



**SPNHC 20th Annual Meeting
and Workshops 2005
12–18 June**

Abstracts and outline programme

Edited by C. Giles Miller and Paul G. Davis

Organised by the Society for the Preservation of Natural History Collections in conjunction with the Natural Sciences Collections Association, the Geological Curators Group, ICOM-CC Natural History Collections Working Group and hosted by the Natural History Museum, London.





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20th Anniversary for SPNHC

The Society for the Preservation of Natural History Collections is proud to be recognizing 20 years of service to the Natural History Community in 2005. SPNHC is an international association of individuals who are interested in the development and preservation of natural history collections. Within SPNHC, "natural history" encompasses more than biological and geological topics; it also includes the fields of anthropology, e.g. ethnology and archaeology. SPNHC members are collection managers, curators, registrars, conservators, and other specialists and generalists involved with research, educational and exhibit collections; a broad range of associated values to these materials are both acknowledged and protected.

In the last 20 years, SPNHC has led the way in providing support to the Natural History Community via:

Books:

Storage of Natural History Collections: A Preventive Conservation Approach, *Storage of Natural History Collections: Ideas and Practical Solutions* (both of these have quickly become classics, and have import beyond natural history fields), *Managing the Modern Herbarium*, and our latest *MuseumWise: Workplace Words Defined*; more are scheduled to come out soon.

Collection Forum:

Our internationally respected peer reviewed journal which covers the diverse subject matter relevant to the needs of natural history collection management. Book reviews are regularly included; visit our web-site to view two volumes and the contents of other previous issues.



Twice-yearly Newsletters:

Which includes an occasional series of subject specific Leaflets (the Leaflets and some newsletters are on our web-site for your inspection).

Annual Meetings:

Sometimes held in conjunction with other organizations such as the Natural Science Collections Alliance (previously known as the Association of Systematics Collections/ASC) and the International Society for Biological and Environmental Repositories/ISBER. Workshops are held at each meeting.

Forums:

Participation in pertinent forums relating to the Society's mission, e.g. Heritage Preservation's *Heritage Health Index*, and the *Workshop to Produce a Decadal Vision for Taxonomy and Natural History Collections* funded by NSF.

The Society's contributions were recognized by the American Institute for Conservation of Historic and Artistic Works (AIC) and Heritage Preservation who presented SPNHC with their 2001 **Award for Outstanding Commitment to the Preservation and Care of Collections**.

SPNHC is a valuable resource which should not be overlooked by workers in the natural history field. The Society actively encourages the participation of individuals involved with all aspects of natural history collections.

Ann Pinzl



The Natural Sciences Collections Association

The Natural Sciences Collections Association (NatSCA) provides a forum in The United Kingdom for individuals, museums and other institutions involved in the management, curation, conservation and interpretation of natural science collections and records, and to present the views of professionals and institutions.

NatSCA aims to act as an advocate for natural sciences collections, promoting their protection, development and use, and seeking to help people within and outside of the profession to understand the value and importance of these collections, and that of understanding the natural world and our relationship to it. We provide, by way of publications, seminars and other events and activities, a means for the exchange of information, the establishment of standards and principles, professional training and the ability for the community to undertake cooperative ventures.

'NatSCA News' and the planned NatSCA web-site, will be the focus for advertising and reviewing conferences and seminars, airing members' views and for disseminating all museological news relevant to natural sciences collections.

The group maintains close links with relevant bodies such as the Museums Association, the Museums, Libraries and Archives Council, the Geological Curators Group, the Institute of Conservation, the National Federation for Biological Recording, the Society for the Preservation of Natural History Collections, in America and the Natural History Collections Working Group of the International Council for Museums.

NatSCA was formed in 2003 by merger of the Biology Curators' Group and the Natural Sciences Conservation Group. NatSCA is also a United Kingdom Registered Charity.

Paul Brown



The Geological Curators' Group

The Geological Curators' Group was founded in 1974 and is affiliated to the Geological Society of London. Since then it has been an active group in the UK and in the last few years has been expanding its membership worldwide. The group is dedicated to improving the status of geology in museums and to raising the standard of geological curation. In order to achieve this, the group holds meetings and workshops to promote the exchange of information amongst geological curators and other interested bodies. Information and advice on all matters relating to geology in museums is provided and active surveillance of geological collections and information undertaken with a view to ensuring their continued wellbeing. The group also strives to develop and maintain a code of practice for the curation and deployment of geological collections. It is also committed to the advancement of the documentation and conservation of geological sites.

As well as a regular series of meetings and workshops, both in the UK and overseas, the group accomplishes its aims through publications. The quarterly newsletter *Coprolite* and the group's journal *The Geological Curator* are well established. Published books have included *Guidelines for the curation of geological materials* and *The value and valuation of natural science collections* both published by the Geological Society. A leaflet entitled 'Thumbs up' producing guidelines for young collectors was also published in conjunction with Rockwatch, The Geologists' Association, British Gas and the Geological Society. The Group also carries out surveys of UK geological collections with an update of the last "State and status" survey done in the early 1980s' the subject of one of the presentations at this conference. A list server for information regarding geological collections is also maintained. For details of how to join the list and the GCG, please refer to our website <http://www.geocurator.org/>.

Giles Miller



The Natural History Collections Working Group (NHCWG)

The Natural History Collections Working Group (NHCWG) is one of the many specialist working groups of the Committee for Conservation (ICOM-CC). It is the largest of the 28 international committees of ICOM (International Council of Museums) with over 1400 members worldwide from all areas of the museum and conservation profession. ICOM-CC aims to promote the conservation, investigation and analysis of culturally and historically significant works and to further the goals of the conservation profession.

The Triennial Congress brings the membership of ICOM-CC together to review and report on current research. Over 1000 papers have been published in the congress pre-prints in the past twenty years. The working groups actively communicate with their members through newsletters, meetings, and at the Triennial Congress. The NHCWG has about 150 members in more than 50 countries. Due to its global character, in the last triennial period, the WG board has taken various initiatives to encourage more collaboration between international natural history societies in order to increase dissemination of important developments in conservation.

The NHCWG has honoured this, together with NatSCA and GCG, by taking a shared part in the SPNHC 2005 anniversary meeting. We congratulate SPNHC on their 20th birthday and are sure that the beginning of the next 20-year period is a good moment for initiatives leading to more cooperation between our societies. The main topic "Realising Standards" is a very interesting subject that will hopefully lead to a lot of debate, constructive ideas, and of course useful

standards. With the important recognition that standards in conservation can only be implemented when the local situation, with respect to the availability of resources, has been taken into account, the WG has developed a decision-making trajectory that anticipates these different circumstances. It will be presented in a workshop (focusing on conservation of fluid collections) at this meeting and later this year also at the ICOM-CC triennial meeting in The Hague. The model has been published as a separate attachment to our latest newsletter. At the forthcoming ICOM-CC meeting in The Hague, over 150 papers will be presented. Furthermore, our WG will hold a forum discussion about limits to collection growth and more specifically de-accessioning as a conservation tool.

Finally, if you are interested in becoming part of the worldwide network in the field of conservation, membership to the NHCWG as well as for ICOM-CC is free but subscription to the parent institute ICOM is necessary. Please specify on the ICOM membership application form that you want to become a voting member of ICOM-CC. An application form can be found on the ICOM-CC website <http://www.icom-cc.org>. In order to become an active member of the WG and to receive the newsletter, contact the co-ordinators of the NHCWG. The addresses of the coordinators and more information about the meeting in The Hague can be found on the ICOM-CC website.

Dries van Dam and Vicky Purewal

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Listing as of April 28th - full details available in your conference pack

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Conference Organisers

Paul Brown	ICOM and NatSCA representative
Chris Collins	Co-chair and sponsorship
Lorraine Cornish	Excursions
Paul Davis	Publications and workshop leader
Adrian Doyle	Registration and workshop leader
Kate Edmondson	Registration
Rob Huxley	Co-chair
Giles Miller	Publications and GCG representative
Gemma Robinson	General administration
Suzanne Ryder	Conference programme and sponsorship
Chris Stanley	Talks programme
Charlotte Stockley	Finance
Clare Valentine	Talks programme and accommodation
Liz Woznicki	Publicity

Outline programme

The full programme including maps is available in your registration pack

Sunday 12th June

- 10.00 - 17.00 Registration and SPNHC Committee Meetings
15.30 - 17.00 SPNHC Outgoing Council Meeting

Monday 13th June

- 08.30 COFFEE
08.30 - 17.00 Registration
09.00 - 16.30 Day trip tours of other collections
4 options:
Tring - Leader Paul Brown
Oxford University Museum - Leader Giles Miller
Kew Gardens - Leader Kate Edmondson
Horniman Museum - Leader Lorraine Cornish
18.30 - 21.00 Ice breaker party

Outline programme

Tuesday 14th June

- 08.30 COFFEE
08.30 - 17.00 Registration
09.00 - 10.30 Introduction and keynote speakers
10.30 - 10.50 COFFEE
10.50 - 12.10 SPNHC session I Chair Rob Huxley
12.10 - 13.10 LUNCH
13.10 - 14.50 SPNHC session II Chair Chris Collins
14.50 - 15.20 COFFEE
15.20 - 17.00 SPNHC session III Chair Iris Hardy
17.15 - 18.45 POSTER SESSION
Beer, wine and other refreshments to be served during the poster session. Authors should be present at poster exhibition to answer questions.

Outline programme

Wednesday 15th June

09.00 - 17.00	Registration
09.00 - 12.40	NHM departmental tours: Tours to one of Zoology, Palaeontology, Palaeontology Conservation Unit, Botany, Mineralogy, Libraries are at:
09.00 - 10.00	
10.10 - 11.10	
11.10 - 11.40	COFFEE
11.40 - 12.40	
09.00 - 12.40	Wandsworth outstation only
13.30 - 15.30	NatSCA session I Chair Sue Ryder
15.30 - 15.50	COFFEE
15.50 - 17.30	NatSCA session II Chair Nick Gordon
19.30 - Midnight	Banquet

Outline programme

Thursday 16th June

08.30	COFFEE
09.00 - 17.00	Registration
09.00 - 11.00	GCG session Chair Amanda Edwards
11.00 - 11.20	COFFEE
11.20 - 12.20	Special Interest Groups
12.30 - 14.00	LUNCH, AGMs and ICOM-CC Working Group
14.00 - 15.50	ICOM session I Chair Dries van Dam
15.50 - 16.10	COFFEE
16.10 - 17.50	ICOM session II Chair Victoria Purewal

Outline programme

Friday 17th June

- 07.30 - 10.00 Breakfast Incoming Committee Meeting
- 10.00 - 17.00 Workshops Day 1 (2 one day workshops)
- Standards - Leader Paul Davis
IPM - Leaders Adrian Doyle, Dave Pinniger and Tom Strang

Saturday 18th June

- 10.00 - 17.00 Workshops Day 2 (2 one day workshops)
- Risk assessment - Leader Rob Waller
IPM - Leaders Adrian Doyle, Dave Pinniger and Tom Strang

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An anatomical collection dissected: practical implementation of a national de-accessioning project

Aarts, Babke*; Brandenburg, Oskar**; van Dam, Andries J.**

*University Museum, Lange Nieuwstraat 106, 3512 PN, Utrecht, The Netherlands

**Leiden Museum of Anatomy, Wassenaarseweg 62, 2300 RC Leiden, The Netherlands

This paper demonstrates how an extensive de-accessioning and preservation project at the Leiden Museum of Anatomy both improved its collection management and collection policy, and served to strengthen collaboration on a national level.

By elaborating two representative examples, practical aspects of de-accessioning and preservation procedures are highlighted. The project resulted in a manageable, accessible and well-organised collection, matching the museums unique task within the Dutch Academic Medical Collection.

Oskar Brandenburg
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Oral presentation on Thursday 16th June

Improving curation standards in paleontology collections where to start?

Adrain, Tiffany S.*; Lewis, David N.**; Horton, Mary M.*

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**Department of Paleontology, The Natural History Museum, London, SW7 5BD, UK

There is a major trend in earth science funding towards data sharing between collections, institutions and organizations. However, before we can share data, we have to have this data available.

The palaeontology collections of the Natural History Museum in London number some 9 million registered curatorial units, of which it is estimated that 10% are type, figured and referred specimens. Perhaps 10% of the collection has been catalogued electronically and the rest is in large book-type registers. None of the information is yet available on-line but will gradually become so when a new Collections Management System is fully installed (KE Emu) in the near future. There is also a considerable backlog of unregistered specimens, much in field state awaiting preparation and first stage curation.

The University of Iowa Paleontology Repository contains over 1 million specimens, 25,000 of which are cited in scientific publications. Approximately 10% of the

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collection is catalogued in a card index, with only 3% electronically catalogued (SPECIFY) and available on line.

For the other 90% of these collections, which are in varying states of curation, the question arises where to start? To assess the current level of curation of the collections and to prioritise curation projects required to improve curation standards, existing collection survey methods were adapted for a survey of the entire UI Repository collection and part of the NHM fossil echinoderm collection. The collections were divided into manageable units and a step by step guide or key was developed and used to assess these units. A curation plan was determined, outlining steps to improve the curation standards of individual units and prioritise curation projects. The survey had several benefits, including the production of a basic collections inventory (what we have and how much there is), determination of current research accessibility (how easy it will be to use material for research), and the determination of realistic curation goals and projects.

Tiffany Adrain
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Oral presentation and poster

A contribution to standards for freezing as a pest control method for museums

Akerlund, Monika*; Jensen, Karl-Martin V.**; Bergh, Jan-Erik***;
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Many museums use ordinary freezers (-20°C) instead of expensive low temperature freezers (-30°C) for pest control. Recommended exposure time for freezing varies. In order to investigate the effectiveness of -20°C freezers, specimens of a number of museum pest insect species were placed in plastic boxes inside well-insulated objects and frozen at -20°C.

Three experiments with 3 or 5 replicates were performed. Test insects (15 individuals of a species) were placed:

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- 1) inside wooden a block 20x20x20 cm, (cooling time 18 h).
- 2) at 4 levels from top to middle (approximately 2, 4, 8 and 16 cm from surface) in a package of woollen blankets (cooling time 30 h).
- 3) inside a wooden block 20x20x20 cm, wrapped in woollen blankets (thickness: 5.5 cm) (cooling time 70h).
In experiment 1 and 3 an upright freezer Gram F 600 was used, and in experiment 2 a Cylinda AFB 500 chest freezer.

The following larvae and some adults reared at Danish Pest Infestation Laboratory were tested: *Trogoderma angustum*, *Reesa vespulae*, *Attagenus smirnovi*, *Attagenus woodroffei*, *Anthrenus museorum*, *Anthrenus verbasci* and *Tineola bisselliella*. The temperatures close to the boxes were recorded with a Squirrel temperature logger. The packages were kept in the freezer at about -20°C for 24 or 72 hours. In Experiment 1 and 3 the untreated control insects were kept in a refrigerator Gram K 600 at 4-5°C and in experiment 2 at room temperature (22-24°C).

In experiment 2 the temperature stabilized after 30 hours, in the 8 cm layer at -16°C and at 16 cm at -14°C even after five weeks of freezing. The temperature under the package reached -8°C. Therefore, a 6 cm high wooden frame was placed on the bottom of the freezer, allowing the air to circulate around the package. The temperature now reached -18 to -19°C after 30 hours.

Results:

Experiment 1. Larvae and adults of *Att. smirnovi* and *Att. woodroffei* suffered 100% mortality after 24 hours at -11°C; *A. verbasci* at -15°C, *A. museorum* at -20°C, larvae of *R. vespulae* at -15°C and *T. angustum* at -18°C.

Experiment 2. After 24 hours -14°C 100% mortality was obtained in larvae of *Att. smirnovi*, *Att. woodroffei*, and *A. verbasci* at -19°C. 100% mortality occurred in *T. angustum* and *R. vespulae* after 72 hours at -19°C, but *A. museorum* still showed high survival. At a check one year after freezing 100% mortality was found in *A. museorum* after exposure to 72 hours of freezing below -18.5°C. The initially surviving larvae had died at first moulting.

Experiment 3. 100% mortality was reached for all species including *T. bisselliella* and *A. museorum* after 72 hours below -17.6°C.

Conclusion:

Pest insects including *A. museorum* are killed at -20°C after 72 hours, if adequate air circulation is ensured during freezing.

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Protecting the ancestors: safely shipping native American artefacts

Anderson, Gretchen; Newberry, Rebecca
Science Museum of Minnesota, 120 West Kellogg Boulevard, St. Paul, MN 55102, USA

Packing fragile Native American artifacts for an international loan presents a unique challenge. The Conservation Department at the Science Museum of Minnesota recently had the opportunity to develop innovative packing techniques to ship 100 artifacts to the Basauri Museum in Spain. When handling Native American artifacts, their physical and spiritual care must be considered. The Department collaborated with the museum's ethnology collections manager, an external art packing company and Native American consultants to ensure the method was easy to use and safe as well as respectful.

Gretchen Anderson
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Poster presentation

Minimising the risks from the ten agents of deterioration in two new West Midlands museum resource centres

Andrew, Katherine J.
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The West Midlands region of Britain is home to two new collection centres, housing around 200,000 items including substantial natural history collections. The Herefordshire Museum Resource and Learning Centre was officially opened on 28th February 2005 and the Ludlow Library and Museum Resource and Learning Centre was officially opened by Her Majesty The Queen in May 2003. Both centres were created from briefs written by the author that set out the need to minimize the risks from the ten agents of deterioration, a model first developed by the Canadian Conservation Institute and expanded by Robert Waller of the Canadian Museum of Nature. Both centres received substantial support from the Heritage Lottery Fund and capital investment from the relevant local authority.

The Hereford centre is a refurbishment of an existing building, the Ludlow project a new build. The differing approaches to achieving minimal risks from each agent and the effectiveness of these measures will be compared and contrasted.

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Oral presentation on Wednesday 15th June

Conservation at The Horniman - new for old. Applying standards to new and historic galleries

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In 1898 Frederick Horniman commissioned Charles Harrison Townsend to design a museum to house his collection of Natural History specimens and Anthropology collections. The two original galleries are now a Grade II* listed building as is a later additional gallery designed by Harrison Townsend in 1911. In recent years the Horniman Museum had a programme re-developing the two Ethnography galleries as well as creating a new gallery for musical instruments in a purpose built Heritage Lottery Funded Building. The Natural History gallery has undergone no large-scale renovation since 1957. It still contains the original 1911 mahogany showcases, which will be retained. Applying conservation and collections care standards to historic galleries and old showcases has its problems and its challenges.

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Oral presentation on Wednesday 15th June

Evacuating a collection of geological specimens, a small scale drill

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The Hadeland Bergverksmuseum, a privately owned mining museum in Norway, had to leave their premises at short notice. The geological collections and the exhibited objects were packed and moved in one day. The Natural History Museum in Oslo conducted this evacuation in co-operation with the local museum. The preparations included:

Collection condition and risk assessment:
Classification of the collections, packing and transport was supervised by one or two professionals from the NHM, Oslo. Most of the geological specimens were handled and packed by volunteers who had no previous practical experience. Fragile specimens were dealt with by professionals from the NHM, Oslo. Digital recording of the collection was done during packing and transport to increase the possibility of reconstruction in case of damage.

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Logistics and preparedness:

An existing store of packing material and empty boxes is a presupposition for an effective evacuation because it is very time consuming to get this from external sources. Transport resources also have to be available. Refreshments for the staff are also very important. New and safe premises for the evacuated material must be established in advance.

The collection was successfully packed, moved and stored within one day.

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Poster presentation

Sustainable collections: local connections and international obligations

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Museums in the public realm exist to serve society, which they do primarily through their purpose as institutes of learning. Collections are held as a means to this end, to be managed and developed as a unique resource for scientific research and wider public engagement. Connecting with the needs of society, responding to the agenda of their principal funders and recognising their international obligations are courses of enlightened self-interest for the sustainable museum. The support that a museum earns from society is proportionate to the cultural (including scientific) value that society places on it. Cultural value is reckoned not only on what the museum has (its collections) but on what it does with them and the beneficial impact of such activities. The development and use of scientific collections has a global context, in which the ethical museum must reconcile a range of obligations to the international community.

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Oral presentation on Tuesday 14th June

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Natural History exhibit renovation and evaluation-setting benchmarks at the Redpath Museum, McGill University

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The Redpath Museum at McGill University recently completed a three-year project to renew and renovate the permanent natural history and ethnology exhibition galleries. The goal of the natural history exhibit renovation was to develop and produce educational and enlightening displays focusing on the geoscientific and biological diversity of Quebec. Because of the special nature of the museum as a university teaching resource, many of the new exhibits were designed to present specific themes and concepts that correlate to academic courses. Concern for formal evaluation of the new exhibits implies that the Museum is aware of the needs of its mandated audience—the university undergraduate student, as well as its main audience—the general public.

The new exhibits were written for the university undergraduate biology and geology students. They were designed so that the emphasis was on the concepts to be communicated rather than on the specimens per se. The general assumption of the design team was that students would be inclined to learn if the design scheme was appropriate and skillful in enabling learning. Most of the new exhibits are didactic in nature and panel texts distill what is to be learned into small discrete steps, arranged in order, usually from the simplest to the most complex. The focus is on the content to be taught, and the content is often hinged to the learning objectives of the professors who utilize the exhibits to teach specific courses.

In order to evaluate how these new exhibits contribute to the teaching of undergraduate biology the author conducted a pre- and post-test survey to measure student gains in understanding the exhibit topics. The pre- and post-test questionnaires were administered to approximately 400 students prior to visiting the exhibit and approximately one week after viewing. Similar or exact questionnaire items were also placed on instructors exams. Interviews were conducted of sample students from each course to collect qualitative data concerning students' perceptions of what they learned from the exhibits. Similar interviews were also be conducted with the exhibit designers but not necessarily during the same time frame as the student interviews. This presentation will provide a brief history of the museum's exhibition programme and then focus on the challenges of recent exhibit renovation and the results of the evaluation process.

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A GIS tool for interpretation of pest monitoring data in a museum environment

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Integrated pest management (IPM) programs rely upon detailed monitoring of pest species activities in order to obtain data describing the occurrences these species in the work, storage and public spaces of a facility. Analysis of this data should help determine the best corrective actions to be taken. Unfortunately, not only is monitoring data capture typically a time-consuming process, but delays in the analysis of this data and difficulties inherent in making clear, succinct presentations of these analyses ultimately slows down and/or interferes with the transfer of information to decision-makers. Consequently, a thorough monitoring effort is often bypassed, forcing collections or facilities managers to turn to pesticides and other expedients, rather than IPM, to control indoor pests.

Since 1999, the Riverside Municipal Museum has utilized IPM procedures in the assessment and control of pest species occurrences in its early 20th century-vintage facility. Recently, the museum has been working with graduate students from the University of Redlands to explore ways in which Geographic Information Systems (GIS) technology can help automate important interpretive and analytical functions of museums. For this particular project, student Jinho Kang has created a spatial analysis tool that utilizes the type of pest monitoring data the Municipal Museum has collected over the past six years, and allows for easy incorporation of new pest monitoring data. This GIS approach is intended to help generate reports on past and present pest occurrences, and anticipate future problems.

Initial steps in the project involved creating digital maps of each floor of the museum building and plotting the monitoring data to display the frequency of specific pests (based on trap records) in certain locations (work spaces, storage areas, exhibition halls). Temporal analysis methods were then incorporated to allow determination a specific category of pest frequency of occurrence, by month or season. Extensions of the project included inserting utility locations, or structural issues, to allow mapping of hypothetical routes for pest movement.

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Poster presentation

GIS, herbarium collections and development of an electronic "field guide" to plant collections

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Though seldom exhibited, herbarium collections can provide enriching experiences for every kind of audience, including botanical researchers, natural resources managers, museum visitors, nature enthusiasts and recreationists, and the Internet user. Geographic Information Systems (GIS) technology offers many ways in which both botanical specimens and data can be presented in conjunction with cartographic depictions of locations of widely-recognized natural significance.

Since 2002, the Riverside Municipal Museum's Clark Herbarium and the United States National Herbarium have shared resources in pursuit of just this sort of application of GIS technology. Using specimen locality descriptions from both collections (and GIS software provided by ESRI of Redlands, CA) and a base map from University of California - Riverside, a project concept was developed that made data sets from historic plant collecting localities in California's San Jacinto Mountains accessible via GIS. In the Spring of 2004, graduate students from the MS in GIS program at the University of Redlands took up the challenge of designing an ArcIMS-based GIS website that combines the initial, basic approach with digital images of plant specimens and other visual reference tools that we commonly associate with printed "field guide" publications.

In April 2004, the new GIS website was previewed at a workshop hosted by ESRI at the corporation's Redlands campus. This new tool proved to be a useful catalyst for discussions among the museum, natural resource management and information technology professionals who attended as to how such an application of GIS can bring about increased cooperation between collections-holding institutions and the custodians of our most valuable natural areas. This geographical perspective on herbarium collections can help increase the accuracy of interpretation of specimen locality data sets, at the same time preparing these collections resources for use in place-based science and natural resources management efforts. In an even broader context, GIS-accessible herbarium data becomes a part of the larger body of information serving to document and enrich the user's general knowledge of such a location. In short, the assembly of the plant data and the interpretive design of the GIS tool are both informed by and contribute to our "sense of place".

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Oral presentation on Tuesday 14th June

Communicating about collections standards to "non-collections people"

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People who manage and care for collections on a daily basis generally have a shared understanding of the importance of standards of care and the benefits of compliance with these indicators of "best practice". But what of the awareness and understanding of people whose work is more removed from collections, or focused only on the research uses of collections? Sometimes administrators, managers, and researchers don't regard standards or compliance with standards as important. Alternately, they may be unaware of how the application of standards can benefit the organization, or they may even be opposed to standards. Collections managers and conservators frequently need to explain the reasons for maintaining standards to people who are responsible for planning, making decisions and allocating resources. Explanations that are tailored to the audience and circumstances, and which include cost/benefit ratios, credibility, public reputation, accuracy and reliability, fiduciary responsibility, and accountability to donors, among other elements, can all lead to broader appreciation within an organization for the value of maintaining standards as well as improved conditions for the collections themselves.

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Oral presentation on Tuesday 14th June

Standards in natural history conservation training

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The preservation of natural history material has traditionally been carried out by the collectors, researchers and curators themselves. In larger institutions trained technicians were used for specific aspects such as taxidermy, skeletal preparations, model making etc, but until recently conservation as a specialisation in natural history was rare.

In the 1980s it was realised that there was wide scale of neglect of natural science collections in museums and, without action, valuable material would be lost. Conservators began to be appointed in the natural science disciplines, but their

appointment was generally restricted to some of the larger national museums. Collections in smaller museums were and are still at risk. The number of natural history conservators has not greatly changed in the last ten years and few are coming into the profession.

There is a world-wide need for a training programme to promote natural history conservation both amongst natural science curators and generic conservators with natural history collections in their care.

This paper will propose a formal training programme to cover the conservation requirements of a natural history collection. It will address which core topics need to be included and what specialisations, and how these programmes can be carried out.

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Oral Presentation on Thursday 16th June

Online botanical databases - global resources at the Natural History Museum, London

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The Natural History Museum is a major repository of natural history collections made throughout the world, and over a long period of time. Its earliest botanical collections date from the late 16th century. Conscious of the need to make these collections more widely available, the Museum has undertaken an ambitious programme aimed at increasing their accessibility. In recent years, the herbaria of John Clayton, Paul Hermann, George Clifford and Sir Hans Sloane (Jamaican collections), all rich in type specimens, have been digitised and the images made freely available online, along with searchable databases to allow easy retrieval of information. Currently, the Museum is actively involved in the Mellon Foundation-funded African Plants Initiative which aims to make available digitised and databased collections of all the world's African plant type specimens, along with associated library materials, online. We are also expanding the scope of these collaborations to include additional historical collections (e.g. Spruce collections from Latin America) and cryptogamic plant groups.

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Poster presentation

Investigating chemical changes in fluid preserved specimens using FTIR spectroscopy

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Infrared spectroscopy has proved to be a powerful tool for studying biological molecules. When a substance is exposed to Infrared light molecular level vibrations can occur. These can be detected and measured by techniques such as Fourier Transformed Infrared (FTIR) spectroscopy. Infrared spectrometry is particularly sensitive to the presence of chemical functional groups which enables a sample to be chemically characterised or even identified. A study was set up to establish the viability of using FTIR spectroscopy to monitor chemical changes in fluid preserved specimens. Animal protein samples were preserved in a range of fluid preservations. These included formaldehyde solutions, ethanol solutions and Dekafald (DMDM Hydantoin). At set intervals small pieces were removed from the samples and critically point dried, after which they were analysed on the FTIR. Additional measurements included observing the condition of the samples and pH measurements. This paper will present the interim findings from the study.

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Poster presentation

Conservation of the Harlech leatherback turtle

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The National Museum of Wales has on display the world's largest recorded specimen of leatherback turtle. The specimen was found dead, washed up on a beach in North Wales in 1988. The museum quickly embarked on a programme to preserve the turtle as a taxidermy mount, and to develop an exhibition to display the specimen. However during 2003/4 the specimen started to noticeably crack and disintegrate. This poster explores the possible reasons for these problems and the ensuing conservation work required to bring the specimen back to display quality.

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Poster presentation

Mould in the desert

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In an effort to practice good preventive conservation, the Museum of Peoples and Cultures humidified its textile storage room. However, the humidifier malfunctioned, and the sensors failed to turn the humidifier off when the humidity reached 40% as they were programmed to do. The continual humidification raised the humidity above 60%. The problem with the humidifier was probably compounded by an uninsulated room, possible ceiling leaks and heavy use of sprinklers spraying on the outside north and west walls. In the corner of the room steam pipes also had a very slow leak.

Mould grew on the west and north walls, in the carpet, and on several of the boxes stacked on shelves near these walls. This mould was identified as non-toxic, but very invasive.

After quickly consulting several conservators, we undertook remedial action to assure that objects were not harmed and that the mould would not return. The collection objects in the room (mainly textiles) had been protected by individual coverings, so the artifacts themselves did not come in direct contact with the mould. All of the textiles were removed from the mouldy housings, frozen, and then put into clean storage containers. The room was cleaned and then redesigned to make it less appealing to mould and better for the long term care of the objects. The wooden shelves and interior walls were cleaned with Clorox water, and painted with KILLZ. False walls were built in front of the two outside walls, and also around the perennially leaking steam pipes; these walls provide dead air space to insulate the outside walls. These walls were painted with KILLZ. The carpet on the floor was pulled up, the sub floor was cleaned with Clorox water and a new flooring, mednetec vinyl, was laid.

We discontinued use of the humidifier because we could not control the humidity with this system. In the future, we would like to reinstitute humidification if we can find a trustworthy system, but for now, the objects are safer without.

The collections objects, in new housings, are back in their refurbished room, safe again.

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Poster presentation

HERBIS is the Erudite Recorder Botanical Information Synthesizer: highlights and a progress report

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The technology required for digital image capture of specimens has become affordable, if not yet commonplace. Digital imaging projects often do nothing more with images than make them available for web display. However, an image can serve the additional purpose as the basis for label data capture. Along with specimen images, label data, particularly georeferenced label data, is a valuable public product for collections.

Our ultimate goal is to reduce the total cost of digital collection data capture by significantly reducing human labor required and total project duration. Ideally, clicking the shutter on a digital camera initiates a sequence that culminates with the population of label data and a specimen image into a structured collection database. Practical gains can be achieved by developing appropriate protocols and methodologies, then packaging them as web services. We are using open source and commercial solutions, and are developing solutions where necessary that accelerate the herbarium specimen data capture process. Each of these solutions is embedded into web services, providing benefits such as cross-platform interoperability and scalability.

Our first operational web service transforms tiff images into a jpeg2000 format with the option of using lossless or lossy compression. We are currently embedding a commercial OCR (Optical Character Recognition) package as a web service and will show the output obtained from running this OCR software on a samples of different herbarium data labels. We have identified issues relating to high-throughput herbarium specimen data capture that can be addressed, and those that may not be solved at this stage with currently available technology.

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Oral presentation on Thursday 16th June

Raising standards: preserving the old, initiating the new

Chambers, Sara

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The Royal Cornwall Museum's collection of South West of England mineralogy is one of the finest in the world. At its core is an outstanding early collection of minerals made by Philip Rashleigh (1729-1811), the most famous of Cornish mineral collectors, who lived at Menabilly, near Fowey, Cornwall. Rashleigh collected over 3000 mineral specimens and meticulously labelled and recorded them in his manuscript catalogue. His two volume *Specimens of British Minerals* published in 1792 and 1802 figures over 300 of his specimens. Thus the collection is almost unique among 18th century mineral collections, having survived essentially intact with extensive supporting historic documentation.

Years of under funding and insufficient human resources resulted in minimal effort being spent on the care and management of the mineral collection. Prior to 2001 it was in a state of some disorder, becoming organisationally fragmented, with individual specimens sustaining damage and others becoming dissociated from their historic documentation. The collection had effectively ceased to function as a reference and research resource and existed only as a group of display items.

The retrieval of this 'dormant' collection presented a considerable challenge, even though it was virtually unencumbered by the piecemeal attempts at curation which so often litter the histories of other collections. A collection-recovery programme was designed comprising three sequential phases: collection inventory and reorganisation; specimen conservation; historic documentation conservation.

The first phase of work was completed in 2002. Phase 2 is underway and the final phase is in its planning stage. The benefits of phase 1 are already apparent: specimens or collection information can be readily retrieved on request; component collections which have lain un-recognised since their initial accession have re-emerged and the new level of activity surrounding the collection has raised awareness and interest in the mineralogical community. Once completed, the standards building programme will have returned the mineral collection to a functional state - available for reference, capable of sustaining research and effectively secured for future generations.

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Poster presentation

Synthesys NAC assessing standards in European museums

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Natural history collections are at the heart of taxonomic research. Improved standards of care, access and management can only improve levels of taxonomic research throughout Europe. Synthesys is a European project focused on improving access, use and development of research into taxonomy in European natural history museums. Split into a number of network activity sections, A-F, Network Activity-C of the Synthesys programme is focusing on identifying and improving standards of care and access to European natural history institutions. Following work undertaken by the Natural History Museum, London, member institutions have identified a range of standards that natural history institutions in Europe should be aspiring to meet. In order to assess how Synthesys member institutions meet these standards a sub-group of NA-C has developed a standardised survey methodology that benchmarks levels of attainment that European natural history museums currently meet. The survey establishes 3 benchmark levels of attainment and the overall benchmark level which a particular institution meets. The Survey also identifies how institutions can move from level C the lowest benchmark, through level B to level A, the highest benchmark. This presentation reviews the standards which an institution is expected to meet to attain a particular benchmark level and the results of trial surveys undertaken at Hungarian Natural History Museum and Naturhistorisches Museum, Vienna. Future developments will link the results of surveys of all Synthesys member institutions with information gathered by NA-B which has looked at the taxonomic collection strengths of each member institution. From this the group will move to look at how prioritised collection improvements can be made throughout Europe. It is hoped that these benchmarks will become standards of attainment for natural history institutions throughout Europe and will attract future European Union funding to assist institutions in improving their benchmark and through this their opportunities to attract increasing financial and research resources.

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Oral presentation on Tuesday 14th June

Technology in museums: friend or foe?

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The vast majority of museum collections (e.g. in the Natural History Museum, Dublin) are un-catalogued and are not easily accessible to either, museum workers or visiting researchers who need them for studies. The sheer volume of data demands new methods to create electronic databases so that records can be easily found. With this project we examine whether lay people can be safely employed to work in museum collections and what methods and technologies may be most efficient to catalogue collection backlogs. "High tech" ways to database collections may be potentially faster than the "traditional" method (transcription)-e.g. intelligent character recognition (ICR), or speech-recognition software (SRS).

Furthermore, new methods may mean that workers could perform curatorial tasks with only a minimum of training, thereby freeing time for curators and technicians. By "lay people" we consider those uninitiated in the workings of museums and those that may have only a small understanding of the area they will work in (biology, history, arts, etc), including the student volunteers used in these trials. It is often assumed that to catalogue a museum collection, a high level of museum training is needed; however, improved technology might reduce necessary training of all workers and prevent common errors.

The performances of two groups-trained and untrained-were examined, with 45 people in each group. Each group was divided between three methods (ICR, SRS, transcription), using passerine bird specimens from the National Museum of Ireland, Natural History Division as a model collection. Preliminary results show that the volunteers using the transcription/typing method catalogued a selection of specimens significantly faster than the volunteers using SRS. However, ICR may be significantly more efficient than SRS and individual differences in software packages impact utility. Systematic testing of comparable methods is fundamental to making decisions about allocating resources, both in staff time and equipment.

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Oral presentation on Wednesday 15th June

Re-curation of specimens preserved in degraded alcohol: testing alternative techniques

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Colorado State University made a donation of 2,965 vials of spiders in need of re-curation to the Denver Museum of Nature & Science by Colorado State University. In the majority of vials, the alcohol levels and concentrations were low and the alcohol was discoloured due to leachates from the specimens and the neoprene stoppers. We tested two different transfer methods: gradual transference into a series of lower alcohol concentration solutions beginning with 45% into standard 75% alcohol solutions and immediate transference from low (45%) concentration solutions into 75% solutions. We tested the effect of these two different methodologies on specimen quality and preservation. It was found that neither method significantly affected the conditions of arachnid specimens. A value assessment also was done on the donation. This consisted of a condition survey, including testing the alcohol concentration, and a mathematical equation was derived to measure value of the entire donation.

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Poster presentation

Can I acquire that fossil? A pragmatic solution to a legal problem

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Acquiring palaeontological specimens for museums has never been more complex. It is the duty of a museum to ensure the highest standards are maintained in the acquisition of palaeontological material to protect the reputation of the museum, the scientific discipline of palaeontology and its practitioners. These standards have been defined as:

- Ensuring that the provenance and history of an object is legal, licit and ethical.
- Ensuring that the object has not been acquired in, or exported from, its country of origin (or any intermediate country in which it may have been legally owned) in violation of that country's laws.

- Ensuring that the provisions of the UNESCO 1970 Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property are upheld (whether the museum resides in a country that has ratified the convention or not).

To achieve these standards would involve natural history collection management personnel requiring a high degree of knowledge of the legal systems and status of the laws in many countries. This creates an immediate problem in that many legal specialists have a very little knowledge of the relevant laws within their own country and are unwilling to interpret laws outside of this sphere. This talk will present a solution to the requirements of specialist legal knowledge and outline a system of 'due diligence'. The concept of due diligence combined with freely available (via the WWW), current and accurate information on the legislation protecting palaeontological heritage and its transport across international boundaries will enable the international museum community to meet standards expected of them in acquiring palaeontological material.

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Reserve oral presentation

The NHM's Collection Management Standards Project: defining, setting & implementing international standards in collection management

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From June 2003 to February 2004 the Natural History Museum London managed the 'Collection Management Standards Project'. This project was tasked with defining the tasks and approaches needed to achieve the NHM's '2010 vision'. This 2010 vision stated that, 'The Museum must continue to be one of the top three natural history museums in the world. To do this we will need to... ..become a world leader in setting and maintaining the most appropriate standards and practices in collections conservation and management'. The NHM Collection Management Standards Project was to achieve this by consulting as widely as possible internally and particularly outside the museum in order to define global best practice, and produce proposals for action that will ultimately lead to the introduction of global best practice at the NHM by 2007, and also define and produce a framework of international standards for collection management.

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During the course of the information gathering and external consultation phase of the project a network of institutions concerned with establishing, implementing, and maintaining the highest standards of all aspects of collection management and conservation of natural history collections were identified and consulted. In addition to the results of the project, presented here, the project provided a platform to build from for the work of the EU Framework VI project SYNTHESYS, in particular Network Activity C that is concerned with creating a European standard in collection management.

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Oral presentation on Tuesday 14th June

Standards of care for gemstone collections

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Different types of museums may hold collections that include gemstones, carvings, spheres, beads, and other types of worked decorative stone and organic material. While these materials may not require special attention in terms of environmental controls, they do present some unique challenges for the collections manager.

Carvings, beads, and other odd-shaped objects can be stored singly in customized containers, or in groups of similar objects. The latter method often saves space, even though it may mean that like materials are separated. Detailed information about each object is crucial to the identification of gems and other specimens where it is not possible or advisable to mark them with catalog numbers. This includes weight, dimensions, shape, colour, type of object (faceted stone, bead, etc.), and possibly other data such as refractive index or specific gravity.

A strong and detailed collections policy is an important asset for anyone who cares for and is responsible for gemstone collections. The greatest risks to these collections are theft and mishandling by exhibits staff or other people not familiar with the materials involved.

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Oral presentation on Thursday 16th June

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Scanning specimens as an alternative to traditional photography

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Flat-bed scanners can be used to record specimens and their associated data. In many cases, this process is faster and more efficient than traditional film or digital photography. Specimens that are light-sensitive may be exposed to a strong, cool light for a very brief period as opposed to being set up under hot lights for a longer time during traditional photography. A single scan can include the specimen along with scale bars, identifying numbers, and/or an entire label.

Most scanners can produce images that show depth of field, so specimens do not have to be flat for this to work. Large items can be scanned in parts, and the images assembled using graphics software. Wet-preserved specimens can be scanned by placing them in a flat transparent container on the scanner bed. Sometimes the addition of fluid will help to maintain the shape and depth of the specimen, making the photo more accurate.

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Poster presentation

Realising new standards for wet collections facilities

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The National Museum of Natural History wet collections include over 10,000,000 specimens from invertebrate zoology, vertebrate zoology, botany, biology and other collections in a variety of jars held in a variety of spaces. Researchers, both in-house and from around the world, use these collections in spaces which have also become rather ad hoc. The long delayed building of a new facility is underway. But providing new space for wet collections involves more than finding more space and finding the money to build it. Current codes and safe work practices have huge impacts on the size of space needed and the operational standards of how collections staff will be permitted to use the collections and the costs to fit out the space.

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This session will use the case study of the design NMNH wet collections design to highlight the most significant issues that will impact the planning and design of a new facility. In particular, lessons learned will include:

- Impact of current codes
- Limitations of your site
- Operational changes
- Process for design to 'remember everything'
- Costs of safety requirements
- Benefits of benchmarking
- Ergonomics of good design

Session participants will hear about the evolution of the design and operations that will permanently affect how the NMNH can care for and use their collections.

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Oral presentation on Tuesday 14th June

Risk zones for IPM: from concept to implementation

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A ban on the use of dichlorvos [DDVP] in the UK resulted in a need to implement an Integrated Pest Management (IPM) programme to protect vulnerable collections in storage areas and on display at the Natural History Museum, London.

With such a large diverse collection in a complex series of interconnecting buildings it was necessary to break the programme down into sections.

A key to this was the decision to define and adopt the concept of "Risk Zones" from high risk A, to low risk D, for all areas of the museum.

The paper describes the development of ideas and subsequent implementation of the "Risk Zone" concept.

We will also make observations on the need to identify priorities and the importance of training staff at all levels in pest awareness.

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Oral presentation on Wednesday 15th June

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A new working group for integrated pest management in museums

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The Integrated Pest Management Working Group was set up in 2002 as an ad hoc group of museum professionals dedicated to the development of pest management resources for the general museum community. Every museum is concerned about insect pests and many use IPM as a method for addressing these concerns. The group's goal is not to IPM for each museum, but rather to focus on deliverables to make IPM easier for museum staff. All museums have similar challenges with regard to pest management; the aim of the group is to help solve problems while alleviating the need for every museum to come up their own solutions. This presentation will describe some of the initiatives being pursued by the group, including the development of on-line resources for collections care personnel to use in identifying potential or real threats to their collections; assessing the need for IPM databases; and developing training resources, both printed and electronic, for all museum staff with a pest management responsibility.

Richard Monk
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Poster presentation

The state and status of geological collections in UK museums

Fothergill, Helen V.

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The Geological Curators' Group, established in 1974, undertook a survey in 1981 investigating the 'State and Status of Geology in United Kingdom Museums'. This survey, the first of its kind, set out to provide a snap-shot impression of how the nation's geological collections were cared for, regarded, used and housed. It allowed the Geological Curators' Group to focus its members' efforts, influencing, where possible, policy decisions regarding the future of many 'at risk' collections and assisting museums in need to specialist curatorial advice.

In 2001 it was felt that more than enough time had elapsed since the original survey, and that there was a need to repeat the process, explore other areas of

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museum management, care and use of collections and compare, where able, the results from the two surveys 20 years apart.

As the political climate has changed emphasis in many museums has been shifting from scientific research and curation to 'lifelong learning', extended intellectual and physical public access, digital and computerised documentation and virtual contact with collections.

With access to new funding opportunities, museums have expanded and in some cases changed beyond all recognition. More funding appears to be available to all, but with 45% of respondees listing lack of staff time or expertise as their biggest 'threat', will the 'new' curators or collection managers be able to dedicate the resources to chasing these elusive funding streams and proving that they are meeting targets and performance indicators whilst maintaining often historically and scientifically important collections?

The United Kingdom has a unique history in the field of geological curation and collections, with many museums holding collections and specimens of unrecognised scientific and historical value. Should the heritage and culture community feel confidence in their continued care? What problems do we, the curators, perceive with the current 'State and Status' of the collections we hold in trust?

The full 'State and Status of Geological Collections in United Kingdom Museums: 2001' report will provide another 'snap-shot' of the UK's collections and explore how the position of these collections has changed in 20 years.

Helen V. Fothergill
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Oral presentation on Thursday 16th June

Outgoing exhibition loans: when you need more than a specimen invoice receipt

Gambill, Vicki
Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, CA, 90007, USA

For the majority of the outgoing research loans from The Natural History Museum of Los Angeles County, the Specimen/Object Invoice and Receipt form serves as both the loan agreement and a receipt. The borrower signs off on the conditions that are stipulated as part of this agreement at the time of delivery of the loan. However, many exhibition loans require more stringent conditions for packing,

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shipping, display and insurance. In such cases, the borrower must agree and sign off on these conditions before the actual shipment of specimens and/or objects. With this in mind, the Registrar's office of the Natural History Museum (NHM) created an Outgoing Loan Agreement and an Outgoing Receipt specifically designed for exhibition loans and other loans with special requirements.

In June 2004, the museum lent a number of entomology, mammalogy, ornithology, and vertebrate paleontology specimens to the Ibaraki Nature Museum, our sister museum in Japan, for Ibaraki's tenth anniversary exhibition. The Registrar and the Collection Managers completed the Outgoing Loan Agreements well in advance of actual shipment. We clearly outlined the terms of shipping and insurance as well as general handling and display conditions in the agreement. Before packing, the Registrar and Collection Managers also completed outgoing condition reports and digital photo documentation for the specimens. A professional art packer, contracted for this loan, fabricated custom packing boxes and crates to our specifications. Professional art shippers handled the shipping of the specimens both in the United States and Japan. After six months, all specimens returned safely to their appropriate collections within the Museum.

Vicki Gambill
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Oral presentation on Tuesday 14th June

Bridging the gap: standards for the transfer of specimens from the field to the museum

Garner, Heath; MacDonald, Kathryn; Carrera, Juan Pablo; Baker, Robert J.
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Natural history museums owe their existence to the collections. In this sense, both researchers and museum professionals are members of a team working to acquire specimens and associated data to ensuring that the collection has maximum value and is accessible for years to come. Problems associated with collection can be traced to one of three places: the field, the transition from field to museum, and the museum. Despite slight differences in philosophies, this team must work together to standardize methods thereby minimizing potential problems. Developing a clear line of communication is the primary key in standardization of methods to obtain and process information. First, each team must understand the duties and philosophy of the workers at each location. Insight into the alternate team's perspective can be accomplished by allowing researchers a chance to participate in museum curation while allowing museum professionals to participate in field collecting. Second, standards must be agreed upon to ensure uniform

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collection methods among the various stages. The procedures must be written and available to workers at all stages as well as to other contributing collectors. Understanding how the specimens will be used in the museum allows the museum staff to properly organize the collection. All protocols must be unanimous, documented, and shared among current and future staff and researchers, to ensure that the legacy of proper care of the collection will continue. Likewise, problems that arise should be recorded so that policies can be adapted accordingly. In this manner, both museum professionals and researchers can be assured that the collection will be valuable into perpetuity.

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Poster presentation

Subject specialist networks - developing a subject specialist network for the natural sciences in the UK

Gordon, Nick
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One of the key drivers behind the formation of NatSCA was the recognition that natural sciences in Britain needed a stronger voice and would be better served by a larger organisation rather than a number of disparate groups. While NatSCA has a national scope, producing publications, organising meetings, seminars and training, it was recognised that there was a clear need for a national network of natural science curators and institutions to take projects forward on a local, regional and national level.

A framework partnership was developed to support a grant bid, including The Natural History Museum, National Museums and Galleries, Merseyside, and museums from the Regional Hubs. The aim of the bid was to develop a framework for a national network based on the major regions of the UK. At the time of writing (March 2005) the first meetings were being organised. This paper will consider the progress to date, issues that have been raised and the priority areas identified for the Network to address.

Nick Gordon
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Oral presentation on Wednesday 15th June

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Lost brachiopods-found in Dublin

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Brachiopods are living fossils, with a fossil record that extends more than 500 million years. They are common in the fossil record of marine sediments and are still alive today but in greatly reduced diversity. The presence of brachiopod specimens in palaeontological collections is generally indicative of the overall strength of invertebrate fossil holdings. Brachiopods are of particular interest not only for their evolutionary history and biology, but as tools for dating the age of sediments poor in microfossils.

The National brachiopod collection of Ireland held in the National Museum of Ireland (Natural History Division; NMINH) has been almost completely inaccessible for more than 40 years due to collections moves and chronic under-staffing. Now, for the first time, we present a survey of fossil and Recent material. The central purpose of this assessment was to make details of the material-including a substantial number of type specimens of Ordovician and Carboniferous brachiopods-available to researchers worldwide. Our assessment covered the diversity and representation of groups through geological time, including Recent specimens in the NMINH zoological collections. Various historical collections contribute to the NMINH holdings, including Sir R. Griffith and more recently J.C. Harper. New analysis of the geographical distribution of samples in Ireland and Great Britain illuminates patterns in historical collecting and palaeofaunal diversity. This poster portrays the localities and ages of the specimens in the collections. The information provided will help potential researchers by better informing them of the collection available for research in the NMINH. Survey results have also enabled Museum staff to develop a comprehensive strategy for improving collections housing and future development.

Cróna Gray and Julia Sigwart
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Poster presentation

"I am beginning my research; what shall I do with my geological specimens?" - a note of advice: re-assessing and re-emphasising the Tunnicliff (1983) paper

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Over twenty years ago Steve Tunnicliff (then of the Institute of Geological Sciences, later British Geological Survey) authored a paper for the Natural Environment Research Council (NERC) detailing advice and guidance to graduate students embarking upon new geological research on how to ensure their specimen collection was not misused or lost to science. The paper offered practical advice to 'supervisors, students and research workers' on how to initiate a project and organise their research collections 'in such a way as to make them useful, easily understood by others, and acceptable to the museums or institutions where they are to be housed'.

Unfortunately, many graduate students, and post-graduate students remain unaware of the importance of generating and donating a well-curated collection upon completion of their research. The recognition of well-curated geological collections as national assets and an irreplaceable scientific resource necessitates re-emphasising the guidance advocated by Tunnicliff to a new generation of students, many of whom receive funding from research bodies other than NERC. In addition to reinforcing the training of curatorial and specimen conservation techniques to new graduate and Masters students (MRes, 4th year undergraduate's and taught MSc course) commencing research projects that generate a collection of specimens (*sensu lato*: includes all materials from which research data has been generated; rock thin sections, powders, digital images, software programmes) it is essential to include guidance on field collecting. This should include advice on safety in the field and the obtaining of collecting permits, permission from the relevant authorities to collect, and if required, to export specimens for scientific research.

Well documented collections form a scientific data-base that is suitable for long term preservation. It is proposed that aspects of the training, such as specimen conservation methodologies and preferred documentation (numbering and naming) procedures, should be made available to students via their Research Institution, Museum Collection Centre or Funding Bodies web-site. Professional organisations with a vested interest, such as the Geological Curators Group, Society for the Preservation of Natural History Collections, Palaeontological Association and Geological Society of London, may also be in a position to host or have links for this information on their web sites, or disseminate 'hard-copy' to students.

Owen Green

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Oral presentation on Thursday 16th June

Notes on conservation tests of failing Collembola (Insecta) micro-slide mounts

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Insect cuticle and Canada balsam have very similar refractive indexes. Its use as a mounting medium was discouraged in the past because the fine structures of insect specimens tend to be invisible using normal light microscopy. Before it was established that phase contrast microscopy could overcome the refractive index problem, many new mounting media with contrasting refractive indexes were used to improve the visibility of the specimens. However, most of these have been proven to be unstable compared with Canada balsam. This project was designed to determine a conservation method to rescue deteriorating Collembola microscope slide mounts at the Natural History Museum, London and to establish whether such material could be successfully remounted in archivally proven Canada balsam. In many cases, the mounting media used in these slide mounts was not known for certain.

Melissa Gunter

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Poster Presentation

Connecting and enabling broad discovery and access to geoscience data and information sets of Natural Resources Canada

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Geoscience collections and associated data form the foundation of basic and applied research conducted by the Geological Survey of Canada (GSC). This foundation is the basis on which geological research can be validated, and if geoscience collections and associated data are properly documented, they can be used as an invaluable resource for current and future research programs. The GSC community has amassed an enormous wealth of data and associated collections over the past one hundred and sixty years - these collections would be costly to replace and many are irreplaceable. The collections, the associated data and their resulting publications are assets which must be recognized as a critical component

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of all research within the GSC. Management of these collections are presently being re-evaluated as a means to improve corporate governance and funding under one corporate program rather than by divisions or centres of excellence. Therefore a corporate Collections Information Management System (CIMS) is presently being developed and will integrate a Laboratory Information Management System (LIMS), a Field Information Management System (FIMS), a Sample Tracking System and together will be accessible online through a common corporate database system known as the Geoscience Data Repository (GDR). This will require the seamless transfer of information from the field, through the labs, to the archives and linked online to this data repository (GDR). To facilitate this transition into the GDR, the developers of each of these systems will need to create appropriate corporate standards and protocols with direct input from the originators or field geoscientists, lab personnel and managers, and collection managers from across the Geological Survey. This poster presentation is an attempt to provide an overview of this evolving process that has taken place from 2003 to 2005, and articulates the vision of the GSC Collections Committee for the long-term management of these national collections beyond 2005.

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Poster Presentation

Data format standards for existing documentation and databases

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Documentation standards, data entry standards, cataloguing standards, etc., all contain descriptions of theoretical minimum or best practices for setting up databases. Some, but not all standards documents also have a list of actual rules of syntax, spelling, and so on, that set out the requirements to actually put the standards into practice for recording and entering data. These standards and rules are presented in a form to facilitate designing a new database, but what happens when the data and storage already exists? Most of us are not starting our collecting tomorrow, after we get our standards all set. As well, many of us are on our third or fourth computer database. We were told that the data could be migrated easily, but that didn't seem to take into account all the reorganization that would be required to bring everything up to a single set of standards and formatting rules. We are basically left with the cleanup.

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Is there an easy way to do this? Probably not. Is it possible to design tools that assist with the cleanup? Maybe. It is at least possible to design a strategy of steps and processes to facilitate cleanup. This would include studying standards documents and choosing several as primary sources; determining what fields are most in need of work; looking at existing data in the field; setting standards and formatting rules; breaking cleanup into small steps or tasks; production of data dictionaries, data entry manuals, and online prompts or helps; and adoption or creation of controlled vocabularies; data authorities or hierarchies. Work needs to proceed with one field at a time if possible, or field groups; however a strategy that would work for multiple fields would be desirable. A strategy appropriate for multiple institutions could assist with data compatibility and would be useful to agencies that distribute data from multiple repositories.

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Oral presentation on Thursday 16th June

From the ledger to the web - Bringing the collections of the North Carolina State Museum of Natural Sciences to the 21st Century

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The North Carolina State Museum of Natural Sciences (NCSM) Research and Collections section is made up of eight units: Mammals, Birds, Reptiles and Amphibians, Fishes, Invertebrates, Paleontology, Invertebrate Paleontology, and Geology. Each section has unique criteria for cataloging specimens. Prior to this project, only a few of these collections had preexisting non-relational databases. Therefore, over the last several years, we have undertaken the task of establishing relational databases that meet the myriad of requirements for each unit's collection but still allow for the data to be compiled in one master database. This database will ultimately be converted into a web-based format that is searchable by researchers and the general public. NCSM had specific database requirements that needed to be met. These included that the technology be robust enough to advance with advancing technologies, that it allow for importing from and exporting to multiple types of software, and that the final product be appropriate for users with varying degrees of computer knowledge. It was also imperative that the product increase efficiency in cataloging, generating reports, and in handling any other data requests. We began by purchasing an Access-based existing

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framework from the Florida Museum of Natural History. We then developed database standards among and within the units, created a strong support system of dictionaries, and established guidelines to minimize data entry error. In order to eliminate the possibility of data loss, NCSM also took several steps to ensure that data is stored in several formats and locations, on site and off site. Currently, seven of the eight sections have functional databases. While several are still under development, they are functional for data entry and storage. To date, over 76,000 lots of specimens and 49,000 localities have been entered.

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Poster presentation

The United States Exploring Expedition botanical specimens: the story continues

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In the mid 19th century, the U.S. Exploring Expedition was launched under the command of Lieutenant Charles Wilkes. During their four-year voyage (1838-1842), the six ships traveled 87,000 miles, circumnavigating the globe. The expedition completed extensive mapping surveys of the Pacific Ocean Islands, the Oregon Coast, and Antarctica, confirming its existence as a continent. Nine "scientific," or scientists, were taken along to collect natural history specimens. The botanical collections, estimated to be nearly 50,000 dried plant specimens representing almost 10,000 species, were by far the largest collection. Bartlett (1940) commented that the efforts of the expedition scientists "enabled America to take a place with the leading European nations as a partner in the development of world science." The U.S. Exploring Expedition collections were housed at various locations prior to being transferred to the Smithsonian Institution in 1858, forming the original basis of the U.S. National Herbarium.

It is suspected that the specimens were treated with mercuric chloride to control biodeterioration by insects and fungi during the expedition. This treatment has resulted in several issues for these specimens. Over time, the mercuric chloride on the sheets can undergo a series of reactions resulting in a progressive darkening of the mounting paper and specimen labels for many of these collections. Beginning in the 1980's, while the original labels were still legible, new labels duplicating the

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the Smithsonian collections in the late 1990's, Catharine Hawks developed a protocol for removing the black stains from the labels to reveal specimen data.

Another issue is the off-gassing of elemental mercury vapor by the expedition collections, confirmed by use of a Jerome Mercury Vapor Analyzer. Safety and health issues were extensively reviewed, and it was determined that when herbarium cases are opened, timed ventilation of the cabinets is effective in dissipating the built-up mercury vapor. Additionally, Catharine Hawks et al. (2004) developed an inexpensive method to test for the presence of mercury vapor in specimen cabinets by using a commercially available mercury indicator powder. Off-gassing of the expedition collections can affect specimens not treated with mercuric chloride. Because of this problem, as well as other collection-related issues, the expedition specimens are being removed from the general herbarium and consolidated as a separate collection. When a specimen is pulled, it is placed in a MicroChamber™ folder, which captures gaseous pollutants and volatile acids. Tests using a Jerome Analyzer have shown that the MicroChamber™ folders are effective in trapping mercury vapor. The type specimens from this expedition have been inventoried and digitally imaged, with both the data and images available online. Future plans include inventorying and digital imaging the general collections from this expedition.

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Poster presentation

Integrated collection care at the National Museum of Wales

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The National Museum of Wales holds in the order of 2.4 million natural history specimens, within eight main collecting areas. Over the last ten years the Institute has developed an effective Integrated Collection Care programme for these collections, to optimise their use and preservation.

Success in implementing the programme is attributed to the close interaction between collection managers, conservation officers and specialist curators. Each major sub-collection area has a dedicated collection manager (e.g. mineralogy & petrology, palaeontology, mollusc, entomology, vertebrate zoology, cryptogamic botany), and major collection areas a Conservation Officer (e.g. geology, zoology,

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botany). Both streams of staff have a relevant science background, and secondary training in collection management or conservation.

Organisationally the process is underpinned by over-arching policies that provide a clear statement of what the National Museum of Wales organisations aims to deliver. These are translated into operational guidelines via generic, museum-wide procedures for all aspects of collection care, customised for each major collection area. Both policy and procedure are revised on a regular basis and topical collections care issues discussed through the Collection Management Group, composed of Collection Managers and conservation and documentation unit representatives.

The strengths of this the approach taken are considered to be:

- (i) The presence of conservation staff within the curatorial department. This facilitates greater cooperation in identifying priority areas of work and provides a greater conservation presence within the collection areas to deal with day-to-day conservation issues.
- (ii) Implementation of standards which acknowledge and build on existing local areas of best practice.
- (iii) The Collection Management Group which is able to respond to issues which directly impact on the collection and the work of conservators and collection managers. As the Museum holds collections outside the natural sciences this enables the transfer of skills, experience, and best practice from other disciplines.

Best practice has been developed and reviewed through three main routes:

- (i) Formal and informal training of staff and support for attainment of professional accreditation (e.g. ACR, AMA).
- (ii) Development of a set more broadly though the Group by the writing of collection management procedures drawn up by practitioners representing the Collection Management Group.
- (iii) Through in-house collection management training.

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Oral presentation on Thursday 16th June and poster

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Darwin Centre Phase Two: uniting a state of the art collections store with a 'shop window on science'

Huxley, Rob; Fitton, Mike
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In the 1990s two threads of thought came together in the NHM: a) an urgent need to replace the spirit building and provide pest-proof storage for entomological and botanical collections, and b) a desire to engage the public with the NHM's science and its vast unseen collections. The result was the award winning Darwin Centre, opened in 2002 and housing the spirit collections and facilities for the Zoology Department. The Phase One building set new standards, in fire engineering for instance, and gave public access to collections and research in innovative ways. Many lessons were learned and the degree to which ideal standards could be met varied. Also, the decision to make Phase One accessible to the visiting public was taken at a relatively late stage. Phase Two (DC2) would provide much needed accommodation for botanical and entomological collections and curatorial and research facilities and take the public access concept a stage further. The first step in design development involved a 'test fit' to see how many collections could be reasonably accommodated, given the constraints of the site and our aspirations to meet new standards. What worked in Phase one would not necessarily work in Phase 2. The design was selected by architectural competition.

From the outset the DC2 project had the aim of providing unprecedented public access to the NHM's scientific work as well as accommodating the Botany and Entomology departments. In the words of our then Director of Science, Phase Two would be "a large-scale and dynamic resource that will be recognised throughout the world for its standards and utility". Working with the architects, engineers and other members of the DC2 team it quickly became apparent that we faced a difficult, not to say impossible, challenge. It was at times a fraught and frustrating process. Mechanisms for management of the interfaces between the science departments and the design team did not always work well. Aspirations changed or were trimmed and difficult decisions had to be made to get the best out of the site and the budget.

Phase Two will be a striking building with the functionality that we need. The completed design includes storage for the insect and flowering plant collections, research and curatorial facilities, a range of laboratories, a UK biodiversity centre, a studio space for interactive events for the public and a public route through the building giving access to the collections, curation and research.

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This presentation looks at the development of the Darwin Centre concept and the role of collections standards. It aims to give an insight into the process of design development of Phase Two and to describe the result.

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Oral presentation on Tuesday 14th June

Re-housing and condition surveying at DMNS - the long road toward standards for the anthropology collections

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Beginning in the late 1980's, the Denver Museum of Nature & Science has been working toward consistent and regular funding to support the standards for collections care that the museum profession has established. Recognizing that re-housing plans, new storage mounts, light surface cleaning and condition surveys can all fit together as a complementary unit, the Anthropology Department has worked with the Conservation Department to successfully apply for a series of Institute of Museum & Library Services Conservation Project Support grants. First the Conservator assessed the existing storage conditions and then with the help of the departmental Collections Managers developed a long range prioritized plan for the entire Institution. For each grant they have relied on the established priority list to decide collection focus.

I will go over the highlights of six Anthropology grants and discuss the relationship of each to collections care standards.

- 1992-1993 condition surveys, storage mounts and re-housing for the African and Amazonian collections
- 1994-1995 condition surveys, cleaning, storage mounts and re-housing for the North American Indian ceremonial and festal collection
- 1995-1996 condition surveys, pest treatment, storage mounts and re-housing for Kachina dolls and Native American masks.
- 1997-1998 condition surveys of the 1600 most important artifacts in the Native American Collections

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2002-2003 condition surveys, cleaning, analysis and re-rolling of North American Indian Textiles

2004-2005 condition surveys, storage mounts, analysis and re-housing for the Southeast Asian costumes and accessories

The grants have ranged from \$25-\$30,000 with the museum providing a match with staff and volunteer time, money to purchase high quality cabinets, and other material costs. I will also discuss the challenge of trying to stay current with the ever changing world of archival supplies and materials. We have also made some projects into opportunities for documentation cleanup, lexicon improvement, object analysis and curatorial input. In sum, fourteen years of DMNS projects provide a good case study of not only deeply rooted standards for quality natural history care and management but also the successful search for money and staff to implement those standards.

Ryntha Johnson
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Oral presentation on Thursday 16th June

Analysis and conservation of fish taxidermy from the collection of the Zoological Museum of Athens University

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The Zoological Museum of Athens University since its foundation in 1858 has been developing a collection that is considered to be the oldest and richest in Greece. In this paper a detailed description of the analysis and the conservation procedure of a taxidermy fish (*Salmonidae*) belonging to the collection of the Zoological Museum of Athens University, will be presented.

The salmon, dating back to 19th century, was brought for conservation to the Laboratory of Conservation of Organic Materials, Department of Conservation of Antiquities & Works of Art, TEI of Athens. The fish was placed in a frame and hung for some time before being stored in uncontrolled environmental conditions. During its display varnish and a paint layer were applied onto the fish. The head of the fish was cut and previous restoration attempt using paper as a support media

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was shown to have completely failed. The whole object was covered with dust and apart from tears and deformation of the main body, a discolouration was observed due to oxidation of the overlying varnish.

Before any conservation attempt, it was considered necessary to estimate the condition of the object using physiochemical methods and then to test the conservation materials that would be used. Estimation of the collagen state of preservation was done by the determination of the acidity and by measuring the shrinkage temperature of the fish skin. By means of Gas Chromatography and F.T.I.R., oils and the type of varnish applied were determined.

Using a Scanning Electron Microscope coupled with an E.D.X. analyzer the stuffing material was identified. Conservation treatment included:

- Detachment of the fish from the frame
- Cleaning of the surface of the fish skin
- Removal of the old restoration remains
- Removal of the stuffing material from the body and the head
- Humidification and reshaping of the deformed parts and of the entire body
- Rejoining of the detached parts
- Filling the missing parts
- Replacement of the supporting and the stuffing material

Although lack of records is a common phenomenon for old natural history collections, modern methods of analysis can provide useful information about previous treatments, estimation of state of preservation, and can influence guidelines for conservation. In this paper the conservation treatment, the problems, the analyses and suggestions about the storage and/or exhibition conditions are described in detail.

Katerina Malea
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Oral presentation on Thursday 16th June

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Museum collections and molecular-genetic investigations

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Molecular data was obtained from preserved fish specimens deposited in the collections of the Natural History Museum, London. Successful molecular investigations were performed on fifteen and twenty year old specimens of formalin-fixed, deep-sea fish *Nezumia* (*Nezumia aequalis* and *N. micronychodon*; family Macrouridae) - species that were genetically uncharacterised and with no available DNA sequence data. Preliminary molecular studies were also carried out on four-year-old mackerel specimens (*Scomber scombrus*; Scombridae) fixed in a variety of different alcohol and formalin-based preservatives. It represents a well-studied species, for which nuclear and mitochondrial gene sequences are available. The mackerel samples were collected, preserved and stored in the Museum exclusively for molecular-genetic investigations in order to determine the most appropriate protocols for DNA extraction from tissues exposed to different preservatives.

These investigations required the development and adoption of different strategies for molecular analysis that primarily depended on: (1) availability of molecular information, and (2) quality of the extracted DNA. In general, it was much more difficult to perform molecular investigations in the *Nezumia* study due to very damaging effect of formalin on the quality and yield of extracted DNA in conjunction with the absence of existing molecular information. The initial molecular data produced on *Nezumia aequalis* and *N. micronychodon* was validated with additional formalin-fixed, DMSO- and ethanol-preserved samples. Specific PCR primers were designed, and reproducible DNA sequences were submitted to the GenBank nucleic acid database under accession numbers: AY826774 - AY826792. These molecular data derived from museum specimens are the first on any member of the genus *Nezumia* which currently contains approximately 50-60 species. The second study (on mackerel) involved testing the protocols for DNA extraction and testing the success of PCR amplifications against known targeted nuclear and mitochondrial sequences.

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Poster presentation

Care of petrology collections at the National Museum of Wales

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The National Museum of Wales (NMW) has around 60,000 mineral and petrology specimens ranging from hand specimens and thin sections to borehole cores and display quality minerals. Museum policy requires that all collections are managed according to best practice and this presentation outlines how this has been implemented in the petrology and mineralogy collections.

The first stage of collection care is a pre-acquisition evaluation of the resources required to store, conserve and curate the specimens. Included within this process, and pertinent to mineralogy and petrology specimens, is hazard checking. Radioactive, carcinogenic, and toxic specimens, if identified, may still be acquired but require packaging, labelling and secure storage.

Petrology specimens are classified using international nomenclature such as the IUGS Subcommittee on the Systematics of Igneous Rocks (e.g. Le Maitre, 2002). Specimens with unconventional names such as "Skomerite" are reclassified, although traditional or colloquial names are recorded separately allowing general terms such as "Campan rosé" (marble) or "Stonesfield Slate" (limestone) to be used. The mineral collection is classified and stored using the Hey system (3rd edition, Clarke, 1993).

Rocks are stored by geographical subdivisions (e.g. Wales, England) and within each of these by acquisition order. Although this may appear a highly unsophisticated system, as all specimens are held on electronic inventory, it has proved the most efficient method of access. Environmental conditions (typically 18-23°C and 45-55% R H) are not an issue to most petrology specimens. Those requiring conditions outside this range, such as pyritiferous rocks and many mineral specimens, are stored in customised microclimates. Rock hand specimens are stored in acid-free trays in closed, static wooden cabinets with large specimens stored in hand-made 'corex' boxes or 'tyvek' covers with abrasion resistant labels. Borehole cores acquired in large wooden crates are cleaned and repacked into lightweight standard card boxes enabling them to be stored on pallets. The mineral collection is housed in roller racking and consequently requires a much higher level of packaging than the petrology collections to prevent abrasion of specimens.

Use of these standards supports a high level of care while enabling access to be maximised. Performance indicators provide a guide to improvements in the standards of care and Collection Care Procedures and the Disaster Plan exist to minimise risks and support the long-term preservation of the collections in our care.

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Poster presentation

Preserving an extant *Araucaria* cone for exhibit

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While developing a permanent exhibit on petrified araucarian wood from Arizona, the Yale Peabody Museum's Paleobotany Division found itself in a quandary. As part of this exhibit, a nearly ripe seed cone of extant *Araucaria* was obtained for comparison to fossil cones. Extant conifer cones present unusual challenges for preservation, and our immediate concern was to prevent this cone from disintegrating. Traditionally, such cones have been wrapped in wire or sometimes string, which is unsightly and has not always been successful. However, after consultation with the Peabody Museum's Conservator, it was decided to undertake an alternative method and wrap the cone in a finely woven silk fabric called Crepeline. Following this, the cone was then soaked in ethyl alcohol, immersed in glycerol and dried in an oven. The exhibit opened in June 2003, and after nearly two years on display, this cone is still intact and shows no signs of deterioration.

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Poster presentation

Adopting a conservation methodology in the investigation and application of Conservare OH 100™ for consolidating fragile dinosaur bone

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The American Museum of Natural History in collaboration with the Mongolian Academy of Science has been excavating the locality Ukhaa Tolgod, Mongolia, a site rich in late Cretaceous dinosaur specimens. Much of the fossil bone, although well preserved, is very fragile, porous and weak due to loss of all organic components yet lack of permineralization of void space. These specimens require a combination of meticulous and challenging preparation techniques and manipulation of consolidants in order to strengthen the bone enough to be completely removed from surrounding sediment. Even with such creative combinations, the results were limited and sometimes unsuccessful, primarily due to the lack of full penetration of the consolidant. An investigation was undertaken into the potential use of Conservare OH 100™ for the consolidation and preparation of these specimens using methodologies and approaches developed in the field of art and artifact conservation. These include thorough examination and documentation of the specimen condition, investigation into potential treatment alternatives, analysis of aging properties, compatibility, and best practices for treatment and application. This approach allowed for two exceedingly fragile specimens, including the type specimen *Citipati osmolskiae* to be safely, easily and quickly prepared using the Conservare OH 100™.

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Poster presentation

Standardisation within a genetic resource collection: perspectives from the Natural Science Research Laboratory, Museum of Texas Tech University

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Although cryogenic collections are now an essential part of many natural history museums, initially, despite great foresight of those that established them, museum staff were unsure of the best way to house and organize these unique ancillary collections. Historically, the time and money were often focused first on the more immediate importance of voucher collections and secondarily on the curation of tissue collections. As a result, genetic resource collections often utilized many different organization and numbering systems. Despite more standardized methods for housing and collection of vital tissues today, there still seems to be no one standard for the documentation, arrangement, and housing for these collections. In 2003, the Natural Science Research Laboratory, Museum of Texas Tech University began a project to inventory and reorganize their Genetic Resource Collection, a collection established in the late 1960's and consisting of over 200,000 vials. The staff made the decision to establish curation protocols for the tissues that would minimize future problems. Lack of standardization within the collection has arisen from several sources 1) No written protocols within collecting procedures in the past led to multiple numbering systems, different tube types, and different labeling procedures 2) Revolving student staff resulted in multiple organizational and tracking systems 3) Lack of time prevented problems being solved at the time of discovery. A review of other similar collections provided insight; however, the final methodology was decided only when we examined our vision for the use, curation, and growth of the collection. While the project is approximately 60% complete, the time for processing a loan has been drastically reduced. Although a limited budget prevents use of ideal methods at times, a functional system, documented in a procedures manual, has been established.

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Oral presentation on Tuesday 14th June

Scripts for zooming images on the web and other simple tools for supporting image databases

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As digital imaging technology improves and prices decrease many images of natural history collection objects are accumulating and being placed online. Managing large image collections and serving images of collection materials to the world in a manner that makes them useful to the scientific community presents significant challenges. The open source community has developed powerful software tools for image manipulation. This software can easily be used to manage and manipulate large sets of images. We discuss a toolkit for automated handling of large numbers of images and manipulation of web served images by linking image files with database records of image metadata and specimen data.

One open source package for image manipulation is ImageMagick. ImageMagick can, from the command line, convert, resize, filter, and annotate image files. ImageMagick commands (and native image handling functions) can be incorporated into program code in a scripting language such as perl or PHP. Scripting languages can connect to a database, so information from a database can be added to images and information about images can be incorporated into a database. For example, the catalog number of a specimen can be looked up and automatically stamped into an image of that specimen, or the height, width, and filenames of images can be stored in a database. Very simple scripts can provide powerful tools to speed up and efficiently manage workflow in large imaging projects.

Dynamic web pages are a standard way of presenting searchable collection data on the web. Such dynamic web pages can easily incorporate images by generating an html image tag that points to an image of a specimen. If, instead of pointing an image tag at an image file, the image tag points to a script capable of retrieving data from a database and returning an image file, sophisticated on the fly image manipulation becomes possible. The key is a script that looks at a database, finds an image, manipulates that image, and returns the modified image. One application of this is on the fly zooming into large image files: an addressable annotated zoom; displaying a low resolution copy of an image, allowing a user to click into the image to define a zoom box, looking up the image scale from a database, and displaying the low resolution image with the zoom box drawn on it and a high resolution image of the zoomed in area with scale bars.

We present examples of these ideas implemented at The Academy of Natural Sciences in the Botany collection (silurus.acnatsci.org/image_zoom_demo), the All

Catfish project (silurus.acnatsci.org), the VIREO ornithological slide collection (vireo.acnatsci.org), and the Peale Butterfly and Moth Collection (data.acnatsci.org/peale).

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Oral presentation on Tuesday 14th June

KE-EMu: A 21st century museum database - improving collections management in the NHM Fish Section

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KE EMu is a relational database specifically designed for usage by museums and is already being used in many of the major natural history museums, including the Smithsonian and the AMNH in the States. The Fish Section of the NHM in London received their first version in June 2003 and has been using and refining it constantly since then. Compared with previous databases used by the Fish Section, KE EMu is fairly revolutionary in that it incorporates data regarding almost every aspect of managing a collection, including loans, conservation and details of all the various people involved. I will be attempting to demonstrate some the applications of the database as a collection management tool.

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Poster presentation

Detection in taxidermy collections: arsenic spot tests

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The presence of pesticides in museum collections has been known for a long time. Many of these compounds are also toxic for human beings and they can be a potential danger to individuals who are in contact with these collections. In the specific case of taxidermy, arsenic was one of the principal substances used in the preparation of the skins. In different taxidermy handbooks, arsenic, realgar, and orpiment were used in preservative recipes. But arsenic is better well known for the arsenical soap, revolutionary preservative invented by Jean-Baptiste Bécœur (1718-

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1777). This paste was applied inside the skin to preserve it from biodeterioration and the attack of insects.

Today curators, conservators, scientists and technicians have to deal with the hazardous effects of this compound. Different analysis techniques can be used to detect arsenic in collection such as XRF, ICPMS, SEM-EDS. Even if all museums do not have the opportunity to access this high technology, the spot tests provide the chance to detect the presence of arsenic.

This study has as its goal to compare different arsenic spot tests analyses. The results of this study will provide further information concerning the limits of detection, the advice for arsenic detection in the specific case of taxidermy collections.

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Poster presentation

Nomenclatural standards for cultivars

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The names of plants governed by the International Code of Botanical Nomenclature are fixed by the application of a nomenclatural type. Designation of a type is a requirement for valid publication of the name. As defined by the International Code of Nomenclature for Cultivated Plants (Brickell et al. 2004), a nomenclatural standard is an herbarium specimen or its equivalent to which the name of a cultivar or Group is permanently attached. Although not a requirement for the establishment of a cultivar epithet, the preparation and designation of such standards is strongly recommended by the Code. The brief descriptive entries of new cultivars in nursery catalogues are rarely sufficient to identify a cultivar with certainty so similar cultivars can easily become confused. Nomenclatural standards act as a reference point and can be used to help to resolve any naming problems, to decide if a "new" plant is really unique and, potentially, can contribute DNA samples for molecular studies. Nomenclatural standards are a vital part of ensuring the stability of names of cultivated plants. It is therefore essential to carry out very careful preparation and curation as well as establishing their validity by publication.

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Poster presentation

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Japanese tissues, uses in repairing natural history specimens

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Japanese tissues are widely used by conservators, especially those who work with paper. Until recently their use had not been applied to Natural Sciences. This poster describes and advises about the basic types of tissues available and shows how they can be used to create tidy and effectively strong repairs and gap fills for the repair of taxidermy and other natural history specimens.

Simon J. Moore
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Poster presentation

Monitoring insect pests in a large herbarium for ten years: implications and actions

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The herbarium at the Natural History Museum, London houses six million specimens in four main storage areas. Historically specimens were protected from attack by insect pests by the use of chemicals such as naphthalene, paradichlorobenzene and lauryl pentachlorophenolate. In 1995, it was decided to monitor for pests using sticky insect traps as part of a collections Integrated Pest Management (IPM) programme. This paper presents some of the results of the trapping programme that has been operating ever since. The major pest species is biscuit beetle *Stegobium paniceum* but cigarette beetle *Lasioderma serricorne* was discovered on traps in 2000 and subsequently caused some severe infestations. Other pest species commonly found include Guernsey carpet beetle *Anthrenus sarnicus*, vodka beetle *Attagenus smirnovi* and the odd beetle *Thyrodrias contractus*. Trap results have given warning of pest infestations, which have then been treated by freezing the specimens and targeted cleaning and spray treatment of the infested storage area. The demonstrable value of the trapping programme has been crucial to the wider implementation of IPM across the Museum.

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Poster presentation

Effects of tanning and fixation processes on skin properties in taxidermy specimens

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Since the 18th century, preservation methods used for mammalian taxidermy collections have varied considerably. Over 140 preservation treatments have been described in the literature. Some of these treatments proved popular (i.e. arsenical soap, formalin, alcohol, alum, salt or chrome tanning); although their effects on skin were not known except for how well they preserved/tanned the specimen.

In taxidermy, skin is tanned or fixed using different methods that depend on the origin of the skin, and its future use. For example, the skin can be fixed in fluid in the field, then prepared as a study skin; fixed and preserved in fluid and then used for a mounted specimen for exhibit; or tanned and mounted. All these processes have some effect (reversible or not) on the behaviour of skin.

This study has as its goal to analyse the effect of different preparation techniques (tanning and fixation) on skin properties. We studied these effects on different levels: mechanical and physical properties (elasticity and yield point), biological and chemical properties (arrangement of collagen fibres; collagen crosslinking). The results of this study provide further information concerning the limits of tanning and fixation processes, and provide further insight into the state of preservation of mounted specimens whose skin is then stuffed or fixed on a mannequin.

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Oral presentation on Thursday 16th June

New approaches to the identification and treatment of contaminants in herbaria

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Herbaria have been a major source for botanical research and reference for centuries. Libraries, museums and universities have acquired collections by donation, bequest, collection and purchase from individual collectors. The nature of the material may be varied and the manner in which it has been prepared may also differ from one collection to another. Past methods of preservation favoured applications of chemical pesticides and fungicides to the specimens. Pesticide

applications have invariably not been documented, therefore identity, quantity and date of application is unknown. It is now apparent that the residues of some of these chemicals have only partially degraded and therefore still pose a risk to health and safety to personnel working with and handling the material.

There is also the hazard of organic fumigants present on the collections, which can affect personnel much more readily than the inorganic species producing irritation to the eyes, nose, throat and skin.

Current research is looking into the different colours of fluorescence and relating the colour to the presence of metal ions and their concentration.

Decontamination studies have also started and simple methods have proved to be very successful. This research is forming the basis of a PhD project.

Victoria Purewal
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Reserve oral presentation and poster

Herbarium networks: towards creating a 'toolkit' to advance specimen data capture

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A workshop on herbarium networks was held in September 2004 at Michigan State University. Out of this gathering, a bold challenge arose: to capture the data of all specimens in United States herbaria by 2020. It was immediately recognized that standards would be required at all stages of the data capture process. To provide focus on this issue, the 'Toolkit' committee was formed. The committee's first priority is providing a set of standardized tools for the botanical community when capturing herbarium specimen data and associated information. Our initial energy has involved considering a schema that provides the flexibility necessary to represent our unique specimen data. Once adopted, we can incorporate this standard into data capture software and attempt to normalize our 'legacy' data to be compatible; the latter is often a major hurdle. Of great concern is the daunting number of specimens that remain to have their data captured (approx. 95 million), with the limited resources currently available in our community. Many promising technological advances are being tested to make capture of data from specimens and data processing more rapid. Sharing data directly between herbaria and/or the

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use of distributed networks for sharing associated information between institutions also holds great promise to speed data capture, reduce duplicative effort, and aid in quality control. Authority files must also be adopted or created to standardize and normalize specimen data. It is the committee's intent to evaluate the components necessary for providing our 'toolkit', promote initiatives that contribute to its refinement, and communicate them to the user community.

Several examples documenting our progress will be presented.

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Oral presentation on Tuesday 14th June

The MOA Programme - introducing a unified approach to collection management at the NHM

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With more than 70 million specimens, The NHM holds one of the most comprehensive natural history collections in the world. Our renowned collection has been developed over more than two centuries and significant effort has been put into creating data-base records of the collection as technology has become available.

Historically, individual curators and researchers would identify database software suitable for their needs and use this to manage their own work. This unstructured and individualistic approach to selecting electronic resources has generated a vast array of databases. This plethora of databases does not allow for efficient management of the Museum's collection. Moreover, the application of the highest collection management standards has so far only been applied at the discretion of individual database owners.

The MOA programme was launched in September 2004 to start our journey towards a single and comprehensive collections management system in support of our goal of becoming a world-leader in collection management best practice. Attending this session will provide you with a unique insight into the MOA programme, showing you why we chose KE EMu and the benefits we expect to achieve.

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Oral presentation on Tuesday 14th June

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Databasing the collections: data standards - their importance and application

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Commonly in the past, data management and documentation initiatives have been maintained by local or national scientific organisations with little or no consideration of the wider benefits of data and database compatibility. In the past, this organisational model has made it difficult to share data or to disseminate database design advances and complementary technologies. Recognising the difficulty of physical aggregation of datasets, however, there exists a new trend toward recognition of fundamental intellectual property rights whilst, at the same time, achieving dissemination and aggregation through distributed database designs and use of aggregation portals such as that introduced recently by the Global Biodiversity Information Facility (GBIF). In support, specimen (and related) databases need to be constructed around data models that conform wherever possible to established schemas (e.g., Access to Biological Collections Data (ABCD), Darwin Core 2, Linnean Core, Taxonomic Concept Transfer Schema (TCS)) promoted by the Taxonomic Databases Working Group (<http://www.tdwg.org>), and to upcoming extensions to those standards for geo-referencing, collections metadata, the integration of bibliographic data and observational data.

Only by integrating these trends with major advances in the provision of Large-Museum Specimen Databases - a task that will require concomitant integration of museum database policies; researchers & collections management administration, computer science, informatics technology and learned society support - can the goal of providing suitable data Infrastructures be achieved in a reasonable time.

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Oral presentation on Thursday 16th June

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Hatching a plan: developing modern standards in egg collections

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Recent research based on egg collections has highlighted the need for obtaining a continuing time series of avian eggs. Modern specimens are frequently under-represented in museum collections following tightened legislation over the last fifty years. It has become apparent there is a need for proactive discussion at international level with regard to obtaining modern comparative specimens of avian eggs within a controlled ethical and legal framework. The only current techniques for continuing a time series, which are presently open to institutions, include collecting under licence, police seizure and through avian breeders. This presentation will examine the merits of the various acquisition options available and discuss possibilities for national cooperation. Furthermore, fulfilling access demands has led directly to increased pressure to supply collections data online. The need for international cooperation, consensus and consultation in the release of sensitive data online is discussed, with particular reference to the challenges of balancing increased public access against the sensitivity of data used in researching species conservation.

Douglas G. D. Russell
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Oral presentation on Wednesday 15th June

Hatching and fledging the bird collections in Dublin

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The National Museum of Ireland (Natural History Division) houses a major European collection of birds, preserved primarily as study skins. The bird collection in Dublin forms an important part of Irish National heritage, on par in its size to ornithology collections in other European capitals; its presence in Ireland is critical to our understanding of global avian conservation and biodiversity. The catalogued holdings include more than 7,000 non-passerine skin specimens, representing less than 50% of the total ornithological holdings. Because the NMINH has suffered from under-staffing the bulk of these important specimens currently remain almost

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completely unknown. We have developed an ongoing project to document and publicize this important ornithological resource: a new publication including the complete catalogue of the non-passerine birds will allow us to make the National bird collection available to the Irish public and beyond.

This bird project is the flagship initiative of Collections-based Biology in Dublin (CoBiD), a new partnership between the NMINH and University College Dublin. Using collections management standards implemented by CoBiD, all of the curatorial labour has been provided by undergraduate and postgraduate students and technicians from UCD. We have achieved a thoroughly researched, published catalogue product from the part-time work of non-museum professionals. Previously, no curatorial work had been done on these birds since ca. 1910, and no specimens had any kind of unique catalogue numbers. In 18 months CoBiD has transformed this to a fully digital, complete catalogue with all specimens relabelled, many re-housed, and each with a unique identifier that links catalogue data to accession records.

This catalogue of the non-passerine collection has just been published as a searchable electronic database on CD-ROM, containing the catalogue of the non-passerine bird collection, relevant specimen and historical notes, as well as background information to inform and educate people about this aspect of Ireland's national heritage. The tremendous success of our non-passerine project has set new management and data standards for the NMINH and serves as a model for ongoing and future work to make these long-lost collections available to the scientific community.

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Reserve oral presentation and poster

Adult education as a tool for volunteer training and recruitment

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Museums "behind the scenes" is a subject that always arouses great public interest. In Autumn 2004, we elected to pursue an Adult Education module based on curriculum elements in our undergraduate teaching programme. The resulting course "Dead Zoo: behind the scenes in the Natural History Museum" aimed to introduce interested members of the public to the living scientific research face of

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the National Museum of Ireland (NMINH). A second, unadvertised aim of this course was to train a group of prospective volunteers with an effective six-week orientation programme.

The class was administered and advertised through the University College Dublin Adult Education Centre as part of the annual UCD "interest courses" brochure. Classes were scheduled during working hours, two hours per week, and held in the NMINH exhibits building. Place and time were carefully selected—all students who were free to attend the class would potentially be free in future to volunteer. Topics were selected from a range of subjects, including lectures and discussions on the breadth of uses of museum objects, background in biodiversity and evolution, and an introduction to conservation. Learners were typically retired individuals, with a keen interest but no academic background in the sciences. This learning experience was highly successful for the 16 students enrolled, and "Dead Zoo" was an integral part in our Teaching Programme 2004, which was awarded the top prize for outreach in the all-Ireland Museum of the Year Awards. More importantly, six individuals have stayed on as volunteers in various capacities, suited to their interests and abilities.

There is a constant concern about standards to ensure that the volunteer-museum relationship is constructive for all parties. Having experienced a structured course means that learners have a common basic knowledge about collections and museum procedures. Indeed, since the course required a fee, volunteering (for free) can feel even more rewarding. In our museum in Dublin, low staffing levels mean a chronic lack of staff-time to dedicate to the training and supervision of newly recruited volunteers. We have addressed this issue in a novel way that will be applicable across the community.

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Poster presentation

The application of GIS to IPM risk zone mapping

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A geographic information system (GIS) is a computer-based tool for mapping and analysing features that exist, and events that happen, on earth. It offers a platform to overlay the visual representation of tabular data and build queries to interrogate the variables to analyse trends or hotspots and assist in planning strategies.

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The holistic approach of the Integrated Pest Management (IPM) regime was established through a strategy of managing risk to the collections. Each area of the museum has been designated in one of four zones grading from high to low risk. This then determines the priorities for action, the working practice in that area and the level of monitoring for pests. Analysing and correlating variable levels of documentation from so many concurrent initiatives could not be possible without a system that could translate the data into a common and comprehensible format. A pilot project demonstrated that the application of geographical information software to the improved integration of the various pest management activities was a viable solution.

The results of the pilot project demonstrated quite conclusively that the digital representation of risk zones would enable effective development of targeted strategies. Together with the attachment of captured data to a scaled plot of the spatial array of insect monitoring traps, this exercise showed that geospatial analytical software could be a hugely powerful tool to monitor pest population density across the museum and analyse trends with time. With the digital zones firmly embedded, there are enormous museum-wide implications in terms of environmental conditions of collection areas, space planning, disaster planning, exhibition design and security. The Natural History Museum, London will now look to implement a centralised database of pest monitoring data and integrate building environmental data to further improve the resolution of 'cause-and-effect' assessments.

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Oral presentation on Wednesday 15th June and poster

Standards in the museum care of geological collections - a new web resource

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There is a growing understanding that besides purely scientific and aesthetic value rock, mineral and fossil collections are unique resources, which help people to understand their world. The value of collections may be usefully divided into five broad categories: research value in pure and applied science; cultural value, especially the influence of collecting and collections on the development of society and on science; financial value where the activity of private collectors and the public in general has raised the perceived and actual value of minerals and fossils because of their rarity, beauty or association; educational value in lifelong learning

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where collections are used as a learning resource either to instruct, inform or inspire; and entertainment value where the aesthetic beauty of rocks, minerals and fossils is appreciated by the viewer. Almost twenty years ago the Geological Curators' Group published, through the Geological Society, 'Guidelines for the Curation of Geological material' - a seminal work at the time setting standards for all aspiring curators of what ever subject. In 1993 the Museums and Galleries Commission published 'Standards in the museum care of geological collections' as one of a series of 'Standards in the museum care of .'. In the succeeding years the advent of the internet has revolutionised access and communication. Great advances have been made in many aspects of museums through the voluntary registration scheme for museums. But 'standards' are perhaps more necessary now than ever as the number of curators has declined with a concomitant increase in the less-specialised collection managers. Standards in plain English must be accessible across the globe if we are to create and sustain both new and historic collections.

The revision of 'Standards' gave an opportunity to look afresh at the processes and activities of managing and caring for collections. The term curation has not been fashionable for almost a decade, especially with the advent of the more fashionable term 'manager' following administrative practice across the world. But care is just one of the tasks of curation, which can be broken down into four task areas for collections of whatever type; these areas are Procedural; Collection Care and Maintenance; Building and Management; and Access and Education. Consequently the Standards were revised focusing on these areas.

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Levels of IPM control, matching conditions to performance and effort

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In this paper we model pest activities across the wide spectrum of cultural objects that we try to protect, organized as a perceptual scale of bio-deterioration situations. Within the scale, we set seven levels, in large part determined by accessibility to pests and progression of protective structures against other deleterious agents. For each level there are described appropriate remedial IPM

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solutions to vulnerabilities. Long term planning would attempt to move collections up the levels to increase their protection.

The potential uses behind this model are:

- 1) A starting point for IPM planning.
- 2) For classifying risks to collections from pest activities during collections surveying.
- 3) A contribution to setting guidelines for institutions offering tax benefits, or hosting exhibitions indemnified by government programs.

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Regional collections at risk. Why funding stuffed otters and dried nettles is seen as an easy cut to make

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Of the 20 million natural science specimens held outside nationally funded institutions, most are in local government hands. They are in constant competition with roads, schools, housing and so on for local taxpayers money. In some areas the value of collections is recognised and appreciated, in others cuts have already been made. Why do collections find themselves in trouble and what can we do to address this? Which collections do well and why? A lot of time has been spent appreciating the value of natural science collections, there is no question of their merit as a resource. How do we go about translating this into funding, staffing and use?

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Referencing collectors of biological specimens: issues and standards

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Projects at the Natural History Museum, London, involving digitisation of botanical specimens, both imaging and recording associated information, have revealed many common issues relating to citation of collectors. An unprecedented richness in the diversity of collectors has been found with approximately one in five of all botanical collectors from the entire history of the discipline. The diversity reflects the unique position of the institution in natural history and common patterns emerge showing the driving processes behind this exploration of the natural world. Analysis of individuals shows that most contributed to other areas of natural history, or completely unrelated disciplines, suggesting that issues of citation are generic. Inadequacies and inaccuracies in both standard published literature and internet sources containing this information have indicated the need for new approaches and outputs. An outline will be given of related contexts where standards exist, an information model used to develop a standard collector reference and the benefits of a collector referential standard.

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Oral presentation on Thursday 16th June

Haslemere Educational Museum: an introduction to the natural history collections

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The Haslemere Educational Museum was established in 1888 by Sir Jonathan Hutchinson (1828-1913), an eminent surgeon based in London who built a country house at Haslemere. In Haslemere he had space to indulge his delight in collecting and set up his own museum based upon his deep conviction that an education could be acquired through the study of objects. After Hutchinson's death in 1913 a board of Trustees was established that ensured the museum's continuation to the present day.

The museum holds approximately 400,000 items in its collections, over two thirds of which are natural history specimens. Many of the early exhibits were acquired from auction rooms around the country, especially Mr Stevens at Covent Garden.

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The present-day collections include geology, birds, eggs, nests, osteology, mammals, corals and sponges, shells, insects and botany, collected from local, national and international sources.

The most significant collections in terms of quantity are shells and botany. The shells amount to 80,000-100,000 specimens and include the R.H. Moses collection of worldwide significance. The botanical specimens mostly comprise of Victorian and Edwardian pressed herbarium sheets. The Miss Lightfoot collection combines poetry with pressed plants of the 1870's. There are also specimens of plant galls, conifers, mosses and liverworts, and wood block samples.

A substantial Edwardian collection of cased birds is of particular interest and includes a passenger pigeon, owls, terns, woodpeckers, sandpipers, gulls, finches and ducks. The taxidermists include TE and FE Gunn of Norwich, Rowland Ward of London and James Gardener of London. The collection also includes the Slaines Boorman collection of British birds eggs and nests.

The insect collection is mainly comprised of butterflies, moths, beetles and flies and amounts to about 70,000 objects. They include the JJ Joicey collection of foreign butterflies and the Rupert Long collection of British butterflies and moths.

The vertebrate collection includes East African game heads and miscellaneous worldwide taxidermy specimens. A composite moa skeleton is on permanent display. Rare pieces of moa eggshell and a single feather are preserved in the reserve collection. Invertebrates include a collection of about 1,000 corals and sponges.

The geology collection includes fossils, minerals and rocks from the GF Walton collection, the Col. Oliver Hawkshaw collection and the John Edward Lee collection. Fossil material includes a specimen from the Burgess Shale and two almost complete ichthyosaur skeletons.

The museum is also home to the Geikie Archive, a unique collection that records the life and career of the distinguished geologist Sir Archibald Geikie. The collection includes his personal and administrative correspondence, field notebooks, illustrative artwork and geological specimens.

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Poster presentation

Real world disaster plans

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Although a great deal has been said and written about disaster planning, my experience has been that the writing of a plan to work in our specific situation still came up against practical problems of detail. This poster is therefore effectively a case study which, while not presenting new ideas, will hopefully highlight seemingly minor points that will nevertheless improve the effectiveness of the final plan. These are items that I have found seem to take up a disproportionate amount of time to sort out, and for some of which we have not yet found entirely satisfactory solutions. These include structure of the plan, relationship to local authority emergency planning, insurance issues, provision of emergency storage, and creation and use of disaster kits. This case clearly relates to a UK local authority museum, but it should be possible to see the equivalent scenarios in other contexts.

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Poster presentation

Climate control in an uncontrollable building

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The collections of the National Museum of Ireland (Natural History Division; NMNH), are held separately from the exhibition in a dedicated collection building. This building is a converted army barracks, lacking insulation and heated by an antiquated closed loop system of radiators. Monitoring of the collections environment during phases of intervention and non-intervention by technical staff provides a case study demonstrating the effectiveness of attempts at climate control in an old building. The majority of visitors to the building are researchers working through the Museum's partnership with University College Dublin (Collections-based Biology in Dublin; CoBiD). Together, we are working to develop standards that maximise effective use of the Museum's extremely limited staff.

Fifteen digital monitors in a range of locations have been in use for the past three years recording local temperature and RH throughout a building over 800 m². Environmental monitoring has recently been accompanied by detailed documentation of attempts at climate control (temperature) by adjustment of

radiators. We compared the total internal climate records with external climate conditions, to determine whether our efforts really have a significant impact on stabilising the collection environment.

Temperature changes within various rooms followed the same overall patterns on weekly, monthly and annual scales; however, diurnal fluctuations substantially varied in magnitude between rooms. This reflects the sensitivity of different room volumes, locations and uses to external atmospheric influence, and not the success of staff intervention. Humidity fluctuated even more dramatically, showing a complex relationship with temperature (changes in humidity were often associated with rapid changes in temperature, although RH measurements did not correlate directly with temperature). This relationship is partly ascribed to the movement of frontal weather systems introducing warmer or cooler air with very different moisture contents, resulting in rapid change that stabilise over time. A strong seasonal effect was also identified, where humidity lows were associated with temperature lows in the winter, but during the summer the relationship between precipitation, evapotranspiration and insolation resulted in a less clear-cut association between humidity and temperature.

Manual control of radiators—the only means of climate control in this building—in order to influence humidity was found to have drastically less influence than fluctuations due to changes in weather. Furthermore, these effects may be slower than external weather changes, negating any useful effects. On average, the fluctuations in humidity were no greater during periods of non-intervention, suggesting that in a poorly sealed building, with woefully inadequate levels of staffing, manual control of temperature in an effort to reduce fluctuations in humidity is an inefficient use of human resources.

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Oral presentation on Wednesday 15th June

Calling on GOD: The Gallery Object Database at the Royal Ontario Museum

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In 2002 the Royal Ontario Museum embarked on an ambitious Renaissance project aimed at doubling attendance by the year 2007. Including a landmark new wing designed by architect Daniel Liebeskind, the project will result in over 300,000 square feet of new and expanded galleries and public spaces over three phases.

Over 20 individual gallery projects are proceeding together, involving an estimated 20,000 specimens and artifacts. These objects currently reside in 20 discipline collections with data residing in 20 independent databases on three different platforms. Any one gallery may have specimens from several different collections, and any collection may be providing specimens for several galleries. A tracking method was required that would immediately flag all objects being considered for gallery use, along with their destination gallery and any other relevant information for the planning and design process.

A decision was made to develop one comprehensive gallery object database (GOD) in Microsoft Access 2003 that would hold a record of each individual specimen or artifact being considered for use in a gallery, along with a reference image. Data was uploaded from various sources: directly from various collection databases, from Microsoft Excel spreadsheets, and from various text formats. An effort was made to provide for clear mapping from fields in the existing collections databases wherever possible. Each gallery has a collections data manager who can work within a form that shows only their records. With 20 collection managers managing the data, establishing and maintaining internal consistency within such a varied database has been a challenge.

There are presently over 24,000 records in the database, representing the maximum wish list for all galleries. Because the system will not accept duplicates (combination of collection code and museum ID number that uniquely identifies the object) the risk of double booking of objects into more than one gallery is eliminated.

As new applications are identified fields have been added for information such as specific conservation concerns (light, RH), conservation and mount making instructions and tracking, registration concerns, and exhibit location codes. Gallery teams can easily update information as it changes, such as current location

tracking, preparation status, and mount status. Much of the basic label information such as provenance and donor recognition can be extracted from the various main collections databases using specimen lists generated from the GOD, greatly facilitating generation of this information. New information about the specimens that is generated for the gallery project, such as dimensions and weights, can ultimately be migrated into the collections databases, enhancing their use.

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Oral presentation on Tuesday 14th June

Curation of the U.S. Antarctic Meteorite Program Collection: 20th century standards for the 21st century and beyond

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Meteorites from Antarctica represent an inexpensive sample of the Moon, Mars, and previously unknown asteroids. These rocks provide essential "ground-truth" for understanding solar system history and differ from non-Antarctic meteorites in recording a much longer period of collection (c.2 Ma) in the cleanest environment on Earth.

In 1977, the U.S. National Science Foundation (NSF), NASA and the Smithsonian Institution formed a partnership for the collection, short-term curation, and classification and long-term curation, respectively, of these meteorites. This cooperative three-agency agreement forms the U.S. Antarctic Meteorite program and insures the continued support of the best scientific, technical, and laboratory resources in the United States. Curatorial standards were modified from those used in the Lunar Processing Facility at NASA's Johnson Space Center in Houston, Texas. These have been modified during the intervening 28 years as the collection expanded, first at JSC and eventually to a long-term storage facility at the Smithsonian modeled after the JSC facility.

In the last 5 years, non-governmental collecting of meteorites has begun in Antarctica, spurring the Antarctic Treaty Organization to require member governments to protect these valuable resources. The U.S., represented by NSF, responded by codifying the curatorial standards in the Federally Registered Document 45 CFR 674 used by the three-agencies and expected of any collecting

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party. In this talk, we will outline the major principles of this curatorial plan as a guide for others both responsible for curation of such materials and who may have input to their governmental organizations empowered with implementing the recommendations of the Antarctic Treaty Organization.

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Oral presentation on Thursday 16th June

The Paleontological Portal: a distributed collection database for outreach and research

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The Paleontology Portal (<http://www.paleoportal.org>) is a resource for anyone interested in paleontology, from the professional in the lab to the interested amateur scouting for fossils to the student in any classroom. Produced by the Society of Vertebrate Paleontology, the Paleontological Society, the US Geological Survey, and the University of California Museum of Paleontology, the Paleontology Portal is an attempt to gather many different resources into a single entry or "portal" to paleontological information on the Internet. Images and links that you see as you browse through the site have been reviewed and selected for quality by one or more members of an Editorial Board, following the guidelines of an established editorial policy. Please use the "add to site" link at the top of the page to contribute images or links for consideration.

"Behind the scenes" of the Paleontology Portal is a pilot project of four museum collection databases that support scholarly requests for distribution data that supports the education and outreach mission. Paleontological collection data from the Academy of Natural Sciences in Philadelphia, American Museum of Natural History, Florida Museum of Natural History, University of California Museum of Paleontology, and the Yale Peabody Museum of Natural History are being provided through a Distributed Generic Information Retrieval (DIGIR) protocol for distributed queries. Extensions to the Darwin Core have been developed for managing the stratigraphic data elements specific to fossil collections. Additional museum collections will be added in the future.

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Poster presentation

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Guidelines for the curation of geological materials: setting or simply revisiting the standards?

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In 1985 the seminal volume *Guidelines for the Curation of Geological Materials* was published by the Geological Society. For over a decade this important publication remained the standard to which curators aspired, but by the late 1990s it had become obvious that a revision was needed. For the past three years the Geological Curators' Group has been working towards an expanded revision which will contain updated sections but also new sections on diverse topics including museum security and media uses for collections. *Guidelines* however, was not the first such manual for curatorship. In 1696 John Woodward produced his anonymous Brief Instructions for making observations in all parts of the world and also for collecting, preserving and sending over natural things, while Ami Boué included details of curatorial methods in *Guide du géologue-voyageur* (Paris, 1835-36). The British Geological Survey published their own manual of collecting/curation in 1914 for the use of their field geologists. The GCG project to set standards and produce guidelines is not the first time that this has been attempted. This paper will discuss the development of these earlier schemes and examine the breath and scope of the new GCG project in the context of the pioneering manuals.

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'Standardising' within a multi-disciplinary museum: how do the natural sciences collections fit in?

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National Museums Liverpool (NML) consists of eight museums and galleries. In addition to the natural science collections of botany, zoology and geology, it has collections ranging from the fine and decorative arts, ethnology, archaeology and antiquities, maritime and social history. The natural science collections are based in the World Museum Liverpool (formerly known as Liverpool Museum).

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In 2003 a Registration Department was created with the specific brief of introducing collections management standards and procedures across NML. The task facing the department was to develop and implement policies and procedures that were appropriate for the entire organisation, while taking into account the particular requirements of collections. This has involved a process of consultation between curators, registrars and conservators. The challenge is to ensure that conforming to corporate standards does not constrain the use and access of the collections. This is particularly true for the natural sciences where there are well-established, and often unwritten, codes of practice.

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Infrastructure upgrades for the University of Georgia Herbarium [GA]

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The University of Georgia Herbarium [GA] is a highly used facility with one of the largest collections of vascular plants in the southeastern United States (237,000 specimens). However, proper care of this valuable collection was imminently threatened by an aging and dangerous compactor system requiring constant repair, coupled with cabinets unsuitable for archival storage. This NSF Biological Research Collections [BRC] grant is funding the following urgently needed improvements to GA Herbarium: upgrades for the heavily used and aging electronic compactor system; acquisition of herbarium cabinets for proper archival specimen storage; mounting and accessioning backlog specimens to help attain projected growth for the next 15 years; reorganization of the main collection folders for easier access; and completion of data entry for the Georgia Atlas pilot project and posting this database on the www.

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Poster presentation

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