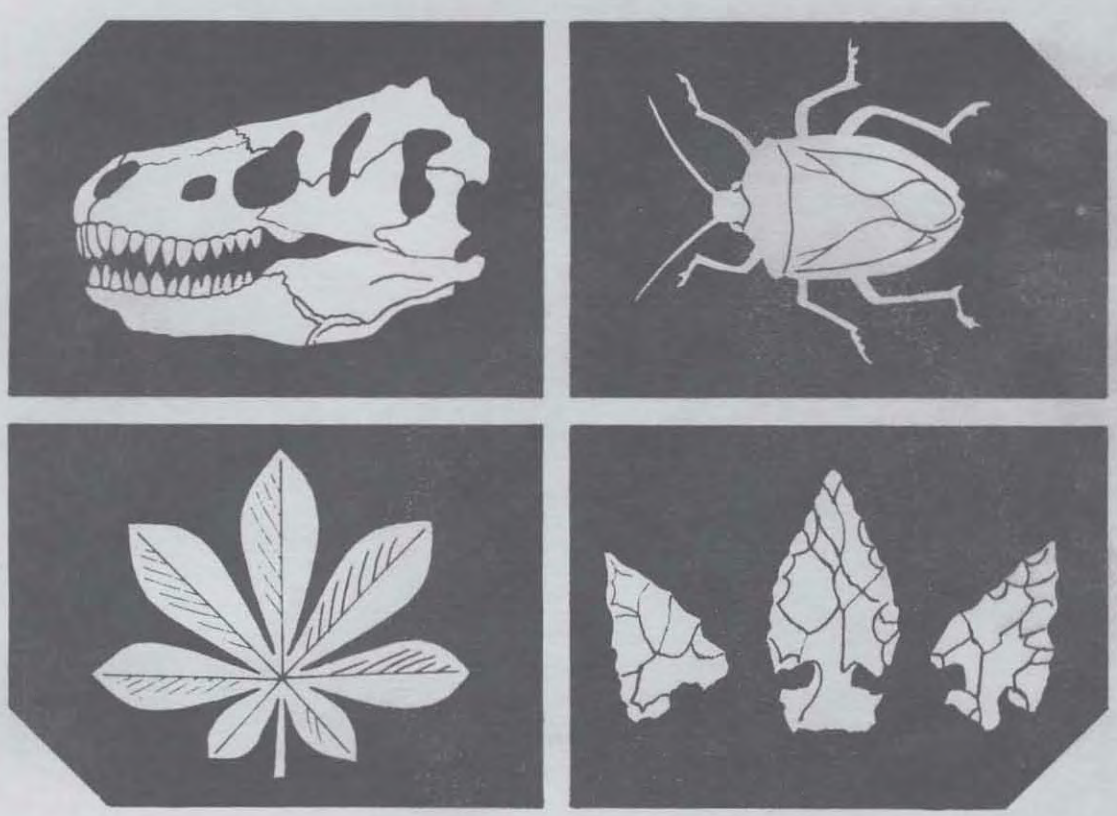
3rd 1988 ANNUAL MEETING OF THE

SOCIETY FOR THE PRESERVATION OF NATURAL HISTORY COLLECTIONS

MONDAY, 30 MAY TO FRIDAY, 3 JUNE

PROGRAM & ABSTRACTS



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Museum of Natural History

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PROGRAM AND ABSTRACTS PRODUCTION

Sue McLaren (Section of Mammals)

PROGRAM DEVELOPMENT

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Gerry Fitzgerald (National Museums of Canada, Ottawa)
Cathy Hawks (Section of Mammals)
Janet Waddington (Royal Ontario Museum, Toronto)

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Betty Hill (Section of Vertebrate Fossils)
Carolyn Leckie (Section of Mammals)
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SOCIAL ACTIVITIES

C. J. McCoy, Co-chairman (Section of Amphibians and Reptiles)
Ellen Censky, Co-chairman (Section of Amphibians and Reptiles)
Grete Evans (Archives and Animal Portraitures)
Elizabeth Kwater (Natural History Museum Library)
Marilyn Niedermeier (Section of Birds)

(PROGRAM SUPPORT CONTINUED ON INSIDE OF OF BACK COVER)

PROGRAM

MONDAY, 30 MAY

9:00 - 12:00 **BUSINESS MEETING OF COUNCIL AND COMMITTEE REPRESENTATIVES.**

1:00 - 5:00 **BUSINESS MEETING OF COUNCIL.**

1:00 - 6:00 **REGISTRATION.**

7:00 - 10:00 **ICE BREAKER.**

TUESDAY, 31 MAY

8:00 - 5:00 **REGISTRATION.**

9:00 - 9:30 Welcoming Address by Dr. Robert Wilburn (President, The Carnegie) and Dr. James King (Director, The Carnegie Museum of Natural History).

CONSERVATION AND NATURAL HISTORY -- Chairman, Joan S. Gardner The Carnegie Museum of Natural History, Pittsburgh, Pennsylvania).

9:30 - 10:00 1. The Issue of Conservation in Natural History Museums by Peter Raven (Keynote Speaker, Missouri Botanical Garden, St. Louis, Missouri).

10:00 - 10:20 2. Art Conservation and How it Relates to Natural History Museums by Arthur Beale (Museum of Fine Arts, Boston, Massachusetts).

10:20 - 10:40 3. Similarity of Conservation Concerns Between Anthropology and Natural Science Collections by Mary-Lou E. Florian (Royal British Columbia Museum, Victoria, British Columbia).

10:40 - 11:10 **BREAK / POSTERS / DISPLAYS.**

11:10 - 11:30 4. The Conservation Survey and Long-Range Planning by Toby Raphael (National Park Service, Harpers Ferry, West Virginia).

11:30 - 11:50 5. The Society for the Preservation of Natural History Collections -- Past, Present, and Future by Cesar Romero-Sierra (Queen's University, Kingston, Ontario).

11:50 - 1:30 **LUNCH / POSTERS / DISPLAYS.**

GEOSCIENCES -- Chairman, Janet Waddington (Royal Ontario Museum, Toronto, Ontario).

1:30 - 1:45 6. Palaeontological Conservation Documentation by Gerald R. Fitzgerald (National Museum of Natural Sciences, Ottawa, Ontario).

1:45 - 2:00 7. A Review of the Breakdown and Conservation of Sub-Fossil Bone by Chris Collins (Leicestershire Museums Service, Leicester, United Kingdom).

2:00 - 2:15 8. Plastics Used in the Consolidation and Preparation of Fossil Vertebrates: A Review by Dan S. Chaney (National Museum of Natural History, Washington, D. C.).

2:15 - 2:30 9. Golden Oldies: Curating SEM Specimens by Julia Golden (Department of Geology, University of Iowa, Iowa City, Iowa).

2:30 - 2:45 10. The Non-destructive Examination of Fossil Vertebrate Material Using Computed Axial Tomography by L. G. Andrew Leitch (Royal Ontario Museum, Toronto, Ontario).

2:45 - 3:00 11. Quarry Staking at Dinosaur Provincial Park, Alberta: A Unique Type of Locality Data Conservation by Jane Colwell Danis (Tyrrell Museum of Palaeontology, Drumheller, Alberta).

3:00 - 3:30 **BREAK / POSTERS / DISPLAYS.**

BIOSCIENCES -- Chairman, Paisley S. Cato (Texas Cooperative Wildlife Collection, Texas A & M University, College Station, Texas).

3:30 - 3:45 12. Conservation of Dioramas at The Academy of Natural Sciences of Philadelphia by Tamsen Fuller and Keith Russell (Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania).

3:45 - 4:00 13. Considerations Pertaining to the Conservation of Open, Diorama-Type Exhibits by W. Peter Conroy (Anniston Museum of Natural History, Anniston, Alabama).

4:00 - 4:15 14. Deterioration of Hair by Airborne Microorganisms: Implication for Museum Biological Collections by Catharine A. Hawks (The Carnegie Museum of Natural History, Pittsburgh, Pennsylvania) and Walter F. Rowe (Department of Forensic Sciences, The George Washington University, Washington, D. C.).

4:15 - 4:30 15. The Influence of Preparation Techniques on the Preservation of Mammalian Skulls by Stephen L. Williams and Stephen P. Rogers (The Carnegie Museum of Natural History, Pittsburgh, Pennsylvania).

4:30 - 4:45 16. A Case Study of the Bird Conservation Project at The Denver Museum of Natural History by Elizabeth A. Webb (Denver Museum of Natural History, Denver, Colorado) and Carl Patterson (Rocky Mountain Regional Conservation Center, Denver, Colorado).

4:45 - 5:00 17. A Treatment for Baleen Adapted to Bison Hornsheaths by Mary P. Peever (Canadian Conservation Institute, Ottawa, Ontario) and Gerald R. Fitzgerald (National Museum of Natural Sciences, Ottawa, Ontario).

5:00 - 7:00 **DINNER.**

SYMPOSIUM

CONTROLLING THE ENVIRONMENT

Carolyn L. Rose, Chairman (SPNHC Conservation Committee)

7:00 - 7:15 18. Controlling the Environment: Introduction by Carolyn L. Rose (Smithsonian Institution, Washington, D. C.).

7:15 - 7:45 19. The Museum Climate by Stefan Michalski (Canadian Conservation Institute, Ottawa, Ontario).

7:45 - 8:15 20. Control of the Deteriorating Effects of Light by Robert L. Feller (The Mellon Institute, Carnegie Mellon University, Pittsburgh, Pennsylvania).

8:15 - 8:30 **BREAK.**

8:30 - 9:00 21. Choosing Materials for Use in Museum Storage and Display by David Erhardt (Smithsonian Institution, Washington, D. C.).

9:00 - 9:30 Open discussion.

Conclusions.

WEDNESDAY, 1 JUNE

8:00 - 12:00 **REGISTRATION.**

PHILOSOPHIES, TRENDS, AND GENERAL INTEREST -- Chairman, Daniel J. Faber (Environment Canada, Ottawa, Ontario).

8:30 - 8:45 22. Collection Management at the Buffalo Museum of Science by Richard S. Laub (Buffalo Museum of Science, Buffalo, New York).

8:45 - 9:00 23. Natural History Collection Management at the Royal Ontario Museum by Janet Waddington (Royal Ontario Museum, Toronto, Ontario).

9:00 - 9:15 24. Interesting and Evolving Species of Museum Workers: Collections Managers and Registrars by Jane Sledge (Smithsonian Institution, Washington, D. C.).

9:15 - 9:30 25. The Architecture of Collections Responsibility by Frederick J. Collier (National Museum of Natural History, Washington, D. C.).

9:30 - 9:45 26. Training in the Care of Natural Science Collections: Beyond the Collections Care Pilot Training Program by Kimball L. Garrett and Linda J. Barkley (Natural History Museum of Los Angeles County, Los Angeles, California).

9:45 - 10:00 27. Endangered and Orphaned Natural History Collections in the United States and Canada by Robert M. West (Cranbrook Institute of Science, Bloomfield Hills, Michigan).

10:00 - 10:30 **BREAK / POSTERS / DISPLAYS.**

10:30 - 12:00 **GENERAL BUSINESS MEETING.**

12:00 - 1:30 **LUNCH / POSTERS / DISPLAYS.**

SPECIAL TOPICS -- Chairman, Gerald R. Fitzgerald (National Museum of Natural Sciences, Ottawa, Ontario).

1:30 - 1:45 28. Infrared Spectroscopic Analysis of Degraded Amber by Julia Fenn, Janet Waddington (Royal Ontario Museum, Toronto, Ontario), and R. Scott Williams (Canadian Conservation Institute, Ottawa, Ontario).

1:45 - 2:00 29. Beyond Asbestos Removal: Problems Don't End When the Stuff Comes Down by Arnold Y. Suzumoto (Bernice P. Bishop Museum, Honolulu, Hawaii).

2:00 - 2:15 30. Natural History Collections: An Essential Component of School Education. The Story of an Experience by Louise LePage and Cynthia Bowllan (SAJIB, Jardin botanique de Montreal, Montreal, Quebec).

2:15 - 2:30 31. The Development of Faunal Surveys and National Natural History Collections in Developing Countries -- Ethiopia as a Paradigm for Africa by A. Bekele (Zoological Natural History Museum, Addis Ababa University, Addis Ababa, Ethiopia) and Duane A. Schlitter (The Carnegie Museum of Natural History, Pittsburgh, Pennsylvania).

2:30 - 2:45 32. Type Collection by Fahmida Rafi, Judith Price, and Diana Laubitz (National Museum of Natural Sciences, Ottawa, Ontario).

2:45 - 3:15 **BREAK / POSTERS / DISPLAYS.**

FLUID PREPARATIONS -- Chairman, Catharine A. Hawks (The Carnegie Museum of Natural History, Pittsburgh, Pennsylvania).

3:15 - 3:30 33. Effects of Standard Museum Preparation Methods on Materials of Natural History Specimens. Part II. Wet preparations -- A Review of Material Interaction with Aldehydes, Alcohol, and Phenoxetol by Mary-Lou E. Florian (Royal British Columbia Museum, Victoria, British Columbia).

3:30 - 3:45 34. Characteristics of a Collection of Fluid-Preserved Mammals and Implications for Collection Management by Paisley S. Cato (Department of Wildlife and Fisheries Sciences, Texas A & M University, College Station, Texas).

3:45 - 4:00 35. No Bones About It: An Analysis of Enzyme Preparation Methods by Sally Y. Shelton and John Buckley (Texas Memorial Museum, University of Texas, Austin, Texas).

4:00 - 4:15 36. The Effects of Isopropyl and Ethyl Alcohol Preservative on Fish by John E. Simmons (Museum of Natural History, University of Kansas, Lawrence, Kansas).

4:15 - 4:30 37. pH Change in a Formalin/Borax Fixative Solution by Grant W. Hughes and James A. Cosgrove (Royal British Columbia Museum, Victoria, British Columbia).

4:30 - 5:30 POSTER PRESENTATIONS (Authors are to be present with posters at this time).

38. The Computer for Insect Collections: An alternative by Gemma Quintero G. (Museo de Historia Natural de la Ciudad de México, México, Distrito Federal) and Juan Manuel Castelazo (Unidad Aragon, México, Distrito Federal).

39. Computerized Data Storage and Retrieval for Fossil Vertebrates: Specimen and Preparation/Conservation Worksheets for CHIN by Kevin Seymour and L. G. Andrew Leitch (Royal Ontario Museum, Toronto, Ontario).

40. Database Management Using R:Base System V by Suzanne B. McLaren (The Carnegie Museum of Natural History, Pittsburgh, Pennsylvania).

41. A Nature of Specimen Coding System for Mammals -- Mixing Tradition and Computers by Susan M. Woodward (Royal Ontario Museum, Toronto, Ontario).

42. University of Georgia Zoological Collections Computer Cataloging System by Amy Lyn Edwards and M. Elizabeth McGhee (Museum of Natural History, University of Georgia, Athens, Georgia).

43. Preservation Microfilming of Atlantic Geoscience Centre Underway Geophysical Records by Iris A. Hardy (Geological Survey of Canada, Atlantic Geoscience Centre, Dartmouth, Nova Scotia).

44. Archival Storage of Disintegrating Labels from Alcohol Preserved Specimens by Carla H. Kishinami (Bernice P. Bishop Museum, Honolulu, Hawaii).

45. Radioactive Dinosaurs: The Radon Content of Jurassic Morrison Formation Vertebrates by Mary R. Carman (Field Museum of Natural History, Chicago, Illinois).

46. An Indelible Printing System for Recording Permanent Data in Natural History Collections by Fernando Palacios and Julio Gisbert (Museo Nacional de Ciencias Naturales, Madrid, Spain).

47. Experiences in Labelling Type-Specimens by Julio Gisbert and Rosa Garcia-Perea (Museo Nacional de Ciencias Naturales, Madrid, Spain).

4:30 - 6:00 **FINAL BUSINESS MEETING OF COUNCIL.**

6:00 - 10:00 **SPNHC SOIREE AT THE PITTSBURGH ZOO.**

(Barbecue from 7 to 9).

THURSDAY, 2 JUNE

GENERAL SCHEDULE

8:00 - 10:00 **WORKSHOPS / TOURS -- SESSION 1.**

10:00 - 12:00 **WORKSHOPS / TOURS -- SESSION 2.**

12:00 - 1:00 **LUNCH.**

1:00 - 3:00 **WORKSHOPS / TOURS -- SESSION 3.**

3:00 - 5:00 **WORKSHOPS / TOURS -- SESSION 4.**

LIST OF WORKSHOPS AND TOURS

W-1. Monitoring Environmental Conditions in Natural History Museums by Linda Barkley (Natural History Museum of Los Angeles County, Los Angeles, California) and Robert Waller (Canadian Conservation Institute, Ottawa, Ontario).

W-2. Identification of Insect Pests Commonly Found in Natural History Collections by Bob Davidson and John Rawlins (The Carnegie Museum of Natural History).

W-3. Care of Library and Archival Materials in Research Collections by Liz Kwater (The Carnegie Museum of Natural History) and Jean Gunner (Private Conservator, Pittsburgh, Pennsylvania).

W-4. Selection and Use of Plastic Films for Protecting Museum Materials by Thomas Taylor (Taylor Made, Lima, Pennsylvania).

W-5. Identification Techniques of Selected Preservatives Used for Skins of Birds and Mammals by Stephen Weber (University of Pittsburgh, Pittsburgh, Pennsylvania) and Kimal Z. Ismail (Alexandria University, Alexandria, Egypt).

W-6. Radiographic Applications for Examining Natural History Objects by Carolyn Leckie (The Carnegie Museum of Natural History) and William Real (The Carnegie Museum of Art).

W-7. Computer Applications for Collection Management and Research Purposes by Sue McLaren, Scott Wood, and Tony Barnosky (The Carnegie Museum of Natural History).

W-8. Education Loan Collections - The Carnegie's Traveling Discovery Room by Pat McShea (The Carnegie Museum of Natural History).

T-9. Tour of Conservation Laboratories of The Carnegie by Joan Gardner (The Carnegie Museum of Natural History).

T-10. Tour of the Geoscience Research Collections by Betty Hill (The Carnegie Museum of Natural History).

T-11. Tour of the Bioscience Research Collections by Jay Loughlin (The Carnegie Museum of Natural History).

T-12. Tour of the Powdermill Nature Reserve and Bird-banding Facility of The Carnegie by Joe Merritt (The Carnegie Museum of Natural History).

T-13. Compactor Storage for Research and Library Collections by James Scheidler (Spacesaver Corporation, Ft. Atkinson, Wisconsin).

T-14. Tour of the Hunt Institute for Botanical Documentation by Elizabeth Walsh (The Carnegie Museum of Natural History).

T-15. Tour of the Exhibits of The Carnegie Museum of Natural History by CMNH Docents.

T-16. Tour of the Exhibits of The Carnegie Museum of Art by MOA Docents.

FILM Wei T'o Book Dryer and Insect Exterminator by Richard Smith (Wei T'o Associates, Matteson, Illinois).

FRIDAY, 3 JUNE

SPECIAL SYMPOSIUM

HEALTH HAZARDS ASSOCIATED WITH NATURAL HISTORY MUSEUMS

by Monona Rossol

Arts, Crafts, and Theater Safety
181 Thompson Street #23; New York, New York 10012

9:00 - 12:00 **MORNING SESSION.**

12:00 - 2:00 **LUNCH.**

2:00 - 5:00 **AFTERNOON SESSION.**

END OF PROGRAM

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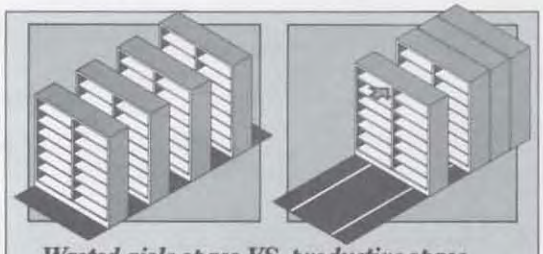

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ABSTRACTS

1 - 37 ORAL PRESENTATIONS

38 - 47 POSTER PRESENTATIONS

1

THE ISSUE OF CONSERVATION IN NATURAL HISTORY MUSEUMS.

Peter Raven, Missouri Botanical Garden, P. O. Box 299, St. Louis, Missouri 63166

Widespread extinction among plants, animals, and microorganisms which is occurring now and will accelerate greatly over the next few decades, makes the responsible preservation of materials in natural history collections imperative. No longer can we assume there is an endless supply of specimens available in nature to replace those which deteriorate, disintegrate, or are lost because of improper care. This is, therefore, the time to reevaluate our policies, practices, and philosophies with regard to the care of these collections, which otherwise will be lost eventually. The presentation will stress ways in which this serious problem might be approached.

2

ART CONSERVATION AND HOW IT RELATES TO NATURAL HISTORY MUSEUMS

Arthur Beale, Research Laboratory, Museum of Fine Arts, Boston, 465 Huntington Ave., Boston, MA 02115

Among other relatively recent developments in the conservation of natural history collections, the emergence of a conservation grant program within the Institute of Museum Services five years ago began an interdisciplinary dialogue. A year later a congressionally mandated survey of the conservation needs of all types of U.S. Museums and the adequacy of conservation training, personnel and facilities to meet those needs, further revealed how underdeveloped this discipline was in natural history museums. In response to the findings of this and other studies, pilot training programs in collection and maintenance care were established in four museums including the Natural History Museum of Los Angeles County. This program has accelerated the flow of relevent information on deterioration mechanisms, and the materials and techniques used in art preservation to those responsible for the care of natural history collections. A few examples of these areas of information exchange, from the broadest perspective of collections use to the more specific problem of the effect of storage and exhibition materials on collections, are explored. Areas of common concern are emphasized with possibilities for future collaborations outlined.

3

SIMILARITY OF CONSERVATION CONCERNS BETWEEN ANTHROPOLOGY AND NATURAL SCIENCES COLLECTIONS

Mary-Lou E. Florian, Royal British Columbia Museum, Victoria, British Columbia, Canada V8V 1X4

In accepting the responsibility of dedicated care of museum objects, either anthropological or natural history, the same conservation concerns apply to both groups, mainly because of common materials. Conservation concerns range from material interaction with the environment and treatment as well as collection use.

There is a conservation advantage with natural history specimens. Often, anthropological objects have been fabricated and it is this process that presents future conservation problems, whereas natural history specimens are prepared (fabricated) for preservation in the museum or institute. If logical preparation methods are used, many future conservation problems can be prevented.

The similarity of conservation concerns will be illustrated in discussions on: attitudes; tanning; color preservation; and insecticide use and alternatives.

4
THE CONSERVATION SURVEY AND LONG-RANGE PLANNING

Toby J. Raphael, Division of Conservation, National Park Service, Harpers Ferry, West Virginia 25425

Within systematic collections the goal of preservation can best be met through thoughtful conservation planning and constructive aciton. Museums have, in recent years, begun to develop conservation programs that methodically identify and organize their collections' preservation needs. The objective of such planning is to achive stabilization of the collection utilizing a series of steps:

1) Documentation of the existing condition of collected specimens.
2) Identification and correction of environmental deficiencies within the institution.
3) Establishment of a preventive maintenance program.
4) Development and implementation of prioritized plan for the treatment of unstable specimens.

Most of these planning steps must, understandably, take place at the museum, and directly involve the collection, its housing, and museum staff. It is recommended that a museum's own staff take responsibility for the writing and development of conservation planning documents, relying heavily on conservation specialists for technical input. Much of the needed technical content can be gained from on-site assessments performed by a variety of conservation specialists. The conservation "survey" can take a variety of forms according to individual circumstances. Surveying has become a means by which museums are bringing conservation professionals in to help them evaluate and set in motion their conservation programs.

5
THE SOCIETY FOR THE PRESERVATION OF NATURAL HISTORY COLLECTIONS - PAST, PRESENT, AND FUTURE

César Romero-Sierra, Queen's University, Kingston, Ontario, Canada K7L 3N6

The brief history of our Society dates back to 1980. Events taking place on May 22, 1985, divide these past eight years into two distinct periods.

The first, or foundation period, starts with Dr. Daniel Faber's conception and formulation of ideals and continues with two workshops, 1981 in Ottawa and 1985 at the ROM, and the subsequent publication in 1983 of the proceedings of the first workshop, namely, **Syllogeus No. 44**. On May 22, 1985, at the end of the second workshop, the participants agree to form a society of which they become founding members.

The second, or organization period, is characterized by a rapid succession of events: the launching of **Collection Forum**, official journal of the Society; the formation of an Organizing Committee that becomes the Council of the Society; the ROM publication of the 2nd workshop proceedings; the holding of annual meetings; the establishment of the bylaws of the Society; the start of the newsletter of the Society, another regular publication; the development of new activities by standing committees; the formulation of standing rules; and the establishment of liaisons with other organizations.

The awareness of the history of the Society serves as an inspiration in our continued work for its future growth.

6
PALAEONTOLOGICAL CONSERVATION DOCUMENTATION

Gerald R. Fitzgerald, National Museum of Natural Sciences, P. O. Box 3443, Station 'D', Ottawa, Ontario K1P 6P4.

Palaeontological conservation documentation has generally been neglected by most museums. At the few institutions where records are kept it has usually been a recent introduction and the data are often incomplete. As a result, even when relatively simple traditional treatments have been used, it can be difficult to asses the extent or type of intervention to a specimen. This has often led to difficulties in determining the validity of analytical techniques or in deciding on an appropriate course of treatment. With the rapid development of new products and techniques these problems can only increase. Keeping good records of treatments will prove invaluable for the future care of our collections and research on them.

7
A REVIEW OF THE BREAKDOWN AND CONSERVATION OF SUB-FOSSIL BONE

Chris Collins, Leicestershire Museums Service, 96 New Walk, Leicester, LE1 6TD

A problem commonly found in geological (and archaeological) collections is the delamination and splitting of sub-fossil bone, including tusks, teeth, horns, antlers etc.

For a long time it has been realised that the breakdown of this material is due to its remnant collagen content. The collagen, which gives bone its mechanical strength, is very sensitive to changes in relative humidity outside, perhaps even within, its stability range, and bone subject to a relative humidity outside this range (roughly 45% to 55%), is certainly liable to degrade and deform in some way.

Many methods have been developed to stabilise/consolidate degrading sub-fossil bone, the most popular of which is impregnation with poly vinyl acetate (PVA). The variety of methods which can be used to conserve degrading sub-fossil bone (wet and dry) are discussed and suggestions are made as to other possible techniques which can be used to stabilise such material.

8

PLASTICS USED IN THE CONSOLIDATION AND PREPARATION OF FOSSIL VERTEBRATES: A REVIEW

Dan S. Chaney, U.S. National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560

The possible hazards to fossil vertebrates which may result from the use of nitrocellulose based plastics has not been widely recognized, nor have solutions to the possible problems resulting from past use, been dealt with by preparatorsor conservators of fossil vertebrates. Nitrocellulose based consolidants have been in general use in a number of institutions for over 40 years. In an attempt to find an alternative to these plastics experiments were conducted on a wide variety of acetone soluble thermoplastics. The thermoplastics tested included resins from the following groups. SAN, ABS, Acrylic, Polyvinyl, and Polystyrene. A number of these were found to be suitable in some but not all applications, others were not readily available. The two which were found to be effective and available have been in use in some institutions for a number of years and therefore have a proven track record; they are polyvinyl acetate and polybutylmethacrylate. These plastics are discussed in Rixon's 1967 Fossil Animal Remains: Their Preparation and Conservation. Even though this source is dated in some areas the section on plastics can generally be relied upon to contain useful information with the noted exception of the recommended use of nitrocellulose based consolidants. Polyvinyl.acetate is suggested as a general consolidant as it is easily dissolved in acetone and polybutyl-methacrylate dissolved in methyl ethyl ketone is suggested for use in acid preparation.

9

GOLDEN OLDIES: CURATING SEM SPECIMENS

Julia Golden, Department of Geology, University of Iowa, Iowa City, Iowa 52242

Although most biologists and archaeologists consider specimens chosen for Scanning Electron Microscopy (SE' expendable, paleontologists do not. Primary type specimens, which must be retained, are frequently gold-coated. Should the gold coating remain on the specimen? Can the coating cause specimen damage or will removing the gol pose a greater threat to the specimen? Procedures for safely removing gold coatings will be reviewed and alternative coating materials will be discussed. A preliminary survey of paleontologic literature and museum collections indicates diverse research and curatorial practices involving specimens and SEM analysis. Some recommendations for curatorial policy will be presented.

10

THE NON-DESTRUCTIVE EXAMINATION OF FOSSIL VERTEBRATE MATERIAL USING COMPUTED AXIAL TOMOGRAPHY

L.G. ANDREW LEITCH, Dept. Vertebrate Palaeontology, Royal Ontario Museum, Toronto, Ontario, Canada, M5S 2C6

Through the use of Computed Axial Tomography and Computed Three-dimensional Imaging programs it has proven possible to examine previously inaccessible areas of fossilized vertebrate material. The use of three-dimensional imaging allows the researcher to "dissect" a detailed computer generated image to examine soft tissue pathways and sutural contacts. Images thus generated can also be transfered to computer controlled milling machines for replication in plastic or soft wax.

11

QUARRY STAKING AT DINOSAUR PROVINCIAL PARK, ALBERTA: A UNIQUE TYPE OF LOCALITY DATA CONSERVATION

Jane Colwell Danis, Assistant Head Collections Programme, Tyrrell Museum of Palaeontology, Drumheller, Alberta

Dinosaur Provincial Park near Brooks, Alberta is one of the richest dinosaur-bearing areas of Late Cretaceous (Judithian) age in the world. Equally unique is the fact that for about thirty years (1925-1955), the exact location of major quarries and specimens were mapped by C.M. Sternberg of the Geological Survey of Canada. These quarries were marked with metal stakes. Sternberg published a map in 1950 which showed 112 quarries. By 1955, quarries 113-123 had been staked. Unfortunately however, some of the maps showing exact localities have since been lost. After 1955 the effort was abandoned and valuable locality-related data was lost. In the late 1970's Dr. Philip Currie of the Palaeontology Section, Provincial Museum of Alberta (later the Tyrrell Museum) revived the practice of staking quarries. Collections staff have been deeply involved in the project since before the formal designation of the Collections Programme at the Tyrrell Museum. A conserted effort is underway to locate and identify old unmarked or unrecorded quarries in the field. Quarry #'s 124-141 were used for pre 1979 quarries and specimens. An additional 40 quarries have been excavated and staked since 1979 (#'s 142-182). A large scale updated map is currently in preparation. This project has been invaluable from the standpoint of the accuracy of Collections records. Several studies have already been published based on quarry information and the project continues to provide rich research potential for a wide variety of taphonomic, palaeontological and sedimentological studies.

12

CONSERVATION OF DIORAMAS AT THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

Tamsen Fuller, Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania 19103
Keith Russell, Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania 19103

Thirty-three dioramas form the core of the Academy of Natural Sciences' exhibit offerings. The dioramas were constructed primarily during the 1930's and 1940's and are arranged geographically. All but the most recent, which opened in 1986, are enclosed behind glass. Deterioration from light damage, water damage, dirt, insect infestations, and inherent vice have occurred over time in the enclosed dioramas. Relative humidity and temperature fluctuations appear to be minor on a weekly basis within the dioramas but to be greater seasonally. Some damage associated with these factors has been found. Some of the dioramas have service doors. While access to the dioramas is important, human disturbance has led to significant damage in accessible dioramas over the years. The Academy is currently conserving its largest diorama, The Serengeti Plains Group. After a thorough examination and condition reporting, the diorama will be cleaned, repaired, avenues for dirt and dust will be sealed, and light levels will be lowered. This project is expected to provide valuable experience and information useful for future diorama conservation projects at the Academy.

13

CONSIDERATIONS PERTAINING TO THE CONSERVATION OF OPEN, DIORAMA-TYPE EXHIBITS

W. Peter Conroy, Anniston Museum of Natural History, Anniston, Alabama 36202

Many people agree that the aesthetic effectiveness of an open, diorama-type exhibit can be greater than one which is enclosed by a case. Objective visitor behavior studies generally support this claim while designers and curators frequently consider the open exhibit as a viable option.

With respect to the conservation of these open exhibits, there are many special considerations. Problems do exist, such as the increased risk of pests, dust, fire, touching, vandalism, water damage, exposure to new construction, and overall climate fluctuation. Open exhibits do have attributes. There are fewer problems with three-dimensional inspections and there are fewer risks associated with poor circulation (i.e., the build-up of damaging gases and the greenhouse effect.)

The Anniston Museum of Natural History evaluated the open exhibits of several museums as well as its own. Anniston now has fourteen open exhibits, including one that features a full-sized Baobab tree and an adult bull elephant. Such studies have yielded information pertaining to open exhibit maintenance, design precautions, condition reports, climate control, barrier effectiveness, and a variety of both successful and failed approaches to open exhibits.

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DETERIORATION OF HAIR BY AIRBORNE MICROORGANISMS: IMPLICATIONS FOR MUSEUM BIOLOGICAL COLLECTIONS

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When exposed to relative humidities in the 80-90% range, human and animal hair samples were rapidly attacked by airborn microorganisms. Damage included exfoliation of cuticular scales, distortion of the cortex and medulla, dramatic color changes in some samples, and eventually, complete disintegration of the hair shaft. Degreasing with diethyl ether briefly delayed the onset of attack by microorganisms, but had no other discernible effect on the process of biodeterioration. The hair was severely damaged long before the presence of microorganisms could be detected with the unaided eye. The findings suggest that museum collections of mammals require storage environments with relative humidities below 50% to prevent regeneration of mold spores.

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THE INFLUENCE OF PREPARATION TECHNIQUES ON THE PRESERVATION OF MAMMALIAN SKULLS

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This study attempts to determine some of the causes of deterioration observed in mammalian skulls. Series of skulls from a species of a Neotropical fruit bat (Artibeus jamaicensis) were carefully monitored as they were processed by various methods currently used in mammal research collections. Initially, examination involved methods of processing osteological material removed from fresh and frozen specimens, as well as material associated with fluid preservations. There is a strong indication that skulls associated with fluid preservations are less likely to have structural damages than skulls prepared with standard drying procedures. The next procedures examined involved those associated with laboratory cleaning of skeletal materials. It was found that the standard use of water or alkaline solutions for cleaning caused a substantial increase in the amount of dental fracturing. This study demonstrates differences in levels of deterioration between standard preparation and processing procedures, thus indicating a need to reconsider the value of current methods for the long-term preservation of the specimens. Discussion is provided for alternative preparation procedures for mammalian skulls.

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A CASE STUDY OF THE BIRD CONSERVATION PROJECT AT THE DENVER MUSEUM OF NATURAL HISTORY

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Conservation of zoological specimens is a balancing act between providing a safe environment for museum staff and visitors, treating insect and rodent infestations with chemicals that may be toxic, and insuring that specimens are not adversely affected by the measures taken. The Zoology Department at the Denver Museum of Natural History recently suspended use of toxic chemicals for preventative fumigation of the research collections, and instituted a non-chemical monitoring program that allows for localized fumigation when problems arise. A bird conservation survey was implemented in cooperation with the Rocky Mountain Regional Conservation Center to document baseline information on the 125-year-old bird collection. It served to determine the overall physical condition of the collection, to search for evidence of dermestid beetle infestation, to clean specimens, and to target specimens in need of conservation treatment. Results showed that dermestid larval casings were present on 7.6% of the specimens, but only 1.3% showed slight insect damage. Even though the survey showed that the dermesterium was not part of the problem, it was redesigned for better containment of beetles and preparation methods were tightened to decrease the chance of dermestids being introduced into the collections. The museum also expanded its protection of exhibited zoological specimens by instituting an integrated pest management program in 88 dioramas using regular monitoring, low-toxicity insecticides, and insect traps.

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A TREATMENT FOR BALEEN ADAPTED TO BISON HORNSHEATHS

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Archaeological sites in northern Canada have yielded baleen artifacts and unaltered plates in various stages of deterioration. Treatments developed at the Canadian Conservation Institute were initially for wet baleen, but as testing proceeded, it was found that dessicated pieces could be rehydrated and treated. Since baleen, as a keratin, shares certain characteristics with horn it was hoped that certain bison hornsheaths might respond to a similar treatment. These hornsheaths, dating from about 20,000 to 30,000 years old, were washed out of frozen muck by placer miners in the Dawson area of the Yukon Territory and were left on the surface until collected by scientists from the National Museum of Natural Sciences, Ottawa. Their condition when excavated is not known but by the time they were collected, many were badly dessicated and had the appearance of "exploded cigars".

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CONTROLLING THE ENVIRONMENT: INTRODUCTION

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The conservation of natural history collections includes three major activities: preventive care, treatment, and research. Traditionally, preservation activities have emphasized treatment, including preparation techniques and chemical pest control. Systematic preventive care programs, however, have been shown to have a greater impact on the long-term stability of collections, and have become the primary conservation activity in many museums. These programs include not only policies and procedures for the handling and use of collections, but also careful control of the physical and chemical environment surrounding the object. Knowledge of the effect of climate, light, and various materials composing the specimen's microenvironment not only leads to a better understanding of long-term preservation requirements, but also provides information concerning the effect of past environments on the deterioration and alteration of material components. Such information may be critical for scientific research and sophisticated material analysis.

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THE MUSEUM CLIMATE

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Deterioration of materials loosely referred to as "due to" temperature or relative humidity can be classified by values of incorrect temperature or humidity. These incorrect values can then be conceived as agents of deterioration along with mechanical forces, thieves and vandals, fire, water, pests, contaminants, and radiation. Preventive conservation is the control of these nine agents. For temperature (T) incorrect values are: (1) large fluctuation in T that cause fracture or delamination of brittle inorganic materials; (2) average T sufficient to cause unacceptably rapid chemical change (e.g. skin in air, color photographs). For relative humidity (RH), incorrect values can be: (1) RH high enough for fungal attack; (2) RH fluctuations sufficient to cause fracture or delamination of constrained organic materials (e.g. cracks in wood, fracture of tightly mounted membranes); (3) RH above/below the threshold for hydration or deliquescence (e.g. minerals); (4) RH over 0% sufficient to cause unacceptably rapid chemical change (e.g. many dyes on cellulose light-fade faster as RH increases acid hydrolysis). Control of the agents of deterioration follow five stages: elimination of sources, detection, compartmentation, suppression, clean up. Preventive conservation emphasizes the early stages; disaster planning and remedial conservation deal with the latter.

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CONTROL OF THE DETERIORATING EFFECTS OF LIGHT.

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The emission characteristics of various light sources will be reviewed in relation to the potentially damaging effects both of ultraviolet and visible wavelengths. The concepts of net exposure and the reciprocity law will be noted and the inherent sensitivity of different materials towards photochemical damage. Also to be discussed are the effectiveness of ultraviolet filters and the heating effects of incandescent lamps.

21
CHOOSING MATERIALS FOR USE IN MUSEUM STORAGE AND DISPLAY

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The use of inert materials for storage and display is of critical importance to the long term survival of museum specimens. Reports in the literature and numerous examples from the author's experience demonstrate the corrosive and damaging effects of reactive or pollutant-emitting materials on nearby objects. Most of the examples are visually obvious. For example, the corrosion of metals, the formation of crystals or liquid droplets on smooth surfaces, and the uneven discoloration of surfaces are immediately evident. Effects such as embrittlement or loss of strength of natural history specimens caused by reactant materials and pollutant gases are often less noticable and less quantifiable, but certainly occur. There are two approaches to the choice of materials for storage and display. One can use only materials known to be safe, or empirically test those materials which are proposed for use. Lists of materials accepted as safe and of materials known to be unsafe are presented. Methods of testing materials for their suitability for use in the museum are reviewed.

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COLLECTION MANAGEMENT AT THE BUFFALO MUSEUM OF SCIENCE

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Collection management is governed by policies established by the Museum's Board of Managers. Day-to-day responsibility for the collections resides with the curators, research scientists whose training develops an understanding of the significance of the specimens in their care. Where possible, each division has a curatorial assistant working under the curator, with clerical and lab-oriented duties. In practice, however, much use is made of volunteer workers who receive training from the curators.

The registrar maintains traffic control of specimens moving into and out of the Museum, and stores records of these movements as well as documents bearing on the provenance of specimens and their significance.

There are plans to add a staff conservator, who will advise the curators on the specific environmental needs of specimens, and be involved in some restoration work. A safety officer will also be appointed to oversee use of chemicals in the labs, etc.

Due to manpower limitations, computerization of collections has been limited to specific cases, and will be expanded as priorities allow.

23
NATURAL HISTORY COLLECTION MANAGEMENT AT THE ROYAL ONTARIO MUSEUM

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Management of natural history collections at the Royal Ontario Museum is the direct responsibility of each of nine science departments. Each department controls its own acquisition, documentation, storage, loans, etc., within the limits of institutional policies and procedures. The Registration Department provides assistance with legislation regarding endangered species, customs regulations, and all relevant cultural and heritage acts. The Collection Management Department co-ordinates pest control, assessment of institutional collection storage needs and risk management requirements, and serves as the interface with the CHIN computerized cataloguing system. Rather than controlling collection management, these two departments serve as advisory and support resources to the individual collection holders to facilitate various collection management functions throughout the institution.

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INTERESTING AND EVOLVING SPECIES OF MUSEUM WORKERS: COLLECTIONS MANAGERS AND REGISTRARS

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An often asked question is "How does your computer system do collections management?" The strange thing about the question is that computers do not do collections management. Homo sapiens, more specifically museum staff, do collections management. How museum staff do collections management is an interesting research question with functional and sociological implications. What are collections management functions and who performs these funtions? While this area is now evidence for an increased degree of role specialization, collections management is changing to reflect new museological attitudes towards the nature and scope of the collections. New levels of management and increasingly complex expectations of staff expertise are evidenced by advertisements for museum positions. Computer literacy and knowledge of database design and use appear as basic requirements for anyone performing a collections management function. Is this knowledge required? What are some of our assumptions about collections management and the roles of curators, registrars, and collections managers and how are these roles changing in light of new technologies, the post-positive debate on the nature of knowledge, and increased role specialization?

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THE ARCHITECTURE OF COLLECTIONS RESPONSIBILITY

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The last few decades have been a time of breaking ground which has lead to a transition that is being established in a new pattern of responsibility in management of collections in Natural History Museums. There have been a few papers written, much debate and little agreement in the proper role of administration and assignments of responsibilities. The Registrars, Curators, Collections Managers and those allied with each are still groping with new technologies and each other to set standards. The role of each group and the whole within most Natural History Museums is still fluid. A new "middle management" has emerged in the collections environment though it is still not firmly rooted. Underlying the confusion of role assignments are a number of factors: several new technologies, the slant of science away from systematics and the appearance of a well-trained force of collection and Museum cognoscenti. There has been a corresponding increase in the sophistication of those the Museum serve. Role assignment is and will remain a function of well thought out objectives logically based on size and resources within any single Natural History Museum.

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TRAINING IN THE CARE OF NATURAL SCIENCE COLLECTIONS: BEYOND THE COLLECTIONS CARE PILOT TRAINING PROGRAM

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Two Collections Care Pilot Training Programs have been held at the Natural History Museum of Los Angeles County. The programs, offered in 1987 and 1988 and designed to instruct museum professionals in the care and preservation of natural science collections, were funded by a grant from the Bay Foundation and administered by the National Institute for the Conservation of Cultural Property in conjunction with the American Association of Museums and the American Association for State and Local History. A curriculum was developed which was unique in its natural science scope and its emphasis on collection maintenance and preservation.

Based on our experience in overseeing the two, somewhat different, programs, we offer a critical evaluation of the components of the curriculum and the training techniques employed. Refinements in and potential venues of future short-term training programs for collections care professionals in the natural sciences are suggested. In particular, large natural history museums, regional conservation centers, major conservation institutes, and museum organizations such as SPNHC and AAM are foreseen as playing important roles in the near future for such professional training. A longer term goal involves the development of university level curricula designed to train collections care and maintenance professionals and, ideally, conservators of natural science collections.

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ENDANGERED AND ORPHANED NATIONAL HISTORY COLLECTIONS IN THE UNITED STATES AND CANADA

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During 1987 a survey contacted over 700 natural history and anthropology collections in all states and provinces. Responses from 333 represent a range of collections from single discipline (e.g., malacology) to full museum (e.g., several departments with millions of specimens)and from a broad diversity of public and private institutions. Within this group, 30 percent acknowledged awareness of currently and potentially endangered collections, and well over half have taken into their collections materials which were endangered or orphaned. The cost of these transactions cannot be quantified. However, it can be analyzed on a purely financial and physical basis, in terms of resources lost or damaged, and in terms of either impairment or enhancement of the broad research and education endeavor in natural history.

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INFRARED SPECTROSCOPIC ANALYSIS OF DEGRADED AMBER

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In an earlier experiment samples of amber were exposed to high concentrations of common air pollutants and biocides to identify potential environmental hazards. These samples were subsequently analysed by transmission infrared spectroscopy in an attempt to discover mechanisms of degradation. Old oxidized surfaces showed the greatest change in response to the various treatments, both in their appearance and in their infrared spectra.

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BEYOND ASBESTOS REMOVAL: PROBLEMS DON'T END WHEN THE STUFF COMES DOWN

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Exposure of staff to asbestos is, without argument, a serious concern facing some of our institutions today, but once the decision is made to eliminate it from the work environment, other problems may crop up which, when placed in the context of the day-to-day functioning of an institution, may be worse than the presence of the material itself.

The asbestos removal procedure employed at the Bishop Museum is detailed and some problems which arose as a direct result of the process are discussed.

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NATURAL HISTORY COLLECTIONS: AN ESSENTIAL COMPONENT OF SCHOOL EDUCATION. THE STORY OF AN EXPERIENCE.

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In the province of Quebec, the study of plants is an important part of the curriculum. What better context for such a study than the natural environment provided by a botanical garden. But without proper guidance, classes of children simply meander through the greenhouses, not knowing how to relate to the mysterious world they have just entered. Both teachers and students end up with an incomplete learning experience.

"O Jardin" is a publication that attempts to give meaning to a visit at the Botanical garden. It offers both children and teachers a dynamic tool to explore the plant collections and provide a variety of activities for students from 6 to 12 years old.

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THE DEVELOPMENT OF FAUNAL SURVEYS AND NATIONAL NATURAL HISTORY COLLECTIONS IN DEVELOPING COUNTRIES -- ETHIOPIA AS A PARADIGM FOR AFRICA.

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Most countries of Africa are beginning national faunal surveys and developing national collections of natural history objects. Factors affecting surveys and development of national collections are shortages of properly trained manpower; financial handicaps and insufficient and inadequate facilities, equipment and supplies; logistical problems; political instability; historical lack of synoptic material and reference libraries; mistrust for expatriates; and lack of a proper natural science and conservation tradition and attitude in governmental officials and the public.

Vouchers of African mammals in world collections are estimated to number 800,000 specimens from a land mass comprising 20 percent of the world total area. Mammal collections in African countries are estimated to total 200,000 specimens or 3.5 percent of the 5,600,000 specimens in world museums. Museums in Zimbabwe and South Africa house 80 percent of the specimens of mammals in African museums.

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TYPE COLLECTION

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Types are precious unique specimens which are of great scientific importance. Museums are professionally and ethically obligated to care for type collections to ensure their maintenance, while also allowing scientifi access.

This paper reminds museums of their professional obligations when they undertake the guardianship of type specimens and outlines how professional requirements can be satisfied through type collection management.

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EFFECTS OF STANDARD MUSEUM PREPARATION METHODS ON MATERIALS OF NATURAL HISTORY SPECIMENS. PART II. WET PREPARATIONS - A REVIEW OF MATERIAL INTERACTION WITH ALDEHYDES, ALCOHOL AND PHENOXETOL

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Colloidal characteristics of proteins in aqueous solutions are the basis of the tanning or fixing process used in wet preparations of natural history specimens. Fixation is influenced by pH, electrolytes, concentration, etc. Storage solutions of alcohols or phenoxetol are basically used as biocides but do interact with proteins.

A review of the colloidal characteristics of protein in reference to use of aldehydes, alcohols and phenoxetol will be presented to illustrate logical use and material changes.

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CHARACTERISTICS OF A COLLECTION OF FLUID-PRESERVED MAMMALS AND IMPLICATIONS FOR COLLECTION MANAGEMENT

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A collection of fluid-preserved mammal specimens was recently curated at the Texas Cooperative Wildlife Collection, Texas A&M University, in order to update nomenclature, relieve crowded storage conditions, and physically reorganize the material. As part of this process, data were collected to determine the pH level and ethanol content of the fluid as well as other easily observed characteristics of each jar and its contents. Data were analysed for trends.

These data provide a profile for the collection at a point in time. They also document the result of a relatively typical pattern of care for fluid-preserved materials over a 50 year span. This paper will summarize the descriptive characteristics of the collection in view of how this type of information might affect the management process for a collection of fluid-preserved specimens. The implications concerning documentation needs and problems for these materials will also be discussed.

35

NO BONES ABOUT IT: AN ANALYSIS OF ENZYME PREPARATION METHODS

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Enzyme-based methods for preparing skeletons for dry storage have been described by Ossian (Copeia, 1970) and Mayden and Wiley (Copeia, 1984), among others. A large collection of lower vertebrates, prepared with an enzyme pre-soak compound, was donated to the Vertebrate Paleontology Laboratory, University of Texas, by Ossian. Recent studies indicate that the lower vertebrates in this collection are undergoing disintegration and breakage. While some of this damage may be due to storage conditions, most of it appears to be connected with aftereffects of the preparation method. Evidence for this includes the presence of an encrusted deposit on the most severely affected material. This deposited material can be seen under long-wave UV light in the inner cortical bone of affected specimens. Comparable deposits are not found on or in specimens prepared in other ways. Other problems include severe decalcification and consequent friability, loss of surface detail, and inclusion of extraneous material which contributes to breakage. An analysis of the problems and comparison of different methods suggest that any enzyme-based preparation methods for bones may lead to over-cleaning, decalcification, and eventual disintegration.

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THE EFFECTS OF ISOPROPYL AND ETHYL ALCOHOL PRESERVATIVE ON FISH

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Data from an unpublished 1963 study by Ya-Ching Lai of the University of Kansas concerning the effects of isopropanol and ethanol preservatives on proportional measurements of the Fathead Minnow, Pimephales promelas, are reviewed. Minnows were obtained at the same time and place by seine, and fixed in either 7.5%, 10%, or 15% formalin (unbuffered). After washing, the specimens were transferred to 40% isopropanol or to 65%, 70%, or 75% ethanol. Subsequently, some specimens were transferred (after 15 months) from 40% isopropanol to 70% ethanol, and vice versa.

Concentrations of 5-15% formalin were not found to significantly affect proportional measurements. The proportional measurements of fish kept in 40% isopropanol were significantly different from those of fish kept in 65-70% ethanol.

Transfer of specimens from 40% isopropanol to 70% ethanol caused no change in the proportional measurements, but the reciprocal transfer significantly changed proportional measurements.

These findings are compared to proportional measurements of the same specimens made 25 years later (in 1988).

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pH CHANGE IN A FORMALIN/BORAX FIXATIVE SOLUTION

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Many museums use formalin "neutralized" with borax as a non-acidic fixative for fishes and amphibians. The pH stability of "neutralized" formalin was investigated to see if borax stabilized pH as an alkaline solution to prevent decalcification of specimens. pH decreased over time. The ramifications for use of borax as a neutralizing agent for formalin fixing of vertebrates are discussed.

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THE COMPUTER FOR INSECT COLLECTIONS: AN ALTERNATIVE

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During the last years the Insect Collection of the Museum of Natural History of Mexico City-Instituto de Ecología has increased its stock up to 85,000 samples. The Biosystematics department of the Instituto de Ecología, in charge of the collection, has suggested its Director General to computerize all the information available in the collection to improve the organization and consultation of the same. The main objective of the collection is to support scientific research, providing easier localization of the material required. It is also desirable to have participation and active interaction with other departments of the Institute connected with Entomology. For this change we are considering all essential entomological references starting from the samples already available in the collection. Administrative formalities are also being considered to provide a qualified service. As far as we know no other collection in Mexico has been able to provide an efficient service and we believe that a computerized system can make this possible improving the present information systems.

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COMPUTERIZED DATA STORAGE AND RETRIEVAL FOR FOSSIL VERTEBRATES: SPECIMEN AND PREPARATION/CONSERVATION WORKSHEETS FOR CHIN.

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Standardized data collection is an essential component of a properly curated collection. We have devised two data entry sheets for fossil vertebrates in order to store and retrieve specimen and preparation/conservation information on CHIN (Canadian Heritage Information Network). The specimen worksheet is subdivided into seven sections: systematics, cataloguing, specimen nature, collection, source, locality and geology. The preparation worksheet is subdivided into three sections: specimen information, preparation/conservation and replicas (molding/casting). Each sheet is only one page long, a simple but important factor for convenience of handling. As well, worksheets provide CHIN mnemonics for ease of computer data entry.

We first enter all information from these worksheets into a microcomputer using DBase IIIplus; after editing, the data is uploaded to CHIN. Specimen cards and labels are also printed from this database.

This method takes advantage of the flexibility of the microcomputer when manipulating small batches of records as well as the power of CHIN when searching the whole database. Most information recorded is rigidly standardized, enabling rapid retrieval. The use of free-form remarks fields encourages the retention of unstandardizable information. This is crucial for the often unrecorded, yet important, preparation and conservation information.

40

DATABASE MANAGEMENT USING R:BASE SYSTEM V

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There are currently numerous database management programs on the market. A February 1987 issue of InfoWorld reviewed 45 such programs for MS-DOS computers. Versions of Ashton-Tate's Dbase and Microrim's R:base software have attracted high praise. In 1986, R:base System V was named the "Overall MS-DOS Software Product of the Year" while Dbase III Plus received the most votes for "Database/File Management Software" in the same InfoWorld reader's poll.

The Section of Mammals at The Carnegie Museum of Natural History is currently using R:Base System V to build a file containing known records of mammals from West Virginia. In addition, management of the loans from our regular research collection can now be handled entirely by this program. These two tasks will be used to demonstrate some of the features of the R:base System V package.

41

A NATURE OF SPECIMEN CODING SYSTEM FOR MAMMALS - MIXING TRADITION AND COMPUTERS

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The nature of a specimen is essential knowledge for determining whether or not a material is appropriate for a particular use. Although some codes used to describe a nature of specimen are traditional, handwritten records have relied historically upon the decision-making capabilities of the human brain. With the advent of collection automation, software capabilities of the computer need to be considered. Consistent and user friendly codes that permit a database to be searched efficiently and reliably must be developed.

I have devised a coding system that addresses human and computer restrictions while remaining flexible and expandible. The primary descriptor of the nature of specimen code indicates the part(s) of a specimen that have been prepared. It also denotes whether the specimen is dry or wet. The secondary descriptor is used in conjunction with the primary descriptor to indicate the preparation method(s) of the skin, skull, skeleton, and/or other parts of the anatomy. Although unique and consistent strings are the optimal goal from a computer compatibility perspective, some compromise is necessary because people are more comfortable with traditionally used codes.

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UNIVERSITY OF GEORGIA ZOOLOGICAL COLLECTIONS COMPUTER CATALOGING SYSTEM

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The computer system is designed to be used by researchers and museum staff. The museum personnel will be able to use the data base to perform curatorial tasks, while the 'search' programs incorporated in the system will allow scientists to retrieve information based on a variety of parameters. Since the system might be used by people unfamiliar with computers, the system has been designed to be 'user friendly'. It automatically runs, is driven by a set of menus that limits the users input to choices acceptable to the program, and performs file housekeeping automatically. The system uses the Ashton Tate dBase III+ data base program, and an IBM PC with 20K of hard disk memory. To maximize the program's relational data base search capabilities, and use minimum disk storage space, the collections data is divided up into three data base files: 1)collected specimen dbf; 2)taxonomic hierarchy dbf; and 3)collection location dbf. These three data base files are related through overlapping fields. The collected specimen and the taxonomic hierarchy data base files both contain an NODC code field, and the collected specimen and collection location data base files both contain a lot number field. The systems main program sets up the environment for each subprogram, controls their use, allows the user the option of moving easily between the various subprograms, and performs all housekeeping tasks on the three data bases and their accessory index and text files.

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PRESERVATION MICROFILMING OF ATLANTIC GEOSCIENCE CENTRE UNDERWAY GEOPHYSICAL RECORDS

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The Atlantic Geoscience Centre (AGC), Department of Energy, Mines and Resources at the Bedford Institute of Oceanography has investigated methods of releasing to the public sector its massive collective, more than 150,000 linear meters of geophysical records that have been collected since the Centre's inception in 1963. The investigations and testing conducted by AGC in collaboration with the Public Archives of Canada indicated that the most cost-effective technique was to distribute the data on continuous 35 mm microfilm.

Manas Media Ltd. of Ottawa together with Precision Microfilming Services of Halifax and Archimed Ltd. of Montreal was contracted to convert all of AGC's underway geophysical records with a Tameran TFC 6000 automated flow camera system. Microfilming commenced in March 1987 and more than 50 percent of the records have now been filmed as a top quality microfilm product. Dissemination of this valuable information resource commenced in February 1988 with the release of the first 30 AGC cruises as Geological Survey of Canada Open File Reports.

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ARCHIVAL STORAGE OF DISINTEGRATING LABELS FROM ALCOHOL PRESERVED SPECIMENS

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The disintegration of paper labels on alcohol preserved specimens is a common problem in collections. At Bishop Museum we have devised a method of removing, replacing, repairing and storing these labels before they are lost. A 35mm film negative storage system with mylar and acid-free paper components has been adapted to this purpose. This filing system provides an archival quality storage environment that prolongs the life of the labels and allows for convenient retrieval. Removal and replacement procedures ensure that both replacement labels and catalog cards clearly advise that the original label was removed, where it is to be found, when it was removed and by whom.

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RADIOACTIVE DINOSAURS: THE RADON CONTENT OF JURASSIC MORRISON FORMATION VERTEBRATES

Mary Carman, Field Museum of Natural History, Chicago, IL 60605-2496

A unique feature of dinosaur bones found in the Upper Jurassic Morrison Formation of the western United States is their radon content. Radon is a radioactive, odorless, tasteless, and invisible gas, formed by the decay of uranium. Long-term exposure to radon causes an increased risk of lung cancer. Serious consideration must be given to the collecting, handling, and museum storage of these radioactive specimens.

Uranium ore deposits associated with the famous fossil bearing Morrison strata are the source of the radon. Chemically drawn by the calcium component of vertebrate bones, radon, in the form of uranitite and carnotite, is concentrated in the nearby vertebrate Morrison fossils. Collections of these popular specimens have been housed in museums for over 100 years. Visitors and scientists can examine Apatosaurus, Brachiosaurus, Stegosaurus, and other dinosaurs. Radioactive fossils are not limited to the Morrison Formation. South African dinosaur bones were found to be radioactively "hot" by the staff at the American Museum of Natural History.

Radon, which collects on airborne microscopic dust, is inhaled and deposited in the lungs. Good ventilation of areas where radon is present is recommended to prevent accumulation of hazardous concentrations. Fossils containing radon may be unknowingly stored in an unsuitable manner such as unventilated storage rooms or enclosed cabinets. The U. S. Environmental Protection Agency recommends radon checks and radon gas monitoring systems to help reduce the risk of exposure. Charcoal and alpha-track detectors are commercially available to measure radon.

Examinations should be made by all museum workers to determine if there is a problem in our respective institutions, and steps should be taken to insure our safety as well as that of the public.

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AN INDELIBLE PRINTING SYSTEM FOR RECORDING PERMANENT DATA IN NATURAL HISTORY COLLECTIONS

Dr. Fernando Palacios and
Julio Gisbert, Museo Nacional de Ciencias Naturales, J. Gutierrez Abascal, nº 2, 28006 Madrid (España)

In an attempt to solve some problems of data recording systems (file cards, labels and catalogs) in Natural History collections, such as the short life of standard typewriter or printer ribbon inks, the slowness of hand entries with indelible ink, the errors in interpreting handwritten data, or the poor legibility in fluids of labels impressed without ink on synthetic paper, we have successfully experimented with an indelible printing system. We impregnate standard nylon ribbons with Rotring® India ink after eliminating the original ink with solvent. These ribbons can then be used in typewriters or matrix printers to write on paper of plant or synthetic origin. Ribbons are conserved by hermetically wrappring in plastic and stored at 4°C. This system is practical and produces high-quality, rapid work, with considerable time-savings.

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EXPERIENCES IN LABELLING TYPE-SPECIMENS

Julio Gisbert and
Rosa García-Perea, Museo Nacional de CienciasNaturales, J. Gutierrez Abascal, 2, 28006 Madrid (España)

Going on the experiences on labelling (papers and inks) carried out by WILLIAMS and HAWKS (1986), WALKER (1986), GISBERT et al. (1987) and GISBERT et al. (in press), we have used labels made with TYVEK™ paper impregnated with India ink Rotring red or blue. Once dry, the ink has remained stable on the paper during 7 months, and we have observed no degradation in the labels under natural light, nor immersing them in 70° ethanol. The inscription can be made with India ink Rotring black by common procedures, or with typewriter or printer, either with or without ribbon (engraving).

According to results obtained, this method can be used to labelling holotypes and paratypes preserved both in ethanol or dry.

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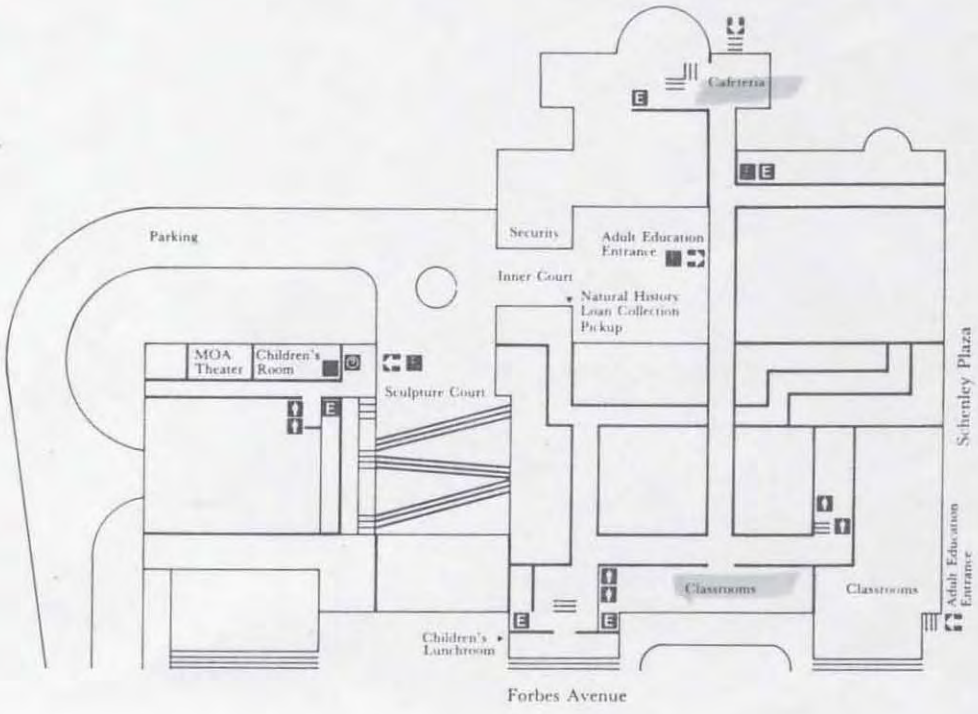

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