

SOCIETY FOR THE PRESERVATION OF NATURAL HISTORY COLLECTIONS

FOURTH ANNUAL MEETING, JULY 23-28, 1989

PROGRAMME AND ABSTRACTS



TYRRELL MUSEUM OF PALAEOLOGY
DRUMHELLER
AND

 Biological
Sciences

BIOLOGICAL SCIENCES DEPARTMENT
UNIVERSITY OF CALGARY



Alberta
CULTURE AND MULTICULTURALISM

ALBERTA, CANADA

LOCAL COMMITTEE

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Technical Programme

Jane Danis (Tyrrell Museum)
Andrew Neuman (Tyrrell Museum)
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Tours

Anna Curtis (Tyrrell Museum)
Susan deCaen (Tyrrell Museum)
Jackie Wilke (Tyrrell Museum)
Laure Yakimchuk (Tyrrell Museum)
Anthony Russell (University of Calgary)
Ann Konecny (University of Calgary)
Warren Fitch (University of Calgary)
Maggie Ballantyne (Provincial Museum of Alberta)

Audio-Visual

Tracy Young (Tyrrell Museum)
Warren Fitch (University of Calgary)

Registration

Ann Saito (Tyrrell Museum)
Jackie Wilke (Tyrrell Museum)
Pat Lee (Tyrrell Museum)

Transportation

Maureen Johnston (Tyrrell Museum)
Anthony Russell (University of Calgary)
Kris Thompson (University of Calgary)

Social Events

Kelly Eskeland (Tyrrell Museum)
Jo-Ann Schwartz (Friends of the Tyrrell Museum Foundation)
Anthony Russell (University of Calgary)
Herbert Rosenberg (University of Calgary)
Kris Thompson (University of Calgary)

Text Preparation

Pat Bobra (Tyrrell Museum)
Linda Culshaw (Tyrrell Museum)

PROGRAMME

SUNDAY, 23 JULY, 1989

- 8:00 - 17:30 TOUR OF DINOSAUR PROVINCIAL PARK - Host: John Walper
(Recreation and Parks)
- 9:00 - 12:00 BUSINESS MEETING OF COUNCIL AND COMMITTEE
REPRESENTATIVES (Boardroom - Tyrrell Museum)
- 13:00 - 17:00 BUSINESS MEETING OF COUNCIL (Boardroom - Tyrrell Museum)
- 13:00 - 17:00 POSTER SETUP (Collections - Tyrrell Museum)
- 13:00 - 21:00 REGISTRATION OF DELEGATES AND ACCOMPANYING
MEMBERS (Drumheller Inn)
- 19:00 - 21:00 ICEBREAKER (Drumheller Inn)

MONDAY, 24 JULY, 1989

- 8:00 - 12:00 POSTER SETUP (Collections - Tyrrell Museum)
- REGISTRATION (Lobby - Tyrrell Museum)
- 19:00 - 21:00 TOUR OF THE COLLECTIONS AND FACILITIES OF THE
TYRRELL MUSEUM OF PALAEOLOGY - Hosts: Jane Danis
and Andrew Neuman (Collections, Tyrrell Museum)
- GEOLOGICAL HIKING TOUR OF MIDLAND PROVINCIAL
PARK - Host: Fred Hammer (Recreation and Parks)
- HISTORICAL BUS TOUR OF THE DRUMHELLER VALLEY -
Host: Mike Rosgen (Thru Time Tours)

MONDAY, 24 JULY, 1989

(9:00 - 12:10)

AUDITORIUM - TYRRELL MUSEUM

SESSION 1 - GEOLOGY

Moderators: Emlyn Koster (Director, Tyrrell Museum of Palaeontology), and Gerald Fitzgerald (National Museum of Natural Sciences, Ottawa, Ontario)

9:00 Welcoming Addresses to delegates by senior officials of the Department of Culture and Multiculturalism, Government of Alberta.

9:20 Geological Collections: the Broad Spectrum by George Robinson (Keynote Speaker, National Museum of Natural Sciences, Ottawa, Ontario)

9:50 Library from the Deep: How Ocean Sediments are Utilized to Reconstruct the Past by Iris Hardy (Atlantic Geoscience Centre, Geological Survey of Canada, Dartmouth, Nova Scotia)

10:10 BREAK

10:30 Beginning a Meteorite Preservation Program by Jack Murphy (Denver Museum of Natural History, Denver, Colorado)

10:50 Problems in Conservation of a Dinosaur Track Exhibit by Bud Barnett and Sally Shelton (Texas Memorial Museum, University of Texas, Austin, Texas)

11:10 Radon in Earth Science Collections by Alice Blount and Carol Bossert (The Newark Museum, Newark, New Jersey)

11:30 Consolidation of Semi-Fossil Postglacial Walrus Remains by Colleen Day and Randall Miller (New Brunswick Museum, St. John, New Brunswick)

11:50 The Russell Effect: A Photographic Technique for Measuring Low Levels of Oxidation in Materials by Carolyn Leckie and Stephen Williams (Carnegie Museum of Natural History, Pittsburgh, Pennsylvania)

MONDAY, JULY 24, 1989

(13:30 - 16:00)

AUDITORIUM - TYRRELL MUSEUM

SESSION 2 - CONSERVATION

- Moderators: Carol Bossert (The Newark Museum, Newark, New Jersey), Kimble Garrett (Natural History Museum of LA County, Los Angeles, California)
- 13:30 Natural History Collections Conservation, the People, the History and New Directions by Mary-Lou Florian (Keynote Speaker, Royal British Columbia Museum, Victoria, British Columbia)
- 14:00 A Conservation Survey of the Mammalogy Collection at The Academy of Natural Sciences of Philadelphia: Results and Long-Range Planning by Ted Daeschler (Academy of Natural Sciences, Philadelphia, Pennsylvania)
- 14:20 From Rags to Riches... The Conservation of a Museum Fungal Collection by Charles Messenger (University of Nebraska State Museum, Lincoln, Nebraska)
- 14:40 A Glass Menagerie: A Brief Look at a Fluid Preserved Collection with Notes on Surveying Same by Arnold Suzumoto (Bishop Museum, Honolulu, Hawaii)
- 15:00 BREAK
- 15:20 Mercury in Bioscience Collections by David von Endt (Conservation Analytical Lab, Smithsonian Institution, Washington, D.C.) and Catharine Hawks (The Carnegie Museum of Natural History, Pittsburgh, Pennsylvania)
- 15:40 Modifications to a Mobile Storage System in a Natural History Museum by Gary Selinger (University of Alaska Museum, Fairbanks, Alaska)

MONDAY, JULY 24, 1989

(16:00 - 17:30)

COLLECTIONS - TYRRELL MUSEUM

SESSION 3 - POSTERS

16:00

Dermestides - A Trail of Consumption? by Sheila Byers (Royal Ontario Museum, Toronto, Ontario)

Recommendations Concerning Shipments of Vertebrate Materials by J. Gisbert and R. Garcia-Perea (Museo Nacional de Ciencias Naturales, Madrid, Spain)

Method for the Preparation of Study Skins of Medium-Size Mammals by J. Gisbert, F. Palacios, and S. Fernandez (Museo Nacional de Ciencias Naturales, Madrid, Spain)

A Method of Conserving Mammal Skins in the Field by J. Gisbert, F. Palacios, S. Fernandez, and R. Garcia-Perea (Museo Nacional de Ciencias Naturales, Madrid, Spain)

Spring Training at CAL by Julia Golden (University of Iowa, Iowa City, Iowa)

Encapsulation of Maps in Polyester Film by Judith Price (National Museum of Natural Sciences, Ottawa, Ontario)

Freeze-drying and Restoration of Water Damaged Paper Products by C. Romero-Sierra, G. Wayne Lyons (Queen's University, Kingston, Ontario)

Status of the Amphibian Types Described by M. Jimenez de la Espada in the Museo Nacional de Ciencias Naturales of Madrid by A. Salvador and J. Gisbert (Museo Nacional de Ciencias Naturales, Madrid, Spain)

Curating a Herbarium and Culture Collection of Microfungi, Value of an Integrated System by Lynne Sigler and Arlene Flis (University of Alberta Microfungus Collection and Devonian Botanic Garden, Edmonton, Alberta)

Techniques for Drying Large Mammal Skeletal Material by Elizabeth Taylor, Grant Hughes (Royal British Columbia Museum, Victoria, British Columbia), and Laura Friis (Ministry of Environment, Victoria, British Columbia)

Skulls of Peromyscus Holotypes: A Case Study of Specimen Deterioration by Stephen Williams and Catharine Hawks (The Carnegie Museum of Natural History, Pittsburgh, Pennsylvania)

TUESDAY, 25 JULY, 1989

(9:00 - 12:00)

AUDITORIUM - TYRRELL MUSEUM

SESSION 4 - PANEL DISCUSSION

Topic: PUBLIC VS. RESEARCH ACCESS TO NATURAL HISTORY
COLLECTIONS

Chairman: Charles G. Gruchy (Canadian Conservation Institute, Ottawa, Ontario)

Panel: Richard C. Fox (Laboratory of Vertebrate Paleontology, University of
Alberta, Edmonton, Alberta)
Bruce G. Naylor (Research and Field Operations, Tyrrell Museum of
Palaeontology, Drumheller, Alberta)
Carolyn L. Rose (Anthropology Conservation Lab, National Museum
of Natural History, Washington, D.C.)
Ridgeley Williams (Marketing and Communication, National Museum
of Natural Sciences, Ottawa, Ontario)

13:00 - 15:00 ANNUAL GENERAL MEETING (Auditorium - Tyrrell Museum)

15:30 TRANSFER TO CALGARY

17:00 Arrive Kananaskis Hall, The University of Calgary

19:00 Cocktails - Blue Room, Dining Centre, The University of Calgary

19:30 SOIREE (Blue Room) Sponsor - Spacesaver Corporation, Mississauga,
Ontario

WEDNESDAY, 26 JULY, 1989

(9:00 - 12:10)

Rooms 276, 277 MacEwan Student Centre

SESSION 5 - BIOLOGY

- Moderators: Anthony Russell (The University of Calgary, Calgary, Alberta) and Grant Hughes (Royal British Columbia Museum, Victoria, British Columbia)
- 9:00 Welcome from the Faculty of Science, by John Kendall (Dean, Faculty of Science, The University of Calgary, Calgary, Alberta)
- 9:20 The Management of Living Collections, with Particular Interest to Rare and Endangered Species by Peter Karsten (Keynote Speaker, Calgary Zoological Society, Calgary, Alberta)
- 9:50 The Mountain Gorillas of Africa: An Examination of One of the World's Most Successful Endangered Species Projects by Brian Keating (Calgary Zoological Society, Calgary, Alberta)
- 10:10 BREAK
- 10:30 Assessment of Plague as a Biohazard in Museum Collections by Grant Hughes (Royal British Columbia Museum, Victoria, British Columbia)
- 10:50 Freeze Drying Biological Material for Teaching and Reference Collections by Ronald Cole (Museum of Wildlife and Fisheries Biology, University of California, Davis, California)
- 11:10 Effect of Buffering Salts on the Penetration Rate of Formalin: A Morphometric Study by Wayne Lyons (Queen's University, Kingston, Ontario)
- 11:30 Trivial Pursuit or Essential for Survival? Biological Recording in Natural History Museums by Ingrid Birker (Redpath Museum, McGill University, Montreal, Quebec)
- 11:50 High Density Mobile Storage Systems - Storage Beyond the '90's by Gene St. Aubin (Spacesaver Corporation, Mississauga, Ontario)

WEDNESDAY, 26 JULY, 1989

(13:30 - 17:00)

Rooms 276, 277 MacEwan Student Centre

SESSION 6 - RESOURCE MANAGEMENT AND GENERAL SESSION

Moderators: Herbert Rosenberg (The University of Calgary, Calgary, Alberta), and John Simmons (Museum of Natural History, University of Kansas, Lawrence, Kansas)

13:30 C.I.T.E.S. Convention and How it Affects Curation and International Transport of Museum Specimens by John Heppes (Keynote Speaker, Canadian Wildlife Service, Ottawa, Ontario)

14:00 Genetically Engineered Life Forms and the Role of Culture Collections by Kenneth Sanderson (Keynote Speaker, Salmonella Genetic Stock Centre, The University of Calgary, Calgary, Alberta)

14:30 The Preservation of Alberta's Palaeontological Resources - Amateurs, Dealers and Scientists by Anna Curtis (Keynote Speaker, Tyrrell Museum of Palaeontology, Drumheller, Alberta)

15:00 BREAK

15:20 Selection Pressures on Natural History Collections in the U.K. - Adaption or Extinction? by Philip Doughty (Ulster Museum, Belfast, Northern Ireland)

15:40 Volunteers in Scientific Areas by Fahmida Rafi (National Museum of Natural Sciences, Ottawa, Ontario)

16:00 Volunteer Orientation to Natural History Museums and Their Collections by Elizabeth Webb (Denver Museum of Natural History, Denver, Colorado) Carl Patterson (Rocky Mountain Regional Conservation Center, Denver, Colorado) and Sarah Christian (Denver Museum of Natural History, Denver, Colorado)

16:20 Display Lighting: A Case Study by Karen Messenger (University of Nebraska, Lincoln, Nebraska)

16:40 Natural History Collections at the Provincial Museum of Alberta by Margaret Ballantyne (Provincial Museum of Alberta, Edmonton, Alberta)

18:30 - 22:00 CALGARY ZOO, FACILITIES TOUR AND BARBECUE

THURSDAY, 27 JULY, 1989

Science A - University of Calgary

SESSION 7 - WORKSHOPS

Workshop 1 Room Sci A 137

10:00 - 12:00 Computers: Collections Management and Beyond by Andrew Neuman (Tyrrell Museum of Palaeontology, Drumheller, Alberta) and Ann Konecny (The University of Calgary, Calgary, Alberta)

Using Laser Printers to Produce Specimen Labels: The Results of a Survey and Some Preliminary Tests by Peter Frank (National Museum of Natural Sciences, Ottawa, Ontario)

How Reliable is your Long-Term Storage Method for Computerized Data? (Poster) by Suzanne McLaren (The Carnegie Museum of Natural History, Pittsburgh, Pennsylvania)

Workshop 2 Room Sci A 241

10:00 - 12:00 Stable Polymers for Storage, Display and Packing by Scott Williams (Canadian Conservation Institute, Ottawa, Ontario)

Workshop 3 Room Sci A 143

10:00 - 12:00 Production of Anatomical Teaching and Display Specimens: A Workshop by Anthony Russell (The University of Calgary, Calgary, Alberta)

Workshop 4 Sci A 137

13:00 - 15:00 Preservation of Natural History Specimens on Exhibit by Jean DeMouthe, Charles Cecil, and Stephen Bailey (California Academy of Sciences, San Francisco, California)

Workshop 5 Room Sci A 143

13:00 - 15:00 How to Pack Unique and Unusual Natural History Specimens by Jerry Svencicki (Canadian Parks Service, Calgary, Alberta)

Workshop 6 Room Sci A 241

13:00 - 15:00 The Extraction and Preservation of Silicified Plant Remains from Ironstone Beds - A New Procedure by Kevin Aulenback (Tyrrell Museum of Palaeontology, Drumheller, Alberta)

THURSDAY, 27 JULY, 1989

- 8:30 - 18:00 TOUR OF KANANASKIS ENVIRONMENTAL CENTRE - Host: Mike Mappin (Kananaskis Environmental Research Centre, Kananaskis, Alberta)
- TOUR OF HEAD-SMASHED-IN BUFFALO JUMP - Host: Anna Curtis (Resource Management, Tyrrell Museum of Palaeontology, Drumheller, Alberta)
- 9:00 - 10:00 TOUR OF UNIVERSITY OF CALGARY COLLECTIONS FACILITY - Host: Warren Fitch (The University of Calgary, Calgary, Alberta)
- 13:00 - 14:00 TOUR OF UNIVERSITY OF CALGARY COLLECTIONS FACILITY - Host: Warren Fitch (The University of Calgary, Calgary, Alberta)
- 15:00 - 16:00 COMMITTEE MEETINGS (Sci A 137, 143, 241)
- 15:00 - 16:00 TOUR OF UNIVERSITY OF CALGARY COLLECTIONS FACILITY - Hosts: Ann Konecny and Kris Thompson (The University of Calgary, Calgary, Alberta)
- 16:00 - 18:00 FINAL COUNCIL MEETING (Biosciences 312, The University of Calgary)
- 16:00 - 17:00 TOUR OF UNIVERSITY OF CALGARY COLLECTIONS FACILITY - Hosts: Ann Konecny and Kris Thompson (The University of Calgary, Calgary, Alberta)
- 19:00 - 21:00 WIND DOWN (BioSciences 211, The University of Calgary)

FRIDAY, 28 JULY, 1989

- TOUR OF PROVINCIAL MUSEUM OF ALBERTA - Host: Maggie

FRIDAY, 28 JULY, 1989

(9:00 - 17:00)

Rooms 276, 277 MacEwan Student Centre

SESSION 8 - CONSERVATION SYMPOSIUM - STORAGE DESIGN AND MATERIALS FOR NATURAL HISTORY

- Moderator: Sally Shelton (Texas Memorial Museum, University of Texas, Austin, Texas)
- 9:00 A Preventive Conservation Approach to Storage in Natural History Collections by Carolyn Rose (National Museum of Natural History, Smithsonian Institution, Washington, D.C.) and Catharine Hawks (The Carnegie Museum of Natural History, Pittsburgh, Pennsylvania)
- 9:15 Materials for Storage Cases by David von Endt and David Erhardt, (Smithsonian Institution, Washington, D.C.)
- 9:30 The Selection of Cellulosic Materials for the Storage of Natural History Specimens by Helen Burgess (Canadian Conservation Institute, Ottawa, Ontario)
- 10:00 Plastics in Conservation Storage, Display and Packing by Scott Williams (Canadian Conservation Institute, Ottawa, Ontario)
- 10:20 Break
- 10:30 Case Studies on Specialized Storage Systems - Fluids by John Simmons (Museum of Natural History, University of Kansas, Lawrence, Kansas)
- 10:45 Storage Concerns for Ancillary Preparations by Paisley Cato (Department of Wildlife and Fisheries Science, Texas A & M University, College Station, Texas)
- 11:00 Design and Building of the Tyrrell Museum Storage Area: A Case Study by Jane Danis (Tyrrell Museum of Palaeontology, Drumheller, Alberta)
- 11:15 Bird and Mammal Study Skins and Mounts: Protection and Support by Tamsen Fuller (Lansdowne, Pennsylvania)

FRIDAY, 28 JULY, 1989

Rooms 276, 277 MacEwan Student Centre

- 11:30 An Investigation into the Permanence of Storage Materials used by the Royal B.C. Museum Herbarium by Betty Walsh (British Columbia Archives and Records Service, Victoria, British Columbia)
- 11:45 Care and Storage of Archival Materials by Ann Gardner (Glenbow Museum, Calgary, Alberta)
- 12:00 Lunch
- Moderators: Carolyn Rose (National Museum of Natural History, Smithsonian Institution, Washington, D.C.) and Catharine Hawks (The Carnegie Museum of Natural History, Pittsburgh, Pennsylvania)
- 1:30 Modification of Storage Design to Mitigate Insect Problems by Stephen Williams and Suzanne McLaren (The Carnegie Museum of Natural History, Pittsburgh, Pennsylvania)
- 1:45 Risk Management Strategies Applied to the Development of Pragmatic Solutions to Collections Storage Problems by Robert Waller (National Museum of Natural Sciences, Ottawa, Ontario) and Sally Shelton (Texas Memorial University, Austin, Texas)
- 2:00 Pelt Storage Considerations: Materials and Methods by Linda Barkley and Jesus Maldonado (The Natural History Museum of Los Angeles County, Los Angeles, California)
- 2:15 Mitigating Problems in the Storage of Paleontological Collections by Gerald Fitzgerald (National Museum of Natural Sciences, Ottawa, Ontario)
- 2:45 Break
- 3:00 Panel Discussion and Wrap-up
- Exhibits of Materials by Carla Kishinami (Bishop Museum, Honolulu, Hawaii)

SATURDAY, 29 JULY, 1989

- 8:00 - 18:00 TOUR OF PROVINCIAL MUSEUM OF ALBERTA - Host: Maggie Ballantyne (Collections, Provincial Museum of Alberta, Edmonton, Alberta)

ABSTRACTS

1

THE EXTRACTION AND PRESERVATION OF SILICIFIED PLANT REMAINS FROM IRONSTONE BEDS - A NEW PROCEDURE

Kevin R. Aulenback, Tyrrell Museum of Palaeontology, Box 7500, Drumheller, Alberta, Canada T0J 0Y0

Silicified plant remains have been collected throughout dinosaur-bearing strata for years. These paleo-botanical specimens consist mainly of more resistant elements such as seeds and cones, that, for the most part, are not in situ but differentially weathered out of outcrop. This makes identification difficult and ecological studies virtually impossible.

Through a new technique recently pioneered, acids and heat have been used to extract in-situ specimens. Results have been quite rewarding. The recovery has yielded both known and unknown forms. These consist of three-dimensional leaves and seeds showing exquisitely preserved microscopic detail.

This new technique yields specimens that can be studied in greater detail and related more easily to recent plants giving a greater understanding of relationships and ecology than the previous materials at hand.

2

NATURAL HISTORY COLLECTIONS AT THE PROVINCIAL MUSEUM OF ALBERTA

Margaret R. Ballantyne, Provincial Museum of Alberta, Edmonton, Alberta, Canada T5N 0M6

The Provincial Museum of Alberta opened its doors to the public in December 1967. The PMA today houses some 314,500 Human History artifacts and 263,100 Natural History specimens. The Natural History collections are divided among seven programs (collection sizes in parentheses): Botany (25,850), Biogeography (2,150), Geology (16,000), Invertebrate Zoology (167,000), Mammalogy (9,500), Ornithology (25,600), and Quaternary Paleontology (15,000). The Botany collection is comprised of vascular plants, mainly from Alberta localities. Biogeography, a new program, maintains the non-vascular plant collection. Geology's holdings include Albertan rock and stratigraphic material and minerals from around the world. Invertebrate Zoology's collections contain specimens from all Zoogeographic regions and include fine samplings of Lepidoptera, Coleoptera and marine shells. The curator's research is centred on Aculeate wasps. The Mammalogy collections concentrate on Alberta material and include all but five of the 91 mammal species known to occur in Alberta. Ornithology's collections are worldwide in scope and include the second largest holdings of eggs and avian skeletons in Canada. Quaternary Paleontology holds two major collections of Albertan cave material.

3

PELT STORAGE CONSIDERATIONS: MATERIALS AND METHODS

Linda J. Barkley and Jesus E. Maldonado, Section of Mammalogy, The Natural History Museum of Los Angeles County, Los Angeles, California, USA 90007

Our project discusses the unique concerns of storage and preservation of tanned skins, which are

an integral part of most mammal research collections. Proper maintenance of these specimens must address past and present storage conditions along with initial preparation techniques and subsequent treatments. Not only are most tanned skins large, posing problems for storage and handling, but many of them have undergone radical chemical treatments in the tanning process which may affect the longevity of the specimen. Environmental concerns such as light, temperature, humidity, chemicals and storage materials are evaluated. Based on our investigation of the storage environment of the LACMNH pelt collection, we suggest practical steps for creating an optimal environment to maintain the integrity of pelts as scientific research specimens.

4

PROBLEMS IN CONSERVATION OF A DINOSAUR TRACK EXHIBIT

Bud Barnett and Sally Shelton, Texas Memorial Museum, University of Texas, Austin, Texas, USA 78705

The Texas Memorial Museum's dinosaur track exhibit is notable for its intermingled carnosaur and sauropod footprints. The small building which encloses the trackway has deteriorated over the years, and nearby construction of a parking garage has compounded drainage problems, which have had a deleterious effect on the dolomitic limestone matrix which comprises the trackway. Over the past few years museum employees have noticed localised exfoliation of the limestone surface with growth of small crystals on the exfoliated surfaces. Damage seems to be due to water infiltration of the foundation of the building, with subsequent rising damp saturating the limestone. Temperature and humidity fluctuations in the structure have caused expansion/contraction cycles, resulting in surface damage. This problem has not been seen in the parent trackway (*in situ* at Glen Rose, Texas) or in the sister section on display at the AMNH.

5

TRIVIAL PURSUIT OR ESSENTIAL FOR SURVIVAL? BIOLOGICAL RECORDING IN NATURAL HISTORY MUSEUMS

Ingrid Birker, Redpath Museum, McGill University, 859 Sherbrooke St. West, Montreal, Quebec, Canada H2W 1S9

The curation of *biological records* is now a significant part of the work of the museum biologist in Britain. Biological records are observations of the natural world preserved permanently on paper, film or other media. Each uniquely refers to a species or habitat recorded in one place at one time, usually by one person. Over time, an accumulated databank of biological records provides information about plant and animal distribution, variety and abundance.

Over 100 museums in Britain curate biological records and use them daily as an essential information resource. For example, at the Leicestershire Biological Records Centre, the databank is used daily to tackle over 900 enquiries and land-use consultations per year. In contrast, the natural history divisions of many Canadian museums collect local faunal and floral records haphazardly and have very little strategic input into environmental planning.

Canadian natural history museums, as preservers of natural 'heritage', must respond to the needs of environmental protection legislation and organize their activities, records and skills to become an essential force in the conservation of wildlife and resources.

RADON IN EARTH SCIENCE COLLECTIONS

Alice M. Blount and Carol J. Bossert, The Newark Museum, P.O. Box 540, Newark, New Jersey, USA 07101

Radon, a naturally-occurring radioactive gas has always been present and, in recent years, has received great attention as a potential health hazard. This dangerous material can build up to significantly high levels in tightly-sealed environments such as energy-efficient homes. Custodians of Earth Science Collections should be aware of this hazard when rock and minerals are stored in tightly-sealed cabinets. We recently tested for radon in our Lane storage cabinets that have housed the mineral collection for three years with an alpha track detector, similar to those used for home detections. The results showed a value of greater than 175,000pCi/1*days (picoCuries per litre per days). The environment outside the storage cabinet was found to be only 2.2 pCi/1, a value far below identified health risks. Furthermore, a separate test of the room environment over a two day period with the cabinet doors open gave a value of 2.3 pCi/1 suggesting that the radon can quickly dissipate to safe levels. Tests are currently underway to identify any daughter products, such as Pb^{210} , within the case since radon decays to chemically active daughter products that attach themselves to dust particles.

THE SELECTION OF CELLULOSIC MATERIALS FOR THE STORAGE OF NATURAL HISTORY SPECIMENS

Helen D. Burgess, Conservation Processes Research, Canadian Conservation Institute. Department of Communications, 1030 Innes Road, Ottawa, Ontario, Canada K1A 0C8

This lecture describes some of the important chemical and physical properties of cellulosic materials used in commercial products such as papers, boards, tissues, etc. The mechanisms for the deterioration of the major components of these materials are explained, along with a discussion of possible effects on natural history specimens. The relative permanence of the various types of products are explored with special reference to their suitability for use in the storage of artifacts. Recommendations are given for the testing of commercial products; the safe pH ranges for materials in contact with specimens of varying sensitivity to alkali and acid; as well as strategies for the purchase of suitable storage materials.

DERMESTIDS - A TRAIL OF CONSUMPTION?

Sheila C. Byers, Department of Invertebrate Zoology, Royal Ontario Museum, 100 Queen's Park, Toronto, Ontario, Canada M5S 2C6

During the planning and early development of a permanent gallery, the Department of Invertebrate Zoology at the ROM considered building open dioramas with invertebrates from rocky shores and salt marshes. Conservation concerns led to preliminary experimentation on the destructive potential of dermestid beetles in the dioramas. Invertebrate specimens (138) were introduced into a "Dermestid Farm" to determine 1) their susceptibility to dermestid attack and 2) whether they were a

preferred prey, compared to mammal and reptile carcasses. All specimens were dry but included chemically preserved (10% formalin), freeze-dried, and unpreserved material. Dermestid larvae attacked 10% of the specimens tested, including a sponge, an anemone, a sea star, sea urchins, barnacles and insects, but only after a period of 10-12 months. Coincidentally a substantial and deliberate increase in dermestid densities occurred at about 10 months just prior to observations of larval destruction. Insects were completely consumed by dermestid larvae. The sea star was also badly damaged, including the presence of drill holes. Preliminary results suggest that invertebrates which had not been treated with formalin were the most readily consumed; however, those preserved with formalin were not avoided. Invertebrates generally were not preferred prey items, but became alternate food sources following an increase in the density of dermestids within the Farm.

9

STORAGE CONCERNS FOR ANCILLARY PREPARATIONS

Paisley S. Cato, Department of Wildlife and Fisheries Science, Texas A & M University, College Station, Texas, USA 77843

The term, ancillary preparation, generally refers to all preparations other than the traditional ones. For vertebrate collections this includes all preparations other than study skins, skeletons and fluid-preserved whole specimens. With the increased emphasis on molecular studies in systematics as well as the demand for maximizing the data obtained from each specimen, both the quantity and importance of ancillary preparations have grown dramatically. Many of the preparations require specialized storage units (ultra-cold freezers, liquid nitrogen tanks, etc.) and special handling for shipping. Many preparations are used up during scientific analysis; others are created during the analysis process. The rapid growth and the sensitive nature of the materials have demonstrated the need for effective management policies and procedures to ensure the best care for the materials. The Mammal Division of the Texas Cooperative Wildlife Collection has recently been involved in a project to integrate some of the ancillary preparations into the division. Of central concern have been the establishment of a policy to regulate use and access, the storage unit requirements, security systems, ease of data management (including cross-referencing with traditional materials), and ease of specimen retrieval. Numerous questions remain to be addressed.

10

FREEZE DRYING BIOLOGICAL MATERIAL FOR TEACHING AND REFERENCE COLLECTIONS

Ronald E. Cole, Museum of Wildlife & Fisheries Biology, University of California, Davis, California, USA 95616

In 1977, preparators at the Museum of Wildlife and Fisheries Biology of the University of California, Davis, began using a freeze dry apparatus to prepare specimens for undergraduate classes in bird and mammal identification. Since 1977, over 800 specimens have been prepared via freeze drying. Each specimen has retained documentation concerning initial and terminal weights, length of drying time, vapor pressures during dehydration, and full morphometric information normally associated with classical "study specimens". This paper discusses freeze drying, its observed and potential advantages and disadvantages for museums, and contrasts this method of preparation with other methods of preparing and archiving reference materials.

THE PRESERVATION OF ALBERTA'S PALAEOLOGICAL RESOURCES - AMATEURS, DEALERS AND SCIENTISTS

Anna B. Curtis, Tyrrell Museum of Palaeontology, Box 7500, Drumheller, Alberta, Canada T0J 0Y0

Responsibility for the preservation of Alberta's palaeontological resources lies within the Historical Resources Act. The question of use of these resources, how much and by whom, is a contentious issue. Meeting the needs of different interest groups while administering the Act requires the implementation of creative alternatives towards education and administration, both in the public and private sectors. Growing interest in fossils and the science of palaeontology has also opened up a growing commercial trade in fossil resources, some in a gem form known as "Ammolite" and others for the commercial trade in scientific specimens. Determining to what extent these businesses will affect on-going research and recreational usage of the resource base is difficult. Enforcing the surrounding palaeontological resources may be even more difficult to enforce. Alberta is a leader in Canada in this type of legislation, a situation created out of the need to protect a vast yet valuable palaeontological heritage. Just where the line should be drawn between preservation/protection and denial of access to the resource to all but recognized scientists is unclear. This is an emotionally charged issue for many who have, prior to the introduction of aspects of the legislation, known no restrictions in their usage of the fossils of this province. Education stressing the need for preservation, as is the case in all types of conservation practices, is the key.

A CONSERVATION SURVEY OF THE MAMMALOGY COLLECTION AT THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA: RESULTS AND LONG-RANGE PLANNING

Ted Daeschler, Academy of Natural Sciences, 19th St. and The Parkway, Philadelphia, Pennsylvania, USA 19103

The mammalogy collection at the Academy of Natural Sciences has been understaffed and underfunded for almost 50 years. As a result, care of this valuable collection has suffered.

A conservation survey funded by IMS was undertaken in 1988-89 to identify problems in the collection and set priorities for improvements. Environmental conditions, physical plant and storage materials were evaluated, as well as a random sample of specimens to illustrate specific degradational processes. Interviews with previous workers, orally and by questionnaire, revealed past specimen preparation techniques and collection care practices.

Immediate improvements include organizing and lining drawers, dust protection, security measures, establishing written policies for collections care and usage, and creating documentation standards. Overcrowding of specimens in sub-standard storage facilities is a major concern and will require an institutional commitment to the collection in the future.

DESIGN AND BUILDING OF THE TYRRELL MUSEUM STORAGE AREA: A CASE STUDY

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The Province of Alberta has been known for its rich dinosaur remains, especially articulated skeletons, since the early 1900's. Until the completion of the Tyrrell Museum of Palaeontology in September, 1985, the major collections of Alberta dinosaurs were housed and displayed outside Alberta, in major museums in eastern Canada, the United States and London. A major dinosaur museum had long been a dream in Alberta and a primary purpose of the Tyrrell Museum of Palaeontology was to house world class dinosaur collections. This required very specific storage planning. Fuelled by a provincial oil boom, sufficient Provincial Government funding was available to allow state of the art facilities planning and design. Vast open areas with extremely high ceilings, compactor storage and large areas available for future expansion were envisaged and initially designed. However, between government constraints and communication difficulties with early management, the size of the storage area was cut and broken up by large concrete pillars, the high ceilings blocked by huge girders and compactor storage scrapped in favour of conventional metal racking. The completed storage facility is impressive and functional, but limited in its efficiency and expansion potential.

CONSOLIDATION OF SEMI-FOSSIL POSTGLACIAL WALRUS REMAINS

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Remains of postglacial walrus (*Odobenus rosmarus*) are occasionally recovered from Quaternary age sediments in eastern North America. Bones and tusks are sometimes found in surface gravel where preservation is usually good. However, specimens are also recovered from the seafloor by scallop draggers. A semi-fossil walrus skull, donated to the museum (NBMG 4559), required conservation treatment to stop exfoliation caused by salt crystallization. Drastic intervention was necessary to prevent further damage as the salt solubilized and recrystallized in fluctuating relative humidity.

Treatment consisted of wrapping the skull and tusks, soaking to remove salt and consolidation using Rhoplex AC33. Consolidation was achieved using a variation of the drip method described by Doyle (Geol. Curator 4, 1987). The skull was then dried over several months. Some reassembly after consolidation was carried out using Acryloid B-72 adhesive. The skull has been on display for six months with no further deterioration.

Walrus form part of a small Quaternary mammal fauna in New Brunswick that includes whale and seal remains. A method for treatment of salt damaged bone is an important step toward continued study of the ice age marine fauna.

PRESERVATION OF NATURAL HISTORY SPECIMENS ON EXHIBIT

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A variety of conservation problems arising from the display of natural history specimens can be mitigated or eliminated through proper exhibit planning and design. Specimen damage due to unregulated humidity, temperature, and light levels, or attack by insects, mold, or humans can be prevented by changes in the physical exhibit or in the maintenance of the display.

Exhibit plans and designs should consider the particular environmental needs of the specimens to be displayed. Important factors include light, humidity, temperature, and accessibility of the case to pests and people. Exhibit access should be simplified, but limited to trained personnel. Museum staff whose responsibility it is to install and maintain exhibits should be trained in specimen handling.

Exhibit budgets should include instrumentation for the monitoring of environmental conditions and for the maintenance of the exhibit. Specialized lighting, environmental controls, and security devices can add significantly to the cost of an exhibit, but are necessary for the conservation of the specimens involved.

Fundamental to the achievement of these goals is the establishment of effective lines of communication among the staff. Each exhibit task force should include a scientific curator and a conservator.

SELECTION PRESSURES ON NATURAL HISTORY COLLECTIONS IN THE U.K. - ADAPTATION OR EXTINCTION?

Philip S. Doughty, Ulster Museum, Botanic Gardens, Belfast BT9 5AB, U.K.

New material enters museums at a rate greatly exceeding loss by decay and disposal. Finite national economies must inevitably impose limits on continual expansion. In the U.K. there are already 2600 museums with currently an addition of one per week. There is also clear evidence of progressive reduction of government support for the collections in publicly funded institutions. Museums have developed no strategic or policy response to this looming crisis.

Two wide-ranging and detailed surveys of geological and biological collections throughout the U.K. have been published in the last decade. They place natural scientists in a particularly advantageous position to develop an empirical response. Even before the most recent round of government cuts collections were in a parlous state. Examples and statistics will be presented as supporting evidence.

This paper examines sufficient of the historic background to identify causes for the present state of natural history collections and identifies possible collection strategies relevant to government policy and bearing on scientific and wider public use, and professional reorganization and regulation.

MATERIALS FOR STORAGE CASES

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In this paper we discuss the functions, uses and requirements of materials used in the construction of storage cases, their finishes and seals. We then discuss the chemistry of some of these materials and finishes in relationship to their suitability for use. Materials should maintain their properties, should not cause any damage to objects, and if possible, should contribute actively to the protection of objects. Quick tests which can be used to screen out unsuitable or damaging materials are presented, along with some simple methods for the classification of modern polymers. Procedures for long term testing of construction materials also are discussed, along with a series of procedures and tests for evaluating the physical characteristics and chemical resistance of coatings. We also describe the rationale used to choose the procedures for our own large-scale testing of various paints being considered for use on the storage cases walls and other parts of the new Smithsonian Museum Support Center. Finally, we provide as examples our results from testing a number of these coatings.

MERCURY IN BIOSCIENCE COLLECTIONS

David W. von Endt, Conservation Analytical Laboratory, Smithsonian Institution, Washington, D.C., USA 20560

Catharine A. Hawks, The Carnegie Museum of Natural History, 5800 Baum Blvd., Pittsburgh, Pennsylvania 15206-3706

Mercury and its compounds are found throughout natural history museums: in geological/paleontological collections as integral parts of the specimens or their matrices; in biological and anthropological collections as residues of pest control treatments; and in biological collections as a residue of some preparation methods. Mercuricals may volatilize toxic vapor and pose a threat to museum staff. Some convert to a black sulphide which can alter the integrity of specimens from aesthetic, scientific, and preservation perspectives.

First, the authors briefly review the chemistry of mercury and its compounds and the reactions which they can undergo with many of the materials found in biological collections. We then present data from XRD, XRF, x-radiography, and SEM-EDS analyses used to indicate strongly the presence of mercury sulphide and other chemicals on the specimens, and postulate some reaction pathways. However, due to the numerous chemical treatments and environmental factors to which specimens have been exposed, we cannot yet define a mechanism for conversion of mercury salts to sulphides.

MITIGATING PROBLEMS IN PALEONTOLOGY COLLECTIONS

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Collection professionals often find themselves in a position where they must take actions to upgrade the state of the collection for which they are responsible. Unfortunately this responsibility is

seldom supported by an appropriate level of funding. Even so, significant improvements can often be made within the constraints of existing budgets or with only small increases in funding.

A strategy for approaching a collection with limited resources and examples of low-tech solutions to the most common problems will be discussed.

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NATURAL HISTORY COLLECTIONS CONSERVATION: THE PEOPLE, THE HISTORY, AND NEW DIRECTIONS

Mary-Lou Florian, Chief, Conservation Services, Royal British Columbia Museum, Victoria, British Columbia, Canada V8V 1X4

Like natural history itself, which is continually changing and evolving to fit a new environment, so too is our attitude to the care of our natural history collections changing and evolving to fit a changing environment. This changing environment is people directed. It is their changing attitudes and new awareness of aspects of the natural history collections that have been the new forces for change. A new awareness of the potential research use of collections and the intrinsic value of the collections as our natural history heritage, have put new demands on the care of collections. Today the care or conservation of our collections is no longer dictated by historical procedures, but is directed by knowledge based procedures, which involve understanding specimen material interaction. It is this knowledge of specimen material interaction with storage materials and the storage environment, in preservation procedures and even in collecting procedures which is the basis of the new approaches to preventing loss of research information and giving optimum longevity to these heritage collections. And today the curator, collection manager and conservator are working together to reach these goals.

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USING LASER PRINTERS TO PRODUCE SPECIMEN LABELS: THE RESULTS OF A SURVEY AND SOME PRELIMINARY TESTS

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Computers are now commonly used to store specimen data in natural history collections. However specimen labels are still often produced manually by writing with india ink or by using a typewriter, thereby increasing the risk of transcription errors. The Invertebrate Zoology Section of the National Museum of Natural Sciences was interested in having labels produced from a computer database and, because of the small size of the labels and the amount of data they should contain, it was felt that the job could be done best by a laser printer. However there were concerns about the effects of fluid preservatives on the labels.

The electronic mail service of the Conservation Information Network and the SPNHC Newsletter were used to distribute a survey of collections using laser printers for specimen labels, to find out what kind of problems might be encountered and possible solutions. As well, testing of samples from various laser printers and photocopiers was initiated. Survey responses show that while some collections have experienced problems, others have not. Preliminary results of the test samples are encouraging.

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BIRD AND MAMMAL STUDY SKINS AND MOUNTS: PROTECTION AND SUPPORT

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Bird and mammal study skins and mounted specimens suffer damage from a number of sources, including uncontrolled environment and poor storage materials. Perhaps the most common type of damage, however, is physical damage to specimens.

Physical damage typically arises from careless handling, crowded storage, and lack of physical support and protection for specimens in storage or in transit.

Provision of individual containers and support systems for specimens guards against damage from direct handling, crowded conditions, and from shocks and vibrations caused by sticking drawers or specimen transport.

The design of specimen containers and supports depends on the analysis of specimen needs. Is the specimen requested frequently for research purposes? Is its outer storage case new and well designed, or do all the wood trays stick? Is the specimen a study skin which lies flat, or is it a taxidermy mount whose only attachment to its base is thin metal wires?

The use of suitable support fabrication materials and the degree of physical protection offered by various system designs are discussed.

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RECOMMENDATIONS CONCERNING SHIPMENTS OF VERTEBRATE MATERIALS

J. Gisbert and R. Garcia-Perea. Museo Nacional de Ciencias Naturales, C/J Gutierrez Abascal, 2, 28006 Madrid, Spain

One of the main purposes of scientific collections is to provide a basis for research in numerous disciplines, being indispensable for research in Systematics, Morphology, Anatomy and Evolutionary Biology, among others.

Researchers often find that materials they need to study are inaccessible. The frequent lack of funds for trips to other regions or countries to study collections underline the importance of interinstitutional loans.

Nonetheless, some centers are reluctant to loan vertebrate material because of the potential risk of damage. The main causes of deterioration are: inadequate packaging and handling by shippers or customs agents, and incorrect handling by the borrower or the institution in which the material is temporarily located.

The present communication offers some recommendations for shipping vertebrate material and we invite professionals interested to collaborate in elaborating guidelines for loans.

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METHOD FOR THE PREPARATION OF STUDY SKINS OF MEDIUM-SIZE MAMMALS

J. Gisbert, F. Palacios, and S. Fernandez, Museo Nacional de Ciencias Naturales, C/J Gutierrez Abascal, 2, 28006 Madrid, Spain

The preparation of study skins of medium size mammals presents a series of mounting and storage problems.

We describe a method of preparation of these specimens using an internal wire framework giving details of the procedure used in various species.

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A METHOD OF CONSERVING MAMMALS SKINS IN THE FIELD

J. Gisbert, F. Palacios, S. Fernandez, and R. Garcia-Perea, Museo Nacional de Ciencias Naturales, C/J. Gutierrez Abascal, 2, 28006 Madrid, Spain

Due to the elevated expense of field trips, the conservation of mammal skins for later mounting in the laboratory is proposed as a time-saving measure.

The method consists in use of a salt-alum mixture.

We describe our experience with this mixture as a preservative and tanning agent for mammals skins, emphasizing the advantages of this method in the field and laboratory.

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SPRING TRAINING AT CAL

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

After attending 'The Conservation of Earth Sciences Collections' course sponsored by the Smithsonian Institution Conservation Analytical Laboratory (CAL) in April, I returned to work and reevaluated my curatorial practices. How could I apply all the theoretical principles and practical knowledge of materials and methods I had just learned to my collection? I knew that whatever I planned to do I would not have extra funds, nonetheless I intended to implement changes to improve the care of the collection.

The four things I decided to concentrate on first and which I will describe are: 1) reviewing policy and procedural documents as well as statements on access to and use of the collection; 2) reducing physical damage to type specimens; 3) changing to archival quality curatorial, storage and packing materials; and 4) beginning to monitor the paleontology repository environment to obtain data which will assist in identifying problems and formulating priorities.

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LIBRARY FROM THE DEEP: HOW OCEAN SEDIMENTS ARE UTILIZED TO RECONSTRUCT THE PAST

Iris A. Hardy, Atlantic Geoscience Centre, Geological Survey of Canada, P.O. Box 1006, Dartmouth, Nova Scotia, Canada

The history of our planet Earth has been marked by ice ages and other climatic changes recorded in the sediments of the ocean floor. Each climatic era leaves evidence of its former presence through sedimentary and microfossil clues. This can be utilized to predict the future by reconstructing the past.

Analysis of sediment cores can provide glimpses of world climate over long spans of time, often more than 50,000 years in length. From the record of past glacial and interglacial periods, the present phase of high temperatures could be expected to be drawing to a close and perhaps shifting towards

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the next glacial epoch. Each preceding interglacial period has averaged 10,000 years in duration - we are already 13,800 years into this recent interglacial pulse (Ruddiman and McIntyre, 1982).

The question of future climatic change is no longer a passing curiosity and the planet can ill-afford to arrive unprepared at the doorstep of the next climatic major change. The diverse sample collections presently housed by the Atlantic Geoscience Centre represent a Canadian "Rosetta Stone" for understanding the past natural changes of the planet, which can be used as a reference for future potential change.

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ASSESSMENT OF PLAGUE AS A BIOHAZARD IN MUSEUM COLLECTIONS

Grant W. Hughes, Royal British Columbia Museum, 675 Belleville Street, Victoria, British Columbia, Canada V8V 1X4

It has now been newly discovered at the Royal British Columbia Museum that two specimens of wood rat to be prepared for vertebrate collections had died of plague (*Yersinia pestis*). This discovery marked the first record of plague from British Columbia known to the Royal British Columbia Museum although plague had been known to occur in Alberta and the Western United States. Concern was raised about staff safety in the vertebrate preparation laboratory. The Royal British Columbia Museum reviewed specimen handling protocols following the discovery and adopted Biosafety Level 2 precautions as a standard. This paper discusses the topic of assessing biohazards in museum collections based upon the experience of the Royal British Columbia Museum with the discovery of plague killed specimens.

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THE MANAGEMENT OF LIVING COLLECTION, WITH PARTICULAR INTEREST TO RARE AND ENDANGERED SPECIES

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The dramatic interest of wild species of animals becoming endangered through escalating habitat destruction has led to re-focused policies and technology to maintain live collections in public education institutions, i.e. zoological and botanical gardens.

International collaboration between zoological gardens and field biologists has led to new conservation strategies to manage captive gene pools as global resources. The International Species Inventory System (ISIS), the Species Survival Program (SSP), the Europaeische Erhaltungszucht Program (EEP) and the Heritage Species Program (HSP) are examples of such worldwide networks to manage endangered species for the long-term survival of self-sustaining populations with the highest degree of genetic diversity possible.

Initiatives of the Calgary Zoological and Botanical Gardens are discussed.

THE MOUNTAIN GORILLAS OF AFRICA: AN EXAMINATION OF ONE OF THE WORLD'S MOST SUCCESSFUL ENDANGERED SPECIES PROJECTS

Brian Keating, Calgary Zoological Society, P.O. Box 3036, Station "B", Calgary, Alberta, Canada T2M 4R8

Collectors and exhibitors of natural history specimens have an obligation to use their exhibits as tools for interpretive inspiration. A case study of wild populations of two endangered primate species provides an interesting and entertaining outlook on the significance of preserving healthy populations in the wild.

A recent survey of Africa's Mountain Gorillas indicates a population growth of some 40 animals. This population increase demonstrates a remarkable achievement for both local governments and the efforts of conservation agencies worldwide. Since 1979, the "Mountain Gorilla Project" of controlled tourism has created a natural history opportunity unmatched by any other program of similar design.

On behalf of the Zoo, three excursions into prime Mountain Gorilla habitat in both Zaire and Rwanda were recently conducted to observe and photograph these remarkable primates. With the assistance of some video and slides, the programs of both countries will be compared and contrasted highlighting successful techniques and possible future pitfalls.

To complete the discussion, the Chimpanzees of Gombe (site of Dr. Jane Goodall's research) will be contrasted to the Mountain Gorilla.

THE RUSSELL EFFECT: A PHOTOGRAPHIC TECHNIQUE FOR MEASURING LOW LEVELS OF OXIDATION IN MATERIALS

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Organic materials are susceptible to low levels of oxidation. This degradation mechanism has not been fully appreciated by the conservation community, however it may be one of the most important chemical causes of deterioration. Although the cumulative effects of oxidation are often observed, the ambient rate is so low it is extremely difficult to measure. The Russell Effect is a photographic technique that is sensitive enough to record ambient rates of oxidation. This is possible because a specially prepared film is sensitized to a byproduct of oxidation -- hydrogen peroxide. The basics of the Russell Effect, procedure, and three general conservation applications, will be presented. The ability to detect low levels of oxidation provides another parameter by which conservators and collection managers can evaluate the care and treatment of museum specimens.

EFFECT OF BUFFERING SALTS ON THE PENETRATION RATE OF FORMALIN: A MORPHOMETRIC STUDY

G. Wayne Lyons, Department of Anatomy, Queen's University, Kingston, Ontario, Canada K7L 3N6

Traditionally, addition of buffering salts to fixative, such as formalin was thought to improve quality and reduce time of fixation for tissues. The present study was designed to evaluate the effect

of different buffering salts on the penetration rate of formalin. Canine thigh muscles were obtained 5 minutes after death, cut into 3 cm cubes, and fixed in either buffered or unbuffered formalin at concentrations of 5, 10 and 15%. All buffer solutions were at 0.1 M and pH 7.2. After 2, 4, 8, 12 and 24 hrs, samples were removed from fixed tissue blocks and analysed for the apparent fixed and unfixed areas by a computer-assisted morphometry system (Bioquant). Results show that the penetration rate is the fastest when tissues were fixed with unbuffered 15%, followed by 5% and then 10% formalin. Addition of different buffering salts to 15% formalin tended to reduce the penetration rate of the fixative. Tris buffered formalin penetrated the tissue block at the slowest rate. Results of the present study indicate that buffering systems may have a negative effect on the penetration rate of fixatives. Whether the reduced penetration rate of fixative will affect the fixation quality of tissue blocks awaits further histological evaluation.

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HOW RELIABLE IS YOUR LONG-TERM STORAGE METHOD FOR COMPUTERIZED DATA?

Suzanne B. McLaren, The Carnegie Museum of Natural History, Annex Building, 5800 Baum Blvd., Pittsburgh, Pennsylvania, USA 15206-3706

You've spent the time and effort to enter data for all the specimens in your collection onto a computerized database. You've edited typographical errors and verified data entries. You've even had a few years to become familiar and dependent upon the convenience of computerized collection data. By now, your financial investment represents only a portion of the total value to your database. How good is your method of long-term data storage and are you prepared to find out the hard way?

These are the types of questions that have been posed in numerous computer magazines during the past year. Certainly the question of long-term storage reliability and integrity is an important one. However, is a pseudo-debate being generated by vendors of the newer, more expensive, and not well-established storage products? This poster will explore the reliability, compatibility, and cost of long-term storage media currently on the market. Although the information is pertinent to all computerized information, emphasis will be placed on museum collection data because the subject represents a familiar extreme in long-term storage requirements.

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FROM RAGS TO RICHES... THE CONSERVATION OF A MUSEUM FUNGAL COLLECTION

Charles L. Messenger, University of Nebraska State Museum, Lincoln, Nebraska, USA 68588-0514

The University of Nebraska State Museum Division of Botany houses some 300,000 catalogued specimens. A recent survey of our fungal collection, which numbers some 60,000 specimens and dates from the late 1800's, showed significant deterioration of mounting, packet, and label paper. A successful Institute of Museum Services grant was obtained in 1988 by the Curator of Botany, Dr. Margaret Bolick, for the conservation of this historic collection. The grant will provide for proper storage, in-house training by a conservator from the Rocky Mountain Conservation Laboratory, and for future taxonomic study and curation. This will be an overview of the methods used in the treatments, and the results so far accomplished.

DISPLAY LIGHTING: A CASE STUDY

Karen Kreycik Messenger, Lentz Center for Asian Culture, University of Nebraska, Lincoln, Nebraska, USA 68588-0372

The Lentz Center for Asian Culture is located in the University of Nebraska State Museum in Lincoln, Nebraska. From October, 1988, through June, 1989, our area of the Museum underwent extensive renovation including installation of climate control, which necessitated removing all items from the display and office areas to temporary storage. As objects were removed for packing, inspection revealed problems due to light and heat inside the display cases, even though special fluorescent tubes with filters were in use. Evaluation of display case construction followed, resulting in changes in the lighting system for the cases.

BEGINNING A METEORITE PRESERVATION PROGRAM

Jack A. Murphy, Curator of Geology, Denver Museum of Natural History, City Park, Denver, Colorado, USA 80205

A collections management program was initiated at the Denver Museum of Natural History in the early 1970's when the meteorite collection was removed from storage, unpacked, inventoried and evaluated. The collection, with over 430 individual specimens representing 170 separate meteorites was principally acquired in the 1930's. Cataloguing, classifying, cleaning and developing data files were among the priority objectives accomplished.

An IBM compatible, 20 megabyte hard disk computer is being used to store 27 fields of information per specimen on commercial database software. The collection is a resource for displays and educational programs in the Museum and for regional schools. Samples are also available to qualified researchers.

A 1988 Institute for Museum Services conservation survey focused attention on the specific techniques and associated applications for meteorite preservation. Monitoring of the storage and exhibit environments, inspection of oxidation products, preparing condition reports, positioning tray labels for greater visibility, literature searches and networking with professionals are functions currently in progress. Further research and identification of necessary treatments are required to insure the long-term future of these museum treasures.

COMPUTERS: COLLECTIONS MANAGEMENT AND BEYOND

Andrew G. Neuman, Tyrrell Museum of Palaeontology, Box 7500, Drumheller, Alberta, Canada T0J 0Y0

Ann Konecny, Department of Biological Sciences, The University of Calgary, 2500 University Dr. N.W., Calgary, Alberta, Canada T2N 1N4

The major responsibility of any museum is to interpret and communicate knowledge effectively. In order to do this, a museum must first have detailed and accurate information about the objects in its collection. In recent years a major move toward computerization of documentation has increased

the ability to make information readily available, easily revised and updated as well as cutting down on effort spent doing time-consuming tasks such as report writing and inventory.

Many computer systems are available, with varying degrees of complexity and cost, that are capable of managing information storage. It is important for every museum to carefully evaluate its needs and find the appropriate software and hardware to do the job at the most reasonable cost. This workshop will summarize some of the steps that should be taken in choosing a computer system for collections management, present several systems currently in use in natural history collections and present some innovative ways to enhance the effectiveness of your collections management system.

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ENCAPSULATION OF MAPS IN POLYESTER FILM

Judith C. Price, Zoology Division, National Museum of Natural Sciences, Ottawa, Ontario, Canada K1P 6P4

Maps used to pinpoint collecting stations in the field are a valuable resource in documentation of the specimens collected. In a zoological collection area they may not receive the care they deserve from cataloguers or curators. The maps used by E.L. Bousfield during his tenure at the National Museum of Natural Sciences, Canada represent over thirty years' collecting stations and have recently been encapsulated in polyester film in preparation for cataloguing and storage as a resource to future workers in the crustacean collection. The method and materials chosen will be illustrated.

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VOLUNTEERS IN SCIENTIFIC AREAS

Fahmida Rafi, Zoology Division, National Museum of Natural Sciences, Ottawa, Canada K1P 6P4

Lack of resources in the scientific areas of our museum presented a vital problem in the maintenance of the collections. Our volunteer programme has enabled us to maintain specimens in optimum condition and make the collection available for study.

The relationship between the museum and its volunteers is one of mutual advantage: the museum depends upon the benefits from the effort, and the volunteers profit from their affiliation with a large cultural institution and its many programmes.

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FREEZE-DRYING AND RESTORATION OF WATER DAMAGED PAPER PRODUCTS

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For years water damage to manuscripts, papers and books has proven very costly to libraries. Only recently has freeze drying been successful in assisting in the restoration of paper products. As published in "The Association of Canadian Archivists Bulletin Vol. 12, Number 4 (March 1988)", various methods have been employed in freeze drying of different materials.

In our particular study we examined various methods for restoring documents containing glossy type photographs, using books of varying paper composition and varying degrees of wetness. Some

books were treated as found; others were wet further; some were air dried and some had pages separated with paper towelling. All books except those which were air dried were frozen and then freeze dried.

Overall results varied. Some books containing glossy photographs freeze dried better and the pages separated more easily if the books were wet thoroughly prior to freeze drying.

Although these results are not conclusive, and other techniques are needed to alleviate other problems such as distortion or water marking, we feel the procedure outlined here does significantly improve the restoration possibilities in glossy paper materials.

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A PREVENTIVE CONSERVATION APPROACH TO STORAGE IN NATURAL HISTORY COLLECTIONS

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A protective environment for the storage of collections does not have to be expensive, but requires careful planning and the application of basic conservation principles. These include appropriate control of environmental factors such as light, temperature, relative humidity, and pollutants, as well as mitigating potential problems such as fire, leaks, vibration, theft, vandalism, pests, and mishandling.

Criteria for developing good storage areas, including location, construction materials, general interior design, and storage furniture are reviewed. Also discussed are the policies, procedures and guidelines that are integral to insuring the proper care of collections during storage.

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PRODUCTION OF ANATOMICAL TEACHING AND DISPLAY SPECIMENS: A WORKSHOP

Anthony P. Russell, Department of Biological Sciences, University of Calgary, Calgary, Alberta, Canada T2N 1N4

The average zoological museum in a university biological sciences department has only limited resources and a limited budget to work with. In most instances, specific materials are not available from commercial supply houses; thus, innovative preparatory techniques must be employed if particular types of instruction are to be exploited to their fullest extent. University teaching museums have a unique place in the overall museum community. They are faced with special problems that call for such innovative methods which, above all, must be economical.

One of the areas where we can most successfully exploit this approach is in the teaching of comparative vertebrate anatomy and vertebrate systematics. Many anatomical features are of importance, both from functional and systematic viewpoints; permanent preparation of such material is of great value. Due to its unusual nature, it also adds teaching impact. We do not ignore the standard preparatory techniques of skeletal and study skin preparation, but by utilizing more unusual methods, we are also able to make use of many valuable pieces of soft anatomical material which would otherwise be discarded. Our museum is fortunate because it receives material from the Calgary

Zoological Society, which enables us to make some quite exotic preparations. However, similar preparations can be made with any freshly dead (or frozen) material, provided that sufficient care and attention is paid to detail.

The advantage of modelling with real material is the accuracy in which it represents the actual biological situation. Models prepared from once-living material can also be produced with a greater three-dimensional relief than commercially produced models (if available), especially bone-tendon-muscle preparations. Various procedures will be outlined and discussed.

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**STATUS OF THE AMPHIBIAN TYPES DESCRIBED BY M. JIMENEZ DE LA ESPADA
IN THE MUSEO NACIONAL DE CIENCIAS NATURALES OF MADRID**

A. Salvador and J. Gisbert, Museo Nacional de Ciencias Naturales, C/J. Gutierrez Abascal, 2, 28006 Madrid, Spain

The Museo Nacional de Ciencias Naturales (MNCN) collections contain the specimens collected by Marcos Jimenez de la Espada during the expedition to the Pacific from 1862 to 1865.

Of special importance are the type specimens of the amphibian taxa described by this author.

The recent organization and cataloguing of the MNCN amphibian collection has led to the localization of this material.

The number and type of taxa existent and the modern nomenclature are offered.

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**GENETICALLY ENGINEERED LIFE FORMS AND THE ROLE OF CULTURE
COLLECTIONS**

Kenneth E. Sanderson, Salmonella Genetic Stock Centre, Department of Biological Sciences, University of Calgary, Calgary, Alberta, Canada T2N 1N4

In the past 20 years, techniques to construct new life forms have been developed in both microorganisms and higher forms. In the microorganisms these originate primarily from recombinant DNA methods, while in higher forms they are from these methods or from sexual recombination. These new forms raise many complex questions which must be dealt with by the scientific community. Who owns these forms, and how should they be maintained and distributed? Is it safe to release the genetically engineered microorganisms into nature? How can these forms be exchanged between scientists? Some of these questions are similar to those faced for many years by curators of natural history collections as well as of culture collections. These questions, and perhaps some answers, will be considered.

MODIFICATIONS TO A MOBILE STORAGE SYSTEM IN A NATURAL HISTORY MUSEUM

Gary M. Selinger, University of Alaska Museum, 907 Yukon Drive, Fairbanks, Alaska, USA 99775-1200

In 1979 the University of Alaska Museum moved into a new building which included a mobile storage system, consisting of open shelving, molded plastic drawers, and metal storage cabinets. This system was expected to accommodate the Museum's collections, both present and future.

Modifications to the mobile storage system became necessary as the collections expanded. For example, oversized storage needs were not carefully considered during the designing phase. As a consequence, vertical shelving supports were permanently installed every 36 inches, making it difficult to store objects over a few feet in length. In addition, alternative storage for collections sensitive to the vibration of the moveable aisles was not planned for.

Although the mobile storage system is very adaptable, it should not be expected to accommodate all collections, especially ones requiring special and unique sets of conditions. The purchase of any storage system must be consistent with the long range plans, goals, and needs of the museum.

CURATING A HERBARIUM AND CULTURE COLLECTION OF MICROFUNGI, VALUE OF AN INTEGRATED SYSTEM

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The University of Alberta Microfungus Collection and Herbarium (UAMH) contains over 6,000 strains of filamentous fungi, the majority represented by both living cultures and herbarium specimens. The maintenance of a herbarium, in which specimens are readily accessible and accurately represented, provides a useful adjunct to a culture collection since it provides a convenient mechanism for confirming the identity of strains sent for deposit or identification, and valuable information for taxonomic studies. Most fungal herbaria follow traditional methods; specimens, usually consisting of a portion of the fungus growing on the host, are stored in paper envelopes affixed to large cardboard sheets. At UAMH, herbarium specimens consist of dried colonies on cellophane membranes. These specimens provide a durable record of the fungus colonial morphology under different growth conditions. Photomicrographs and camera lucida drawings of the microscopic morphology are stored along with the dried colonies in conveniently accessible file drawers and provide a multidimensional characterization of each strain. Routine record processing is aided by a publicly accessible interactive data base. This data base allows for generation of catalogues, herbarium record sheets and other useful information.

CASE STUDIES ON SPECIALIZED STORAGE SYSTEMS--FLUIDS

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Fluid preserved collections must be protected from dehydration, degradation of the preservative,

and damage from excess light and heat.

Containers must seal tightly to prevent evaporation of the contents. While providing protection from light damage containers must also allow for inspection of fluid level and specimen condition without disturbing the seal. Containers and closures must be made of materials that are resistant to embrittlement.

The storage area should have shelving designed to protect against severe vibration. Ideally, specimens should be kept in closed cabinets or compactor units. When this is not possible, lighting must be controlled. Light fixtures should be wired so that only those lights needed must be turned on. All lights in storage areas should be turned off when not in use. Fluorescent bulbs must be shielded with ultraviolet (UV) light filters.

Temperature fluctuations in the storage area must be minimized because differences in thermal expansion characteristics of different materials will cause closures to become loose, allowing fluids to evaporate.

The condition of the containers, gaskets, seals, specimens, and the fluid concentrations must be monitored on a regular basis.

48 **A GLASS MENAGERIE: A BRIEF LOOK AT A FLUID PRESERVED COLLECTION WITH NOTES ON SURVEYING SAME**

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An IMS grant awarded to Bishop Museum for the purpose of examining its zoological collections to generate a long-range conservation plan included a survey of the fish collection. A form was developed and utilized to count and evaluate an assortment of glass storage vessels in the collection. Although the data have not yet been fully analyzed, initial interpretations indicate our collection is in very good condition (in terms of containing alcohols) and a strategy for surveying other collections of a similar nature may be extracted from our experience.

49 **TECHNIQUES FOR DRYING LARGE MAMMAL SKELETAL MATERIAL**

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Mammalian specimens prepared by boiling need to dry completely before being permanently housed in storage cases. The standard drying method is to leave bones exposed to the regular room atmosphere, but this may attract harmful insects to the collection area.

An experiment was conducted to determine drying times of Canis lupus skulls and jaws under different sets of conditions and to project the best technique for adequate drying but minimal attraction to the pest insects Anthrenus verbasci and Tinea pellionella.

Results show that drying is not consistent in an environment without air circulation. The conclusion was reached that large mammal skeletal material should be dried in the preparation area in well ventilated, but insect proof, holding cases.

RISK MANAGEMENT STRATEGIES APPLIED TO THE DEVELOPMENT OF PRAGMATIC SOLUTIONS TO COLLECTIONS STORAGE PROBLEMS

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Many problems with the storage designs and materials commonly used in natural history collections have no simple answers. Ideal solutions may be prohibitively expensive or unattainable, and not all problems can be solved simultaneously. An approach to establishing priorities and planning improvements that is based on risk management strategies is recommended. This involves, as a first step, identification and at least ranking, if not quantification, of the diverse risks to collections. Secondly, the cost and benefit of various mitigation strategies including removing sources of problems, establishing barriers, implementing improved procedures and so on, must be assessed. Examples of practical solutions that follow from this type of analysis will be given.

AN INVESTIGATION INTO THE PERMANENCE OF STORAGE MATERIALS USED BY THE ROYAL B.C. MUSEUM HERBARIUM

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The storage materials for herbarium type specimens were reviewed from the perspective of a paper conservator. The materials were tested by common conservation techniques: pH and spot tests for papers, Beilstein and burning tests for plastics, and solubility and light fading tests for inks. The adhesives were researched in the conservation literature. Overall, the materials were considered to be impermanent: the papers were acidic; some plastics were potentially unstable, and the inks were water soluble and light sensitive. Recommendations were made for stabilizing the herbarium sheets inside acid free paper and Mylar folders. When new specimens are mounted, they should be stored utilizing acid free papers labelled with permanent inks.

VOLUNTEER ORIENTATION TO NATURAL HISTORY MUSEUMS AND THEIR COLLECTIONS

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Volunteers who come into contact with museum collections should have a fundamental knowledge of collections care. A slide presentation prepared by a curator, conservator, and volunteer coordinator provides basic information to museum volunteers on security and safety procedures, good work habits, recognition of pest problems in collections, and proper handling of objects. The

presentation can be used as a volunteer recruitment, screening, and training tool. Specific points address security station check-in, location of fire extinguishers, hand washing, and awareness that objects in collections may contain toxic substances. Slides demonstrate preparation of a clean work surface, identification of common museum pests, support of objects during handling, use of gloves for handling certain objects, and specific pointers on handling anthropological, biological, geological and paleontological objects, and books and photographs. The presentation is available to natural history museums to increase volunteer awareness of the value and irreplaceable nature of museum objects.

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PLASTICS IN CONSERVATION STORAGE, DISPLAY, AND PACKING

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Criteria for the selection, evaluation, and use of plastics in conservation applications will be presented. Selection criteria are based on anecdotal information from colleagues, on information in the literature of conservation and other disciplines, and on laboratory analysis of products and damaged artifacts. Mechanisms by which plastic damage (and protect) artifacts are described, including the effects of additives (e.g. plasticizers, antioxidants, heat stabilizers, dyes, pigments, emulsion stabilizers, catalyst residues). Selection criteria will discriminate products by polymer class, product form, intended application, and mode of interaction with artifacts. The appropriateness for conservation applications of several commonly used commercial products in the form of foams, films and sheets, containers, and coatings, representing the main polymer classes, will be discussed in detail to demonstrate the kinds of decisions that should be made when selecting plastic products.

Several simple, "low tech" tests will be demonstrated, to determine the polymer composition of plastic products. These tests require no specialized equipment beyond that which is found in any studio or workshop, so that they can be routinely performed by anyone.

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SKULLS OF PEROMYSCUS HOLOTYPES: A CASE STUDY OF SPECIMEN DETERIORATION

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The skulls of 214 rodents (genus Peromyscus) were examined as part of a condition survey of type specimens of recent mammals in eight major U.S. collections. In addition to their inherent value as types, type specimens were chosen for the survey because any damage observed in these specimens is expected to represent damage in mammal collections as a whole.

The condition of each skull was recorded in 92 fields of a computerized database. The records contain information on individual skull parts, including taxonomically important characters. Observed damage in Peromyscus varied from hairline fractures in virtually all skulls to missing parts in over 88% of the skulls. The results of this project reveal a relationship between the deterioration of the skulls as museum objects and the value of the skulls as research specimens; this suggests that current preservation and collection management procedures may not provide sufficient protection from factors known to damage bone and teeth.

MODIFICATION OF STORAGE DESIGN TO MITIGATE INSECT PROBLEMS

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A case study involving a serious pest infestation is described. Regular monitoring of the infestation to determine the source of the problem made it obvious that the use of toxic chemicals in the cases would provide only short-term relief. The source of the infestation was the organic materials that accumulated underneath storage cases. The storage design actually provided a protected area for insect pests to flourish.

To correct the situation, special metal frames with adjustable legs were designed, assembled, and incorporated in the storage design. It was found that this modification provided 1) better support for positioning storage units, and 2) easy access to areas below cases for cleaning purposes.

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