

SOCIETY FOR THE PRESERVATION OF NATURAL HISTORY COLLECTIONS

24TH ANNUAL MEETING

6-11 JULY 2009

LEIDEN, THE NETHERLANDS

**BRIDGING CONTINENTS
NEW INITIATIVES AND PERSPECTIVES
IN NATURAL HISTORY COLLECTIONS**

**ABSTRACTS AND
OUTLINE PROGRAMME**

. naturalis



LEIDS UNIVERSITAIR MEDISCH CENTRUM

SPNHCO 

BRIDGING CONTINENTS 2009

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Bridging Continents

New Initiatives and Perspectives in Natural History Collections

July, 2009. Financial crisis. Mexican (Swine) flu... But here you are!

More than 200 delegates from more than 20 countries representing dozens of natural history museums, universities and collections. It is therefore with even greater pleasure that the National Museum of Natural History Naturalis and the Leiden University Medical Centre LUMC welcome you at the 24th annual meeting of the Society for the Preservation of Natural History Collections in Leiden, The Netherlands.

To be honest, the organising committee had their worries. Will you be able to convince your institution to send you to Leiden? Will vendors invest the money to come over to Leiden? Will sponsors – so important for the setting and budget – respond? Will not, after all, the exchange rate of the Dollar to the Euro frighten off our American colleagues? And indeed, it took a while before registration got really started. Only on May 5th, the deadline for the earlier fee, when the interest in the SPNHC2009 conference site exploded and the number of registrations boosted, we felt more relaxed. You did register and here you are.

The organising committee and staff of Naturalis and LUMC, supported by staff of the National Herbarium Netherlands Leiden branch, and the Boerhaave Congress Office enjoyed organising SPNHC2009. We hope that through the programme and the presence of so many colleagues from all over the world the 24th annual meeting of the SPNHC will keep its promises of bridging continents and will make this an inspiring and pleasant meeting.

Dries van Dam, René Dekker & Christiane Quaiser
Organising Committee SPNHC2009

Welcome! Welkom!

I want to offer a sincere welcome to all attending the 24th annual meeting of the Society for the Preservation of Natural History Collections. We are excited that you are able to join us as we bring our meeting to the European mainland for the first time. This forum gives us the chance to meet with, and learn from, friends and colleagues from other lands and organizations. I am pleased to welcome members from EDIT and the Working Group Natural History Collections of ICOM-CC who are joining us. The theme of the meeting, *Bridging Continents, New Initiatives and Perspectives in Natural History Collections*, reflects the international nature of our role as collection stewards and emphasizes the need to be connected with initiatives that are being developed and implemented outside of our home areas.

We all need to offer a special word of thanks to our host committee and their host institutions, the National Museum of Natural History Naturalis and the Leiden University Medical Center LUMC, for their willingness to continue efforts to stage this meeting while facing the challenges that arose from the recent global economic downturn. They have developed a stimulating schedule of presentations, discussions, workshops, and social events for the delegates. I also thank all who are making presentations, leading workshops, etc. - your contributions are the intellectual "meat" of the meeting and we appreciate your efforts.

SPNHC meetings are known to be lively affairs and I expect this one to be no different. Enjoy!!

Rich Rabeler

President, Society for the Preservation of Natural History Collections



BRIDGING CONTINENTS 2009

EDIT – Workpackage 3 “Integrating and Reshaping the Infrastructure Basis“

Welcome

Thank you for attending the SPNHC meeting in Leiden. We are happy with registration of individuals and institutions from many countries and consider it very timely to have a meeting where representatives from several continents meet and exchange ideas.

In Europe, projects like SYNTHESYS and EDIT are doing a major effort to streamline and harmonise many aspects of collection management. We look forward to hear and learn from initiatives elsewhere in our General (EDIT) Session, but also during the whole conference and beyond. In addition, the back-to-back and special events are certain to be highly stimulating and will increase the impact of SPNHC2009. For example, the Directors of Collections of all EDIT institutions will meet on Friday, 10th July, to discuss and take steps towards an agreed scientific loan policy and a task force for orphaned collections, examples of concrete steps in the process of integrating European natural history collections.

Welcome to Leiden and, for those coming from overseas, welcome to Europe!

Leo Kriegsman, Leader EDIT Workpackage 3 & SYNTHESYS Network Activity B,
and Christiane Quaiser, Scientific manager EDIT WP3.1
National Museum of Natural History, Naturalis, Leiden
Website: <http://www.e-taxonomy.eu/>



ICOM - Committee for Conservation Working Group on Natural History Collections

Welcome

It is a great pleasure to welcome you to the 24th Annual Meeting for the Society for the Preservation of Natural History Collections here in Leiden. I know the local organising committee have been working tirelessly to bring you an extensive and enlightening programme of talks and workshops under the umbrella theme of "Bridging Continents: New Initiatives and Perspectives in Natural History Collections".

Working Group on Natural History Collections last met at the ICOM – Committee for Conservation 15th Triennial meeting in New Delhi, September 2008, taking the theme: "Diversity in Heritage Conservation: Tradition, Innovation and Participation". All the Working Groups met to present an overview of the current state of conservation research and practice through reports. The Working Group on Natural History Collections session discussed a range of issues from pest control to using X-ray fluorescence spectrometry to investigate biocides.

Over the next three years, we aim to work very closely with SPNHC as we have common goals and interests in wanting to examine standards, policies and procedures and international agreements that will ensure best practice in the management, care and conservation of natural history collections. From a practical point of view we hope to start looking at ways increase knowledge and understanding of the materials and techniques used which will ensure best practice in all aspects of specimen preparation, preservation and conservation, and develop defined environmental parameters (temperature, light levels and relative humidity) for collections storage with the aim of developing a more scientific approach for these standards.

The Working Group on Natural History Collections is delighted to have been invited to participate in this meeting and we look forward to seeing you at our hosted session on Friday, which will be focussing on Interdisciplinary Projects.

Clare Valentine, Coordinator and Henry McGhie, Assistant Coordinator
ICOM-CC Working Group on Natural History Collections

Website: <http://www.icom-cc.org/33/working-groups/natural-history-collections/>

Committees

Local Organising Committee (SPNHC 2009)

René Dekker	Naturalis
Dries van Dam	LUMC
Christiane Quaisser	Naturalis
Jeroen van Drongelen	Naturalis
Aimée van Schie	Naturalis
Jacob Muller	Boerhaave Congress Office
Linda van Dun	Boerhaave Congress Office
Peggy Metz	Boerhaave Congress Office

Registration Boerhaave Congress Office

Sponsors, Vendors and Advertisers

Marcia A. Revelez	Sam Noble Oklahoma Museum of Natural History
Aimée van Schie	Naturalis
Clare Valentine	The Natural History Museum London

Programme

René Dekker	Naturalis
Dries van Dam	LUMC
Christiane Quaisser	Naturalis
Jeroen Goud	Naturalis
Eulàlia Gassó Miracle	Naturalis
Leo Kriegsman	Naturalis
Gerard Thijsse	Nationaal Herbarium Nederland Leiden
Gerda van Uffelen	Hortus Leiden
Caroline Pepermans	Naturalis
Minke van Det	Naturalis

Workshops

Dries van Dam	LUMC
Christiane Quaisser	Naturalis

Website

Thierry Moelker	Boerhaave Congress Office
Linda van Dun	Boerhaave Congress Office

Layout and Production

Fred Mooij	Naturalis
Niko Korenhof	Naturalis
Marc de Hart	Naturalis

We are grateful to all who have contributed to the success of SPNHC 2009



Tradeshow and sponsors

We thank all our sponsors and vendors who will be appearing at the 24th annual meeting of SPNHC

The National Museum of Natural History Naturalis, the Leiden University Medical Center LUMC and the European Distributed Institute of Taxonomy (EDIT)

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Trade Show Literature

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Leica - Microsystems

Keynote speakers

Peter Tindemans,

**Consultant for the Board of the Netherlands Centre for Biodiversity:
The Netherlands Centre for Biodiversity: a new bridge between the Dutch natural
history collection, the public and academia**

Peter Tindemans, born 1947 in Nederweert, Netherlands, has a PhD in Theoretical Physics from Leiden University. A long career in science policy in the Netherlands starting with coordinating in the late 70-ies a new comprehensive innovation policy for the Netherlands, involved many European activities such as chairing the COSINE Policy Group for a pan-european computer networking infrastructure in the 80-ies and international ones such as chairing the OECD Megascience Forum from 1992-1999, and ended with being responsible for the whole of research and science policy in the Netherlands which included helping set up the International Institute for Asian Studies and the International Institute for the Study of Islam in Modern Societies. Since 1999 he is independently engaged in for example discussions on European Science, Technology and Innovation Policies and on Research Infrastructures: he chairs the European Spallation Source efforts and a European Alliance for Permanent Access to the Records of Science to establish a European Digital Information Infrastructure. With the World Bank, UNESCO, ESCWA and governments he is working on STI policies in the Middle East, Africa and Latin America, but also on regional innovation policies in the Netherlands, Germany and Belgium. Since 2006 he has also been leading the efforts to establish the Netherlands National Centre of Biodiversity, a merger of world-renowned natural history collections and research.

**Wouter Los,
Universiteit van Amsterdam:**

The landscape of European Natural History Collections and related infrastructures

From his original study interest, theoretical chemistry at the University of Leiden, Wouter Los entered biology. For almost 20 years up to 2005 he was director of the Zoological Museum at the University of Amsterdam. His interest in the prospects of using large-scale biodiversity data-sets for research resulted in the development of various initiatives and projects. These include topics as the establishment of taxonomic reference databases and refocusing of scientific efforts in this area. His position as chair of the Science Committee of the Global Biodiversity Information Facility from 2003-2007 also reflects these interests. After his coordinatorship of e-BioScience at the University of Amsterdam, he currently is coordinator of the LifeWatch preparatory project aiming at the construction of a large scale e-infrastructure for biodiversity research. His focus is now on issues such as accelerating specimen digitization, sensor network development, integrating analytical and modeling tools, and grid computing.

Practical information

Venue

The conference venue is divided over two locations: the Education Building of the Leiden University Medical Center (LUMC) and the Pesthuis of Naturalis.

Registration, lectures, part of the trade show and the refreshment breaks take place in the Education Building. The main lecture room is the Buruma Hall. The Education Building is located only 3 minutes walking distance from the Leiden Central Railway Station. The session on digitisation and documentation (Thursday morning) will be presented in Lecture Hall 1 of the neighbouring building (see the attached route description). Parallel sessions and SIG's are on the second and third floor of the Education Building. Signs will guide you there.

Posters, part of the trade show and lunch are in the Pesthuis. The Pesthuis is the historical building next to the LUMC.

Registration desk

The registration desk is situated on the ground floor of the Education Building. Opening hours are:

Monday, 6 th July:	15.00 - 17.00
Tuesday, 7 th July:	15.00 - 17.00
Wednesday, 8 th July:	08.00 - 17.30
Thursday, 9 th July:	08.00 - 17.30

Employees from the Boerhaave Congress Office will be there to help you with questions on registration. A message board will be placed near the registration desk. Please check the board regularly for personal messages or announcements.

Boerhaave Congress Office

During the congress the Congress Office can be reached via:

Ms. Linda F. van Dun, mr. Jacob J.L. Muller, PO Box 9600, 2300 RC Leiden, The Netherlands. Tel.: 31 71 5268500 or 31 71 5268511. Fax: 31 71 5268255. E-mail: j.j.l.muller@lumc.nl and l.f.van_dun@lumc.nl

Catering

During the refreshment breaks, coffee and tea will be served in the Foyer (ground floor) of the Education building. All lunches will be served in the Pesthuis. Coffee and tea as well as lunches are included in the conference fee.

The Ice breaker reception

The Ice breaker reception on 7th July will be held at the Town Hall of Leiden (Bree-straat 92-104) from 17.00 until 18.30. For participation you will be requested to show your invitation at the entrance. Please do not forget to take it with you.

BBQ on the beach

The BBQ, offered by Naturalis, takes place at the 'Strandhuys De Gouden Bal', Wassenaarseslag 31 in Wassenaar on Wednesday, 8th July. Please note that drinks will be on your own account.

The ticket for the BBQ will be issued during your registration. There are still a few tickets available: ask at the registration desk.

A bus service will be organized to pick you up at the LUMC and bring you back afterwards. The buses return twice, at 21.30 and 22.00. However, if you wish, taxis can be ordered by the catering personnel or can be called directly via City Tax 31 70 3830830 (at your own account!).

Congress Party

The congress banquet will be held at 'Het Arsenal', Arsenal 1, Leiden on Thursday 9th July. Doors open at 19.00 for reception. Entertainment and dancing will end at 23.30. There are a few tickets left for sale at the registration desk.

Shop opening hours

In Leiden most shops are open from Monday to Saturday, 9.00 to 18.00. On Thursday the shops stay open until 21.00. On Sunday, most city centre shops are closed.

Parking

The LUMC has a multi-storey car park. Rates depend on the duration of parking.

Paid parking restrictions apply to many areas in Leiden, including the city centre, between 10am and 10pm.

Climate

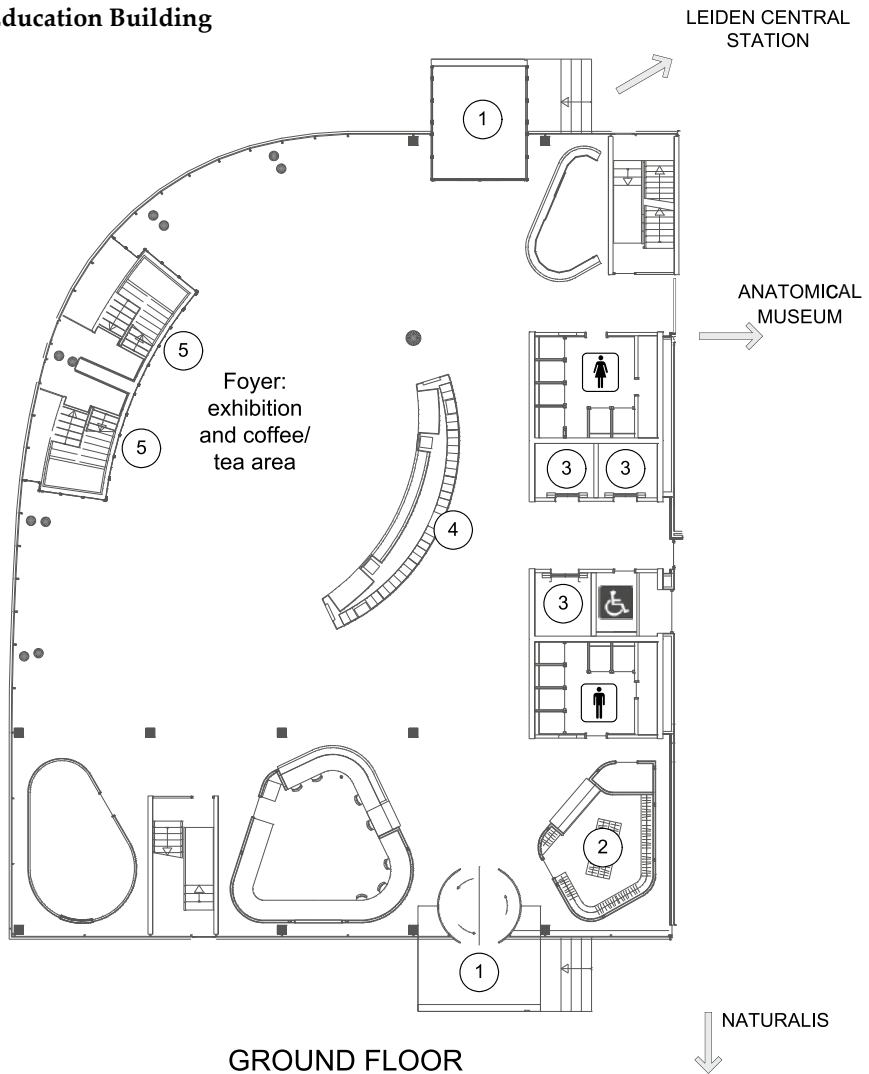
In July the average temperature in Leiden is 22 degree C.

Electricity supply

Electricity supply 230 V - 50 HZ AC.

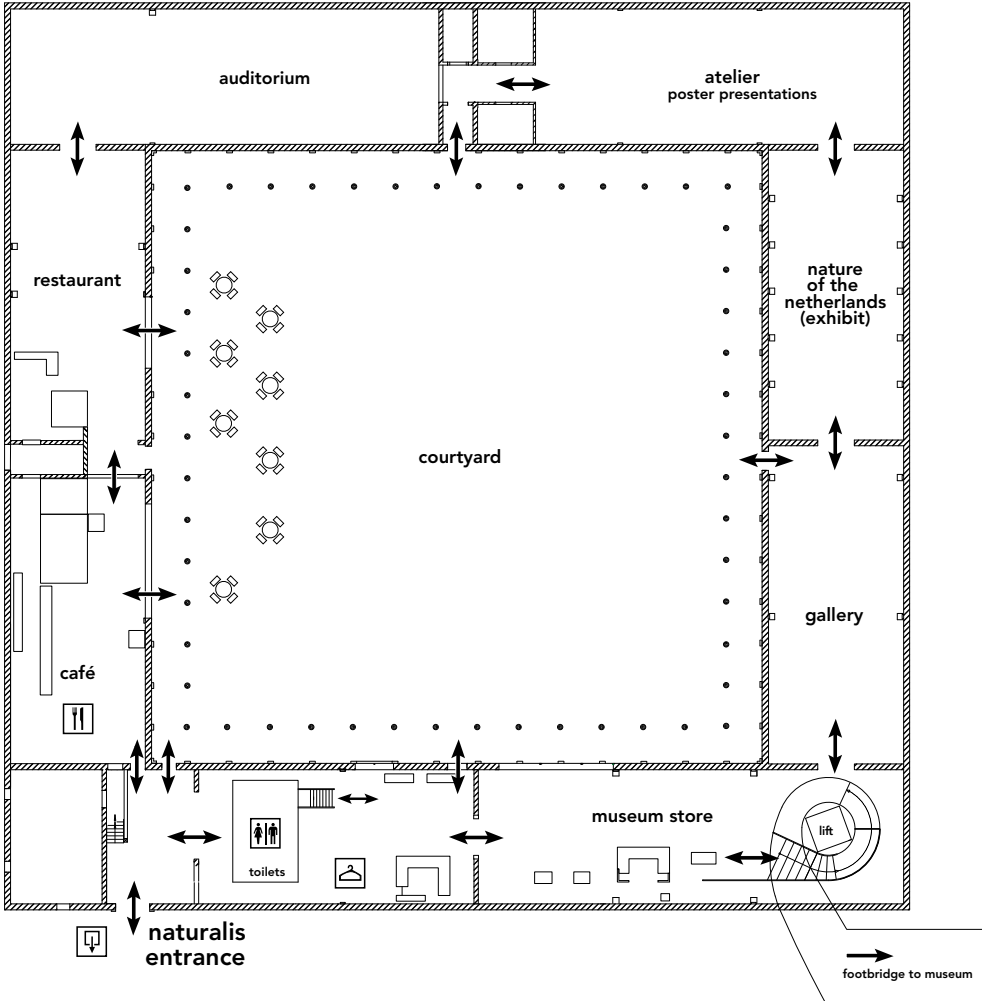


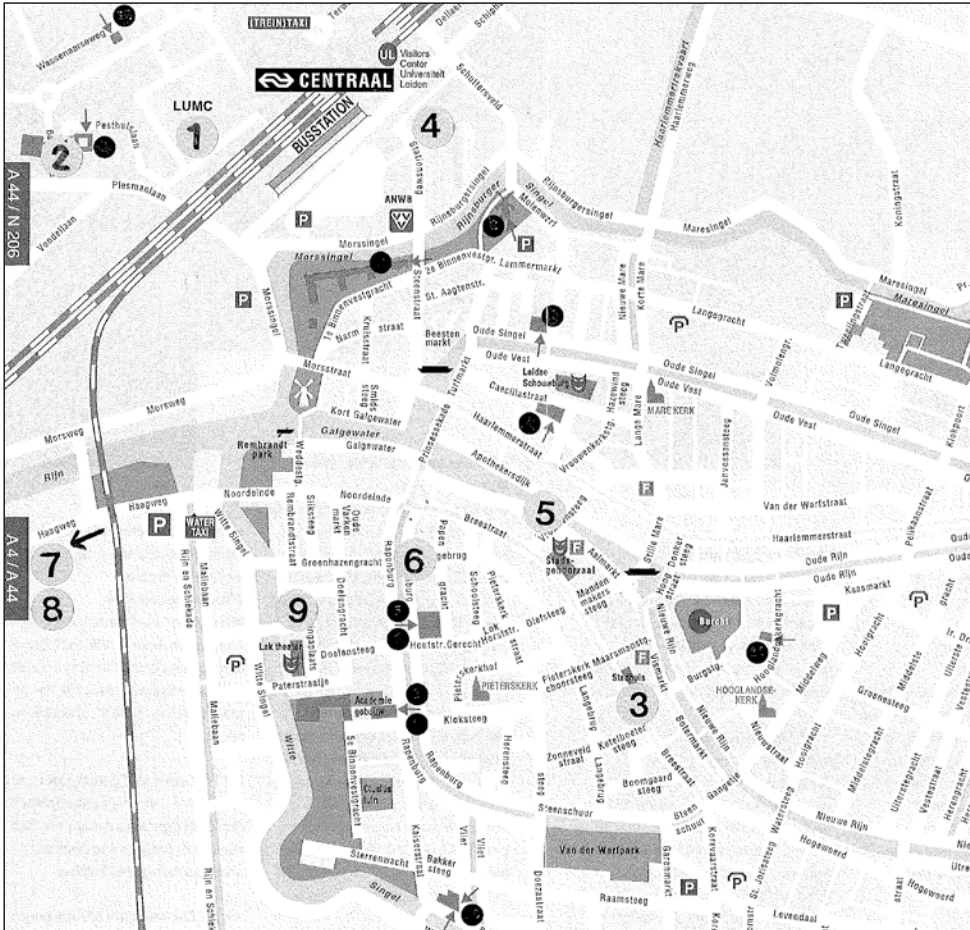
LUMC 'Education Building



- 1. Entrance
- 2. Registration desk
- 3. Elevators
- 4. Lockers
- 5. Entrance Buruma Hall and 'via elevators

Pesthuis Floorplan





1. Leiden University Medical Center
2. Naturalis
3. Town Hall
4. Golden Tulip Leiden
5. Minerva Hotel
6. Hotel de Doelen
7. Hotel Het Haagsche Schouw
8. Holiday Inn
9. Arsenaal (Congres Diner)

Programme at-a-glance

Monday 6 July 2009

- 09.00-17.00 **SPNHC Committee Meetings**
LUMC Education Building
- 15.00-18.30 **Registration**
LUMC Education Building
- 19.00-22.30 **SPNHC First Council Meeting**
LUMC Education Building Barge Hall

Tuesday 7 July 2009

Pre-conference field trips

Departure: LUMC Education Building

- 08.30-16.00 Neeltje Jans and Kinderdijk
- 08.30-16.30 Train and museum boat trip Amsterdam
- 09.00-13.00 Meijendel and Panorama Mesdag
- 15.00-17.00 **Registration**
LUMC Education Building
- Trade show set-up**
LUMC Education Building & Naturalis Pesthuis Auditorium
- 17.00-18.30 **Icebreaker reception**
Town Hall of Leiden, Stadhuisplein 1, Leiden

Wednesday 8 July 2009

- 08.00-17.30 **Registration**
LUMC Education Building
- Trade show**
LUMC Education Building & Naturalis Pesthuis Auditorium
- Poster display**
Naturalis Pesthuis Atelier
- 08.30-09.15 **Welcome and opening remarks**
LUMC Education Building Buruma Hall
- 09.15-10.45 **Keynote speakers**
LUMC Education Building Buruma Hall
- 10.45-11.15 **Refreshment break**
LUMC Education Building Buruma Foyer



- 11.15-12.00 **Opening and keynote address General Session**
New Initiatives and Perspectives in Natural History Collections
 LUMC Education Building Buruma Hall
- 12.00-13.30 **Lunch**
 Naturalis Pesthuis
- 13.30-15.10 **General Session 1 (EDIT Session)**
New Initiatives and Perspectives in Natural History Collections I
 LUMC Education Building Buruma Hall
- 15.10-15.40 **Refreshment break**
 LUMC Education Building Buruma Foyer
- 15.40-17.20 **General Session 2 (EDIT Session)**
New Initiatives and Perspectives in Natural History Collections II
 LUMC Education Building Buruma Hall
- 18.00 **Busses leaving conference venue**
 Departure: LUMC Education Building
- 18.30-22.00 **BBQ on the beach**
 Strandhuys De Gouden Bal, Wassenaarse Slag 31, Wassenaar
- 21.30-22.00 **Busses departing for Leiden**

Thursday 9 July 2009

- 08.00-17.30 **Registration**
 LUMC Education Building
- Trade show**
 LUMC Education Building & Naturalis Pesthuis Auditorium
- Poster display**
 Naturalis Pesthuis Atelier
- 08.20-09.40 **Technical Session 1 (concurrent)**
Integrated Pest Management, Health and Safety, and Disaster Planning
 LUMC Education Building Buruma Hall
- Technical Session 2 (concurrent)**
Digitisation and Documentation of Collections I
 LUMC Lecture Hall 1
- 09.40-10.00 **Refreshment break**
 LUMC Education Building Buruma Foyer
- 10.00-12.00 **Technical Session 3 (concurrent)**
Preservation Techniques (Fluid, Dry, and Frozen Collections)
 LUMC Education Building Buruma Hall
- Technical Session 4 (concurrent)**
Digitisation and Documentation of Collections II
 LUMC Lecture Hall 1



- 12.00-13.30 **Lunch**
Naturalis Pesthuis
- 13.00-14.00 **Poster Session**
Naturalis Pesthuis Atelier
- 14.10-15.50 **Technical Session 5**
Move, Storage and Display of Collections
LUMC Education Building Buruma Hall
- 15.50-16.10 **Refreshment break**
LUMC Education Building Buruma Foyer
- 16.10-17.50 **Technical Session 6 (ICOM-CC Session)**
Interdisciplinary Projects
LUMC Education Building Buruma Hall
- 19.00-23.30 **Banquet, entertainment & dancing**
Het Arsenal, Arsenalstraat 1, Leiden

Friday 10 July 2009

- 08.00-13.30 **Trade show**
LUMC Education Building & Naturalis Pesthuis Auditorium
Poster display
Naturalis Pesthuis Atelier
- 09.00-10.30 **Special Interest Groups**
LUMC Education Building
- 1 Collections ownership, legal issues and access
 - 2 Building bridges of learning and experience
 - 3 Software toolkit demonstration session
 - 4 Digital photography and e-preservation
 - 5 Scientific loan policy
 - 6 Measuring once and for all
 - 7 DNA-barcoding and destructive sampling
 - 8 Cultures of collecting, the undervalued cultural and historical significance of biology collections
 - 9 New developments in fluid preservation
 - 10 Integrated pest management (IPM)
- 10.30-10.45 **Refreshment break**
LUMC Education Building Buruma Foyer

- 10.45-12.15 **SPNHC Annual Business Meeting**
LUMC Education Building Buruma Hall
- 12.15-13.30 **Lunch**
Naturalis Pesthuis
- 13.30-15.00 **SPNHC Best Practice Symposium (concurrent)**
Digitisation and Documentation
LUMC Education Building Buruma Hall
Interactive Session: (Re)valuating collections (concurrent)
LUMC Lecture Hall 1
- 15.00-17.00 **Leiden museums tours**
Trade show move-out
- 18.00-20.00 **SPNHC Second Council Meeting**
LUMC Education Building Barge Hall

Saturday 11 July 2009

- 07.30-12.30 **Workshop registration**
LUMC Education Building
- 08.00-12.00 **Workshop 1: Developing best practices and new standards for fluid preservation**
LUMC Lecture Hall 4
Workshop 2: How to prioritise the digitisation of natural history specimens
LUMC Education Building
- 10.00-10.30 **Refreshment break**
LUMC Education Building Buruma Foyer
- 12.00-13.00 **Lunch**
Naturalis Pesthuis
- 13.00-17.00 **Workshop 3: The ultimate label**
LUMC Education Building
Workshop 4: New approaches to and uses for morphological imaging/scanning in a collections context
LUMC Education Building
- 15.00-15.30 **Refreshment break**
LUMC Education Building Buruma Foyer

Detailed programme

Monday 6 July 2009

- 09.00-17.00 **SPNHC Committee Meetings**
LUMC Education Building
- 15.00-18.30 **Registration**
LUMC Education Building
- 17.00-19.00 **Diner Break**
- 19.00-22.30 **SPNHC First Council Meeting**
LUMC Education Building Barge Hall

Tuesday 7 July 2009

Pre-conference field trips

Departure: LUMC Education Building

- 08.30-16.00 **Neeltje Jans and Kinderdijk**
More than half of the Netherlands lies below sea level. The Delta Works were built to keep everyone safe and to prevent a recurrence of the 1953 flood disaster. You can re-live history at Deltapark Neeltje Jans: from the flood disaster to the construction of the Delta Works. Exhibitions, films and a visit to the storm surge barrier itself will give you an impression of the stupendous power of water.
The Netherlands is famous for its windmills. Today there are still more than 1.000 mills. Nowhere in the world you will find as many windmills together as near (the Dutch village) Kinderdijk. Around 1740 no less than 19 sturdy mills were built here. They have been well preserved to the present day. In 1997 the mills of Kinderdijk were put on the World Heritage List of UNESCO.
- 08.30-16.30 **Train and museum boat trip Amsterdam**
By train from Leiden to Amsterdam. In Amsterdam you will go by boat through the canals. You will visit the Anne Frank House, Van Gogh Museum, the Rijksmuseum and the Netherlands Institute for Cultural Heritage (ICN) in the new Atelier Building.
- 09.00-13.00 **Meijndel and Panorama Mesdag**
The Meijndel Dunes are among the most important coastal areas of the Netherlands, with a primarily open dune landscape with brushwood. The larger dune valleys also support woodlands, e.g. the valleys of Meijndel, Bierlap and Kijfhoek. Vincent van Gogh has lived here in 1882-'83. The most important functions of the area are: nature protection, collection of drinking water, coastal defence and recreation.
Panorama Mesdag is a cylindrical painting, more than 14 meters high and 120 meters in circumference. The vista of the sea, the dunes and Scheveningen village was painted by one of the most famous painters of the Hague School, Hendrik Willem Mesdag. It is the oldest 19th century panorama in the world in its original site, and a unique cultural heritage.

- 15.00-17.00 **Registration**
LUMC Education Building
Trade show set-up
LUMC Education Building & Naturalis Pesthuis Auditorium
- 17.00-18.30 **Icebreaker Reception**
Offered by the Mayor of Leiden and the Board of Leiden University
Town Hall of Leiden, Stadhuisplein 1, Leiden

Wednesday 8 July 2009

- 08.00-17.30 **Registration**
LUMC Education Building
Trade show
LUMC Education Building & Naturalis Pesthuis Auditorium
Poster display
Naturalis Pesthuis Atelier
- 08.30-09.15 **Welcome and opening remarks**
Moderator: René W.R.J. Dekker, Naturalis
LUMC Education Building Buruma Hall
René W.R.J. Dekker
Organising committee, Naturalis Leiden
Richard K. Rabeler
SPNHC President, University of Michigan Herbarium Ann Arbor
Bert M. Geerken
Director Naturalis Leiden
Pancras C.W. Hogendoorn
Chair of the Museums Commission, LUMC Leiden
- 09.15-10.45 **Keynote speaker**
Moderator: René W.R.J. Dekker, Naturalis
LUMC Education Building Buruma Hall
Peter Tindemans
Consultant for the Board of the Netherlands Centre for Biodiversity
The Netherlands Centre for Biodiversity: a new bridge between the Dutch natural history collection, the public and academia
- 10.45-11.15 **Refreshment break**
LUMC Education Building Buruma Foyer

- 11.15-12.00 **Opening and keynote address General Session (EDIT Session)
New Initiatives and Perspectives in Natural History Collections**
Moderator: Leo Kriegsman, Naturalis
LUMC Education Building Buruma Hall
Wouter Los
University of Amsterdam
**The landscape of European natural history collections and related in-
frastructures**
- 12.00-13.30 **Lunch**
Naturalis Pesthuis
- 13.30-15.10 **General Session 1 (EDIT Session)
New Initiatives and Perspectives in Natural History Collections I**
Moderator: Richard Lane, The Natural History Museum
LUMC Education Building Buruma Hall
- 13.30-13.50 **SYNTHESYS and EDIT: streamlining and integrating
operations in European natural history Museums**
Leo Kriegsman*
- 13.50-14.10 **Towards agreed collection management standards and
policies – the EDIT Directors of Collections working
group**
Christiane Quaisser, René Dekker, Michel Guiraud &
Rob Huxley
- 14.10-14.30 **How the SYNTHESYS project has impacted on collec-
tions management and collections based research**
Gemma Robinson & Rob Huxley
- 14.30-14.50 **Setting the standard: A review of the state and status of
Natural History Collections in Europe**
Lorraine Cornish & Chris Collins
- 14.50-15.10 **Business continuity and collections salvage:
An integrated European approach**
Clare Valentine, Tanya Pollard, Chris Collins, Michel
Guiraud, Rob Huxley, Jackie Mackenzie-Dodd & Simon
Owens
- 15.10-15.40 **Refreshment break**
LUMC Education Building Buruma Foyer
- 15.40-17.20 **General Session 2 (EDIT Session)
New Initiatives and Perspectives in Natural History Collections II**
Moderator: Kieran Shepherd, Canadian Museum of Nature
LUMC Education Building Buruma Hall

* For addresses of speakers see abstracts.

- 15.40-16.00 **SciColl: an international mechanism for scientific collections**
Richard Lane
- 16.00-16.20 **Adapting herbaria to 21st century challenges**
Gisèle Mitrow, P.M. Catlin & J. Cayouette
- 16.20-16.40 **Towards a European network of DNA- and tissuebanks**
Ole Seberg
- 16.40-17.00 **Destructive sampling and the future: coordinating an international strategy for the preservation of natural history collections in the face of next-generation DNA sequencing technologies**
Richard Sabin
- 17.00-17.20 **STERNA: building semantic bridges between Europe's natural history collections**
Maarten Heerlien & Steven van der Mije

- 18.00 **Busses leaving conference venue**
Departure: LUMC Education Building
- 18.30-22.00 **BBQ on the beach**
Offered by Naturalis Leiden (drinks at one's own expense)
Strandhuys De Gouden Bal, Wassenaarseslag 31, Wassenaar
- 21.30-22.00 **Busses departing for Leiden**

Thursday 9 July 2009

- 08.00-17.30 **Registration**
LUMC Education Building
- Trade show**
LUMC Education Building & Naturalis Pesthuis Auditorium
- Poster display**
Naturalis Pesthuis Atelier
- 08.20-09.40 **Technical Session 1 (concurrent)**
Integrated Pest Management, Health and Safety, and Disaster Planning
Moderator: Laura Abraczinskas, Michigan State University Museum
LUMC Education Building Buruma Hall
- 08.20-08.40 **Development of KeEMu to be a generally applicable tool for pest management**
David Smith
- 08.40-09.00 **Using robotic vacuum's at the Smithsonian Institution**
G. Jackson Tanner



- 09.00-09.20 **Using the Thermo Lignum process for the treatment of natural history collections-research and practical experience**
David Pinniger, Karen Roux, Clare Valentine & Alison Paul
- 09.20-09.40 **Portable X-ray fluorescence for the examination of taxidermy specimens at the Horniman Museum; exploring the possibilities**
Louise Bacon, Felicity Bolton, Georgina Garrett & Monika Harter
- 08.20-09.40 **Technical Session 2 (concurrent)**
Digitization and Documentation of Collections I
Moderator: Richard Rabeler, University of Michigan Herbarium
LUMC Lecture Hall 1
- 08.20-08.40 **Herbarium Networks Part III: A prototype for exchange of botanical specimen data to reduce duplicative effort and improve quality using a 'filtered push'**
James A. Macklin, Paul Morris, Robert Morris, Zhimin Wang & Maureen Kelly
- 08.40-09.00 **Summary reports for users to improve data quality: Experimenting with tagged biodiversity information in social media**
Paul Morris
- 09.00-09.20 **Community building and collaborative georeferencing using GEOlocate**
N.E.R. Rios & H.L.B. Bart
- 09.20-09.40 **New perspectives on natural history collections through automated discovery**
Antal van den Bosch, Caroline Sporleder, Piroska Lendvai, Marieke van Erp & Steven Hunt
- 09.40-10.00 **Refreshment break**
LUMC Education Building Buruma Foyer
- 10.00-12.00 **Technical Session 3 (concurrent)**
Preservation Techniques (Fluid, Dry, and Frozen Collections)
Moderator: Richard Sabin, The Natural History Museum
LUMC Education Building Buruma Hall
- 10.00-10.20 **Progress, plans, and challenges of the New Specimen Preparation Lab at the California Academy of Sciences**
Maureen Flannery & John Dumbacher
- 10.20-10.40 **Documentation of methods, routines and conservation status - A preventive conservation project**
Ingela Chef Holmberg & Monika Åkerlund

- 10.40-11.00 **The wet collections of the Museum für Naturkunde Berlin: Problems and the KUR project**
Birger Neuhaus & Martin Aberhan
- 11.00-11.20 **Alcohol Recycling at the Smithsonian Institution**
William G. Keel, William Moser, Jennifer Giaccai, Andrea Ormos, Jackson Tanner & Lee Weigt
- 11.20-11.40 **Management and preservation of new natural history collections: Tissues and DNA collection of the MNCN**
Isabel Rey & B.A. Dorda
- 11.40-12.00 **Bone maceration & bone degreasing - a necessary tool for preserving natural history collections**
Günther Weber
- 10.00-12.00 **Technical Session 4 (concurrent)**
Digitization and Documentation of Collections II
Moderators: Walter Berendsohn, Botanical Garden and Botanical Museum Berlin & Andrew Bentley, Natural History Museum & Biodiversity Research Center, University of Kansas
LUMC Lecture Hall 1
- 10.00-10.20 **The potential of digitised herbarium and NHM collections**
Niels Raes, Marco Roos, Hans Ter Steege & Pieter Baas
- 10.20-10.40 **Documenting specimen citations in published literature for collection management and for posterity**
Willem Coetzer, Paul Skelton, Margie Shaw & Elaine Heemstra
- 10.40-11.00 **From the 19th century to the 21st: A small, rural natural history museum's challenge to create change**
Mary Prondzinski
- 11.00-11.20 **Changes in gathering and presentation of the data from the palaeontological collections: The case study of the Czech Geological Survey**
Petr Budil, Pavel Bokr, Petr Coupek, Olga Moravcová & Marika Steinová
- 11.20-11.40 **Digital integrated collection management: A fusion of resources**
Ann Molineux, Christine McCulloch & Angella Inzinga
- 11.40-12.00 **Systematics research in the South African National Biodiversity Institute**
Gideon Smith
- 12.00-13.30 **Lunch**
Naturalis Pesthuis

13.00-14.00 **Poster Session**
Naturalis Pesthuis Atelier

Posters in alphabetical order – number corresponds with computer on which poster will be displayed.

1. **Exhibit collection restoration at the Spanish Museo Nacional de Ciencias Naturales (MNCN). CSIC: Preliminary results**
Josefina Barreiro
2. **A configurable specimen and observation portal for the GBIF- and BioCASE-network**
Walter Berendsohn, Anton Güntsch, Jörg Holetschek, Patricia Kelbert, Wolf-Henning Kusber & Elke Zippel
3. **A river runs through it! Building bridges between flooded collections: Disaster response to the 2008 Iowa, USA, floods**
Holly Berg, Cindy Opitz & Tiffany Adrain
4. **The Apiary project: High-throughput workflow for computer-assisted human parsing of biological specimen label data**
Jason Best, Amanda Neill & William Moen
5. **Revision and digitisation of the Scháry collection in the Museum of Comparative Zoology (Harvard University)**
Peter Budil & Jessica Cundiff
6. **Moulding and casting unusual fish at the National Museum Wales**
Caroline Buttler & Annette Townsend
7. **A curatorial assessment for stratigraphic collections to determine suitability for incorporation into the systematic collection**
Susan Butts, Jessica Bazeley & Derek Briggs
8. **The zoological and anthropological collections of the Museu Nacional de História Natural, University of Lisbon, Portugal**
Alexandra Cartaxana, M.J. Alves, C. Bastos-Silveira & D. Carvalho
9. **The pressing side of mounting specimens with adhesive**
Jovita Cislinski Yesilyurt
10. **Recent and ongoing collections facility renovations at the Museum of Comparative Zoology (Harvard University)**
Jessica Cundiff, Adam Baldinger, Judith Chupasko, Linda Ford & Jeremiah Trimble
11. **Unique solutions to large mammal specimen storage challenges**
Maureen Flannery
12. **An African natural history museum with European/western dreams: How's that logical in the new South Africa?**
Wayne Florence, Denise Hamerton & Hamish Robertson
13. **Plastic covers and inserts for glass bottles**
José Enrique González-Fernández

14. **Three million botanical specimens on the move**
Jonathan Gregson
15. **Curation of silica dried plant tissue at the Natural History Museum, London**
Michael Grundmann
16. **EDIT ATBI+M surveys: Collecting combined with biodiversity inventories and monitoring of conservation areas**
Christoph Häuser, Friederike Woog, Jutta Eymann, Alexander Kroupa, Juan Carlos Monje & Lars Krogmann
17. **Ranges and changes of pH in zoological alcohol collections**
Marion Kotrba, Daniel Burckhardt, Klaus Golbig & Christoph Meier
18. **Collection policies of the State Museum for Natural History Stuttgart**
Johanna Kovar-Eder, Jutta Eymann & Friederike Woog
19. **Controlled environments: Creating space for critical specimens**
Ann Molineux & Angella Inzinga
20. **Remote annotations: Keeping natural history collections vital in an age of digital dissemination**
Paul Morris, Maureen Kelly, James Macklin, Robert Morris & Zhimin Wang
21. **Biodiversity research and the role of natural history collections**
Marine Mosulishvili & Georgi Arabuli
22. **Beeswax as remedial treatment for pyrite disease**
Rodrigo Pellegrini, Albert Jehle, Barbara Grandstaff, Shirley Albright & David Parris
23. **Recognition of the relationship between a cellulose substrate and historic biocides applied to herbaria over time**
Victoria Purewal, Belinda Colston & David Morgan
24. **Insect pest population trends at the Natural History Museum, London**
Suzanne Ryder & Alison Paul
25. **Darwin and barnacles, Darwin and earthworms: The differing approaches**
E. Sherlock & M. Lowe
26. **Digitalisation of a Polychaete type collection to be accessible through a web based catalogue (KE Emu)**
E. Sherlock & M. Packer
27. **Condition reports on freshwater bryozoans – a tool for access as well as conservation**
Mary Spencer Jones & Emmy Woess
28. **Speeding up prioritising of backlogs of unincorporated material by scoring of backlog-containers instead of individual specimens**
Holger Thüs
29. **Measuring birds, morphometrics in ornithological collections**
Till Töpfer, Siegfried Eck, Jürgen Fiebig, Wolfgang Fiedler, Iris Heynen, Nils Hoff, Bernd Nicolai, Renate Van den Elzen, Raffael Winkler & Friederike Woog

30. **Reducing destructive sampling in ornithological collections by DNA extraction from arsenic-treated bird skins**
Till Töpfer & Elisabeth Haring
31. **Botanical and mycological collections of the Natural History Museum of Tartu University**
Kai Vellak & Ave Suija
32. **Seeking a novel approach to the conservation of fragile coralline algae specimens**
Joanna Wilbraham & Jovita Yesilyurt

14.10-15.50 **Technical Session 5**

Move, Storage and Display of Collections

Moderator: Jean-Marc Gagnon, Canadian Museum of Nature
LUMC Education Building Buruma Hall

14.10-14.30 **Managing a collections move – planning, packing, and logistics, Oh my!**

Annette van Aken, Roger Colten & Maureen DaRos

14.30-14.50 **Moving collections as collections management: The Yale Peabody Museum of Natural History Anthropology collections go west**

Roger Colten, Maureen DaRos & Annette van Aken

14.50-15.10 **Post occupancy evaluation of the wet collections facility for Smithsonian NMNH**

Walt Crimm

15.10-15.30 **Collective inclusion – realities of a wet collection redevelopment at the Museum of New Zealand**

Simon Whittaker & Carol Diebel

15.30-15.50 **Microscope slide project at Yale Peabody Museum of Natural History**

Gregory Watkins-Colwell, Catherine Sease & E. Lazo-Wasem

15.50-16.10 **Refreshment break**

LUMC Education Building Buruma Foyer

16.10-17.50 **Technical Session 6 (ICOM-CC Session)**

Interdisciplinary Projects

Moderators: Andries J. van Dam, member of the ICOM-CC Directory Board & Clare Valentine, coordinator ICOM-CC Working Group on Natural History Collections

LUMC Education Building Buruma Hall

16.10-16.30 **Cultures of collecting - the Leiden anatomical collections in context**

Marieke Hendriksen & Hieke Huistra

16.30-16.50 **Scientists under glass: Exhibiting research in a natural history museum**

Rebecca Peters & Maureen Flannery



16.50-17.10 **Fostering interdisciplinarity in a shared collections facility**

Tim White & Christopher A. Norris

17.10-17.30 **Observation and distillation - preservation, depiction, and the perception of nature**

Julianne Snider & John Simmons

17.30-17.50 **Breaking up is hard to do: Deaccessioning on a large scale**

Lori Benson

19.00-23.30 **Banquet, entertainment & dancing**
Het Arsenal, Arsenalstraat 1, Leiden

Friday 10 July 2009

08.00-13.30 **Trade show**
LUMC Education Building & Naturalis Pesthuis Auditorium

Poster display
Naturalis Pesthuis Atelier

09.00-10.30 **Special Interest Groups**
Pre-registration required
LUMC Education Building

1 Collections ownership, legal issues and access
Moderator: Carol Butler, National Museum of Natural History

2 Building bridges of learning and experience
Moderator: Jeff Stephenson, Denver Museum of Nature and Science

3 Software toolkit demonstration session
Moderator: Amanda Neill, Botanical Research Institute of Texas

4 Digital photography and e-preservation
Moderator: Jeroen Goud, Naturalis

5 Scientific loan policy
Moderator: Richard Sabin, The Natural History Museum

6 Measuring once and for all
Moderator: Till Töpfer, Senckenberg Naturhistorische Sammlungen Dresden

7 DNA-barcoding and destructive sampling
Moderator: Clare Valentine, The Natural History Museum

8 Cultures of collecting, the undervalued cultural and historical significance of biology collections

Moderators: Marieke Hendriksen, Hieke Huistra, Leiden University

9 New developments in fluid preservation
Moderator: Simon Moore, Hampshire Museums & Archives Service

10 Integrated pest management (IPM)
Moderator: Suzanne Ryder, The Natural History Museum

10.30-10.45 **Refreshment break**
LUMC Education Building Buruma Foyer



- 10.45-12.15 **SPNHC Annual Business Meeting**
LUMC Education Building Buruma Hall
- 12.15-13.30 **Lunch**
Naturalis Pesthuis
- 13.30-15.00 **SPNHC Best Practice Symposium (concurrent)**
Digitization and Documentation
Moderator: James A. Macklin, Harvard University Herbaria
LUMC Education Building Buruma Hall
- 13.30-13.40 **Introduction**
James A. Macklin
- 13.40-14.20 **The Atlas of Living Australia – a project to share
Australia’s biodiversity knowledge**
Penny Berents
- 14.20-15.00 **Title to be announced**
Nick King
- 13.30-15.00 **Interactive Session: (Re)valuating collections (concurrent)**
Moderators: Agnes Brokerhof, Netherlands Institute for Cultural Heritage
(ICN) & Rob Waller, Canadian Museum of Nature
LUMC Lecture Hall 1
- 15.00-17.00 **Leiden museums tours**
- 15.00 **Trade show move-out**
- 18.00-20.00 **SPNHC Second Council Meeting**
LUMC Education Building Barge Hall
- 09.00-17.00 **Second Workshop of Directors of Collections – EDIT member institu-
tions**
Coordinator: Christiane Quaisser, Naturalis
Naturalis Pesthuis Regentenkamer
Separate invitation

Saturday 11 July 2009

- 07.30-12.30 **Workshop registration**
LUMC Education Building
- 10.00-10.30 **Refreshment break**
LUMC Education Building Buruma Foyer
- 12.00-13.00 **Lunch**
Naturalis Pesthuis
- 15.00-15.30 **Refreshment break**
LUMC Education Building Buruma Foyer



08.00-12.00 **Workshop 1: Developing best practices and new standards for fluid preservation**

Organizers/presenters: John E. Simmons, Museologica & Andries J. van Dam, LUMC

Invited speaker: Rob Crèvecoeur, Glass and ceramics restoration consultant

LUMC Lecture Hall 4

Animals and plants have been preserved in fluids in natural history museums for more than 350 years, providing an invaluable resource for research on both macroscopic and microscopic levels. However, many of the techniques and chemicals used in fluid preservation do not produce specimens that endure long-term or serve modern bio-molecular research needs. Furthermore, institutions housing and exhibiting fluid preserved specimens are facing increasingly stringent health and safety regulations.

This workshop will briefly review the present state of knowledge of fluid preservation, assess fluid alternatives to traditional formaldehyde fixation and alcohol preservation, and evaluate storage and exhibit containers. A summary of best practices in fluid preservation and storage environments will be presented, along with guidance for making sound decisions about the conservation and restoration of fluid preserved specimens.

08.00-12.00 **Workshop 2: How to prioritise the digitisation of natural history specimens**

Organizers/presenters: Walter Berendsohn, Botanical Garden and Botanical Museum, Berlin & James A. Macklin, Harvard University Herbaria
LUMC Education Building

Every single specimen in natural history collections carries a wealth of information, most notably the past location in space and time of an identified organism. General agreement exists that having all this information available in electronic form would greatly improve the information base for many research domains, including - but by no means restricted to - systematics.

Substantial efforts have been invested by institutions over the past years to digitise specimen information, and the Global Biodiversity Information Facility (GBIF) offers the technical infrastructure to make these data records universally available. However, we realise that

- we are very far from a complete data resource, most specimen data remain accessible only by consulting the actual specimen

- digitising individual specimens is a very costly process and there is no funding for comprehensive specimen digitisation in sight
- existing digitisation efforts are not coordinated and lead to an information resource that is patchy in taxonomic and geographic coverage as well as in quality
- there is no mechanism to globally request information about relevant (non-digitised) holdings of collection institutions, and thus potentially valuable specimen information is not discoverable by the wider user community.

We suggest that we may overcome these obstacles by making user demand the driver of the detailed digitisation of individual specimens. Accordingly, priorities for digitisation should be set by demand from ongoing or projected research, or in accordance with socio-political demands (Conventions, repatriation, environmental laws, etc.). Funding of digitisation activities should be linked directly to these priorities, i.e., the costs are either to be incorporated into research proposals, or covered by relevant (international) organisations, foundations, or governments.

To make this possible, collection-holding institutions will need to co-ordinate their efforts on a national and regional, if not global level, and agree to implement the necessary mechanisms. Estimating and publishing the costs involved in specimen digitisation (separately for taxonomic verification and exact georeferencing) is one of the tasks. The creation of a high-level metadata catalogue is another. For example, metadata on collection sites for specimens present in a collection will enable access by geographical and taxonomic categories on a rough scale and thus enable researchers to identify potentially relevant holdings. Based on the available metadata, researchers may request the detailed digitisation of the information needed. They can determine the costs of these digitisation efforts in advance and incorporate these in their research budgets. In this manner digitisation will be directly driven by research needs.

Establishing the collection metadata catalogue would constitute a major step forward, and may also be feasible financially, because the cost of metadata capture should be scales lower than those of complete specimen digitisation.

Some presentations on existing metadata implementations will be made to provide the base for discussions. The workshop will focus on an open discussion on the possibility of establishing such a global catalogue, and methods and costs involved in gathering the actual metadata.

13.00-17.00 **Workshop 3: The ultimate label**

Organizers/presenters: Kees van den Berg, Naturalis

Invited speaker: Gerrit de Bruin, Nationaal Archief & John Havermans, TNO

LUMC Education Building

The ideal label for stored natural history collections should outlive the material it represents, printed and handwritten labels should be perfectly readable and instantly ready for study. The introduction of new printing techniques like laser printing looked very promising, however, data acquired in this fashion do in some cases not have a lifespan of more than 5 years. Painstakingly collected and curated collections with laser printed data fading may become bereft of meaning and of no value to science. Many permanent papers and inks used offset printed and handwritten seem to outlast all successive methods.

This interactive workshop discusses methods and media, and should contribute to a museum standard in the use of archival materials in label printing. Furthermore, an overview of best practices for archival treatment of historical labels will be presented.

13.00-17.00 **Workshop 4: New approaches to and uses for morphological imaging/scanning in a collections context**

Organizers/presenters: Norman MacLeod, The Natural History Museum

Invited speaker: Jonathan Krieger, Heather Bonney & Margaret Clegg, The Natural History Museum

LUMC Education Building

As the number of purposeful visitors to natural history museum collections grows the ever increasing demand for access to specimens will need to be balanced against the need to safeguard these same specimens from the cumulative wear and tear – not to mention episodic damage – that results from repeated handling, especially when handling is for the purpose measurement. Many critical specimens in museum collections already exhibit wear damage resulting from attempts to obtain replicate measurements by many generations of researchers.

Alternative methods of preserving and making morphological data available to researchers must be found so that access to such specimens can be restricted. Fortunately, new developments in 2D imaging and 3D scanning can not only be used to create non-destructive digital surrogates of specimens that can then be inspected, measured, transported, and combined with other data in ways that pose no risk to the real spec-

imens, but that also allow researchers and curators to experiment with new ways of accessing, sampling, analysing, and interpreting morphological data. This workshop will familiarise participants with the theory and practice of obtaining 2D images and 3D scans for objects of virtually any size and shape. Presentations will include discussions of instruments and software currently being used to obtain 2D images and 3D scans of recent and fossil natural history specimens in the NHM Palaeontology Department's Imaging Suite. In addition, presentations/demonstrations of new data representation and analysis approaches (e.g., neural nets, eigensurface analysis) will be provided. The workshop will conclude with a detailed description of a new NHM-based collections data extraction/analysis project based around the integrated use of these technologies and approaches.

ORAL PRESENTATIONS

in alphabetical order

SPNHCO 

BRIDGING CONTINENTS **2009**

Managing a collections move - planning, packing, and logistics, Oh my!

**Annette van Aken,
Roger Colten, Maureen DaRos**

Yale Peabody Museum of Natural History, New Haven, Ct, United States of America

The Yale Peabody Museum of Natural History was tasked with moving over 1.2 million objects of the Anthropology collection from the main Yale campus to a temporary "off-site" storage facility at Yale's new West Campus, seven miles away. Planning and moving needed to be completed in 17 months. Because of the time constraints of the move, the Anthropology Division expanded from two full time staff, a Collections Manager and Senior Museum Assistant, to thirteen. New staff included a Project Registrar to manage the move, an Assistant Conservator to review and stabilize material and nine Museum Assistants to pack, inventory and move collections.

Before any packing could take place, renovations to facilitate moving had to be completed. Stairs blocking the main moving egress were removed, the loading ramp widened and walls in a suite of rooms were demolished to create a large packing and staging area. The space allocated at West Campus was reconfigured from offices and cubicles to a large storage room and adjacent study and workspaces. A climate controlled truck and mechanized equipment were purchased to expedite moving the collections. Since most objects would remain packed for 2-3 years, they were packed using 98% archival materials.

Although space is limited at the new storage location, we were able to pack the archaeological material in a way that kept it accessible for research. New Delta cabinets were purchased to house this material. Archaeological material was stabilized, packed in drawers in the cabinet and the cabinet was used as a transport container. For most other collections, including whole vessels and ethnographic materials, objects were digitally photographed, packed in custom archival boxes and palletised, or packed in custom crates.

Portable X-ray fluorescence for the examination of taxidermy specimens at the Horniman Museum; exploring the possibilities

**Louise Bacon¹,
Felicity Bolton², Georgina Garrett¹, Monika Harter¹**

¹The Horniman Museum, London, United Kingdom

²Museum Victoria, Melbourne, Australia

The Horniman Museum in South East London was opened to the public in 1901. The natural history collections therefore include specimens which date from the nineteenth century to the present day. As a part of a future refurbishment plan for the Natural History Gallery, the Collections Conservation & Care section has been investigating the taxidermy specimens using portable X-ray fluorescence (XRF). This technique utilises equipment developed for industrial purposes, but is employed in museums for its non invasiveness, speed and ease of use. The main aim of the investigation was to detect potentially harmful pesticide residues such as arsenic and mercury. In the process it quickly became clear as expected that a large proportion of the collection contained some potentially dangerous contaminants, but also that understanding and interpreting the results and spectra would be a much slower and more arduous task than taking the readings.

As the survey progressed the results indicated that perhaps the technique could help in identifying other features of the specimens such as fillers and armature materials. Results also indicated that the technique was susceptible to interference from associated materials and they furthermore showed considerable variation within one object.

We will discuss the following points:

- How the results were interpreted, in light of current published research, as regards to levels of contaminant.
- Identification of harmful contaminant 'hot spots' within the collection.
- The limitations and interference from associated materials such as painted mounts and backboards.
- Variations in readings according to their location on the specimen and how they relate to the skin preparation and structure of the specimen.
- Identification of method of preservation including more recent pesticides and relating this to recipes and literature on taxidermy.
- The exploration of a chronological 'cut off' point in terms of object manufacture after which harmful preservatives would not have been used.
- Exploration of other uses of the results such as the examination of colour in feathers, and the armatures used in construction of the specimens.

Breaking up is hard to do: Deaccessioning on a large scale

Lori Benson

Texas Natural Science Center, Austin, United States of America

Texas Memorial Museum (TMM) opened in 1939 partly as a consequence of the Texas Centennial Exposition. Its first collections were those objects and specimens exhibited as part of the Exposition held at the University of Texas at Austin in 1936. Throughout its history, the museum acquired history and ethnographic collections as well as a full range of natural history specimens.

TMM continued in this vein until 1997, when a multidisciplinary advisory council spent 5 years helping the museum to redefine itself. The focus turned to curatorial and collection strengths as well as connections to academic departments, integrating its strengths in vertebrate and non-vertebrate paleontology, geology, fishes, amphibians, insects and cave-dwelling arthropods. With this change of direction came organizational restructuring and a new name.

In 2002, the newly named Texas Natural Science Center (TNSC) set out to deaccession its cultural collections. These collections included approximately 25,000 historical, ethnographic and archaeological objects as well as paintings, flat art and documents.

This presentation will examine the pitfalls and problems encountered with this large scale deaccessioning project, the procedures that were developed and what was learned in the process.

The Atlas of Living Australia - a project to share Australia's biodiversity knowledge

Penny Berents

Australian Museum, Sydney, Australia

The Atlas of Living Australia (ALA) is a partnership of Australian scientific institutions and organisations, funded under the Australian Government's National Collaborative Research Infrastructure Strategy (NCRIS).

The aim of the ALA is to develop a data management system which will provide access to and organise information relevant to the study of Australia's biodiversity.

The project is a five year project (2007-2012) which will bring together information from a wide variety of sources including many of the country's most significant natural history collections and herbaria, ecological and observational data sets, images, on-line literature, diagnostic tools and molecular data.

The ALA will be:

- Authoritative - guiding users to the most relevant data resources and well-researched information for each species
- Freely accessible - delivering services, tools and content for free use by all
- Distributed and federated - integrating existing systems and networks to bring together the most current and complete content.

The ALA will develop tools for research which will include:

- A registry of information resources on Australian biodiversity
- Search interfaces to locate information by species, topic, local region and other categories
- Tools to compare species and identify organisms
- Overview pages for every Australian species
- Tools to map and analyse the occurrence of Australian organisms
- Tools to capture and store observations and user-provided data
- Linkages to international data sharing projects

New perspectives on natural history collections through automated discovery

Antal van den Bosch¹,
Caroline Sporleder², Piroska Lendvai¹, Marieke van Erp¹, Steven Hunt¹

¹Tilburg University, Tilburg, Netherlands

²Saarland University, Saarbruecken, Germany

Metadata, ontologies, knowledge discovery.

We present a 'metadata toolkit' that addresses three aspects of digital heritage collection databases. Natural history offers a rich mix of traditional and modern ways of organising data, information, and knowledge. The Linnaean tradition still defines the basis of how taxonomic knowledge of organisms is organised, while at the same time complementary perspectives on databases and ontologies are developed and implemented. Parts of this process may be automated, such as cleanup and enrichment of textual collection databases, and discovery of metadata from such databases. We show that by making intelligent use of existing resources it is possible to improve data quality and organisation.

Method 1 offers computer-assisted cleanup of noisy data. Manual correction of large databases is very costly; semi-automatic error detection and correction offers a way out. We present approaches for the detection of errors in a Reptiles and Amphibians collection database, and show that these can efficiently zoom in on a low number of potentially erroneous database cells, capturing the majority of database errors.

Method 2 helps collection managers select new metadata classes to improve weakly structured databases, where free-text columns ('Special Remarks', 'Biotope') often act as dumps of important information that does not have a designated column. We discover metadata candidates by detecting grammatical regularities in text: syntactic heads often deserve a status as metadata class, yielding improved data structuring.

The third method automatically discovers ontological relations between a pair of metadata classes. We look for sentences in encyclopedic text in which instances of two classes co-occur, such as a geographical region and a particular species, and then perform automated linguistic analysis to identify the verbal construction that links these occurrences (e.g., 'is found in').

Changes in gathering and presentation of the data from the palaeontological collections: The case study of the Czech Geological Survey

Petr Budil,

Pavel Bokr, Petr Coupek, Olga Moravcová, Marika Steinová

Czech Geological Survey, Praha, Czech Republic

Various professional and part-time solutions have been used during the last 20 years to make inventory of institutional but also some private palaeontological collections. Several problems arose during this computer processing or digitization. Firstly, the amount of time needed to complete this process proved very challenging. Secondly, the approach and process of data gathering changed during this long period of time. The first databases originated in the nineties, being mostly based on the off-line MS FoxPro or MS Access solutions. Although often sophisticated, they were mostly used for locating material in museum depositories. These first databases were often made by enthusiasts (paleontologists with computer skills) rather than truly IT professionals. These first-generation databases are very different from the modern on-line information systems, which are more focused on the interactive communication with the public users. The palaeontological collections database housed in the Czech Geological Survey is a good example of these data management problems. The old, feebly structured MS FoxPro/MS Access database has been changed and incorporated into the on-line Czech Geological Survey information system built in the ORACLE 10g and Oracle Portal environments. In 2002, based on the former database structure, the "Virtual Museum" application was built on the previous version of Oracle - Oracle 8i. This application, still available on the <http://www.geology.cz/app/museum/m.pl>, seems to be very popular but it needs substantial modifications. The using of an optimised and normalised data model is necessary and substantial re-building of the original on-line application should follow. Its new version "Virtual Museum 2.0", based on the new database structure, will offer more sophisticated services to the public, including time and space searching and sorting of the registered specimens. The contribution was supported by the project VaV DE08P04OMG002.

Documentation of methods, routines and conservation status - A preventive conservation project

**Ingela Chef Holmberg,
Monika Åkerlund**

Swedish Museum of Natural History, Stockholm, Sweden

Collection assessment. The Swedish Museum of Natural History (NRM) is one of the oldest museums in the world, founded in 1739. The scientific collections, with a global scope, hold close to 10 million objects. They are divided in 11 departments and curated by 182 permanent staff members. Each department may have several, separate subcollections. During the last two years, the Preventive Conservation Group at NRM has run two projects.

The first project was aimed at the documentation of methods and routines used in the collections. The routines have never been documented and some research departments have an aging staff profile. About 15% of the curating staff will retire within the next 5 years and with them important knowledge may be lost forever. The project has already resulted in an improved skill transfer to new staff as well as a better tracking of conservation history.

The second project assessed the conservation status in the scientific collections. We inspected, from a preservation point of view, to detect possible damages; evaluated storage conditions and quality of the storage materials. Our study showed that a majority of damages was the result of wrong storage methods and/or non-suitable storage environments. Our findings have called attention to the importance of rehousing and building new storerooms. It has now been given top priority in future planning of collection care.

The documentation process has opened up an internal, museum wide discussion on best practice, which has already helped us evaluate our routines. Running these two projects at the same time has increased the awareness, that methods and routines used in collection care have a great impact on the state of the collections.

Documenting specimen citations in published literature for collection management and for posterity

Willem Coetzer,
Paul Skelton, Margie Shaw, Elaine Heemstra

South African Institute for Aquatic Biodiversity, Grahamstown, South Africa

Specimen citations, images and illustrations in published literature are a source of validated information about the objects in a collection. It is standard practice to use this information to update the collection database on a continuous basis (e.g. adding a new determination when a specimen is re-identified).

The South African Institute for Aquatic Biodiversity (SAIAB), which cares for the National Fish Collection, has initiated an ambitious effort named the Collection Use Project, which has two broad aims. Firstly we are systematising the collection of specimen citations, updating of the collection database, and the resultant curation and collection management tasks. Secondly we are broadening the application of specimen citation information to mean more than information that is only used in collection management. A published citation is a key to other information about how a specimen in our collection has been used by someone for some purpose (e.g. to obtain a 'barcode' in the field of genetics).

Whereas the application of specimen citation information to collection management is well established (if not systematic in many collections), we are not aware of similar projects that aim to document information associated with the use of a collection, at the resolution of the individual specimen, throughout the collection's existence - a 'specimen citation bibliography'. We anticipate finding answers to, and discovering quantitative and informative spatial and temporal patterns in the answers to, questions such as 'Who collected the specimens, when were they collected and from where?' We will also improve accessibility to the digital literature containing citations, and to images and illustrations.

In this way we will describe and characterise our collection scientifically, and show that it is being used and is therefore of value to science and society. We expect the shifts and changes in collection use through time to be of historical importance.

Moving collections as collections management: The Yale Peabody Museum of Natural History anthropology collections go west

**Roger Colten,
Maureen DaRos, Annette Van Aken**

Peabody Museum of Natural History, New Haven, Ct, United States of America

The anthropology division of the Yale University's Peabody Museum of Natural History has one of the largest collections among the museum's eleven curatorial divisions. The collections are world-wide in origin and range in size from pot sherds to boats. Until recently, the collections were stored in 19 rooms in three different buildings on the Yale University campus. In recent years we have undertaken a variety of collection management tasks including cataloging, inventorying, transferring catalog records to a relational data base, digital imaging of objects, scanning documentation, and updating storage equipment.

Due to re-allocation of real estate on the university campus, we were obliged to move collections out of one of these buildings. The relocation of over seventy-five percent of the anthropology collections, at least 1.3 million individual items, to Yale University's new West Campus provided an opportunity to significantly advance standard collection management processes as well as develop new procedures that will improve access and facilitate managing the collection. Some of the most important changes include upgraded packaging and cabinetry, rapid photographic capture methods and thousands of new digital images, improved climate control, greater lot count accuracy, and the integration of bar coding technology into our location tracking procedures. In this presentation we describe this recent collection move in the context of the collection management strategies in the anthropology division at the Yale Peabody Museum.

Setting the standard: A review of the state and status of natural history collections in Europe

**Lorraine Cornish,
Chris Collins**

The Natural History Museum, London, United Kingdom

SYNTHESYS Network Activity C (NAC) is part of a 5 year European Infrastructure project which began in 2004. NAC has been working towards the establishment of a European Collections Standards Network (ECSN) which aims to encourage the active participation of all European countries in the long-term preservation, targeted development and wide use of their collections and inherent information. The project has to date carried out benchmark surveys of 17 Natural History institutions including one non-European institution. The methodology which was developed by staff at the NHM London has recently been reviewed by an independent assessor and methods of assessing the core data in surveys developed. This allows the surveyors to assess an institution in far more detail than was previously available. The survey results show that most natural history museums in Europe are at similar stages of development. Most are involved in some type of rebuilding and investment in collections and collections management.

The results of the collections assessments were used to inform and develop a training course in Collections management and to contribute to data collection for a European disaster planning initiative.

Although NAC will be completed in June 2009 the project legacy is incorporated into SYNTHESYS2-NA2 which is fully funded by the European Union and will commence in August 2009. NA2 aims to significantly reduce the potential barriers to future access by identifying the current standard of European Natural History collections which have not yet been surveyed and targeting key areas for improvement.

Overview results and an assessment of the data compiled from the NAC survey are presented along with progress and recommendations on the development and future use of the survey for institutions holding natural science collections.

Post occupancy evaluation of the wet collections facility for Smithsonian NMNH

Walt Crimm

Ewing Cole Cultural Design, Philadelphia, Pa, United States of America

The 120,000 SF (14,000 M2) Pod 5/Lab 5 facility designed for wet collections has been operational for 2 years. A survey of over 30 users developed by the building's design team, in coordination with Smithsonian project leadership, presents the findings resulting from a 6 page questionnaire on a wide range of subjects covering collections storage space, labs, offices and support spaces. This information will help other institutions with their collections and lab planning and design on a wide variety of issues and support future facility design efforts.

Progress, plans, and challenges of the new specimen preparation lab at the California Academy of Sciences

**Maureen Flannery,
John Dumbacher**

California Academy of Sciences, San Francisco, United States of America

The Department of Ornithology and Mammalogy at the California Academy of Sciences in San Francisco, California has been a key member of the Marine Mammal Stranding Network Southwest Region since receiving a research authorization letter in 1982. The department plays an important role in managing the Marine Mammal Stranding Hotline for dead animal reports, responding to strandings, performing field necropsies, and collecting voucher specimens. In addition to field work, the department prepares, curates, and archives these biological specimens and provides data to researchers from around the world. The collection holdings of over 5,000 marine mammals consist of various parts including complete skeletons, skulls, pelts, baleen, teeth, and tissues. Of particular interest are the collections of California sea lions (*Zalophus californianus californianus*, 2300+ specimens) and California sea otters (*Enhydra lutris nereis*, 900+ specimens), both among the largest in the world.

In the fall of 2008, we received a NOAA John H. Prescott Marine Mammal Assistance Grant to improve equipment infrastructure at the new large mammal preparation laboratory in our newly rebuilt green building. The overall goal of this project is to provide the infrastructure necessary to collect, produce, and accession higher quality and greater numbers of marine mammal specimens into the permanent research. This presentation will review the work completed on the grant thus far, including the installation of an indoor salt-water maceration tank and the design of a new dermestid beetle cabinet. Some of the challenges we have faced in equipping this laboratory as well as an overview of the plans for the remainder of the grant period will also be presented.

STERNA: building semantic bridges between Europe's natural history collections

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Launched in 2008, the STERNA project is an eContentplus best practice network that aims to contribute to the further development of the European Digital Library initiative as a portal to the riches of Europe's cultural and scientific heritage. STERNA's participants, mostly European institutions that are concerned with collecting and managing content on biodiversity, wildlife and nature in general, join forces to explore new ways of providing their content to the public. The project was initiated by the Dutch National Natural History Museum Naturalis and major technical contributor Trezorix. Both took part in the Dutch RNA (Reference Network Architecture) project, the predecessor of STERNA that dealt with developing best practices for setting up dynamic knowledge systems.

STERNA is short for Semantic web-based Thematic European Reference Network Application. And to whom the ambiguity of this abbreviation escapes: sterna is also the scientific name for the bird genus of terns. Not coincidentally, because birds are the central theme of STERNA with respect to the content that will be made accessible by project partners via the semantic information network, which is a genuine RNA environment.

One of the focal points of the STERNA project is multimodelling: the content can be any type, from taxonomic data, scientific articles and imagery to MP3 files of bird sounds and artefacts with bird feathers in them. The other important focus is the use of a distributed environment: STERNA partners maintain full control of their own collections, which are literally located all over Europe. The end users can access the data in a uniform way, as if it is one big heterogeneous collection of all sorts of bird related material.

For further information: <http://www.sterna-net.eu/>

Cultures of collecting - the Leiden anatomical collections in context

**Marieke Hendriksen,
Hieke Huistra**

Leiden University, Leiden, Netherlands

The research project 'Cultures of Collecting - the Leiden Anatomical Collections in context' started in September 2008 and consists of three subprojects. Two of these projects will be discussed.

'Collections of Perfection' by Marieke Hendriksen. This project aims at an analysis of how the early modern anatomical collections (mainly 18th century) of Leiden University were rooted in ideals of perfection in different fields of knowledge and expertise. It starts from the premise that collections (institutional as well as private) generally represented and generated knowledge. Anatomical exhibits were meant to show the anatomy of the body, but are at the same time portraits of their makers, of their image of the ideal body and of the intimate experience of their own body. For the eighteenth century Leiden anatomists Rau, Albinus, Van Doeveren, Bonn and Brugmans perfection was at the core of their decisions. Aesthetically, the objects had to be presented according to fixed proportions, perspectives and other aesthetic conventions. Technologically and scientifically, the anatomical collections aimed at showing perfect methods of revealing and preserving nature. Ethically, the collections functioned like mirrors and helped in the educational and therefore ethical perfectibility of man. There was even a theological meaning of perfection as some collectors sought to represent the perfect order of creation. The project will result in a better understanding of ideals of perfection, and will enhance our understanding of the contemporary quest for the perfect body as a cultural phenomenon. It discloses the origin of many contemporary (and public) images of the perfect body. It shows that the quest for the perfection of man is not new and can therefore inform the current debate on the perfectibility of the human body.

'Collecting Pathological Anatomy' by Hieke Huistra. The project investigates the historical and educational import of the nineteenth-century pathological collection at Leiden University. In the nineteenth century, anatomy focused more and more on pathology. At the same time, anatomical collections became less accessible to the public, artists became less involved in the construction of anatomical objects and both the education and the practice of medicine changed. Boerhaavian medicine was replaced by a medicine more concerned with practical knowledge of pathology and healing than with theoretical knowledge of old anatomy and physiology. The project researches how these changes are reflected in the university's pathological collection; how technological and medical developments influenced the way specimens were no longer exhibited in their ideal form; how ideas in anatomy determined the formation of pathological anatomy as an academic discipline; how pathological collections related to the perception of the body and its diseases; how the anatomical museum was shut off from the public view; and how educational values determined the exhibition of particular specimens.

Alcohol recycling at the Smithsonian Institution

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In an attempt to reduce the volume of hazardous waste generated by specimen processing and curation activities, the Smithsonian Institution, National Museum of Natural History evaluated an alcohol/formalin/solvent recycler. The purpose was to produce a contaminant-free recycled alcohol product for re-use in specimen curation. Over forty test samples of used alcohol (isopropanol and ethanol) from various fluid preserved zoological specimens were distilled at 90°C and 85°C. Sulphuric acid or charcoal filter pre-treatment and a double distillation method were also evaluated as techniques to reduce contaminants. Fluid source, volume, alcohol percentage, and distillation times were recorded. Pre- and post- distillation samples were analysed by gas chromatography-mass spectrometry (GCMS). The effect of distillation on DNA integrity and carryover were examined by testing mtDNA amplifications on a DNA-spiked sample. The distillation of each 13-17 L used alcohol sample required 5-9 hours to complete, yielding recycled alcohol product at 89-92% concentration. No detectable DNA (down to 230 bp amplicon) survived the distillation and no DNA from the spiked-in DNA sample was detectable by amplification. The GCMS results for ethanol routinely identified the presence of ethyl ethers, ethyl esters, and aldehydes, all in very small concentrations. These compounds were present both before and after distillation, with very little change in concentration. Aromatic compounds, including toluene and xylenes, were also routinely identified in the isopropanol solutions both before and after distillation, again, only partially reduced in concentration by the distillation process. A significant odor (probably derived from amines) could also be detected in the recycled ethanol.

SYNTHESYS and EDIT: streamlining and integrating operations in European natural history museums

Leo Kriegsman

Naturalis, Leiden, Netherlands

(infrastructure, bridging continents)

The European natural history scene is changing rapidly as a result of the Integrated Infrastructure Initiative grant SYNTHESYS and the Network of Excellence EDIT ('Towards a European Distributed Institute of Taxonomy'), that are both funded within the EU Framework Programme VI (FPVI). The two are complementary, with SYNTHESYS focussed on improving access to and use of natural history collections and promoting standards and best practices, and EDIT working on collaboration, integration and building a research infrastructure. EDIT is taking all SYNTHESYS results on board, striving to implement the standards and best practices, and advancing into policy and strategy levels. The focus of SYNTHESYS is on collections, that of EDIT on taxonomy, although recent discussions on integration have also touched upon other fields of science common to natural history museums.

During SYNTHESYS FPVI a set of collections management benchmarks was developed and a peer collections assessment methodology was devised to assess the current status of natural history collections in Europe. Its follow-up programme SYNTHESYS FPVII, starting autumn 2009, will create a self-assessment tool, complemented by an audit system, to greatly increase the geographical scope and overall impact. The new programme will continue and upgrade earlier activities, such as general collections management courses and a helpdesk on digital standards and online data management. It also aims to consolidate a pan-European, multi-disciplinary group of collections management experts, and to expand the benchmark to include aspects particular to molecular collections and collection informatics.

The key objective of EDIT is "to integrate European taxonomic effort within the ERA and to build a world leading capacity", which highlights two main approach strategies. The first is at the practical level, through several work packages dealing with concrete joint action, enabling scientists to cooperate and create an international collaborative atmosphere, and leading to well-defined products. The second deals with the infrastructure basis: the organisation of, e.g., collections and lab facilities. The central objective is to come to a unified vision for the preferred infrastructure basis at European level, and to prepare the design of a new integrated infrastructure for implementation. The notion of sustainable integration is gradually getting into shape by the establishment of general or specialised working groups, such as the Board of Directors, the Directors of Collections Committee, and the Information Science and Technology Committee. In addition, collaboration with infrastructures, networks and organisations outside Europe is increasingly on the agenda.



SciColl: an international mechanism for scientific collections

Richard Lane

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The OECD Global Science Forum discusses common science issues that affect the world's major economies. In 2007, at the suggestion of the Dutch national delegation, the GSF initiated an activity to explore the benefits of international coordination of interest in scientific collections (see <http://www.oecd.org/dataoecd/7/58/42237442.pdf>). This topic includes a remarkable array of materials used in scientific research from ice and ocean drilling cores through natural history to biomedical and archaeological collections.

The benefits of such an international mechanism are (1) to ensure collections are integrated and efficient infrastructures and (2) that greater coordination should enable more science to be done, especially interdisciplinary research. The ability to undertake topical and broad ranging research is a primary driver for the initiative. It is the realisation of these benefits to users, funders and keepers of collections that should ensure the development and sustainability of collections rather than the international coordination being a mechanism to fund collections directly. Plans are currently being developed by a steering committee of national representatives for the scope, governance, work plan and funding for such a mechanism with the view to its formal launch at the end of 2010.

Herbarium Networks Part III: A prototype for exchange of botanical specimen data to reduce duplicative effort and improve quality using a ‘filtered push’.

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Biodiversity Informatics.

The challenge of digitizing the remaining nearly 90 million herbarium specimens held in US institutions by 2020 remains daunting. Capturing these records with efficiency and at high quality is paramount. The proven existence of a considerable number of duplicate specimens can be taken advantage of if institutions that have these specimens could share data. This would allow data capturers to save time by not needing to re-enter information and improve quality by detecting errors or adding further knowledge that would enhance the value of the record.

A map-reduce network solution referred to as the Filtered Push has the potential to identify duplicates, improve quality, and enhance communication about specimens between curators and researchers. Our progress to date includes a prototype of this network with a client implemented in the Specify Workbench, and can detect duplicates within the network, allow curatorial oversight, and provide for rapid inclusion in that institution’s master Specify database. To discover related information in the network the capturer would input a collector name and number and be presented with a reduced set of records, which should match the specimen data they are about to digitize. More generally, this interface will allow gated access pending human review of sets of ‘filtered’ information gathered from the community before injection into a herbarium database. We are currently testing the ‘push’ of annotations based on authoritative specimens and/or expert opinions to institutions which house a relevant specimen to enhance their record quality. We are also refining analysis tools that incorporate fuzzy matching to better detect related records and use authoritative data sets to alert the capturer of outlying specimens and potential errors.

Adapting herbaria to 21th century challenges

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Over the last few decades there have been changes in the ways that collections are used and in their expected values. Key recent challenges have included control of pest insects and the needs for increased storage efficiency. Herbarium pest control has evolved rapidly and advances in this area are reviewed, particularly non-toxic climate control. Space for developing collections can be alleviated by well-planned compactor systems. In the current competitive climate, herbarium resources necessitate client and management support, requiring salesmanship. While collection managers and curators are aware of the value of collections to a diversity of clients, decision-makers are often insufficiently informed or impressed. This situation can be addressed by aggressive use of current communication techniques, including websites that reach much greater audiences. Particularly valuable are national and international cooperative projects that make collection information available through online databases, such as the Federal Biodiversity Information Partnership (FBIP), the Canadian Biodiversity Information Facility (CBIF) and the Global Biodiversity Information Facility (GBIF). Correctly identified reference material in a herbarium will remain important as aids to identification, and as research vouchers. In the future however, herbaria and their collections can become increasingly valuable by providing images and data online, contributing more directly in support of landscape planning and legislation, accepting increased use as a result of improvements in technology of microchemical analysis, and increasingly focussing on education.

Digital integrated collection management: A fusion of resources

**Ann Molineux,
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The non-vertebrate paleontology and geology collections of the Texas Natural Science Center continue to expand both in volume and usage. Collections are held in two separate buildings with a total footprint of about 15,000 square feet. Incremental acquisition of the collections results in a wide diversity of cabinetry, levels of curation and conservation. The most effective way to manage this extensive repository is to utilise a digital mapping system linked to the burgeoning catalog database. Our field projects use similar digital mapping and in situ data recording.

The initial GIS repository system began in 2002 and was described earlier; this presentation examines the expansion of that system to cover the entire repository. The system now includes multiple layers, each relating to an important aspect of collection management. We map, for example, our current inventory status, the locations of dataloggers and silica gel treatment zones, pest traps and sightings, zones of water penetration and reported mold, and, as we are forced to expand vertically, additional 'cabinet' layers.

What began as a mapping system designed to allow us rapid access to particular specimens is now a platform for the integration of multiple datasets. This type of approach is vital in a very large repository with few permanent staff members and an ever-changing population of students and volunteers. It also gives us valuable data to illustrate and analyze problematic aspects within the collections. This data is primarily for us, but is an equally effective administrative lever in the long search for additional space and improved climate control.

Summary reports for users to improve data quality: Experimenting with tagged biodiversity information in social media

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Informatics Quality Control

The Encyclopedia of Life (EOL) established a group on the social media site Flickr to allow individuals to contribute images of organisms to the species pages of EOL. To enable uptake of images into EOL, requirements were established that each image contributed to the group needed to be licensed with a Creative Commons license suitable for EOL's needs, and that the image needed to be tagged with the scientific name of an organism in machine readable form. Flickr's interfaces readily allow an image to be marked as "All Rights Reserved," or as licensed under one of six Creative Commons licenses. Flickr's interfaces also allow an image to be associated with both arbitrary text tags and with machine readable tags. The machine tags have a simple structure of namespace:concept="value", where namespace, concept, and value can all be arbitrary text strings. EOL chose to require concepts from the preexisting taxonomy namespace, which includes taxonomy:family, and taxonomy:binomial, for example, taxonomy:binomial="Aporrhais pespelecani".

I have written an application to examine the data quality of the metadata in EOL's Flickr group pool. The application uses the open source Phlickr library over Flickr's API to obtain a list of images in the group pool, and for each image in the list, cache metadata elements (particularly the machine tags, license, contributor, and geocoding) in a local databases. I then wrote a simple web interface (http://www.aa3sd.net/qc_test/) to query the database and present quality control reports on both the pool as a whole, and for individual contributors. Some 20% of 10,000 images in the group didn't meet EOL's standards, with incorrect licenses and incorrectly formed machine tags being typical. Individual contributors to the pool found this central quality control report to helpful. Within a week of its release, about half of existing quality problems had been corrected.

The wet collections of the Museum für Naturkunde Berlin: Problems and the KUR project

**Birger Neuhaus,
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Museum für Naturkunde, Berlin, Germany

The Museum für Naturkunde Berlin houses some 22 million zoological specimens, including 230,000 jars in the wet (alcohol) collection. The collection is intensively used, as demonstrated by about 550 visiting scientists and the loan of ca. 70,000 specimens to other institutions per year. Presently, the wet collection suffers from inadequate environmental conditions (limited fire protection, temperature changes, no moisture control) and a mixture of dry, wet and slide collections. Specimens are stored in ground-glass stopper jars, Picein-sealed jars, plastic containers, and twist-off jars. Frequently, jars retain old, external labels, while historical and determination labels occur inside the jars. Also, the laser print of more recent labels may become detached from the paper. - In 2010, environmental conditions will improve significantly with the opening of a new, purpose-built wing of the museum which will house the entire wet collection. In addition, the "KUR - Programme for Conservation and Restoration of Mobile Cultural Heritage" of the German Kulturstiftung des Bundes enables restorative activities until 2011. The focus will be on type material, extinct species, scientifically valuable specimens, and very large specimens. Conservation and restoration activities will focus on the storage of the most valuable specimens in borosilicate jars, the transfer of additional specimens into twist-off jars, the storage of large specimens in stainless steel containers, the restoration of Picein-sealed specimens, the replacement of external labels by internal labels, and the restoration and archiving of collection labels. The wet collection was recently evaluated following a profiling scheme adopted from the "Smithsonian Collections Standards and Profiling Systems". - Project partners are the Research Institute and Natural History Museum Senckenberg in Frankfurt, the Bavarian State Collection of Zoology in Munich, and the Berliner Medizinhistorisches Museum der Charité.

Effect of the denaturing agent MEK (methyl-ethyl ketone) on collection jars

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Natural history collections guarantee integrity of taxonomic resources of the observed biodiversity throughout the world. However, budget cuts, loss of knowledge of old preservation techniques, and ignorance of the inestimable value of these collections among policy makers are endangering collections. Financial cuts in the 1990s demanded to substitute expensive high-quality (borosilicate) ground-stopper glasses for cheap industrial glasses closed with plastic liners or twist-off lids in many collections.

Today, many specimens are damaged or even dried up in their containers caused by high evaporation losses through corroding metal and crumbling plastic lids. The chemical additive MEK (methyl-ethyl-ketone) used to denature the alcohol has been identified as the main reason for chemical corrosion of the lids, and especially plastic polymeres such as PVC. The chemical and structural properties of MEK are highly capable to erode plastics and to accelerate stress-cracks in large plastic containers used for storage of large specimens.

A second, possibly more serious problem arising from chemical corrosion caused by MEK is a new, previously unknown kind of glass corrosion, the so-called micro-cracks. They are leading to spall and fracture of soda-lime glasses, especially in poor quality glasses produced shortly after the second world war. First indications for physical and chemical causes of the observed micro-cracks are presented, possible actions to be taken are discussed.

Scientists under glass: Exhibiting research in a natural history museum

**Rebecca Peters,
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The design of the California Academy of Sciences' new state-of-the-art museum incorporates a real-time exhibit depicting active, ongoing Academy research. A glass-walled laboratory, equipped with a minimum of distractions and an abundance of broad-use research equipment, is staffed daily by members of the Academy's research departments. Visitors to the Academy view projects as varied as sorting insect collections, identifying botanical specimens, preparing bird and mammal specimens, aligning DNA sequences, and cataloguing collections. In addition, members of the staff can be seen preparing images of research materials – from scientific illustration to high-resolution digital scans to microscopic automontage. This Project Lab allows what is normally kept behind-the-scenes to become an active part of a visitor's experience. Researchers working in the Project Lab have access to equipment that may not be available in individual departments and museum guests have the opportunity to witness the day-to-day science that makes the more familiar exhibits possible. We will review what has worked well for us and discuss some of the challenges in providing an exhibit laboratory.

Using the Thermo Lignum process for the treatment of natural history collections - research and practical experience

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It has long been known that heat will kill insect pests. The use of heat treatments at 52°C with controlled humidity has given us the option of killing insect pests without causing damage to collections by drying and shrinkage. The Thermo Lignum system uses a computer to control the environmental conditions around the object within close limits specified by the user. Major benefits compared with freezing are - the specimens do not need to be bagged before treatment and the treatment cycle is only 24 hours. Trials were carried out by the Natural History Museum in London to assess the effect of this treatment on a large number and range of biological specimens. These included mammal skins, mounted mammal specimens, fish, insects and Crustacea, and a wide range of botanical material, including vascular plants, bryophytes and lichens. There were no observed adverse changes to any of the specimens tested with the exception of some oily fish specimens where there was some migration of oil after treatment. More recently, concern was expressed about the possible deleterious effects of the treatment on DNA in specimens. A series of tests carried out on old and new Lepidoptera specimens clearly demonstrated that there were no differences in DNA extracted from treated and untreated specimens. Work in Japan on vertebrate and fungal tissue has also confirmed these results. The practical treatments which have been carried out for a number of museums have demonstrated the value and effectiveness of the Thermo Lignum system as a means of treating large numbers of natural history specimens in a relatively short time without the additional labour and logistics of bagging.

From the 19th century to the 21st: A small, rural natural history museum's challenge to create change

Mary Prondzinski

Fairbanks Museum, ST. Johnsbury, United States of America

The Fairbanks Museum was created for the local residents by its visionary philanthropist, Franklin Fairbanks, in a small town in the Northeast Kingdom of Vermont. The NEK is one of the most isolated, sparsely populated corners of the state, and one of the most economically depressed. The museum was constructed in better times when industry and rail transport advanced the towns prosperity. It was built to house the enormous bird collection and other items that Fairbanks had acquired for his "Cabinet of Curiosities." As the collection grew, staff came and went, and prosperity waned, the museum lost track of its Natural History beginnings, gradually evolving into the town's collective attic[3DOTS]a place to drop off one's unwanted "stuff." Today the museum holds-in-trust the town's historical past, mostly in off-site storage, while the smaller natural history collection dominates the main hall, with a small percentage stored in the poorly climatized basement of the 120 year-old building.

One of my jobs as Collection Manager is to inventory and automate the zoology collection which has fallen upon hard times from age and disorganization. Recordkeeping began at the museum's inception, but specific data for individual specimens was lost or lumped under one catalogue number per species, creating chaos. Fortunately, the museum's well-curated archives can sometimes correlate specimens with correspondence from 19th Century dealers and collectors, or old newspaper clippings. Determining which specimens are referenced is a painstaking process which slows the progress of data input.

The limited collection storage lacks climate control, subjecting specimens to mold and other vectors of deterioration. Mitigating environmental problems is a full-time job in itself, requiring careful vigilance to prevent further decline and impedes creating interpretive dynamics for a new generation of museum goers. The Fairbanks Museum is an educational, not a research institution, with a Natural History collection that still possesses vitality in its extraordinary stories of acquisition and Victorian roots. The relevance of collections in a changing world where the exotic has become commonplace through the internet, travel and film, seems want for justification. Through the museum's database and website, I hope to bring the collections into the public realm to tell their story of how they ended up in a small, rural New England museum.

Towards agreed collection management standards and policies - the EDIT Directors of Collections working group

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EDIT (European Distributed Institut of Taxonomy) aims at bringing together taxonomic institutions in Europe that for historical reasons have been developed independently. Durable integration is one of the overall objectives of this project and this also includes scientific collections. In comparison with SYNTHESYS, a second European infrastructure project on collections integration, EDIT works complementary, with SYNTHESYS providing the basis by collecting data and developing standards and EDIT taking over the implementation.

A year ago Directors and Heads of Collections of 15 EDIT partner institutions participated in the First Directors of Collections Workshop in Leiden, the very first meeting on this decision-making management level in Europe. Central goals were decisions and timeline towards unified collection standards and policies. Two focal action points were identified at the meeting: an agreed policy on scientific loans and an orphaned collections rescue taskforce. Apart from that, it revealed that considerable time would also have to spent on the comparison of all the different collection organisational structures of the EDIT partner institutions and on a definition of responsibilities in order to identify synonymies and enable cooperation on all management levels. A small working group was set up to speed up the working process on these focal action points and to prepare the ground for decisions to be taken at the next meeting, which will be held back-to-back with the SPNHC 2009 conference.

The first workshop made clear that there is a broad interest on the decision-making management level to intensify cooperation between European natural history museums. However, it also showed that creating a sustainable integrated infrastructure of EDIT collections will be a challenge and a long-term process of small steps. The first one might be an agreed policy on scientific loans.

The potential of digitised herbarium and NHM collections

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With the ongoing digitisation of vast amounts of herbarium and natural history museum collections, major advances have been made in several fields of research. These include, amongst others, the analyses of biodiversity- and biogeographical patterns at high spatial resolution, understanding of species' ecological niche requirements, predicting the existence of unknown populations, planning of area selection for conservation, and forecasting the impact of global climate change. An important contribution to these advances in science has been, and still is, the development and use of species distribution modelling techniques. The development of these techniques started in the 1980s, and from 1995 onwards their use has increased almost exponentially, resulting in approximately 2400 published papers by the end of 2008 (ISI Web of Science).

Species distribution models (SDMs), or ecological niche models (ENMs), predict the potential distribution of a species by interpolating identified relationships between presence/absence, or presence-only collection data on the one hand, and environmental predictors on the other hand, across an area of interest. A major advantage of the use of SDMs is that the presence and absence of species can be predicted, even for areas where never a collection has been made. I will briefly demonstrate the use of SDM techniques, and show how the resulting models can be applied to generate diversity-, endemism-, and biogeographical patterns.

Management and preservation of new natural history collections: Tissues and DNA collection of the MNCN

**I. Rey,
B.A. Dorda**

MNCN, Madrid, Spain

The tissue and DNA collection of the MNCN began started activities in 2002. Today it consists of 29,876 specimens catalogued with over 59,000 samples already classified and available to the scientific community. A data base of 12,445 specimens, is available in www.gbif.es. Approximately 250,000 samples more are already deposited and are currently in the process of being classified.

The popularity of this collection is growing and the number of users requiring tissues or extracted DNA is steadily increasing. Until the present 1,213 samples have been loan to 120 different researchers. In case samples belonged to species included in annex I of CITES, the required permits were provided.

The catalogue number of the samples in our collection is a voucher number, which appears in Genebank where currently 211 sequences belonging to our frozen samples, can be localized.

Community building and collaborative georeferencing using GEOLocate

**N.E.R. Rios,
Henry L. Bary Bart**

Belle Chasse, United States of America

Over 2.5 billion biological specimens are archived in the world's natural history museums and herbaria. Major efforts are ongoing to computerise and network the data associated with these collections. Sadly, much of these data lack geographic coordinates, so vital to our utilization of this vast information resource in large-scale studies. Development of automated georeferencing tools have greatly facilitated the task of generating geographic coordinates from textual locality descriptions, yet a bottleneck still exists whereby users must manually verify each record georeferenced. We have developed GEOLocate, a software tool for computer-assisted georeferencing and verification of natural history collection's data. Recent advancements include user-defined locality expressions and multi-lingual georeferencing.

Another recent advancement provides a built-in community-based collaborative georeferencing framework where end users can form communities, combine data and distribute workloads of record verification. The Darwin Core format and DiGIR protocol are used in harvesting end user data. Support for additional protocols and models are under development. Integrating techniques for collaborative georeferencing with automated tools has great potential for significantly decreasing the workload of record verification.

How the SYNTHESYS project has impacted on collections management and collections based research

Gemma Robinson,
Robert Huxley

The Natural History Museum, London, United Kingdom

SYNTHESYS. With 13million Euros of European Community money, what has SYNTHESYS done to improve access to natural history collections?

SYNTHESYS was a 5 year project comprising 20 European natural history institutions aiming to create an integrated European infrastructure for researchers in the natural sciences. The two elements of the project were Access, providing funding for researcher visits, and Networking, to encourage sharing of collections-related best practice, policies and protocols.

Access has funded 2,071 researchers 29,992 days access to SYNTHESYS collections. This has resulted in the publication of 734 peer reviewed papers to date and contributed towards 87 PhDs.

The Networking has provided tools to improve development and management of natural history collections. Amongst the achievements are:

- A survey of taxonomic and geographical strengths and weaknesses
- A survey of molecular collections and their management in Europe
- An international standard for collections management including molecular collections
- Disaster plan framework for morphological and molecular collections
- Training 43 staff from 14 EU countries in collections management
- A review of literature on extraction of DNA from museum and herbarium collections
- A workshop on the needs of users beyond the traditional taxonomic community
- Launching the BIOCASE portal, providing access to collections databases across Europe - 16% of GBIF records have been entered via this portal
- Reports on the use of SEM, CT and MRI on natural history collections
- Created collaborations across Europe leading to new projects.

SYNTHESYS has secured a further 7.2M€ for four more years work. The project will continue to provide access to collections and improve the standard of collections management in Europe. Additionally, tools to predict the chances of successful extraction of DNA from collections and protocols for DNA extraction from botanical and invertebrate collections (where mucopolysaccharides are problematic) will be developed.

Destructive sampling and the future: coordinating an international strategy for the preservation of natural history collections in the face of next-generation DNA sequencing technologies

Richard Sabin

The Natural History Museum, London, United Kingdom

Topic description: destructive sampling

In the past decade, the number of applications received for destructive and invasive samples from the research collections at the Natural History Museum (NHM), London, has increased significantly compared to previous years. The Department of Zoology recently commissioned an internal audit of the destructive sampling carried out using its vertebrate collections. This showed an unsatisfactory trend by external research groups in the non-reporting of results, non-return of unused tissues and extracted DNA, and a lack of cross-referencing of related publications and GenBank reference numbers.

At a recent closed conference at Pennsylvania State University (PSU) entitled 'Genomic Analysis of Species Extinctions', it became clear that the development of studies using next-generation sequencing technology, critically relied upon the availability, accessibility and crucially the suitability of historical museum specimens. Associated next-generation sample-preparation methodologies suggest the use of hair as an excellent source of preserved ancient DNA, highlighted by the recent publications in the scientific literature of genomic sequences for both the extinct Siberian mammoth and Tasmanian tiger.

Whilst acknowledging the need for museums to engage in the developing frontiers of genomic research and the resultant scientific enhancement of collections, this paper will examine suggested safeguards and strategies for museum specimen preservation as outlined in a sub-group workshop at PSU lead by the NHM. These include the biobanking of tissues in museum collections, establishment of an international extinct species specimen inventory, experimental research into the differential preservation of DNA in museum specimens and the factors which may determine these, and the creation of online resources for museum workers which aim to inform, educate and assist with the processes of approving applications for the destructive sampling of museum specimens.

Towards a European network of DNA- and tissuebanks

Ole Seberg

Natural History Museum of Denmark, Copenhagen, Denmark

The use of DNA data is routine in many research areas and massive amounts of data from genomics and proteomics are already radically changing the scientific landscape. Although many institutions over the last decades have made considerable collections of DNA and tissue samples, these are often stored, decentralized under suboptimal conditions usually in mechanical freezers at -20° - -80°C and are thus gradually degrading. Such samples represent a considerable investment in both time and money, but their fate is frequently uncertain, when individual research projects finishes.

However, conservation and preservation of samples derived from biological specimens (e.g. DNA extracts or tissue samples) and their associated passport data are essential to ensure compatibility and reproducibility in all areas of biological research and many Natural History Collections have established or planning to establish centralized DNA and tissue banks on their premises.

Using the recently funded Danish National DNA and Tissue Bank, which plan to store samples under optimal conditions in liquid nitrogen with a standardized documentation, the many considerations needed to be taken into account in planning a centralized facility will be illustrated and discussed.

The rapid mushrooming of DNA and tissue banks make it just the right time to discuss international collaboration on storing and sharing samples to avoid unnecessary duplication, and efforts to do so are under way in EDIT and SYNTHESYS-2.

Development of KeEMu to be a generally applicable tool for pest management

David Smith

The Natural History Museum, London, United Kingdom

For over a decade the commercial sector has been using GIS spatial mapping technology as a tool to monitor insect pest activity within agricultural crops, grain warehouses, poultry farms and retail buildings. It is a method that has been shown to quickly identify issues, resulting in rapid response, or even proactive action to be taken.

More recently a small number of museums and cultural institutes housing vulnerable collections have tried to harness the power of this spatial technology. With increased limitations on the use of pesticides, museums have been forced to take a more holistic approach to pest management and have sought tools to aid their cause. However with a multitude of mapping solutions available, many too complex for the needs of the museum community, ambitions have not been fully realised.

The Natural History Museum, London (NHM) is leading a collaborative initiative to develop existing functionality within KE Software's Collections Management system (EMu) to capture and visualise pest management data. Emulating much of the functionality from professional GIS software, but within a familiar user interface, the system will be able to overlay pest trapping and environmental data in a spatial context on building plans. Collections management staff will finally have the capability to relate pest 'hot-spots' to high risk collections areas, check the effectiveness of any pest preventative measure, observe seasonal patterns, and identify anomalies relating to other factors (e.g. T/h levels, Estates activities).

Unlike many other solutions, the integration of pest and environmental data within the EMu collections management system negates the need to have a separate mapping solution and also creates a closer association between the observed risk from pests and the collection data. The result will be a generally applicable tool for a global community of EMu users.

Systematics research in the South African National Biodiversity Institute

Gideon Smith

South African National Biodiversity Institute, Pretoria, South Africa

Systematics research and associated biodiversity collections form the basis of SANBI's diverse research activities, essentially through investigating, classifying, naming and documenting southern Africa's biota. It is here that fundamental biodiversity information is generated and made available to conservation authorities, decision and policy makers, the general public, and a host of other stakeholders. Biosystematics research at SANBI focuses on morphological, molecular and anatomical observational studies, and is mostly carried out in SANBI's three herbaria. The National Herbarium - the second largest herbarium in the southern hemisphere and situated in Pretoria - houses more than 1.2 million preserved plant specimens that are curated and researched in the context of the Flora of southern Africa region (comprising the countries of South Africa, Namibia, Botswana, Lesotho and Swaziland). SANBI's two other herbaria are situated in Cape Town and Durban respectively. The Compton Herbarium (housing about 750,000 preserved plant specimens) focuses mainly on the flora of the winter-rainfall region of southern Africa, while the KwaZulu-Natal Herbarium (housing about 120,000 preserved plant specimens) primarily focuses on the flora of the subtropical eastern region of South Africa, in particular the flora of the KwaZulu-Natal province. The South African Museum collection (the oldest in the country) forms part of the Compton Herbarium, and is managed as a separate entity. Information on the plant specimens housed in SANBI's three herbaria is captured in the National Herbarium, Pretoria, (PRE) Computerised Information System (PRECIS). This is the largest database of its kind, and is a valuable research tool and information resource. It also makes biodiversity information available by producing targeted electronic information products freely available to the public via the Web. These and associated activities are discussed in this presentation.

Observation and distillation-preservation, depiction, and the perception of nature

Julianne Snider¹,
John Simmons²

¹The Pennsylvania State University, University Park, United States of America

²Museologica, Bellefonte, Pennsylvania, United States of America

From the beginning of the 16th century to the middle of the 18th century thousands of natural history specimens were collected but collection preservation technologies were rarely documented. Contemporary illustrations of specimens can provide us with information about preservation technologies in use at that time. Illustrating a specimen is a process of abstraction and distillation that begins with a drawing based on direct observation or information provided to an artist. The illustration of natural history specimens was motivated by both scientific and artistic necessities. 16th to 18th century illustrations in printed books, museum catalogs, and as works of art were based on oral descriptions, parts of specimens, or whole specimens. While the illustrations record the details and characteristics of the specimens they also reflect the preconceptions, cultural values, and artistic aesthetics of the time.

The quality and precision of natural history illustrations evolved rapidly from a rudimentary (and often imaginative) style to illustrations that were very detailed and exact. The increase in sophistication of the illustrations corresponded to advances in preservation technology that produced better preserved specimens. The higher quality of illustrations corresponded to the increased ability to reproduce detailed images as printing techniques evolved from simple woodblocks to copper plates and lithographs during the same time period. Visual records of collections became more readily accessible to collectors and the general population. Today, the same records provide information about specific specimens and the preservation technology used to prepare them. Preservation techniques, all of which cause physical changes in specimens, particularly in form and colors, are often reflected in the illustrations.

Using robotic vacuum's at the Smithsonian Institution

Jackson Tanner

Smithsonian Institution, Suitland, Maryland, United States of America

In an environment of ever increasing demand on human capital resources, the Smithsonian Institution, National Museum of Natural History evaluated the use of robotic vacuums in an attempt to maximize production of its collections support activities. The purpose was to improve basic house keeping of the large offsite collection housing facilities. Debris was collected in order to measure the effectiveness of the robots cleaning ability. Basic area tests were set up to monitor the robotic vacuums ability to autonomously navigate throughout the entire space with obstacles to judge the effectiveness of its ability to clean the selected area. By reducing the need to pull multiple staff from time critical projects, too offsite locations for several days at a time, to perform the difficult task of vacuuming floors around and underneath collection cabinetry on a regular basis, we were able to meet multiple production milestones for large collection move projects. By automating this very basic task we have been able to perform other time critical task and clean offsite locations, now on a continuous basis, while improving the overall conditions of multiple collections at the same time while also providing a basic integrated pest management need.

Business continuity and collections salvage: An integrated European approach

**Clare Valentine¹,
Tanya Pollard¹, Chris Collins¹, Michel Guiraud², Rob Huxley¹,
Jackie Mackenzie-Dodd¹, S. Owens³**

¹The Natural History Museum, London, United Kingdom

²Musee d'histoire Naturelle, Paris, France

³The Royal Botanical Gardens, London, United Kingdom

Specimen salvage planning

The Natural History Museum, London has recently reviewed its Business Continuity Management procedures and as part of that exercise we realised that the individual departmental Collections Salvage Plans needed an overhaul to fit in to Business Continuity Management framework.

Using the Harwell "Middletown" model we now have a joined up collections salvage plan that follow the same format for each department to make it easier for people to understand and assist with. This joined-up approach allows for shared salvage materials and equipment. Our plans now work either at the departmental or building level where departments have collections in juxtaposition. We have also incorporated disaster planning for the specimens in the galleries and the molecular collections.

In addition to this, we have been working with colleagues from a number of natural history museums in European under the SYNTHESYS Network Activity C - Collections Standards. Through a series of Disaster Planning workshops, we have developed a template, which outlines what European natural history museums need to consider when writing their own collections salvage plans. The aim is to set the standard for best practice and define a common approach. We are also discussing setting up a network so that we have a staff trained in salvage and shared equipment, which can be drafted in from other institutions in the event of a disaster given that, we will all have the same approach. The idea is that staff will be trained to the same standard and undertake exercises in each others collections so that we are familiar with each other institutions.

This talk will outline a summary of each of these initiatives and share some of the insights we have gained from undertaking these projects, which may provide a useful focus for other institutions.

Microscope slide project at Yale Peabody Museum of Natural History

**Gregory Watkins-Colwell,
Catherine Sease, Eric Lazo-Wasem**

Yale Peabody Museum of Natural History, New Haven, United States of America

The Peabody Museum of Natural History has been working on an IMLS-funded project to conserve and re-house more than 48,000 microscope slides from the vertebrate and invertebrate zoology collections. The slides are of historic and scientific importance spanning more than 150 years of collection activity and include primary types as well as histological specimens of rare species such as coelacanth. Prior to the project the slides were maintained in period-acceptable cabinets and slide boxes, as well as in disorganized piles in cardboard boxes. Conservation activities include cleaning slides, re-adhering labels, repairing broken slides and monitoring of specimen embedding media. Collection management activities include database entry, electronically connecting the slide to whole specimens within the collection, re-housing slides into custom-made steel cabinets and utilizing an electronic object locator. To date nearly 44,000 slides have been cleaned and approximately 30,000 have been entered in the database. During the project significant discoveries have been made, including the recovery of type specimens and uncovering the historic importance of some slide collections. We will present the methodology and current progress report on this project.

Bone maceration and bone degreasing - a necessary tool for preserving natural history collections

Günther Weber

MEDIS GmbH, Buseck, Germany

Fat is not conservable! Oxidation and micro-organisms which will produce acids that will degrade the specimen. Degreasing is not an optional step in bone preparation but rather a necessary one to avoid bone destruction. It is a necessary conservation technique and should be carried out in each museum in order to save the collection-goods in a stable environment. The loss of valuable specimens due to omitted or inadequate degreasing is well known.

A new method has been developed for use in museum preparation / taxidermy of bone specimens and in human and veterinary anatomy studies. In all of these cases, the bone material must first be macerated (complete fat - emulsification and elimination of all proteins) and degreased (all of bone grease extracted) to assure proper presentation and longevity of the specimens.

Maceration is the procedure of dissolution of organic tissue. It is best accomplished by the standard enzyme-maceration, where it is of utmost importance that the pH-value is steady and controlled at all times. The pH-value has a very large impact on the process-time and the activity of the enzymes. It is therefore advisable to control the pH-value at all times, possibly by use of an "online" monitoring technique.

Without an intensive degreasing of the bone specimens the bones will be decomposed by means of oxygen, light, heat and moisture. Optimum degreasing is accomplished by processing the specimens in a low temperature (41°C) controlled and sealed aerosol environment using dichloromethane (DCM) as the only allowed extracting agent. If any other degreasing agent is used the international health & safety regulations are ignored.

Fostering interdisciplinarity in a shared collections facility

Tim White,
Christopher A. Norris

Yale Peabody Museum, New Haven, Ct, United States of America

The benefits of interdisciplinarity in research and teaching have long been recognized. Interdisciplinary approaches can enable groups of researchers to tackle problems that are too complex or vast to be dealt with the knowledge and tools of a single discipline; sustain disciplines that might be neglected in the traditional disciplinary structure of academia; or applied in a teaching context to enable students to understand a given subject in terms of multiple traditional disciplines. There are three main elements to achieving successful and sustainable interdisciplinarity: combining people from different disciplines to bring new perspectives on problems; providing access to resources like laboratories and collections; and having close proximity of people and resources to facilitate communication and interaction. The Yale Peabody Museum of Natural History has already achieved this “magic mix” once, through the Class of 1954 Environmental Sciences Center, which over the last 8 years has brought together researchers, laboratories, and collections to tackle complex issues such as climate change, earth observation, and extinction. Now the Museum has the opportunity to apply this expertise on the wider stage of Yale’s new West Campus Site, where collections from the Peabody are being brought together under one roof with arts, humanities, and library collections. We will discuss some of the prospects for new cross-disciplinary initiatives in collections care, exhibition, education, and access that the site presents and some of the challenges that the Peabody and its partner institutions will face.

Collective inclusion - realities of a wet collection redevelopment at the Museum of New Zealand

Simon Whittaker,
Carol Diebel

Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand

When our museum and natural environment staff were first faced with designing a new major wet collection facility, we soon realised that people management was also going to be a significant challenge.

Our team was highly emotive and dogmatic in their approach to work practises. They had long held perceptions that were now going to be challenged, and it soon became evident that individual personalities were going to struggle with any suggested change. Work practises and information quality varied across collections, and this was aligned with a limited database management system. Staff interpreted changes in external regulatory compliance as an inconvenience rather than as a necessity. And, management of the project was being driven by financial, architectural and building operations people with little museum collections experience.

It was therefore necessary to develop a singular approach to sensibly deal with the multiple issues faced in this redevelopment through 'collective inclusion' - a merging of practical reasoning, ideas, opinions, and realities. The two core tools involved in achieving the goal was firstly, conducting a collection risk assessment and secondly, the implementation and use of a dynamic collection information management system, KE EMu. Both are not new, but both worked as 'enabling tools', that we used to create structure, depersonalise decision-making, encourage staff to become engaged and integrated in the change process, and to provide a basis upon which to develop processes that forged linkages between the physical collection and virtual KE EMu system.

The benefits of a singular relational objective approach to individual collection issues, implemented as a part of this major wet collection redevelopment, created a safe environment for staff to change long held perceptions and practises. The result was a well designed facility for both the collections and the staff.

POSTER PRESENTATIONS

in alphabetical order

(The number above the title refers to the number
of the computer on which the poster is presented)

1**Exhibit collection restoration at the Spanish Museo Nacional de Ciencias Naturales (MNCN). CSIC: Preliminary results****Josefina Barreiro**

Museo Nacional de Ciencias Naturales, Madrid, Spain

Mainly due to lack of space, the preservation of the MNCN mounted specimens collection was affected. In late 2007 a report was sent to the Spanish National Research Council, the Spanish Administration Institution where the Museum belongs. In 2008 590,000 € were given to restore 1,843 reptiles, bird and mammal specimens. In this poster, the restoration process is detailed as well as the first results. On the following: (1) the restoration requirements that the taxidermists hired to accomplish this tasks have to observe. The technical procedures to be used: adequate techniques and products. (2) The conservation report of each specimen in which the following data has to be included: technical specimen card, specimen original preservation, treatment received and specimen final preservation report.

The control and monitoring of the complete process is done by a MNCN technical direction Committee, formed by museum specialists in natural history specimens restoration.

2

A configurable specimen and observation portal for the GBIF- and BioCASE-network

Walter Berendsohn,
Anton Güntsch, Jörg Holetschek, Patricia Kelbert,
Wolf-Henning Kusber, Elke Zippel

Botanic Garden & Botanical Museum Berlin-Dahlem, Berlin, Germany

The development of an open and flexible information infrastructure for networking distributed specimen and observation records driven by international federations such as GBIF (www.gbif.org) and BioCASE (www.biocase.org) is a great step toward a new generation of search-instruments allowing for instant access to potentially billions of collection objects and occurrence records.

Portal developments in the context of the GBIF infrastructure over the last decade have led to feature-rich search systems offering numerous powerful web-services, free-text searching and browsing as well as on-the-fly distribution maps. However, the implementation of configurable portal systems for smaller communities and thematic networks, who wish to implement their own web-presence, has received relatively little attention.

In the framework of the EU 6th framework project SYNTHESYS (Synthesis of Systematic Resource, <http://www.synthesys.info/>) the BGBM has implemented a highly configurable specimen and observation data portal system filling this gap. The software can be used to set up thematic networks based on a subset of the GBIF index database. It also allows for connecting thesaurus databases (e.g. taxonomic checklists or gazetteers), which expand user queries to related terms (e.g. synonyms, misapplied names) and leads in many cases to significantly richer responses. The portal software comes with 11 language translations including Chinese and a prototype module for user annotations and feedback. The portal has already several installations including

- the Biological Collection Access Service for Europe (BioCASE, <http://search.biocase.org/europe/>)
- the EDIT Specimen and Observation Explorer for Taxonomists (<http://search.biocase.org/edit/>)
- the GBIF-DE Botany Node (<http://search.biocase.de/botany/>)
- the Collection Information System of the Botanic Garden and Botanical Museum Berlin-Dahlem (<http://search.biocase.org/bgbm/>)

Future developments will focus on an optimized thesaurus interface, which enables Users to control the query expansion mechanism conveniently even if a high number of thesauri is connected to the given portal installation.



3

A river runs through it! Building bridges between flooded collections: Disaster response to the 2008 Iowa, USA, floods

**Holly Berg,
Cindy Opitz, Tiffany Adrain**

University of Iowa, Iowa City, United States of America

Record flooding occurred during the summer of 2008 in Iowa, United States, with rivers cresting well above flood stage in many towns, creating a federal disaster area. The flooding caused many hardships for museum collections in the Cedar Rapids - Iowa City area. Museums faced, or sustained, damage from flood water, and numerous collections had to be evacuated across town, or even to other states. Some collections remained dry only to be damaged or endangered by access issues and clean-up efforts (such as mold-mitigation in buildings) after the water had receded. Though fortunately no natural history collections faced direct flood damage, this catastrophic event caused numerous indirect problems to the collections at the University of Iowa Museum of Natural History and the University of Iowa Paleontology Repository, such as power failures, influx of pests, and inaccessibility. This disaster provided many learning experiences, and showed the importance of developing disaster response plans and procedures, creating a network of disaster responders and supplies, collection inventory and documentation, correct collection storage, pre-disaster mitigation and immediate post-disaster response. The flood was truly a bridge-building experience, as staff from all types of museums and collections pulled together to move artworks, social history collections, and library and archival collections out of harm's way prior to the flood, and then assess, salvage, and later clean damaged artifacts. The disaster highlighted the importance of protecting not just the collections, but also ancillary records, administrative records, working collections (reference books, comparative collections) and equipment (especially computers). Recovery of damaged objects and buildings is a slow process and is still continuing a year later, while museums have made tremendous efforts to keep collections accessible and programs running. Lessons are still being learned from the recovery process, and experiences are being shared among museums in the community.

4

**The Apiary project:
High-throughput workflow for computer-assisted human
parsing of biological specimen label data**

**Jason Best¹,
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²University of North Texas, Texas Center for Digital Knowledge, Denton, Texas, United States of America

Millions of specimens in herbaria and other natural history museums worldwide are potential candidates for digitization, which would make them more accessible to researchers. The data contained on herbarium specimen labels provide critical information about each specimen, yet the volume and heterogeneity of these labels present a challenge in the necessary transformation to meaningful digital form to support research. The University of North Texas's Texas Center for Digital Knowledge (TxCDK) and the Botanical Research Institute of Texas (BRIT), with funding from an Institute of Museum and Library Services National Leadership Grant, are conducting fundamental research with the goal of identifying how human intelligence can be combined with machine processes for effective and efficient transformation of specimen label information in a digital workflow.

The Apiary Project (<http://www.apiaryproject.org>) seeks to investigate what workflow provides for a combination of machine-assisted and human-assisted procedures to most effectively and efficiently convert textual data on specimen labels into machine-processable parsed metadata which can then be ingested into a data repository for dissemination. The research will focus on discovering the optimal balance between human and machine processes by evaluating the speed and accuracy of the processes when applied to a variety of label formats with a mix of machine-generated and handwritten text. The workflow will integrate existing technologies for applying Optical Character Recognition and machine parsing using Natural Language Processing. New human interfaces will be developed and evaluated for scenarios where machine processes are unable to extract and parse data with sufficient accuracy or speed. Quality assurance procedures will compare the results of the human process and machine process to benchmark data from a test dataset. The results of this research will yield a new workflow model and tools for effective and efficient label data transformation, correction, and enhancement.

5

Revision and digitisation of the Scháry collection in the Museum of Comparative Zoology (Harvard University)

Petr Budil¹,
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²Dep. of Invertebrate Paleontology, Museum of Comp. Zoology, Harvard University, 26 Oxford Street, Cambridge, Ma 02138, United States of America

The systematic revision and digitisation of the famous Schary (Šáry) collection, stored in Museum of Comparative Zoology (MCZ), Harvard University, began in 2006. The collection contains important palaeontological material from the Barrandian area of Middle Bohemia (Europe, Czech Republic). The collection was purchased by Louis Agassiz in 1882 from the heirs of private collector and beer baron Schary, who lived in the west Bohemian city of Plzeň (Pilsen). During his life, Scháry compiled the second largest 19th century fossil collection in Bohemia. The collection was used extensively by French paleontologist Joachim Barrande for his 22-volume monograph “Systeme Silurien de la Boheme” and contains many type and original specimens. Many modern studies have also utilized the Schary collection, which offers an excellent overview of 19th century collections from the Paleozoic of Bohemia. The majority (99%) of the collection represents the remains of Lower Palaeozoic invertebrates (trilobites, bivalves, cephalopods, echinoderms, graptolites etc.). After its arrival in the USA, the collection was never systematically revised. Originally, the main constraint was the financial limits of European scientists, especially with the “Iron Curtain” prohibiting Czech researchers from visiting the USA. Only occasional visits were made in this period of time (B. Bouček and J. Kříž, who revised the bivalve collection). Since 2004, the collection has been studied by Czech scientists with help of funding from the MCZ and the Czech Geological Survey, GACR and GAAV. Up to now, the bivalves, cephalopods, trilobites and gastropods have been revised. This year, Czech paleontologists worked on Cambrian trilobites, echinoderms and graptolites. These intensive studies have enabled a step-by-step modern stratigraphic and systematic revision, which is essential for the digitisation of the collection. The contribution is supported by the Czech Grant Agency project 205/09/1521.

6

Moulding and casting unusual fish at the National Museum Wales

**Caroline Buttler,
Annette Townsend**

National Museum of Wales, Cardiff, United Kingdom

Some very unusual species of fish have recently been discovered on the coast of south Wales. In 2006 a 60 cm long Atlantic tripletail, *Lobotes surinamensis*, which is usually found in tropical and subtropical waters, was caught by a fisherman near Cardiff. A juvenile almaco jack, *Seriola rivoliana*, normally found off the coasts of Central America and East Africa was caught, in 2007, at Milford Haven in west Wales. In 2008 a 1.8 m long swordfish, *Xiphias gladius*, was washed up dead and scavenged on the south Wales coast. Swordfish are rare in the waters of the British Isles.

The specimens were brought to the National Museum Wales. Once identified, they were stored in deep freeze for preservation. A decision was made to make replicas of the specimens for a display highlighting the discovery of these uncommon species in Wales.

Different methods were used to mould the fish due to their different sizes and condition. The tripletail was still partially frozen when moulded. A fast setting silicon rubber was used to get good definition of the scales. The fins were removed and moulded separately. The almaco jack was treated with a similar technique. The swordfish skin had little detail so plaster was used to mould the body, a cheaper option than silicon rubber. This work had to be carried out very quickly before the unfrozen fish deteriorated. Once the moulds were completed, casts were made with epoxy resin and fibreglass.

7

A curatorial assessment for stratigraphic collections to determine suitability for incorporation into the systematic collection

**Susan Butts,
Jessica Bazeley, Derek Briggs**

Peabody Museum, Yale University, New Haven, Ct, United States of America

The Yale Peabody Museum, Division of Invertebrate Paleontology has a large stratigraphic collection which includes material collected over the past 150 years by graduate students, curators, and division affiliates. We are completing a NSF-BRC Grant (Award #0545210), one objective of which is a curatorial assessment developed to inventory and prioritise components of the collection better suited for incorporation into the division's systematic collection and create a hierarchy for removal of this component.

For the purposes of our project, emphasis was placed on the improvement of our brachiopod collection. The following factors were considered: presence/absence of specimen data (locality or accession), bulk content (graded on a continuum from fossils free from matrix to bulk rock), percentage brachiopods, percentage taxonomically determined, and percentage with specific locality information. The output scores individual drawers with values ranging from 0 to 0.5: 0.5 represents drawers which are ideal candidates for incorporation into the systematic collection, and 0 represents material more suited to a stratigraphic arrangement. A total of 3858 drawers were analyzed, of which approximately 26% (score = 0) are better housed in a stratigraphic collection and 18% received at least 0.20 (the determined cutoff for incorporation into the systematic collection).

Also assessed was fossil condition including damage (Byrne's disease, pyrite decay, pest damage) and other factors which may otherwise influence the transition, such as fragility, presence of thin sections and other preparations, and whether specimens are still bagged or packaged by any other method. While the equation was developed for the particular needs of this project and the collection strengths of the YPM-IP division, it is easily customized for a wide range of cross-disciplinary and highly specific applications.

8

The zoological and anthropological collections of the Museu Nacional de História Natural, University of Lisbon, Portugal

**Alexandra Cartaxana,
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Museu Nacional de História Natural, Lisboa, Portugal

The Museu Nacional de História Natural (MNHN), University of Lisbon, Portugal, was founded in 1858. The MNHN inherited the collections of the Real Museu e Jardim Botânico da Ajuda created in 1772, which incorporated the material collected during the scientific expeditions to Africa, Brazil and India organized by the Portuguese government.

The Zoological and Anthropological Department of MNHN became known as Museu Bocage in honour to its first director (Barbosa du Bocage, 1823-1907), and its collections kept the name until today (collection abbreviation: MB).

The zoological and anthropological collections were completely lost during a fire in 1978. Immediately after the fire, several international institutions responded with donations to requests made by the Museum. Since then, recovery of the MB collections is being achieved mainly through Museum-sponsored fieldwork, research developed in the Museum and in other institutions, and private donations.

The MB collections are divided into mammals, birds, reptiles and amphibians, fishes, insects and invertebrates (non-insects). The fauna of Iberian Peninsula, which is considered an important hotspot of biodiversity, is particularly well represented. There is also an important Anthropological collection with complete records.

More recently, new techniques for collecting, banking, and using biomaterials have been developed. Following these advances we established the "Tissue and DNA Collection" and we are closely involved with the International DNA Barcode Initiative (CBOL).

We have been conducting a strong effort on the digitalization of our collection and aim to contribute to the full access to this information through the Internet, using international initiatives such as the Global Biodiversity Information Facility (GBIF).

9

The pressing side of mounting specimens with adhesive**Jovita Cislinski Yesilyurt**

The Natural History Museum, London, United Kingdom

The material and methods used in preparing herbarium specimens vary from institution to institution, and this not only applies to mounting methods, but also pressing the plants.

If looked at only from the conservation point of view, simply leaving the specimens loose would be the best practice. However, the herbarium material is in constant use, which means that there is a great risk of damage. This was one of the reasons that the Natural History Museum adopted their method of attaching specimens to herbarium sheets with adhesive and strapping. Once attached with adhesive, weight is applied and - in most cases - left for some time.

If the process of applying weights has to be done repeatedly, the weight cannot be very heavy, and has therefore to lie longer, to achieve a good result. There are different ways of doing this while waiting for the adhesive to dry. Sandbags, books, bricks, metal blocks are examples of weights but screw presses are also used.

Comparisons were made between these pressing techniques. A number of different aspects such as health and safety, cost-effectiveness, ease of use, impact on the specimen, the pros and cons for each of the methods applied are highlighted. For example, screw presses scored positive on most aspects, but fails when used on bulky specimens, while sandbags scored very well on this aspect.

10

**Recent and ongoing collections facility renovations at the
Museum of Comparative Zoology (Harvard University)****Jessica Cundiff,****Adam Baldinger, Judith Chupasko, Linda Ford, Jeremiah Trimble**

Museum of Comparative Zoology, Harvard University, Cambridge, Ma, United States of America

Harvard's Museum of Comparative Zoology (MCZ) houses some of the most historically significant and biologically diverse natural-history collections in the world. Extensive renovations that facilitate collections storage and conservation, collections-based research, and teaching have been underway for the last several years and continue today. Major renovations have been completed in many MCZ departments, including entomology, herpetology, ichthyology, invertebrate zoology, invertebrate paleontology, malacology, mammalogy, and ornithology. Funded by both the MCZ and the U.S. National Science Foundation, these renovations include installation of storage-efficient collections cabinetry and shelving, which provide much-needed space for collections growth and decompression, easier specimen retrievability, and enhanced security. Separate electronic databasing and digital-imaging initiatives complement renovations of the physical space and enhance collections access and utility.

11

Unique solutions to large mammal specimen storage challenges

Maureen Flannery

California Academy of Sciences, San Francisco, United States of America

During the rebuilding of the new California Academy of Sciences in San Francisco, California, the Department of Ornithology and Mammalogy was faced with two particularly challenging collection storage issues. To solve these storage issues, we developed two unique solutions to two very different challenges.

Due to space limitations and collection size, the horned and antlered specimens would not fit in the new storage space utilizing the previous shelf storage configuration. Working closely with Spacesaver Corporation and Delta designs, Ltd., we chose a system based around a compactable bank of track-mounted art-racks as the safest and most efficient way to house this collection within the confines of the new space. To address the problems associated with hanging the specimens vertically, a group of volunteers designed and built archival bags to protect specimens and prevent loss of parts, especially teeth.

The pelt collection, previously stored on stationary racks with hard to remove pvc pipe, was traditionally difficult for researchers to use. In order to allow easier access to individual pelts while still taking advantage of the high ceiling in the new pelt storage cooler, we worked with Delta Designs Ltd. to custom design innovative pelt storage racks. This unique system of cabinets with height adjustable sliding frames and easily removable bars fully supports the mammal pelts while allowing researchers complete access to the collection.

12

**An African natural history museum with European/
western dreams: How's that logical in the new South Africa?**

**Wayne Florence,
Denise Hamerton, Hamish Robertson**

Iziko South African Museum, Cape Town, South Africa

South Africa is a melting pot of cultures, with a pronounced European influence. But what makes this Africa? From a natural history point of view, maybe it's South Africa's the rich biodiversity with high levels of endemism, which imparts to it the uniqueness of a land pristine enough to be considered wild.

The Iziko South African Museum is responsible for the collection and preservation of representative specimens of South Africa's natural history. The museum was established in 1825 as a public institution by the colonial Governor of the Cape of Good Hope, Lord Charles Somerset. Since then the growth of its collections has resulted in infrastructure changes in its early days, it was housed in an apartment in the public library, and 184 years later boasting major extensions to its current location, which includes much improved collection areas, research facilities and public galleries. In developing countries standards for preservation of the collections have lagged behind and a plan to further redevelop the current site into a state-of-the-art facility has been initiated through the impending "Courtyard Project".

Many lessons can be learned from Europe and the west to bring Iziko in line with current global standards and best practices, but can we maintain an African identity? Opinion on this question is offered with a description of the bold new initiative to redevelop the Iziko South African Museum.

13

Plastic covers and inserts for glass bottles**José Enrique González-Fernández**

Museo Nacional de Ciencias Naturales, Madrid, Spain

Preventing conservation fluid evaporation has always been a big problem in conserving specimens for collections.

Experienced conservation personnel, assistants, helpers, will remember the old glass bottles with a ground-glass neck plug that were sealed with paraffin, sealing wax and later with silicone.

During the 20th century, an advance was the use of a bottle with a pressure closure and a rubber gasket between the cover and the bottle.

Afterwards, bottles with a bayonet type closure and metal cover protected with discs of inert material such as porex (expanded polyethylene) were used.

A great improvement were the bottles produced by the Japanese company ABICO SCIENTIFIC Co. glass bottles, closed with an insert polypropylene cover that was held in place by pressure and polyethylene covers that screwed in perfectly. However, their capacity was limited to 925 ml and the maximum diameter of the opening was 61 mm.

We introduce several designs developed in collaboration with MNCN curatorial technicians and the Spanish company GRACO S.A. of glass bottle openings that can be found in the market.

The set is made up of an insert high-density polypropylene cover (HDPP) that is held to the bottle opening by pressure allowing the bottle to be completely filled and totally sealed. It also has a polyethylene cover with internal grooves that adjust to the bayonet type threads of commercial bottles ensuring their closure. Three set sizes have been designed (66, 80 and 112 mm) with which we can use 10 different sizes of commercial bottles: from 140 ml to one gallon (3,895 ml).

14

Three million botanical specimens on the move**Jonathan Gregson**

The Natural History Museum, London, United Kingdom

The Natural History Museum's Flowering Plant collection - an estimated 3 million specimens (around half the total Botany collection) - and associated staff are moving to the Museum's new Darwin Centre. The building offers much improved storage conditions, and will help to reduce the risk to specimens from biological, environmental and mechanical degradation. Integrated Pest Management will be much more practical to implement: the herbarium will be easier to keep clean, cabinets have been designed with tightly sealed doors, and a constant 17°C air temperature will help to control pests. We are also freezing the entire collection before it is moved. The extra expansion space will reduce the risk of damage posed by over-packing shelves. We are also taking this opportunity to update the arrangement of the collections to reflect the current state of our knowledge of flowering plant classification and evolutionary relationships. We are following a new arrangement, recently agreed between Kew, Edinburgh Botanic Gardens and the NHM and based on the Angiosperm Phylogeny Group molecular-based classification. The move has posed many challenges, such as the logistics of safely transporting and freezing 3 million specimens and moving each shelf to a new location and position in the sequence, whilst maintaining as much access to museum researchers as possible (we have closed to external visitors for the duration of the move). However, we are already seeing benefits arising from the project: for example the contents of each shelf of the herbarium has had to be mapped as part of the move planning, giving us a clearer idea of the scope of the collections and identifying areas to prioritise re-curation in the future. It has also been an opportunity for general housekeeping, and rediscovering specimens (and even the odd overdue loan!) which have been "lost" in the herbarium for many years.

15
**Curation of silica dried plant tissue
at the Natural History Museum, London**

Michael Grundmann

The Natural History Museum, London, United Kingdom

In recent years molecular data are more and more demanded by an increasing number of disciplines in botanical research, exclusively or in addition to morphological or other data sets. As DNA degrades with time in conventional herbarium specimens museum collections have to meet researcher's requirements for suitable tissue. The generally accepted best method affordable on a large scale is storage of rapidly dried leaf tissue to be kept dry on silica gel. A cost-effective, space-saving and applicatory system of long-term storage of silica dried plant tissue is projected at NHM. Specimens are stored individually in 13 × 9 cm zip-lock bags including a small strip of ART-SORB® silica sheet. Bags are combined in systematic order in air-tight boxes including either additional self-indicating silica gel or Zeolite sachets (for sharp drying), and a humidity indicator strip. These boxes fit into customary herbarium or filing cabinets, which can be placed at room temperature or alternatively in walk-in freezers, according to results of ongoing research at NHM. Each specimen is barcoded and databased in the NHM central database using the database package KE EMu. Data records are linked to their corresponding voucher specimens and DNA samples for convenient retrieval of all data belonging to a particular specimen, including collector details, geographic data, generated sequence data etc. Individual dry packing enables researchers and curators to overlook large numbers of specimens on the bench without the risk of wetting. Currently comparative research is undertaken to evaluate the effect of storage temperature and levels of humidity on the longevity of dried leaf tissue and extracted DNA.

16

EDIT ATBI+M surveys: Collecting combined with biodiversity inventories and monitoring of conservation areas

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EDIT (European Distributed Institute of Taxonomy) is an initiative of 28 European, North American and Russian institutions to build a network in "Taxonomy for Biodiversity and Ecosystem Research" (www.e-taxonomy.eu). EDIT aims to strengthen the input of taxonomic expertise for biodiversity conservation, and supports the participation of experts in ATBI+M projects (All Taxa and Biodiversity Inventories + Monitoring; www.atbi.eu). ATBI+M are large-scale field efforts to record the entire biodiversity in conservation areas and will form the basis for monitoring biodiversity changes over time.

European ATBI+M sites have been established in France, Italy and Slovakia and more than 100 scientists have already collected data in the field. Almost 4,000 species of animals, plants, and fungi have been recorded in all sites to date. More than 3,300 species are documented for the Mercantour & Alpi Marittime National Parks (France/Italy) (www.atbi.eu/mercantour-marittime/) and 855 species in two national parks located in the Gemer area in Slovakia. There is much more biodiversity that needs recording and further taxonomists are encouraged to get involved in collecting and inventorying in the national parks.

The data generated by EDIT's ATBI+Ms are also accessible world-wide through the Global Biodiversity Information Facility (GBIF). The data for Mercantour/Alpi Marittime are available at <http://data.gbif.org/datasets/resource/7949/> and for Gemer at <http://data.gbif.org/datasets/resource/7950/>. Another possibility to search for observation and collecting data is the "EDIT Specimen and Observation Explorer for Taxonomists" (<http://search.biocase.org/edit>).

Additional goals are to test and further develop available digital data recording tools and devices with an integrated GPS functionality, especially for inventory field work. The aim is to facilitate accurate geo-referencing and recording in a semi-automatic manner in standardised formats.

EDIT will also produce a manual on best practice in the field focusing on field recording and collection techniques and protocols for ATBI+M sites. The intention is to further streamline and increase the efficiency for field methods, being an essential part in adding high quality specimens to museums' collections.

17

Ranges and changes of pH in zoological alcohol collections

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Maintenance of neutral pH is, besides avoiding evaporation and decreasing alcohol concentrations, the third and most complicated aspect regarding preservation fluids in natural history collections. The involved media contain little water and are often contaminated with organic substances, rendering the measurement of the current pH a problem in itself. If unacceptable values are found, restitution of neutral pH is likewise difficult, often requiring complete and repeated exchange of the preservation fluid. Due to its complexity and the lack of relevant expertise, this issue is often completely ignored.

In the context of an extensive screening in the wet collections of two large museums (Munich and Basel) before and after curation, the actual extent of the named problems was assessed and the involved methodology evaluated. The pH was measured with three methods, i. e. with a pH electrode before and after dilution with water and with pH-indicator paper.

The values found before curation ranged from 4.5 to 9.5 with about 14% of the samples in the acidic range below 6 and another 14% in the basic range above 8. There were remarkable analogies between the two collections. E.g. the vertebrates (fish, reptiles, mammals) ranged mostly below 7, whereas the crustaceans ranged entirely between 7 and 9 in both collections. The ants ranged all the way from 4.5 to 9.5 in Munich. Standard curatorial measures to reconstitute alcohol levels and concentration hardly improved the pH values.

With almost 1/3 of the samples outside the desired pH range (6-8) we still lack appropriate counter measures. We propose a new approach to avoid the problem altogether by stabilizing the pH with substrate-bound ion-exchange agents, e.g. an ampholyte provided with positively and negatively charged groups in form of pellets, sheets or sticks. Alternatively a combination of separate acidic and basic ion-exchange substrates could be employed.

18

**Collection policies of the State Museum for Natural History
Stuttgart**

**Johanna Kovar-Eder,
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Staatliches Museum für Naturkunde, Stuttgart, Germany

With 11 millions specimens (plants, animals, fossils and minerals) the scientific collections of the State Museum of Natural History Stuttgart rank among the most important ones in Germany. Their heterogeneity (from modern tissue to fossil collections) require very different technical treatment, depositional and documentation standards.

Historically grown, the curation of the different collections was performed rather independently by the curators and on the specific curator's authority. Virtual collection networking requires internationally accepted collection standards. The State Museum of Natural History Stuttgart attempts to match these needs by the development of collection policies that follow internationally accepted best practices and that are accepted and mandatory for all collection curators of the museum.

19

Controlled environments: Creating space for critical specimens

**Ann Molineux,
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Natural history collections contain specimens with varying degrees of 'value'. This value can be a measure of quality, rarity, historical significance, or research importance. The latter category covers the type and figured specimen collection. These are the specimens most often examined by visiting researchers, frequently requested as loans and are of immense taxonomic importance. Studies in the Non-vertebrate paleontology type collections of the Texas Natural Science Center revealed inadequate housing which was exacerbating the disintegration of susceptible specimens.

A project funded by NSF is enabling the digitisation of these type specimens and certain improvements to their storage conditions and conservation. Matching funds from several sources within the University of Texas at Austin broadened the scope of the original proposal such that it could include total cabinet replacement, complete room renovation, and a new humidity controlled system specific to the new space.

This project illustrates two important aspects of collection management. Firstly it demonstrates the use of available funds as leverage for further funding from different entities, increasing the scope of the initial project and broadening the resource base. Secondly, where funding and space are limiting factors, it underscores the importance of ranking collections and thus ensuring that the most important specimens acquire the highest quality environment.

20

**Remote annotations: Keeping natural history collections vital
in an age of digital dissemination****Paul Morris¹,****Maureen Kelly², James Macklin², Robert Morris³, Zhimin Wang³**¹Harvard University, Cambridge, Ma, United States of America²Harvard University Herbaria, Cambridge, Ma, United States of America³University of Massachusetts, Boston, Ma, United States of America

As libraries of information about biological diversity, Natural History Collections are kept vital, in part, through repeated visits by taxonomists and other specialists. The quality of collections information is maintained by annotations made to specimens by such visitors. While global networks are bringing more and more collections data, including images, to the desktops of specialists, the networks lack easy means to return annotations back to the authoritative data sources; a radical departure from the long history of annotation of labels by visitors to collections. By making collections data easily available to more researchers, we are limiting the means for collecting their feedback.

An approach to this change would be to capture annotations at the researcher's desktop, and return their annotations to the relevant authoritative collections databases in a form that could be readily incorporated, if desired, into those databases. This approach implies several requirements. Annotations need to be captured as structured information (such as in atomic fields specified by concepts from the ABCD schema). The annotations themselves need to include structured descriptions of how the content of an annotation is to be handled, with new data (such as new determinations), distinguished from corrections of existing data, distinguished from identification of systematic errors in the mapping of concepts from a data provider onto the network. Network protocols need to include the transport of annotations back to authoritative collections database holders. Since no sensible database manager would allow arbitrary sources to write into their database from afar, annotations pushed from the network must be filtered. Such filtering further implies a global store of pending and rejected annotations. We are experimenting with these requirements in the development of a prototype network, which we term "Filtered Push", openly documented at (http://mantis.cs.umb.edu/wiki/index.php/Filtered_Push).

21

Biodiversity research and the role of natural history collections

**Marine Mosulishvili,
Georgi Arabuli**

Georgian National Museum, Tbilisi, Georgia

Georgian National Museum preserves a unique collection of natural history specimens of the Caucasus. The Caucasus Region, encompassing the entire country of Georgia was named one of the world's 25 biodiversity hotspots by Conservation International, based on selection criteria such as species richness, levels of endemism, taxonomic uniqueness, unusual evolutionary phenomena, and global rarity of major habitat types. The plant diversity in Georgia is very high in comparison to its small territory. During the quaternary glaciations the Colchis (West-Georgia) remained as isolated refugia for tertiary vegetation and harboured a large number of endemic species today (WWF 2006). Out of all the vascular species distributed in Georgia, 980 (23%) are endemic to the Caucasus and there are 17 plant genera endemic to the Caucasus region. Natural history collections and biodiversity research are, beside education, the basic activity of the Herbarium of the Georgian National Museum (TGM). The origin of the Natural History Collections of the Georgian National Museum stem from the founding of the Museum in 1852. The Herbarium of the National Museum is the oldest herbarium in the Caucasus Region. The collections of the Herbarium include the personal herbaria of some of the most celebrated European nature explorers and botanists of the past. The Caucasian Herbarium's main activity is preserving collections, developing digital image database, optimising storage and conservation, collecting, assessing and promoting information on past and present biodiversity. Unfortunately, data on Georgian plants are not incorporated in the pan-European Projects yet. The central aim is to join Europe-wide projects and networks such as ENHSIN, BioCASE, Euro+Med Plantbase, PESI etc. Collaboration with European Natural History Museums and participation in Europe-wide projects is important for Georgian Natural History researchers who need help in the establishment of standardised and authoritative taxonomic (meta-) data. Furthermore, the Europe-wide plant databases, networks and biodiversity management will not be complete without Georgian and the Caucasian Plant data set, local expertise and Biodiversity research.

22

Beeswax as a remedial treatment for pyrite disease**Rodrigo Pellegrini¹,****Albert Jehle¹, Barbara Grandstaff², Shirley Albright¹, David Parris¹**¹New Jersey State Museum, Trenton, New Jersey, United States of America²University of Pennsylvania, Philadelphia, Pennsylvania, United States of America

The minerals pyrite and marcasite are often present in vertebrate, invertebrate, and plant fossils. Oxidation of these iron sulfides (commonly known as “pyrite disease”) is arguably the most likely and severe natural cause of deterioration in fossil collections. Because the damage caused by this reaction is considered preventable but irreversible once the reaction has begun, development of remedial treatments has taken a secondary role to localized preventive measures. While preferable, preventive measures are largely inadequate in cases where the reaction is well underway, and in many cases the reaction has already begun before fossil discovery and excavation. The New Jersey State Museum has conducted research and long-term experiments to evaluate the use of Beeswax (and synthetic alternatives) as consolidants in pyrite-diseased fossils for over two decades.

Beeswax is readily available and inexpensive. The treatment requires only simple apparatus and a heat source. Fossils and wax are gradually heated to 80-120°C during treatment. Heating has the added benefit of removing bound water, thus dehydrating sulfate minerals produced by sulfide oxidation and decreasing the likelihood of further reactions. Results indicate that despite its limitations, the Beeswax remedial treatment is a cost-effective and efficient means to halt ongoing pyritic decay.

23

Recognition of the relationship between a cellulose substrate and historic biocides applied to herbaria over time

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Herbarium material has been routinely treated with biocides (eg. Naphthalene, mercuric chloride, arsenic trioxide) since the 18th century (Hawks & Williams, 1986; Goldberg, 1996; Purewal, 1999; Purewal et al., 2008).

The use of the more toxic and stable compounds has been discontinued through rigid legislation (HSE, 1988), however the legacy of these chemicals still lives on in many natural history and anthropological collections.

Acknowledgement and identification of these applications has been limited due to their presence being undetectable by eye. However, recent research has recognised that these historic applications begin to fluoresce under ultra violet light over time, when associated with a cellulose substrate; this can be from the plant material itself or from the paper backing. The colour and hue of the fluorescence vary greatly, implying there is a specific characteristic that is causing the variation.

As cellulose degrades over time, the degradation products formed can reduce the metal species present in the biocides, giving rise to coloured fluorescence.

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24
Insect pest population trends
at the Natural History Museum, London

Suzanne Ryder,
Alison Paul

The Natural History Museum, London, United Kingdom

The Natural History Museum (NHM) London has a highly organised Integrated Pest Management (IPM) programme and has been monitoring insect pests and collecting this data in many collections areas for 15 years. We are now in a position to analyse the data to see which major pests have become established over time and where they are distributed across the whole site.

We will consider factors that may have contributed to any changes in distribution of our major pest species, including the various measures put in place to treat and control them. This should enable us to further develop the existing IPM strategy in order to continue to reduce pest levels in the Museum.

25

Darwin and barnacles, Darwin and earthworms: The differing approaches

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As this is the 150th year since the publication of the *Origin of Species*, Charles Darwin is at the forefront of our minds.

Miranda Lowe, Crustacean curator and Emma Sherlock, Annelid curator at the NHM London, compare and contrast the work of Charles Darwin in his study of barnacles and earthworms.

'The Formation of Vegetable mould through the action of worms' was a best seller and even outsold *The Origin of species* in Darwin's lifetime. Darwin's two volume monograph on the sub-class Cirripedia, with figures of all species concerning recent barnacles revolutionised taxonomy in this field. Both these major works were important, however his approaches to the study of these animals was interestingly very different.

26

Digitalisation of a Polychaete type collection to be accessible through a web based catalogue (KE EMu)

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Photography has been proposed as one way to improve accessibility of our type collections. This trial project is of the Polychaete collection. Many of our Polychaete type specimens are very old, over 20% from the 1800's. Accordingly a number of these specimens are now very fragile, so being repeatedly sent on loan leaves them vulnerable to further damage. The posting of wet specimens is also becoming increasingly difficult, (impossible to a number of countries) due to new regulations on dangerous goods. Researchers would be able to access the images on demand through KE EMu, inspect the material and assess whether borrowing the material, if possible, would be profitable, and in a few cases access the information they need from the photographs themselves.

This project would serve as a trial for the image data-basing and alternative access of a type collection in the Natural History Museum London. We have 2,170 Polychaete type specimens and hope to complete the project in 5 years.

27

**Condition reports on freshwater bryozoans -
a tool for access as well as conservation**

**Mary Spencer Jones¹,
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²University of Vienna, Vienna, Austria

Condition surveys and reports have mainly been used for conservation and organisational purposes. Undertaking an assessment with a taxonomic specialist on microscopic material, however, can also enhance the collection for visitor access.

The class Phylactolaemata belong to the phylum Bryozoa (Ectoprocta) and are colonial, microscopic, aquatic invertebrates. Phylactolaemates, which currently number sixty nine species (Massard & Geimer, 2008), are found exclusively in freshwater habitats and can be divided into two distinct categories - gelatinous and non-gelatinous. These groups produce over-wintering stages called statoblasts, which are currently used to define the taxonomic status of each species. Classification of the taxa is extremely difficult with only a handful of specialists worldwide and the systematics of the Phylactolaemata have changed greatly over the years due to the introduction of new techniques such as electron microscopy.

During 2008 a project was initiated to re-catalogue the gelatinous phylactolaemate collection at the Natural History Museum, London, with the help of a phylactolaemate specialist. The collection consists of material in mainly 5% formalin or 80% I.M.S, dry and slide material. As well as re-assessing the taxonomic status of each specimen, a condition report was undertaken on each item. Nine conservation criteria and eight morphological criteria were chosen and an overall condition grade was then assigned to each specimen.

It is hoped that this type of data will provide valuable information to taxonomists, and will allow them to prioritise and be more disconcerting in their choice of viewing material during short-term visits or when requesting loans.

28

Speeding up prioritising of backlogs of unincorporated material by scoring of backlog-containers instead of individual specimens**Holger Thüs**

The Natural History Museum, London, United Kingdom

Backlogs are one of the common challenges for most museum collections and developing this resource becomes increasingly important in a socioeconomic environment where the justification for space and staff requirements is crucial for the survival of our collections.

Thirty percent of the lichen collections at the NHM are unprocessed specimens with only a very limited accessibility for the scientific community. The majority of them are stored in cardboard boxes in various parts of the museum. Most boxes contain unprocessed specimens of individual collection events, geographical areas or systematic groups. Their physical arrangement by geography, time and collector turn these backlog specimens into a valuable information resource for ecological and taxonomic studies. Databasing all individual specimens from our herbarium is under way, but it will be a long term process and can not satisfy our immediate need to assess the quality and curation needs of our backlog today. A further development of our existing database of backlog boxes instead can be achieved with reasonable effort and at comparatively low costs. Based on this survey we are starting a process to score the value of the content of each storage unit using criteria which cover conservation aspects as well as their potential for taxonomic and environmental research activities. For each criterion a score is given, the scores are added up for each storage unit and the total score is used as a basis for setting the priorities for the processing of our backlog.

The same database will also be used to address specific user requests and immediately answer the question of how much curation effort is needed to process individual backlog units to a degree that the material can be offered for research activities. We hope to extend this methodology to all backlogs once piloted in the lichen herbarium.

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Measuring birds, morphometrics in ornithological collections**Till Töpfer¹,****Siegfried Eck², Jürgen Fiebig³, Wolfgang Fiedler⁴, Iris Heynen², Nils Hoff³,
Bernd Nicolai⁵, Renate Van den Elzen⁶, Raffael Winkler⁷, Friederike Woog²**¹Senckenberg Naturhistorische Sammlungen Dresden, Dresden, Germany²Staatliches Museum für Naturkunde, Stuttgart, Germany³Museum für Naturkunde, Berlin, Germany⁴Max Planck Institute for Ornithology, Radolfzell, Germany⁵Museum Heineanum, Halberstadt, Germany⁶Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany⁷Naturhistorisches Museum, Basel, Switzerland

Developed by a team of bird ringers and museum ornithologists, this publication is the first comprehensive presentation of a large number of different measurements that can be taken on birds: with the aid of detailed illustrations this handy volume offers concise instructions and recommendations on how to measure birds.

Problems with particular measurement techniques are discussed, as are accuracy, reliability and comparability of measurements, the numbering of flight-feathers, skull ossification, measuring tools and weight.

A comprehensive list of references rounds off this useful book.

Printed on durable water-resistant plastic and with an innovative binding, this manual has been explicitly designed for use in the field and for taxidermy.

An absolute must for bird ringers, museum curators, taxidermists and everyone concerned with morphometrics. To be published by the end of 2009. A publication by the DO-G working group "Ornithological Collections". To be informed about date of publication, subscription rates, etc., please send an email to measuring.birds@web.de

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**Reducing destructive sampling in ornithological collections
by DNA extraction from arsenic-treated bird skins**

**Till Töpfer¹,
Elisabeth Haring²**

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Arsenic has been commonly used to preserve dried zoological specimens for its poisonous and insect-repellent effect. Because arsenic was suspected to inhibit Polymerase Chain Reaction (PCR), samples for DNA analyses are commonly taken from foot pads. We analysed the usability of samples from arsenic-treated bird skins for DNA studies in comparison to samples that were obtained from specimens not treated with arsenic. Furthermore, we compared the PCR success of samples obtained from foot pads as well as skin. We aimed to test (1) whether arsenic treatment actually leads to PCR inhibition, and (2) whether there is a difference in PCR success between the two kinds of samples. The latter point is important with respect to the primary curatorial duty to preserve specimens in the best possible condition. Sampling foot pads of museum specimens for ancient DNA analyses may cause destruction of otherwise important structural features of the feet. Our results show that skin samples can be equally used like foot pad samples to obtain authentic DNA. Furthermore, we found that arsenic can act as a PCR inhibitor but only in concentrations that exceed the amount of arsenic contained in dried zoological specimens. To reduce the amount of destructive sampling of foot pads we recommend using skin samples as substitutes for foot pads because arsenic treatment is not of superior importance for successful ancient DNA processing.

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**Botanical and mycological collections
of the Natural History Museum of Tartu University**

**Kai Vellak,
Ave Suija**

University of Tartu, Tartu, Estonia

Although the Natural History Museum of the University of Tartu (NHM) was founded in 1802, only in 2005 all university collections were united in one institution. Today, the museum consists of collections divided between three museums, i.e. the geological museum, the zoological museum, and the botanical and the mycological museum.

The youngest of them, the botanical and mycological museum (BMM; acronym TU) was founded on the base of botanical, bryological, algological and lichenological collections held in the University of Tartu. The mycological collections accrued only recently. The oldest collections of the BMM date back to the mid of the 19th century and today about 500 000 specimens of vascular plants, bryophytes, lichens, fungi and algae are kept there.

The database UNITE is developed in NHM to satisfy the needs of all museum collections and is being actively used since 2007. The backbone of the database is the Estonian Species Registry a database of names of taxa known from Estonia. Besides the management of collections, the documenting of other relevant data (i.e. field observations, literature notes) in the museum's database is possible as well. Thereby, other services like the compilation of distribution maps, species lists, etc. is easily available through the database.

Taxonomic and phylogenetic research is one of the priorities of the BMM. Every year new taxa are described based on the collections of the museum. Some results from the taxonomical studies in NHM is connected with DNA barcoding. For now, the DNA barcodes are created mainly for the actively studied groups of organisms (primarily fungi and insects), but also for rare and protected species in Estonia.

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**Seeking a novel approach to the conservation
of fragile coralline algae specimens****Joanna Wilbraham,
Jovita Yesilyurt**

The Natural History Museum, London, United Kingdom

The articulated coralline algae (Rhodophyta: Corallinales) pose particular problems for curation due to their fragile and brittle nature. The aim of this study is to find a novel technique to curate this vulnerable herbarium material thus rendering it more stable and at a high standard of conservation that will ensure long term preservation. The coralline algae are particularly susceptible to damage caused by a) friction pressures, as loose specimens move around when sheets are handled and b) compression pressures from the weight of specimens stacked in the herbarium cupboards. Historically, specimens of coralline algae were glued directly onto herbarium sheets, with little or no protection. In addition to the physical stresses, it is possible that glue interacts with the specimens and may interfere with molecular studies. More recent approaches at BM have placed the specimens inside herbarium paper capsules, which are fixed to the herbarium sheet. The later method protects the specimen from the movement of sheets above and captures any loose fragments. However, the specimens are still vulnerable to the compression pressures in the herbarium cabinet. In order to follow best practice in the conservation of these specimens, we are investigating a technique to fix lightweight support frames in place around the specimen on the herbarium sheet. The frame will create a slight gap between the specimen sheets in the cupboard, thus reducing damage from compression pressures. These methods have been considered primarily for the curation and conservation of the coralline algae, so as to preserve the specimens for future scientific study. However, the proposed technique will be equally valid for other groups of fragile herbarium specimens.

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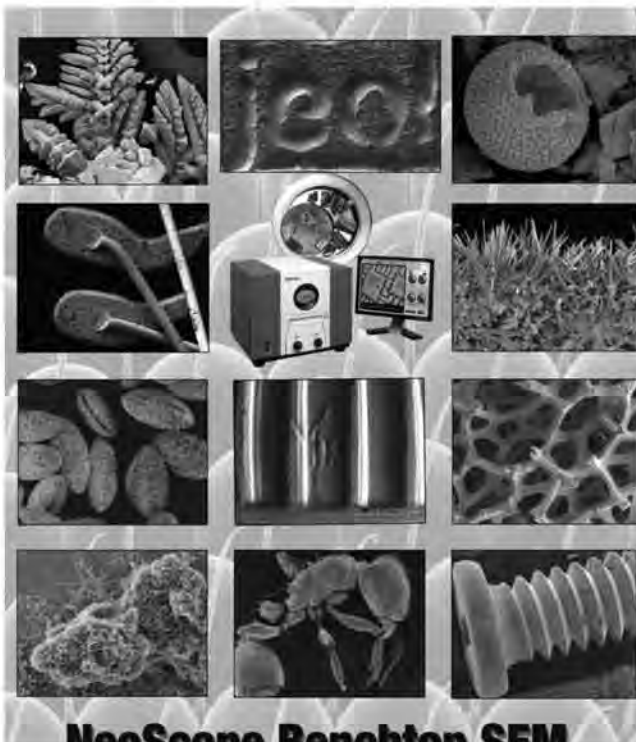
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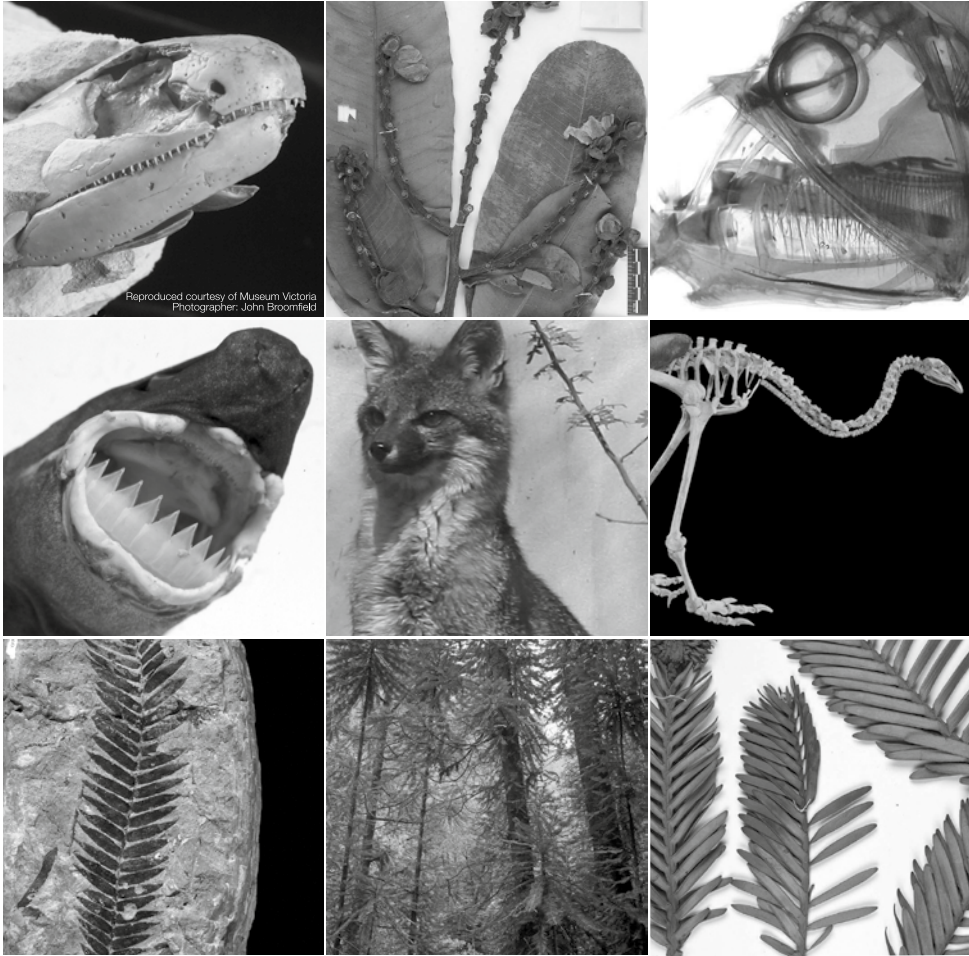
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