collier).

Jade No.403: Talas, Technical Library Services Inc., 213 West 35th Street, New York, New York, 10001-1996, U.S.A.; (212) 736-7744.

TABLE 1: pH Ranges for Direct Use of Adhesive on Cellulosic and Proteinaceous Materials

Material Type	Too Acidic	Caution	Acceptable (Neutral)	Caution	Too Alkaline
Cellulosic Material (Alkaline Non-Sensitive eg. new rag paper)	below 5.5	5.5 - 6.0	6.0 - 7.5	7.5 - 8.5	over 8.5
Cellulosic Material (Alkaline Sensitive eg. unsized degraded paper °)	below 5.5	5.5 - 6.0	6.0 - 7.5	7.5 - 8.0	over 8.0
Proteinaceous Material (eg. gelatin size)	below 5.0	5.0 - 6.0	6.0 - 7.5	-	over 7.5

° Current research being carried out by Helen Burgess, Senior Conservation Scientist, Conservation Processes Research, as part of a general project on the alkalization of cellulose suggests that unsized and heavily oxidized fibers are most likely to exhibit degradation under alkaline conditions. Final conclusions have not been reached.

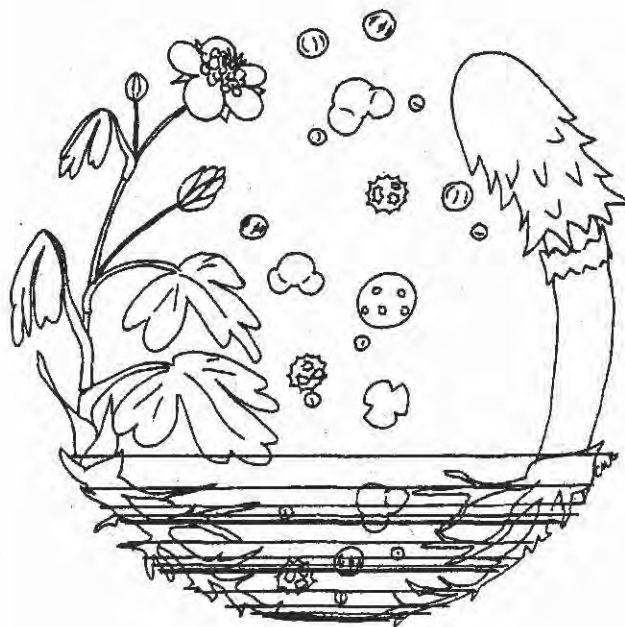
From: Down, J.L. and Williams, R.S., "Report of the Evaluation of selected Poly(vinyl acetate) and Acrylic Adhesives for Use in Paper Conservation," in the Proceeding of the Conservation of Historic and Artistic Works on Paper, CCI Symposium 88, in press, 1988.

SPNHC 1995

**EDUCATION AND TRAINING COMMITTEE
WORKSHOP**

"MANAGING THE MODERN HERBARIUM"

JUNE 5-6, 1995



co-sponsored by

Department of Botany, Royal Ontario Museum

and held at the

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ACKNOWLEDGEMENTS

SPNHC Education and Training Committee

Sheila Byers, Co-Chair

1995 Workshop Organizing Committee

Deborah Metsger, Coordinator

Barbara Moore, Facilitator, "Preventive Conservation in the Herbarium"

Ann Pinzl, Deb Lewis, Facilitators, Herbarium Information Bazaar

Janet Waddington, Chair, SPNHC'95 Local Organizing Committee

Ken Barbour, Exhibitor Liaison

Brad Millen, Registration

Karen Ditz, Ross MacCulloch, Signage

Jeanette Ross, Travel Arrangements

Michael Arlt, Projectionist

Royal Ontario Museum

John McNeill, Director

David Brose, Associate Director Curatorial

Botany Department, University of Toronto

Verna Higgins, Chair

In addition to the organizing committee many people provided valuable input to the program development. Special thanks go to David Brunner, Tim Dickinson, Mike Donaghue, John McNeill, Amy Rossman, Todd Steussey, Emily Wood, and the caucus of botanists who participated in the initial brain-storming session at the SPNHC'94 annual meeting at the Missouri Botanical Garden. Cover artwork is by Christine M. Kampny.

DETAILED PROGRAMME

Monday, June 5

8:00-9:00 am **Registration, Lobby of Koffler Institute for Pharmacy Management
entrance off Bancroft Avenue**

Oral Presentations: Auditorium of the Koffler Institute

- 8:30 am **Introductory Remarks.**
 Sheila Byers, Co-chair SPNHC Education and Training Committee.
- 8:40 am **Welcome**
 Dr. John McNeill, Director, Royal Ontario Museum.

Symposium on Preventive Conservation in the Herbarium

Morning Session Chair: Barbara Moore

- 8:50 am **Preventive Preservation: Concepts and Strategies for Long Term
Preservation.**
 John Townsend
- 9:40 am **Herbarium Building Design and Environmental Systems.**
 William P. Lull
- 10:30 am COFFEE BREAK, Lobby of Koffler Institute.
- 10:50 am **The Brooklyn Botanic Garden: A Case Study in Modern Herbarium
Design.**
 Kerry Barringer
- 11:30 am **Pest Management Control in the Modern Herbarium: Directions for the
Future.**
 Tom Strang
- 12:20 pm LUNCH, Lobby of Koffler Institute.

Panel Presentation: The Chemistry of Herbarium Materials and Storage.

Moderator: Christine Niezgoda

2:00 pm **Paper Conservation and Herbaria.**

Greg Hill

2:20 pm **Spot-Checking Inks for Hand-written Records.**

Stephen L. Williams* and R. Richard Monk

2:40 pm **Adhesives in Herbarium Collections.**

Jane L. Down

3:00 pm **Plastic Products.**

Julia Fenn

3:20 pm COFFEE BREAK, Lobby of Koffler Institute.

3:40 pm **Panel/Audience Discussion.**

4:30 pm **SPNHC As A Resource On Conservation and Collections Care.**

Carolyn L. Rose, President, SPNHC

4:45 pm **Conservation In The Herbarium: A Synopsis.**

John Townsend

WORKSHOP RECEPTION AND DINNER

University of Toronto Faculty Club

Main Lounge and Dining Room

5:00 pm Hors d'ouvres and cash bar

6:00 pm Dinner

7:30 pm **Herbarium Information Bazaar.**

Teaching Labs, Botany Department, 25 Willcocks Street, ground floor.

Convenors: Ann Pinzl and Deborah Lewis

Tuesday, June 6

**Oral Presentations: Auditorium of the Koffler Institute for Pharmacy Management
entrance off Bancroft Avenue**

Contemporary Issues Facing Herbaria

Morning Session Chair: Sheila Byers

8:30 am **Bar Coding: Standards for Systematic Collections.**

George F. Russell

10:00 am COFFEE BREAK, Lobby of Koffler Pharmacy.

**Symposium: "Destructive sampling and molecular systematics: are we moving toward a
consensus?"**

10:20 am **Destructive Sampling of Herbarium Specimens for Molecular Data:
A Step In Which Direction?**

Emily W. Wood*, Torsten Eriksson, Michael J. Donoghue

11:00 am **DNA Sampling from Herbarium Material: A Current Perspective.**

Robert K. Jansen

11:40 am **The Mycological World: Are the Issues and Solutions
the Same?**

Gregory M. Mueller

12:20 pm LUNCH, Earth Sciences Complex Shared Services Center

Afternoon Session Chair: Tim Dickinson

2:00 pm **Destructive Sampling and Information Management: An
Entomological Perspective**

James B. Whitfield

- 2:40 pm **DNA Sampling and Storage: A Vertebrate Perspective.**
 Mark Engstrom*, Robert Murphy and Oliver Haddrath
- 3:20 pm COFFEE BREAK, Lobby of Koffler Pharmacy.
- 3:40 pm **Banking Desiccated Leaf Material as a Resource for
Molecular Phylogenetics.**
 James S. Miller
- 4:20 pm **The Next Chapter: Where Do We Go From Here?**

Moderator: Deborah Metsger

Symposium Participants

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ABSTRACTS

Preventive Preservation: Concepts and Strategies for Long Term Preservation

Townsend, John

P.O. Box 438, Richmondville, NY 12149, USA

The term "preventive preservation" suggests that there are steps that can be taken to prevent the deterioration of collections. In some ways this is true, although it must be remembered that under normal conditions of storage and use all organic materials deteriorate. Nevertheless, the concept of preventive preservation is useful as a means of effectively prolonging the useful life of collections. To do this requires that we understand the nature of the deterioration that takes place and the factors that cause it. Four broad categories of factors can be identified: biological, environmental, chemical and physical. Within each of these categories there are several agents or processes at work that contribute to deterioration. In addition to identifying which of these processes are at work in any given collection, preventive preservation requires attention to the possible interactions among them.

An effective program of preventive preservation is therefore a tool for "managing" the inevitable deterioration of collections -- slowing or interrupting its progress -- to insure that the deterioration has a minimal impact on the research goals of the institution. This presentation will identify the major factors influencing deterioration, discuss the interactions among some of the processes at work, and suggest some broad strategies for achieving long term preservation goals.

Herbarium Building Design and Environmental Systems

Lull, William P.

Garrison/Lull Inc., PO Box 337, Princeton Junction, NJ 08550, USA

Herbarium collections have some special needs that may be addressed through the building and environmental systems serving these spaces. Since herbarium collections are essentially desiccated, low and fluctuating humidity conditions are generally not seen as major problems. The critical factor in humidity control is to avoid any chance for rehydration of the collection. Gaseous contamination control is designed not so much to remove pollution, but rather, in cases where collections have been aggressively treated with insecticides, to remove the various volatile insecticides that may do long term damage to treated and adjacent specimens. The best systems for herbaria can hold temperatures below 65 °F and hold average humidities below 50%. Fungal collections that need cool storage, between 45°F and 55 °F will usually require a special storage area. Wet specimens in formaldehyde or alcohol may need very different conditions from the dried specimens. While temperatures should similarly be low to inhibit the evaporation of the preservation solutions, high relative humidities will reduce the rate of evaporation. Since the need to see specimens can occur at almost any position in the storage area, a herbarium should have consistently good lighting. The best solutions are with indirect lighting or wide-distribution fixtures aligned at 90 degrees to the storage aisles.

A herbarium project also needs to follow most of the environmental goals common to most collections-holding institutions. Herbarium areas should have no windows, good work lighting, efficient layout, and isolation from other spaces, loads and contamination threats. The heating/ventilating/air-conditioning (HVAC) systems should include effective dehumidification, some humidification, particulate filtration, and gaseous contamination control.

The Brooklyn Botanic Garden: A Case Study in Modern Herbarium Design

Barringer, Kerry

Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, NY 112250-1099, USA

In 1991, Brooklyn Botanic Garden built a new herbarium designed to provide the best conservation environment for its scientific collections. The herbarium included temperature and humidity controls, gaseous filtration, and other structural features that were unique for herbaria at that time. In operating the herbarium, we have been able to evaluate the function of some of these designs and their place in the overall conservation of the collection. The results, so far, have been encouraging. Temperature control is the most important short-term control, but it appears that in the longer term, humidity control, gaseous filtration, and adequate fire protection will be equally important.

Pest Management Control in the Modern Herbarium: Directions for the Future

Strang, Tom

Canadian Conservation Institute, 1030 Innes Road, Ottawa, ON, Canada K1A 0C8

Herbarium collections are repositories for material representing plants and fungi that have been the raw materials for the goods that formed the core of 10,000 years of human economic activity. It is not surprising, therefore, that these collections are prone to attack by familiar pests of stored product. Due to the longevity of seeds and spores, herbaria often contain the only specimens within natural history museums that could be called a *living collection*. Pest management approaches have to be sensitive to these factors. This talk will examine means for diminishing pest risks to herbarium collections. In addition, the effects of thermal, controlled atmosphere, and conventional fumigant control methods on seed viability and collection materials will be reviewed.

Paper Conservation and Herbaria

Hill, Greg

National Archives of Canada, 395 Wellington Street, Ottawa, ON, Canada K1A 0N3

The long term stability of herbarium specimens is dependant on a multitude of factors including, the stability and compatibility of mounting and storage enclosure materials, non-destructive mounting techniques, basic care and handling, and proper environmental conditions. This presentation will examine: the use of paper as an ideal material for supports and storage enclosures for herbarium specimens; technical requirements for herbarium papers; mechanisms of deterioration, and; proper storage, handling and display techniques and conditions. A variety of mounting and storage techniques will be examined for their relative merits from a conservation standpoint.

Spot-Checking Inks for Hand-Written Records

Williams, Stephen L.* and R. Richard Monk

Museum of Texas Tech University, Box 43191, Lubbock, TX 79409-3191, USA

As collection workers become increasingly cognizant of the need to properly preserve written records, there is an ongoing challenge to select appropriate writing media. This selection would ideally be based on a thorough analytical examination of each product. However, few institutions have such abilities, and products are continually being altered or replaced. In this situation the identification and avoidance of undesirable products can be a step in the right direction. There are simple tests that can be conducted to help assess the light-fastness, solubility, and adherence of inks. It is possible that the same tests have broad application for other media used for documentation. Any product that does not perform satisfactorily with these tests might be expected to perform poorly over extended periods of time.

Adhesives in Herbarium Collections

Down, Jane L.

Canadian Conservation Institute, 1030 Innes Road, Ottawa, ON, Canada K1A 0M5

Although the perfect adhesive, label, and tape for herbarium collections are still elusive, this talk will provide collection managers with up-to-date information so that they can make informed choices and can be aware of the possible limitations of their products. Because the majority of herbarium specimens are adhered with poly(vinyl acetate) (PVAC) adhesives, the author will review recent CCI PVAC research with particular reference to the products that are already in use in herbarium collections. A brief overview of the new CCI adhesive project on vinyl acetate/ethylene copolymer adhesives, a subset of the PVAC adhesives, will be given, and potential benefits to the herbarium community will be highlighted. Suitability of other adhesives such as methyl cellulose and glue sticks will be discussed along with other possible alternatives. The subject of labels and tapes will be examined with particular reference to the studies that CCI has performed.

Plastic Products in the Herbarium

Fenn, Julia

Conservation Department, Royal Ontario Museum, 100 Queen's Park, Toronto, ON, Canada M5S 2C6

A brief evaluation of the types of plastics used in herbaria; gaskets, envelopes, boxes and petri dishes; and how they respond to freezing and to common biocides. Suggestions will be made for quick and dirty methods of identifying old plastics already in use and prioritising panic-free, recession-style upgrading of plastic materials.

SPNHC as a Resource on Conservation and Collections Care

Rose, Carolyn L.

Department of Anthropology, National Museum of Natural History, Smithsonian Institution,
Washington, D.C. 20560, USA

The Society for the Preservation of Natural History Collections (SPNHC) is an international and interdisciplinary organization dedicated to the improved care and preservation of natural history collections. At present, there are over 700 SPNHC members from 26 countries. Members include collection managers, curators, directors, scientists, technicians and conservators, representing all natural science disciplines and anthropology.

During the last ten years, SPNHC's diverse professional membership, working through 12 standing committees, has greatly advanced the care and management of natural history collections throughout the world. Advances in conservation and collections care have occurred as a result of: 1) increased understanding about the importance of preserving natural history collections; 2) expanded knowledge concerning the mechanisms of deterioration of museum collections and methods of mitigating agents of deterioration; 3) the development of strategies and methods to systematically address collection needs; and 4) increased support for collections management and care projects, programs, and educational activities.

SPNHC Committees and members have achieved this level of accomplishment through a variety of approaches. Far reaching are the solid professional publications that SPNHC has produced during the last decade. These publications include a refereed journal and a timely newsletter, as well as books, booklets, and other printed materials on collections management and care. The Society also provides an annual forum for presentations on research findings, new methodologies and techniques, and for the general exchange of ideas and technology transfer among disciplines. At this time, technical workshops facilitated by the top experts in the field are made available for conference participants. In addition, the Society regularly cooperates with other national and international organizations by participating in projects and programs, by sharing information, and by bringing forth the needs and concerns of natural history collections in order to increase awareness, support, and funding.

Bar-Coding: Standards for Systematic Collections

Russell, George F.

Department of Botany, Smithsonian Institution, Washington, D.C. 20560, USA

Bar codes have existed in commercial applications for decades, however they only found their way into systematics collections ten years ago. Still, it is uncommon to find natural history collections that have employed bar codes to help manage their specimens and their data. Bar codes were introduced to the United States National Herbarium in 1985 and today six hundred thousand specimens are tracked using this technology. The future is even more exciting as international networks permit remote access to, and exchange of, specimen data. The results of a recent survey of bar code usage in systematics collections will be presented along with suggestions for future directions and standards of application.

Destructive Sampling of Herbarium Specimens for Molecular Data: A step in which direction?

Wood, Emily W.^{1*}, Torsten Eriksson², and Michael J. Donoghue¹

¹Harvard University Herbaria, 22 Divinity Ave., Cambridge, MA 02138, USA; ²Botaniska Institutionen, Stockholms Universitet, 106 91 Stockholm, Sweden

Destructive sampling of herbarium specimens for morphological and anatomical studies has been with us for a long time, and most herbaria have had at least an *informal policy* in place to deal with such requests. With the advent of molecular systematics, sampling has taken on an added dimension and has forced us to deal with some basic questions: 1) Is DNA sampling something herbaria want to support? 2) If so, do we want something back? 3) If return of a portion of the DNA is a criterion, are we equipped to handle the material? 4) Is long-term storage of specimen-derived DNA even a realistic assumption? Our aim is to summarize Harvard Herbaria's experience in dealing with these new issues. Discussions with both morphological and molecular systematists on the staff have led to the formulation of a policy statement and authorization form; the process of outlining that document raised some challenging issues in itself. The solution for Harvard Herbaria may not be the same as that for other herbaria, nor is it necessarily a static one. Moreover, there are almost certainly questions which might be better addressed by the botanical community as a whole, such as coordination among herbaria regarding possible designation of storage centers and databasing stored DNAs. It is hoped that this presentation will lead to constructive discussion of where we are now and what questions remain to be answered.

DNA Sampling from Herbarium Material: A Current Perspective

Jansen, Robert K.

Department of Botany, University of Texas, Austin, TX 78713, USA

The use of herbarium specimens for molecular systematics investigations is rapidly increasing. Small scale isolation of DNA from as little as 25 milligrams of leaves using a variety of modifications of standard laboratory methods provides sufficient material for molecular systematic comparisons. The use of Polymerase Chain Reaction (PCR) and DNA sequencing are the most commonly used procedures for generating data. Surveys of both molecular systematics labs and herbaria were performed to determine the extent of use of herbarium collections and policies for sampling herbarium specimens. Molecular labs are clearly increasing their usage of herbarium specimens. Most labs are examining DNA sequence variation of several genes, especially the chloroplast encoded genes *rbcl* and *ndhF* and the internal transcribed spacer regions (ITS) of the nuclear ribosomal repeat. Although most labs are still using DNA extracted from living material, herbarium specimens offer several advantages, including providing automatic vouchers, the possibility of examining inaccessible groups and the examination of rare or extinct species. The survey of herbaria indicate the curators are amenable to the use of collections but that clear policies must be developed for destructive sampling. This includes proper annotation of collections used (including genbank accession numbers), avoiding duplicate sampling of specimens, and acknowledgement of herbaria in any publications.

The Mycological World: Are the Issues and Solutions the Same?

Mueller, Gregory M.

Department of Botany, The Field Museum, Chicago, IL 60605-2496, USA

The advent of rapid methods to extract and amplify DNA brought forth a revolution in fungal systematics. Analyses of RFLPs and sequence data have enabled mycologists to develop robust phylogenies -- necessary components of evolutionary biological research including systematics. Because many fungi cannot be grown *in vitro*, sporocarps, either fresh or preserved herbarium specimens, are often the only source of DNA for systematic and population studies. Other fungal groups can be readily cultured, but many times the species in question are only infrequently encountered. In these cases, herbarium specimens or material from well-maintained culture collections are essential. Three factors unique to mycological collections, at least as compared to vascular plant herbaria, need to be addressed. 1) Mycologists have been undertaking destructive sampling since before the 1900s for micromorphological studies. While flowering plant systematists may sometimes need to dissect a flower, virtually all examinations of fungal specimens require dissection. 2) Sporocarps of many groups of fungi are very small, so taking even the small amount of tissue necessary for DNA analyses may be too much. 3) A herbarium specimen is often made up of a pooled collection of sporocarps collected in a general area on a particular day. This has important implications for studies using herbarium specimens to address population biology questions. These factors need to be taken into account as herbaria develop policies relating to destructive sampling of fungal material for molecular analyses. They also need to be considered by systematists who wish to make use of herbarium resources.

Destructive Sampling and Information Management: An Entomological Perspective

Whitfield, James B.

Department of Entomology, University of Arkansas, Fayetteville, AR 72701, USA

The advent of molecular methods for obtaining comparative genetic data from organisms has, during the last 8 years, made it possible for preserved entomological specimens from museums, even of small insect species, to be used in molecular systematic studies. Often it is necessary that much or virtually all of a given specimen be sacrificed to obtain sufficient DNA for analysis; this extreme of destructive sampling presents special problems for designing museum policies concerning loan requirements, deposition of voucher material, and information management. These problems will be discussed along with some proposed solutions and recommendations. In particular, the importance of the museum maintaining voucher specimen-based data for all studies involving such destructive sampling will be emphasized.

DNA Sampling and Storage: A Vertebrate Perspective

Engstrom, Mark^{1*}, Robert Murphy² and Oliver Haddrath³

¹Department of Mammalogy, ²Department of Ichthyology and Herpetology, ³Department of Ornithology, Royal Ontario Museum, 100 Queen's Park, Toronto, ON, Canada M5S 2C6

With the advent of widespread use of protein electrophoresis in vertebrate systematics in the 1960's and 70's, several museums and universities began to develop extensive collections of frozen tissues. Use of these tissue collections and sophistication of collections management expanded exponentially with the development of the polymerase chain reaction (PCR) and improvements in obtaining nucleotide sequences. Moreover with the use of PCR, DNA sequences can now be routinely obtained directly from reference collections (skins, bone, alcohol preserved specimens, etc.), accentuating the issue of destructive sampling of voucher material. Herein we examine: the history of development of tissue collections for genetic analyses in North America; the logic and methods of collection of voucher specimens and tissue samples amenable to genetic analyses; tissue collection storage, maintenance, management, and loan procedures; protocols, requirements, and restrictions on destructive sampling of both tissue and voucher collections. The rapid development of molecular systematics has added a vital, new approach and rekindled interest in our discipline: at the same time it poses novel challenges for collections management.

Banking Desiccated Leaf Material as a Resource for Molecular Phylogenetics

Miller, James S.

Missouri Botanical Garden, P.O. Box 299, St. Louis, MO 63166-0299, USA

Large research programs focusing their efforts on floristic inventory are often logical sources of plant material needed by molecular biologists studying phylogenetic relationships. Individuals in the field have traditionally collected material specifically requested for phylogenetic studies, and as techniques for DNA extraction and amplification have been refined, herbaria have provided access to small amounts of material removed from herbarium specimens. In order to be more responsive to the demands for material for molecular studies, botanists of the Missouri Botanical Garden have begun to regularly collect leaf material from a broad spectrum of taxa, which is then desiccated in silica gel and stored. The availability of extractable material provides samples that are available immediately, alleviates the long wait often necessary to collect material after a special request, and reduces the need to destructively sample herbarium specimens. The methods that have been used to collect, label, curate, store, and distribute samples will be described. The positive attributes of this methodology will be discussed and specific questions posed focusing on aspects which require additional research or need improved management. A series of ethical questions relating to the collection, distribution, and use of material will also be addressed.

HERBARIUM INFORMATION BAZAAR PRESENTATIONS

A Compactor and Air Conditioning: The "New" University of Michigan Herbarium

Rabeler, Richard K., University of Michigan Herbarium, Ann Arbor, MI, USA

Adhesive Research at the Canadian Conservation Institute: A demonstration and invitation to experiment

Down, Jane L., Canadian Conservation Institute 1030 Innes Road, Ottawa, ON, Canada

Processing Delicate Aquatic Plants

Wieboldt, Thomas F. and Llyn Sharp, Virginia Tech Museum of Natural History, Blacksburg, VA, USA

The Past Use of Mercuric Chloride as a Method of Pest Control in Herbaria

Rader, Linda, University of Nebraska-Lincoln, Lincoln, NB, USA

Methyl Cellulose for Mounting Herbarium Specimens: A how to demonstration

Gibson, Judy, Botany Department, San Diego Natural History Museum, San Diego, CA, USA

Drying and Mounting Techniques for Spruce and Hemlock Specimens

Deborah Lewis and Ruth Herzberg, Department of Botany, Iowa State University, Ames, IA, USA

Ten Years of Planning: Stages in the Design and Implementation of the Renovated University and Jepson Herbaria

Ertter, Barbara, Jepson Herbarium, University of California at Berkeley, Berkeley, CA, USA

Teaching Herbarium Techniques at Kew

Publications from the Royal Botanic Gardens, Kew

Bridson, Diana and David Simpson, Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey, England, UK

How to Construct a Protective Hardboard Folder for Storing Valuable Herbarium Specimens

Temperature and Relative Humidity Observation in the Cooling and Warming of Botanical Specimens for Insect Pest Control

Shchepanek, Michael J., Botany Section, Canadian Museum of Nature, Ottawa, ON, Canada

The Herbaria of Ohio: Some Basic Facts of the Herbaria in Ohio

Chuey, Carl F., Biological Sciences, Youngstown State University, Youngstown, OH, USA

Information on Retrofitting/Replacing the Seals on Older Herbarium Cabinets

Johnson, Karen, Department of Natural History, Manitoba Museum of Man and Nature, Winnipeg, Manitoba, Canada

Turning Recycling into Packing Material for Specimen Shipments

A Display of Different Specimen Mounting Techniques

Pinzl, Ann, Department of Natural History, Nevada State Museum, Carson City, NV, USA

The Roylean Herbarium Conservation Project

Donna M. Hughes, Liverpool Museum, National Museums and Galleries on Merseyside, Liverpool, UK

BIOGRAPHICAL SKETCHES OF SYMPOSIUM SPEAKERS

JOHN TOWNSEND is a Preservation Consultant and Information Specialist whose primary work is with libraries and archives. He has previously served as head of the New York State Conservation/Preservation Program, the first statewide preservation program in the nation, and as the director of the New York Public Library's Conservation Lab. Earlier this year Mr. Townsend served as a member of a technical advisory group to the GEF (Global Environmental Facility) Biodiversity Project in Bogor, Indonesia. His role in the project was to assess the condition of library and archival materials as well as paper, adhesives, and other materials used in the mounting, labeling and storage of specimen collections in the Herbarium Bogoriense and the Bogor Zoology Museum.

WILLIAM P. LULL is a graduate of the Building Technology program at MIT, a principal and senior conservation environment consultant at Garrison/Lull Inc., and is Adjunct Associate Professor of Building Technology at New York University. He has worked as a designer and project manager for architects, engineers and government agencies. He has worked on over fifty (50) museum, library and archives projects, and consulted on over a dozen natural history projects. Completed herbarium projects include the Morris Arboretum in Philadelphia, and the Brooklyn Botanic Garden. Herbarium planning projects include the Peabody Museum of Natural History at Yale and the Carnegie Museum of Natural History in Pittsburgh. He is currently working on the renovation of the New York Botanical Garden and its herbarium.

KERRY BARRINGER is curator of the Herbarium at Brooklyn Botanic Garden. He received his Ph.D. from the University of Connecticut in 1981 for a taxonomic revision of the neotropical plant genus *Angelonia* (Scrophulariaceae) and did postdoctoral work with the Flora Costaricensis project at the Field Museum. In addition to curating the herbarium, he continues to study neotropical Scrophulariaceae, Aristolochiaceae, and Orchidaceae.

TOM STRANG received a M.A. in Art Conservation, 1984 from Queen's University, Kingston, after receiving a B.Sc.(Hons) in Biology, 1979 from Carleton University, Ottawa. He has been a conservation scientist at the Canadian Conservation Institute since 1988. His responsibilities include reviewing, developing and advising on pest control methods for museums. He also writes computer software tools for assisting conservators, eg. artifact cushion design, and management of fluid-preserved specimens. Before joining the CCI, Tom was Acting Chief of Conservation at the Provincial Museum of Alberta, and contributed to numerous heritage preservation projects across Canada.

GREG HILL has a degree in Fine Art from the University of Guelph, and a diploma in Art Conservation Techniques from Sir Sandford Fleming College. Since graduating in 1982 he has worked for the Provincial Archives of Manitoba, in private practice and for the past 7 years as senior conservator of Prints and Drawings in the Conservation Treatment Division, Archives Preservation Branch, National Archives of Canada. His area of specialization is the conservation of works of art on paper and photographic materials and he has been very involved in the development of training for Disaster Preparedness and Response. His introduction to Herbaria comes from the Canadian Museum of Nature, Herbarium collections management staff, who were looking for assistance in developing expertise in conservation mounting techniques and materials.

STEPHEN L. WILLIAMS received his B.Sc. in Zoology/Geology, M.Sc. in Zoology/Botany, and his M.A. in Museum Sciences from Texas Tech University, Lubbock, TX in 1970, 1973, and 1975, respectively. He served as collections data analyst at the Museum of Texas Tech University from 1975-1976 and as Collections Manager at the Carnegie Museum of Natural History in Pittsburgh from 1976-1990. Since 1990 Steve has served as Collections Manager of the Natural Science Research Laboratory, Museum of Texas Tech University, and as adjunct professor in the Museum Science program at the same university. He has participated in numerous workshops and invited lectures for museum professionals throughout the world. Steve is a past president of SPNHC.

JANE L. DOWN graduated from Queen's University, Kingston, Ontario in 1973 with an Honours B.Sc. in Chemistry and Mathematics. From 1973 to 1978 she worked in various areas of scientific research including forensic science at the Ontario Provincial Police Laboratory in Toronto, biochemistry at Queen's University, pharmacology at the University of Ottawa, and pesticide chemistry at the Chemistry and Biology Research Institute at Agriculture Canada in Ottawa. In 1978, she joined the Canadian Conservation Institute as a Conservation Scientist. Although she has carried out research on the dimensional stability of argillite and, from 1985 to 1990, helped to create and develop the materials and suppliers databases for the Conservation Information Network, her main area of study is adhesive research. Jane has carried out research on the suitability of epoxy resin adhesives, poly(vinyl acetate) and acrylic adhesives for use in conservation. Since 1994, she has been evaluating vinyl acetate/ethylene copolymer emulsions and their additives. Jane also responds to the numerous adhesive-related inquiries that are received at CCI every year from conservators and scientists worldwide.

JULIA FENN is the conservator for Ethnology and Folk Arts at the Royal Ontario Museum. She received her B.A. in Archeology and Anthropology from Cape Town University and worked at the South African Museum of Natural History before going to London to study Conservation. Julia prefers an interdisciplinary approach to conservation because it permits her to snoop around interesting projects in other departments. She has had an interest in Natural History issues since attending the first of the Natural History Collections Workshop in Ottawa, 1981, from which SPNHC was spawned.

CAROLYN L. ROSE is Deputy Chairman of the Department of Anthropology, and Senior Research Conservator at the National Museum of Natural History, Smithsonian Institution. She is also an Adjunct Associate Professor at the George Washington University in the Departments of Anthropology, Art, and Museum Studies. Her education and training is in art history, biology, chemistry, anthropology, and conservation. During her career she has worked to develop the fields of anthropological and natural science conservation, and to forward concepts and methodologies concerning conservation assessments and preventive care. She is the author of more than 40 publications on conservation and related topics and has organized, compiled, and edited six books. At present, she serves on the Board of the National Center for Technology Transfer and Training, as the chairman of several national committees, and is the President of the Society for the Preservation of Natural History Collections.

GEORGE F. RUSSELL came to the Smithsonian Institution in 1975 and was appointed Collections Manager of the Department of Botany in 1979. During this time he has been responsible for numerous significant developments in collections management, including the shepherding of the United States National Herbarium into the age of personal computers and information management. In the course of planning and installing computer systems for inventory and transaction management, he initiated the use of bar codes to individually record and track herbarium specimens. More recently, he has been involved with projects that provide a wealth of botanical data on the Internet.

EMILY W. WOOD received her B.A. from Salem College, Winston-Salem, NC, USA, in 1971, and her M.S. from the University of North Carolina-Chapel Hill in 1975. She worked as an NEA Intern and as a Curatorial Assistant in the Herbarium of the Carnegie Museum of Natural History from 1978-1981. She joined the staff of the Harvard University Herbaria as a Curatorial Assistant in 1981, became a Curatorial Associate in 1989. She has held her present post as Collections Manager since 1991. Emily's botanical interests include the floras of eastern North America and eastern Asia, especially Japan.

ROBERT K. JANSEN received his B.Sc. in Biology from the University of Wisconsin, Oshkosh in 1976, and his Ph.D. in Botany from Ohio State University in 1982. After receiving his doctorate Bob served as a Research Associate at Ohio State University (1982-1983), Visiting Assistant Professor and Acting Curator of Beal-Darlington Herbarium, Michigan State University (1983-1984) and Postdoctoral Research Fellow at the University of Michigan (1984-1987). He was an Assistant Professor in the Department of Ecology and Evolutionary Biology at the University of Connecticut from 1987-1991. Bob has held his current position Associate Professor in the Department of Botany of the University of Texas since 1991. Bob's research interests include Molecular Systematics and Evolution, Evolution and Systematics of the Asteraceae and Solanaceae, and chloroplast DNA evolution. Bob and his students have had considerable experience in extracting DNA from herbarium specimens.

GREGORY M. MUELLER received a B.A. and M.S. in Botany from Southern Illinois University, Carbondale in 1976 and 1979 respectively, and his Ph.D. in Botany, from the University of Tennessee, Knoxville, in December 1982. He held several postdoctoral appointments in Sweden, Virginia, Tennessee, and Washington State from 1982 to 1985. He has served in Mycology in the Department of Botany at The Field Museum as Assistant Curator (1984-85), Associate Curator, Mycology (1985-92) and Head of Cryptogams (1993-present). Since 1994 he has also served as a Lecturer for the Committee on Evolutionary Biology at The University of Chicago. Greg's research interests include the systematics, population biology and biogeography of Basidiomycetes, especially Agaricales that form ectomycorrhizae; neotropical mycology; fungal biodiversity; mycorrhizae. He has received numerous scholarships and awards including the 1992 Alexopoulos Prize of the Mycological Society of America, in recognition of outstanding research contributions to the study of fungi within 10 years of receipt of his Ph.D.

JAMES B. WHITFIELD received his B.Sc. in Entomology from North Carolina State University in 1978, and his Ph.D. in Entomological Sciences from the University of California at Berkeley in 1985. After receiving his degree he served as a NATO Postdoctoral Fellow at the University of Manchester, England (1985-86); a Postdoctoral Research Associate at Ohio State University (1986-88); and as Adjunct Assistant Professor at the University of Missouri, St. Louis, and Lecturer at University College, Washington University, St. Louis (1988-92). He has held his present position as Assistant Professor in the Entomology Department of the University of Arkansas at Fayetteville since 1992. Jim's Entomology research specialties include ecology, evolution and systematics of parasitoids and their insect hosts, with emphasis on: phylogeny and evolution of parasitism; coevolution between viruses and parasitoid Hymenoptera; host ranges in parasitoids; molecular systematics; braconid wasps.

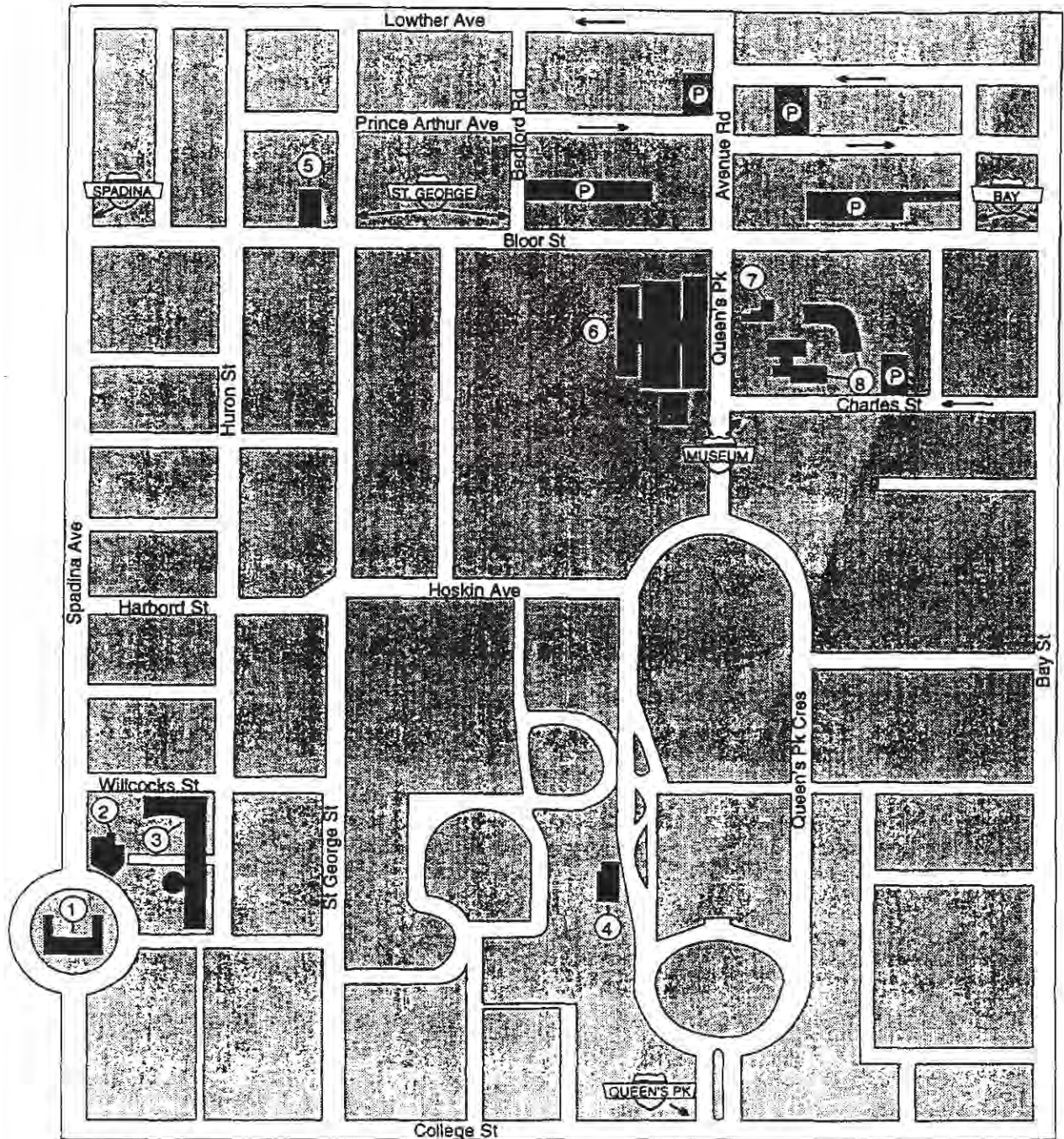
MARK ENGSTROM received his Ph.D. from Texas A&M University in 1984. From 1982 to 1988 he was an Assistant Professor of Biology and Curator of mammals at Angelo State University, Texas. Since 1988 he has been employed by the Royal Ontario Museum and presently is Associate Curator-in-Charge of the Department of Mammalogy. Mark is also cross-appointed as an Associate Professor in the Department of Zoology at the University of Toronto. His research interests are in the evolutionary biology, systematics, and biogeography of mammals, especially rodents. He has extensive field experience studying mammals in the Neotropics and has published over 40 papers in mammalian systematics. Some current research projects include: chromosomal evolution and speciation in arctic collared lemmings; and speciation and biogeography of Neotropical deer mice.

JAMES S. MILLER is Assistant Head of the Africa and Madagascar Department and Associate Curator at the Missouri Botanical Garden. He oversees the natural products research programs at the Garden and has devoted much time and effort to developing protocols for collecting plant samples for pharmaceutical research and to devising models for ethical collaboration in biodiversity prospecting. A native of Washington, D.C., Dr. Miller earned Bachelor's and Master's degrees in horticulture from the University of Maryland and his Ph.D. in biology from Washington University, St. Louis. He has extensive field experience in Latin America and Africa and has been very active in the Garden's research program in Madagascar. His taxonomic specialty is tropical Boraginaceae, and he is working on floristic treatments of the family for Costa Rica, Mesoamerica, Ecuador, Peru, and Madagascar.

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Map of Conference Area



- ① ROM Botany Dept. Cryptogamic Herbarium,
1 Spadina Crescent
- ② Koffler Institute for Pharmacy Management,
575 Spadina Avenue
- ③ U of T Botany Dept., Earth Sciences Centre,
25 Willcocks Street
- ④ Sigmund Samuel (Canadiana) Building,
ROM Botany Dept. Vascular Plant Herbarium,
14 Queen's Park Crescent

- ⑤ Quality Hotel by Journey's End,
280 Bloor Street West
- ⑥ Royal Ontario Museum, Main Building
100 Queen's Park
- ⑦ Gardiner Museum
111 Queen's Park
- ⑧ Victoria University residences

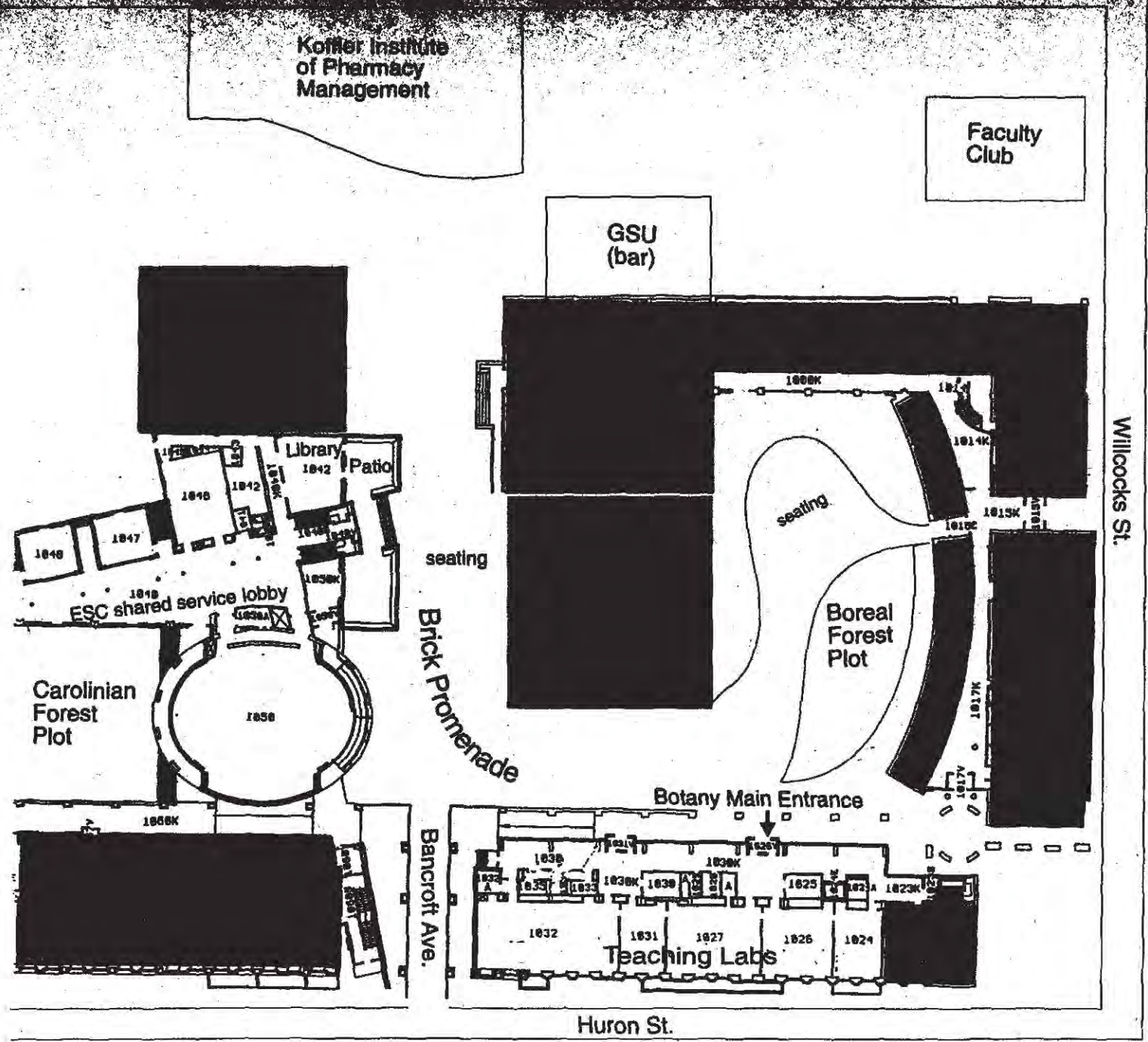


Subway Station



Parking

Herbarium Workshop:
Earth Sciences Centre and Koffler Institute



Willcocks St.

Brick Promenade

Huron St.

Bancroft Ave.

GSU (bar)

Faculty Club

Koffler Institute of Pharmacy Management

seating

Boreal Forest Plot

Carolinian Forest Plot

Botany Main Entrance

Teaching Labs

1858

1858K

1848

1847

1840

1841

1842

Library

Patio

ESC shared service lobby

1839K

1839

1838

1836K

1836

1835

1834

1833A

1825

1823A

1823K

1832

1831

1827

1826

1824

1800K

1814

1814K

1815K

1816K

1817K

1817V

1817

**DESTRUCTIVE SAMPLING OF HERBARIUM SPECIMENS
HARVARD UNIVERSITY HERBARIA**

Policy Statement and Authorization Form

This is to acknowledge your request for destructive sampling of herbarium specimens of Harvard University Herbaria. We ask that you read this policy statement and complete the agreement outlined below.

The collections of Harvard Herbaria are maintained with the goal of balancing preservation of the integrity of herbarium specimens with utilization for scientific research. While every effort will be made to accommodate researchers, decisions concerning destructive sampling of collections are made on a case-by-case basis.

As a rule, no material may be removed from specimens without prior consent of the Director or an appropriate member of the curatorial staff.

Permission for removal of material is contingent upon adherence to the following guidelines:

1- Leaf material, pollen, spores, etc. may be removed from specimens *only* when there is adequate material available. Care must be taken not to damage the specimen.

2- Material may not be removed from type collections, or from taxa represented in the herbarium by less than 3 collections, except in rare instances, and then only by an appropriate staff member.

3- Each specimen must be annotated indicating the material removed, the nature of the study, the researcher's name and institutional affiliation, and the date. The Harvard University Herbaria should be cited in any resulting publication, a copy of which *should be sent here*.

4- Material may not be removed from an herbarium sheet for a second time, if the nature of the study is the same (i.e., pollen material for SEM, leaf material for DNA analysis, etc.).

5- Depending on the purpose of the material removed, the researcher must return to the Harvard Herbaria the following: a duplicate permanent pollen, spore or leaf slide, an SEM photograph, a sample of the extracted DNA (see no. 6), etc. Such material will be housed in the Herbaria in a suitable place, cross-referenced to the specimen from which it was removed, and made accessible to other researchers as requested.

6- Requests for removal of material for DNA studies will be reviewed by the Curator of materials for molecular studies and approved by the Director. An extraction protocol must be submitted, along with an estimate of the amount of material needed. Results (both positive and negative) must be reported in writing; specimens must be annotated; GenBank accession numbers must be included; and a sample of the DNA must be sent to the Harvard University Herbaria. Samples obtained in this way will be properly stored and curated, and material may be provided to others for further study.

7- For large or complicated requests for material for DNA extractions or other studies, researchers will be encouraged to come to the Harvard University Herbaria, using their own funds, and select specimens for sampling themselves. Specimens will be selected and set aside by the researcher; removal of material will be made with supervision and approval of appropriate staff. Not only does this reduce the work required of the curatorial staff, but it allows the investigator to make more precise selections based on specimen age, material in packets, etc.

8- The Harvard University Herbaria maintain no records on the history of specimen collection or treatment methods; materials are supplied with no warranty of any kind.

(over)

If you agree to accept the materials under the above conditions, please sign below and return this form to the Manager of the Systematics Collections, Harvard University Herbaria, 22 Divinity Avenue, Cambridge, MA 02138. For DNA studies, please enclose an extraction protocol. Upon receipt of confirmation, we will contact you concerning the dispatch of the material.

Accepted: _____
Printed Name of Institution

Research Investigator: _____
Printed Name

Signature

Date

➤ *Missouri Botanical Garden*

(<http://straylight.tamu.edu/MoBot/welcome.html>)

The Garden's Web contains information and images from both the public Garden and the "unseen" Garden and its collections. In addition, it contains information about research activities and allows access to research databases.

➤ *Flora of North America*

(<http://fna.wustl.edu/>)

The Flora of North America Web contains images from Volume 2, *Pteridophytes and Gymnosperms*, and a gateway to the FNA gopher.

➤ *TROPICOS*

(<http://straylight.tamu.edu/MoBot/database.html>)

The TROPICOS Web allows two different ways to access this huge storehouse of botanical data. This database contains about 600,000 scientific plant names and thousands of bibliographic records. The gopher versions of the names and bibliography data are accessible here. In addition, we have made the names data available under another indexing and searching system called Managing Gigabytes. This system offers a graphical interface and returns alphabetical hit lists of unlimited size.

➤ *Madagascar*

(<http://straylight.tamu.edu/MoBot/madagascar/welcome.html>)

The Madagascar Web links stunning images of living plants with scientific information from TROPICOS. This Web includes images from all the indigenous plant families of Madagascar.

How to Connect to the Web

The Web is available through browser programs. These programs require an Internet connection. Ask your system administrator or Internet service provider for details.

➤ *Floras & Checklists*

➤ *CHINA CHECKLIST*

The Flora of China Checklist project provides a computerized synopsis of the nearly 30,000 species of ferns and seed plants. It is scheduled completion by mid-1997.

➤ *VASCULAR PLANTS OF WEST CENTRAL AFRICA*

This dataset provides over 12,000 identified specimen records from the region.

➤ *FLORA MESOAMERICANA*

This collaborative effort is the first major regional flora ever written in Spanish. Available here is the complete text of volume 6, *Aismataceae to Cyperaceae*, with a sample of illustrations.

➤ *FLORA OF MISSOURI CHECKLIST*

This database contains information updated from Yatskievych & Turner's *Catalogue of the Flora of Missouri*.

➤ *PERU CHECKLIST*

This catalog provides an annotated listing of the 17,143 species of flowering plants and gymnosperms in 2,458 genera and 224 families known to occur in Peru.

➤ *CATALOG OF POACEAE IN ARGENTINA*

This searchable catalog contains data on all the grasses known to occur in Argentina.

➤ *MANUAL OF THE PLANTS OF COSTA RICA*

This working checklist of over 8,000 species includes names of specimens in the Costa Rican National Herbarium (CR).

➤ *USA INDEX HERBARIORUM*

This searchable index relates herbarium acronyms to full names and contact persons.

➤ *INDEX OF BOTANICAL AUTHORS*

This searchable database includes correct spellings, standard abbreviations, and biographical information about botanists.

➤ *INDEX OF PLANT CHROMOSOME NUMBERS*

This searchable index contains plant chromosome data from the most recently published indices.

➤ *Flora of North America*

FNA is a collaborative, binational effort of more than 30 major botanical institutions to compile the first comprehensive description of all plants growing spontaneously in the US, Canada, and Greenland. Available online are introductory chapters from Volume 1 and the complete text of Volume 2, *Pteridophytes and Gymnosperms*.

➤ *TROPICOS*

In collaboration with the Keck Center for Genome Informatics at Texas A&M University, 600,000 TROPICOS name records—with associated bibliography data—are available here. TROPICOS is the world's largest electronic database of botanical information.

➤ *Library*

Users may see listings of new books or duplicate journals and monographs. Users may search the lists of duplicates and place orders for desired volumes.

➤ *Moss Data*

This database contains names, types, and bibliography records for mosses.

➤ *Plants in Bloom*

The floral beauty of the public Garden is described in these weekly updates.

➤ *MBG E-Mail Accounts*

This searchable directory includes all E-mail users at the Garden.

Guide to Internet Resources at the Missouri Botanical Garden

This brochure outlines the resources that were available at press time. Because additional resources appear regularly, the best way to stay informed about what's online at the Garden is to pay an electronic visit!

World-Wide Web

Missouri Botanical Garden

(<http://straylight.tamu.edu/MoBot/welcome.html>)

Flora of North America

(<http://fna.wustl.edu/>)

TROPICOS (Botanical Database)

(<http://straylight.tamu.edu/MoBot/database.html>)

Conspectus of Madagascar Plants

(<http://straylight.tamu.edu/MoBot/madagascar/welcome.html>)

Gopher

(mobot.org)

Flora of North America

Index of Botanical Authors

Index of Plant Chromosome Numbers

Library

MBG E-Mail Accounts

Moss Data

Other Floras and Checklists

Plants in Bloom

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USA Index Herbariorum

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In collaboration with the Keck Center for Genome Informatics at Texas A&M University, the Garden hosts World Wide Web (WWW) pages for the public Garden as well as the Garden's far-reaching botanical research programs.

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