



SOCIETY FOR THE PRESERVATION OF
NATURAL HISTORY COLLECTIONS

HISTORIC COLLECTIONS | FUTURE RESOURCES

29th Annual Meeting

Cardiff, Wales
22nd - 27th June, 2014

Programme & Abstracts



Elite sponsor of SPNHC 2014



The local organising committee would like to thank all the sponsors for their support. Diolch!

Welcome to the 2014 meeting of the Society for the Preservation of Natural History Collections Annual Meeting in partnership with the Natural Sciences Collections Association (NatSCA) and the Geology Curators Group (GCG).

The SPNHC 2014 Local Organising Committee warmly welcome you to Wales and its capitol, the City of Cardiff. Amgueddfa Cymru – National Museum Wales is proud to be hosting SPNHC 2014 and to have the opportunity to bring together the work and membership of the three groups partnering this meeting who all play a vital role in the mission to improve the preservation, conservation, management and access to our natural history collections.

As usual this meeting will be an important opportunity to meet and mix with our colleagues from across the world helping to establish and maintain professional networks, find out about new innovations and celebrate some of our accomplishments. This year's theme 'Historic Collections – Future Resource' was developed so we could highlight the increasing value of our Natural History collections to both science and to society as a whole. As the demands on our environment increase, and our institutions face the tough challenges of tightening finances and resources, so it becomes more important than ever for our community to act together to raise the profile and importance of our natural history collections to our numerous stakeholders.

The Local Organising Committee has worked hard to bring together the conference program which we hope provides the usual excellent mix of workshops, fieldtrips, technical sessions and socials. However, ultimately, it is you the participants that make this meeting and the LOC warmly thank you all for your support. It is your enthusiasm and attendance that make this meeting the superb event it is.

As ever, this meeting would also not be possible without the significant financial support of our sponsors and vendors to which we extend a big 'diolch yn fawr' (thankyou) and we encourage you to visit our sponsors and vendors at the conference. In particular we like to thank Delta Designs Ltd for their continued generous support of this meeting and their willingness to make the long journey to visit us here in Wales!

For the conference we are using two main venues, mixing the classic architecture of our National Museum Cardiff in the heart of Cardiff's beautiful civic centre with the contemporary buzz of the Wales Millennium Centre situated in the revitalised waterfront of Cardiff Bay. We encourage you to enjoy the museum and the sights and sounds of a city with over 2000 years of history!

lechyd da!

Local Organising Committee

Julian Carter [Lead Co-ordinator]

Helen Kirby [Fieldtrips/local information]

Vicky Purewal [Sponsors/vendors]

Cindy Howells [Collection Tours/Fieldtrips]

Annette Townsend [Communications]

Christian Baars [Fieldtrips]

Caroline Buttler [Programme co-ordinator]

Jim Turner [Design & Publications]

Jen Gallichan [Registration]

Chris Owen [Web]

Andy Haycock [Social events]

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**We are proud to sponsor the SPNHC Conference 2014
and look forward to meeting you.**

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Venues

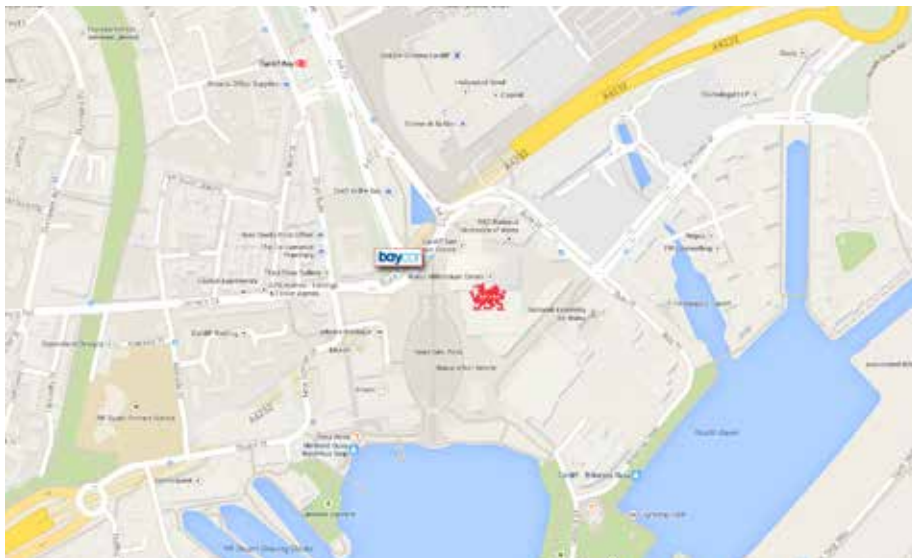
Amgueddfa Cymru - National Museum Wales
Cathays Park, Cardiff City Centre, CF10 3NP

Dates: Sunday 22nd, Monday 23rd (Fieldtrips depart and return), Tuesday 24th & Friday 27th



Wales Millennium Centre
Bute Place, Cardiff Bay, CF10 5AL

Dates: Wednesday 25th & Thursday 28th



Getting between venues

Train: Cardiff Queen Street to Cardiff Bay - Mon-Sat: 6:30am–11:30pm · every 12 min

Bus: Cardiff City Center to Cardiff Bay

Cardiff bay to Cardiff Center

Departs: Museum Ave. or King Edward VII Ave.

Departs: Wales Millenium Centre

	day	eve
Mon - Fri	every 10 mins	every 20 mins
Sat & Sun	15 mins	20 mins

Walk: 1.8 miles, 34 min

Organisation Membership

Please visit our conference partners at the trade fair to find out more information about the benefits of becoming member:



NatSCA membership is open to anyone with an interest in natural sciences and/or collections that contain natural materials.

Benefits of membership:

- Availability of bursaries
- Discounted annual conference rates
- Discounted training seminars and workshops
- Opportunity to attend study trips in the UK and overseas
- Participation in the natural science collections community
- Friendly and helpful network for information and skill sharing
- Membership includes subscription to the peer-reviewed Journal of Natural Science Collections at no extra cost
- Institutional membership provides discounted training and conference attendance for any two institutional representatives

Current Membership Rates

- Personal members £15
- Unwaged members £10
- Institutional members £30



SPNHC was formed in 1985 and is recognized as a non-profit organization {501(c)(3)} in the United States.

The Society's objectives are:

To provide and maintain an international association of persons who study and care for natural history collections

To encourage research on the essential requirements for preserving, storing, studying and displaying natural history collections

To publish a professional journal, Collection Forum, and encourage the dissemination of information about natural history collections

To hold annual meetings and sponsor symposia and workshops to foster the exchange of ideas and information

Benefits of Membership

SPNHC members receive Collection Forum, a biannual journal of reviewed technical information, and two issues of the SPNHC Newsletter each year. More importantly, members become part of an active and vibrant community of more than 600 members worldwide.

- \$350 - Corporate/Commercial
- \$75 - Institutional/Associate
- \$55 - Library/Subscription Service
- \$45 - Regular
- \$20 - Student



GCG is open to anyone interested in geology. Our activities include:

- Meetings, workshops, seminars and training
- A bi-annual journal and newsletter three times a year
- Fieldtrips and study visits
- Providing help, advice and information on collections and geological sites

Subscription rates:

UK Personal Subscription £15 per annum UK Institutional Subscription £20 per annum Overseas Personal Subscription £18 / US\$32 / €25 per annum Overseas institutional Subscription £22 / US\$40 / €32 per annum

Precious little survived the Impact of 2058

But once a great city thrived here. And a museum. Shattered columns, fractured statues and fragmentary artifacts tell us so. Not much to go on. But what's this?

"We've discovered another!" we cheer. Eagerly we unseal it, confident that marvelous treasures await. Securely nestled inside. Butterflies. Brilliantly beautiful. Fearfully fragile. And wholly intact. Imagine!

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From beetles to The Beatles

Entomology Products (Page 271-275)
Photograph Record Storage Sleeves (Page 27)

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Programme outline

Sunday 22nd June 2014

Venue: National Museum Wales

Workshops			
Workshop 1	09.00 - 18.00	Workshop 2	10.00 - 16.00
Committee rooms		Clore Learning Space	
Dirk Neumann & Peter Giere <i>Legal aspects of shipping preserved animals and tissues</i>		Bruker UK Ltd. <i>Analytical techniques (XRD, XRF and IR/Raman)</i>	
40 persons @ £25.00 pp Lunch provided		Free (max. 30 persons) Lunch provided	

Monday 23rd June 2014

Fieldtrips		Travel time
09.00 - 17.00	Heritage Coast with the Geology Curators Group	30 mins
	Exploring the geology and associated natural history of the Glamorgan Heritage Coast.	
	Diamonds, Diggers and Distilleries	45 mins
	An innovative geo-conservation initiative in the South Wales coalfield. Geo heritage trail, working coal open cast site and a whiskey distillery.	
	National Botanic Gardens	1 hr
	Grassland Conservation and DNA bar-coding on Waun las NNR	
	Llandovery	1 hr 30mins
	Caught between a Celtic tribe and a hard place - Ordovician-Silurian fossils in beautiful Mid Wales and the Sedgwick-Murchison controversy	
Parc Slip Nature Reserve	30 mins	
Orchids, adders, and crested newts - exploring the natural history of this former open cast site.		
Big Pit	1 hr	
A tourist visit to the museum's very own coal mine and associated nature trail around the former industrial tips.		

All fieldtrips will be departing promptly from 09.00 onwards from the steps at the front of the National Museum Wales.

Participants will be emailed individual trip itineraries.

Tuesday 24th June 2014

Venue: National Museum Wales

Registration & Inaugural Sessions - Reardon Smith Lecture Theatre

08.00 Registration

09.00 - 13.00 Official welcome & opening lectures

Open committee meetings (Part 1) - Meeting rooms allocated on the day.

Workshop 3
Clare Learning Space

14.00	Web	Conservation	Mentorship	Bruker UK Ltd. Analytical techniques (XRD, XRF and IR/Raman) Free (max. 30 persons)
15.00	Best Practice	Professional Development	Legislation & Regulations	
16.00	Long Range Planning	Documentation	Emerging Professionals group	
17.00	Membership	Conference	Publications	

Icebreaker - Main Hall

18.00 Icebreaker - 'Newbies' welcome and introduction to the committee and conference team.

18.30 - 21.00 Icebreaker - All delegates





Wednesday 25th June 2014

Venue: Wales Millennium Centre, Cardiff Bay

Registration & Technical Sessions

08.00 Registration

	Weston Studio (WS)	Victor Salvi Suite (VSS)	Rehearsal Room 1 (RRI)	Posters	Trade fair Wed & Thurs
08.50	Access and outreach AO1 - AO5	Conservation C1 - C5	Small Collections SCN1 - SCN5		
	Break				
11.10	Historical Collections HI - H5	C6 Assessing Collections AC1 - AC4	Small Collections SCN6 - SCN11		
13.00	Vendors Lunch 				
14.00	Historical Collections H6 - H10	Archives, Special collections and Original source ASO1 - ASO5	Small Collections SCN12 - SCN16		
	Break				
16.10	Exhibition Ex1 - Ex2 ----- Protocols Pr1 - Pr3	Hazardous collections Ha1 - Ha5 	Scientific collections into environmental change EC1 - EC6		

SPNHC Council Meeting - Meeting room to be allocated

18.00 SPNHC Council meeting


Pub Quiz - Urban Tap House

19.30 Natural History Pub Quiz
Urban Tap House, 25 Westgate Street, Cardiff CF10 1DD



Thursday 26th June 2014

Venue: Wales Millennium Centre, Cardiff Bay

Technical Sessions				
08.00	Registration			
08.50	Weston Studio (WS)	Victor Salvi Suite (VSS)	Rehearsal room 1 (RR1)	Room 6 (R6)
	Collections Coll 1 - Coll 5	Advocacy NatSCA	Progress in Digitisation P1 - P5	Posters Bruker UK Ltd. Analytical techniques
11.00	Break		Progress in Digitisation P6 - P10	
	Conservation C7 - C11	Panel Session NatScA		
13.00	Buffet Lunch	NatSCA AGM Lunch (Victor Slavi suite)	Buffet Lunch	
14.00	Democamp Demo1 - Demo3	University Collections U1 - U3	Poster Session	Progress in Digitisation P11 - P4
16.00	Posters & Pastries			
	Democamp Demo4 - Demo8	Collections Coll 6 - Coll 10	Poster Session (inc. take down)	Progress in Digitisation P15 - P16
Conference Banquet - The Parc Hotel				
19.30	SPNHC Conference Banquet The Parc Hotel, Park Place, Cardiff CF10 3UD			

Friday 27th June 2014

Venue: National Museum Wales

SPNCH ABM- Reardon Smith Lecture Theatre			
09.00	SPNHC Annual Board Meeting		
Special Interest groups - Meeting rooms allocated on the day.			
11.00	Collections Digitization and Opportunities for International Collaboration	Sustainability Session (To be confirmed)	Clothworkers Standards Project <ul style="list-style-type: none"> • Wet Collections • Botanical Collections • Skins & Taxidermy
13.00	Lunch (not provided)		
Collection Tours			
14.15	Evolution of Wales Historic Books Library Tour Tour of Art Galleries Geology/Zoology	Geology/Botany Collection Centre - Nantgarew Zoology/Botany Glamorgan Archives	

Inaugural & Technical Session timetables

Tuesday 24th June 2014
National Museum Wales

Main Hall / Reardon Smith Lecture Theatre

08.00	Registration
09.00	Introduction, Official welcome & Ministerial Welcome
09.45	University museums of natural history: whence and whither? Prof. Paul Smith
10.15	Ben Garrod
	Break
11.30	Mammoth Secrets Prof. Alice Roberts
12.00	Dr. Rhys Jones
12.30	When Popularity Isn't Enough: Advocacy for Natural History Collections in the 21st Century Dr. Chris Norris
	Buffet Lunch

Open committee meetings (Part I) - Meeting rooms allocated on the day.

Workshop 3
Clore Learning Space

14.00	Web	Conservation	Mentorship	Bruker UK Ltd. Analytical techniques (XRD, XRF and IR/Raman) Free (max. 30 persons)
15.00	Best Practice	Professional Development	Legislation & Regulations	
16.00	Long Range Planning	Documentation	Emerging Professionals group	
17.00	Membership	Conference	Publications	

Icebreaker - Main Hall

18.00	Icebreaker - 'Newbies' welcome and introduction to the committee and conference team.
18.30 -21.00	Icebreaker - All delegates

Wednesday 25th June 2014
Wales Millenium Centre, Cardiff Bay

Weston Studio (WS)

Access & Outreach to Natural History Collections

09.00	Making Meaning with Museum Collections Rich Busch	AO1
09.20	Q?rius: New Methods for Housing Hands-On Education Collections Leslie Schuhmann , Christine Geer Chagnon & Kerry Button	AO2
09.40	Coding Q?rius: Ranking Education Collections using Safety, Preservation, and Legal Documentation Lisa Palmer , Kathryn Makos, Deborah Hull-Walski, and Catharine Hawks	AO3
10.00	Teaching Evolution Using Natural History Collections: How can we do it better? Jane Pickering & Janet Stott	AO4
10.20	This is how we do things around here –Broadening skills and competencies through staff exchange and training-on-the-job Christiane Quaisser & C., Anja Friederichs	AO5

Historical Collections

11.10	Pitiable pins & lost labels: Issues in identifying historic type specimens Darren J. Mann	H1
11.30	The value of examining pins as part of assessing old insect collections Geoff Hancock	H2
11.50	Shedding new light on Alfred Russel Wallace's insect specimens George W. Beccaloni	H3
12.10	Historical tomato collections in the herbarium of Naturalis Biodiversity Center: an important resource for genomics research Roxali Bijmoer & Barbara Gravendeel	H4
12.30	When Common Taxa Become Endangered: Changes in the Collection Care Strategy of Dry Corals Wachs, K., Johnson , C. A., Nunan, E., Stenzel, J., Surovy, M., Elkin, L., & Rodriguez, E	H5

Historical Collections

14.00	New focus on old Indonesian fossil mollusc collections Ronald Pouwer	H6
14.20	Charles de Geer's collection of vertebrates: a lost and found story of type specimens described by Linnaeus and Pallas. Erik Åhlander	H7
14.40	Countess of Powis mineral collection Tom Cotterell	H8
15.00	The historical collections of Alfred Gabriel Nathorst (1850-1921) Ove Johansson	H9
15.20	Bringing ice age collections to life Nigel T. Monaghan	H10

Exhibitions / Protocols

16.20	The "Images of Nature" gallery at the Natural History Museum. From Solander boxes to public display Mendez, A	Ex1
16.40	Out of the dark: lighting scientific specimens for exhibit Ronald de Ruiter	Ex2
17.00	The European ABS legislation and its national implementation across the EU – implications for Natural History Collections in Europe and beyond. Peter Giere , Ana Casino, Johan Bodegård, Cornelia Löhne, Christopher H. C. Lyal, Anne Nivart, China Williams & Dirk Neumann	Pr1
17.20	The Nagoya Protocol on Access and Benefit-Sharing: The concept, its implementation and its relevance for Natural History Collections and researchers Cornelia Löhne , Ana Casino, Johan Bodegård, Christopher H. C. Lyal, Anne Nivart, China Williams, Peter Giere & Dirk Neumann	Pr2
17.40	Access and Benefit Sharing – global implications for biodiversity research, collections and collection management arising from the Nagoya Protocol. Dirk Neumann , Christopher H. C. Lyal, Johan Bodegård Cornelia Löhne, Ana Casino, Anne Nivart, China Williams & Peter Giere	Pr3

Wednesday 25th June 2014
Wales Millenium Centre, Cardiff Bay

Victor Salvi Suite (VSS)

Conservation

09.00	Specimen preparation in fast-forward: Time-lapse as a training tool Gregory J. Watkins-Colwell & Geoffrey Giller	C1
09.20	Oddy Tests – adding the analytical dimension Gali Beiner	C2
09.40	The use of 3D scanning and printing in the production of replicas for the Stonehenge Visitor Centre Annette Townsend & Caroline Buttler	C3
10.00	Preserving highly reactive lignitized woods : issues related to sulphur oxidation Giliane Odin , Dario De Franceschi, Ronan Allain, Renaud Vacant & Véronique Rouchon	C4
10.20	Once in a whale!: the conservation treatment of historic cetacea at the Oxford University Museum of Natural History Crompton, N. & Palumbo, B	C5

Conservation / Assessing Collections

11.10	Natural history conservation: Conserving an endangered profession Lucie Graham	C6
11.30	Using ESP to understand collection needs: Environmental Sensitivity Profiling (ESP) Robert Waller	AC1
11.50	US National Herbarium: A Plan for APG Conversion on a Large Scale Meghann Toner & Rusty Russell	AC2
12.10	A Simple Self- Assessment Tool for Collections Management and Care Robert Huxley , Rene Dekker, Lucy Reeve and Irene Bisang EuColComp Testing a European Competency Framework for Vocational Education and Training in Collections Management Robert Huxley and Lucy Reeve	AC3
12.30	Eliciting judgments of future value losses in object and collection values Waller , R., Mendez, A., Portela, R., Sherlock, E. & Tomsett, L	AC4

Archives, Special Collections and Original Source

14.00	Enhancing the Value of Natural History Collections through Original Source Documentation: Tim White	ASO1
14.20	What Species is That?: Museum Victoria's Scientific Art, Rare Books, Field Notes and Manuscripts, and Archives Collections. Maryanne McCubbin	ASO2
14.40	History of Plant Collecting in southern Alaska (1868-1908), with tangential mentions of extinct sea cows, a mysterious death, political wheeling and dealing, the power of social media, and the Great Conflagration. Rusty Russell	ASO3
15.00	Uncovering and integrating archives for multidisciplinary research at the MVZ Carla Cicero , Christina V. Fidler, Michelle S. Koo, & Kira L. Dodd	ASO4
15.20	Dredging the Memories: Oral Histories at the Peabody Samantha Murphy & Maureen White	ASO5

Hazardous Collections

16.20	Preserving botanical specimens treated with mercuric chloride Melinda Peters , Deborah Bell, Catharine Hawks, Linda Hollenberg, Kathryn Makos & Michelle Powell	Ha1
16.40	Arsenic and Old Specimens: using a handheld XRF analyzer to determine arsenic prevalence at Naturalis Center for Biodiversity Becky Desjardins	Ha2
17.00	Reduction of mercury emission from historically treated mercuric chloride herbarium collections John Havermans , Ron Sportel, René Dekker & Marc Tilstra	Ha3
17.20	Creating a healthy work environment for contaminated moth-ball containing entomology collections John Havermans , René Dekker, Alex van Renesse van Duivenbode, Sasja Walraven & Richard Correl	Ha4
17.40	What's your poison? Risk assessment and management of hazardous substances in the Economic Botany Collection, Kew. Sheila B. Banks & Mark Nesbitt	Ha5

Wednesday 25th June 2014
Wales Millenium Centre, Cardiff Bay

Rehearsal Room 1 (RRI)

Small Collections Network

09.00	Introduction	SCN1
09.20	Digitizing Specimens in a small herbarium: A viable workflow for collections working with limited resources Kari Harris	SCN2
09.40	Developing iCollections digitisation workflow Vladimir Blagoderov	SCN3
10.00	The iCollection model for digitising small collections of natural history Peter Wing , Elisa Cane, Lyndsey Douglas, Joanna Durant, Gerardo Mazzetta & Flavia Toloni	SCN4
10.20	The Role of small herbaria in large digitization projects Chris Neefus	SCN5

Small Collections Network

11.10	Digitization workflow for a small herbarium Chris Neefus	SCN6
11.30	Teachable Moments: the good, the bad, and the undergrads Kirsten E. Nicholson , Angela Riedel	SCN7
11.50	Achieving the digitization of biological collections from the Pacific Shelley A. James	SCN8
12.10	Arctos: A Collaborative, cost-efficient solution for managing and publishing biodiversity data in collections of all sizes Carla Cicero	SCN9
12.30	Undergraduates in natural history collections: What are the educational gains and how can we make the experience more impactful? Anna Monfils	SCN10
12.50	The place for biological research and field stations in biodiversity digitization Gil Nelson	SCN11

Small Collections Network

14.00	Entomology Collections Network: A model for reaching out to small collections Christy Bills	SCN12
14.20	Michigan Small Herbarium Initiative: the trail from an idea to specimen digitization Richard Rabeler , Anna K. Monfils & Timothy M. Evans	SCN13
14.40	Exposing data from small collections: common questions and solutions Deb Paul & Richard Rabeler	SCN14
15.00	Mobilizing New England vascular plants to track environmental change Dorothy Allard	SCN15
15.20	Resurrecting orphaned collections Gabriela Hogue	SCN16

Scientific collections into environmental change

16.10	Unlocking Evidence: Scientific Collections and Environmental Change Ellinor Michel & Eileen Graham	EC1
16.25	Title to be announced Mark Spencer	EC2
16.40	DOAD, NODE and NANODE: integrating ostracod collections and databases for environmental change research applications David J. Horne & Judith Price	EC3
16.55	Investigating the impact of late Quaternary environmental changes using ancient DNA from collared lemming Selina Brace , Eleftheria Palkopoulou, Love Dalén, John Stewart & Ian Barnes	EC4
17.10	Forgotten molecules, long lost records Matthew Collins	EC5
17.30	Discussing Evidence: Scientific Collections and Environmental Change - Panel Discussion and Audience Participation Eileen Graham & Ellinor Michel	EC6

Thursday 26th June 2014
Wales Millenium Centre, Cardiff Bay

Weston Studio (WS)

Collections

09.00	Rockband – linking Fossils, Fabrics and Folklore Christine Taylor	Coll 1
09.20	A sustainable data connection between culture and natural history – OpenUp! Okka Tschöpe & Walter G. Berendsohn	Coll 2
09.40	“Experience will soon teach you how much arsenic you require...” Old natural history conservation techniques Sophie Stevens & Robert Entwistle	Coll 3
10.00	Management and accessibility of larger specimens in alcohol collections E.M. Dondorp	Coll 4
10.20	Practical solutions for managing asbestos specimens in natural history collections Jana Horák , Jon James, Tom Cotterell & Andrew Haycock	Coll 5

Conservation

11.00	Processing large cetaceans stranded on the Dutch coast: Whale we do this forever? Karen van Dorp	C7
11.20	Converting pharmaceutical manufacturing space into premier fluid preserved collections facilities Lynn A. Jones	C8
11.40	Orca O319, the journey from beach to exhibit hall Moe Flannery , Sue Pemberton, Laura Wilkinson & Rebecca Peters	C9
12.00	Bone maceration & bone degreasing: a necessary tool for preserving Natural history collections Gunther Weber	C10
12.20	Fix for Life: The Development of a New Embalming and Fixation Method to Preserve Life-like Morphology Andries J. van Dam , J. Conny van Munsteren & Marco C. DeRuiter	C11

Democamp

14.00	Setup & Introduction	
14.10	Specify: Specify 7 for the Web, Specify Insight for the iPad, and other Novelties Bentley , Andy	Demo1
14.30	The Field Book Project: The Starting Point of Natural History Collection Rusty Russell , Lesley Parilla & Carolyn Sheffield	Demo2
14.50	Historical Expeditions Website (Botany) at the Smithsonian Rusty Russell & Sylvia Orli	Demo3

Democamp

16.00	GB/3D fossil types online – not only the largest collection of 3D digital fossils, but also major format, schema and vocabulary conundrums. Howe , Mike	Demo4
16.20	Infrared thermal imaging as a collections management tool Larkin , Nigel	Demo5
16.40	FP-DataEntry, a tool for bringing community knowledge into data transcription applications. Chuck McCallum, Paul J. Morris, James Hanken, Maureen Kelly, David B. Lowery, Bertram Ludaescher, James A. Macklin, Robert A. Morris & Tianhong Song	Demo6
17.00	Symbiota crowdsourcing module for the Lichens & Bryophytes TCN Barbara Thiers , Edward Gilbert, Corinna Gries & Benjamin Brandt	Demo7
17.20	AnnoSys – an online Tool to annotate Biodiversity Data Okka Tschöpe , Lutz Suhrbier, Anton Güntsch & Walter G. Berendsohn	Demo8

Thursday 26th June 2014
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Victor Salvi Suite (VSS)

Advocacy - NatSCA

08.50	Introduction & Presentation of the Memorandum of Understanding	NatSCA1
09.10	Keynote address to session Ben Garrod	NatSCA2
09.30	Old rockswho needs them Dermot Henry	NatSCA3
09.50	Major study into the popularity of different disciplines in mixed museums finds natural history comes out on top Jack Ashby	NatSCA4
10.10	Rising to the Challenge Paolo Viscardi , Justine Aw & Russell Dorman	NatSCA5

Panel Sessions - NatSCA

11.00	NatSCA Advocacy Panel session - 5 min presentation per speaker	NatSCA6
	Chair: Clare Brown	
	Panel Speakers: Henry McGhie C. Giles Miller Luanne Meehitiya Chris Norris Rob Huxley Leonard Krishtalka	

11.30	Panel Discussion: Open to floor	
12.00	NatSCA AGM Lunch	

University Collections

14.00	The Anatomy of a University Natural History Museum: The Yale Peabody Museum of Natural History Tim White	UC1
14.20	A quantitative evaluation of natural history collection use in one university museum Bethany L. Abrahamson	UC2
14.40	Rediscovering collection significance through historical research at the University of Iowa Paleontology Repository Tiffany S. Adrain	UC3

Collections

16.00	Natural Science collections in Wales - a Distributed National Collection Christian Baars	Coll 6
16.20	Application of GIS analysis to historical fish collections for research and collection planning Laura Tancredi & Diane Pitassy	Coll 7
16.40	The Timor Collection: from the ground to the cloud N. den Ouden	Coll 8
17.00	A novel and effective way for housing cryptogamic collections Rebecca Peters	Coll 9
17.20	Collections as a source of data for education, conservation and monitoring change in a time of extinction: an amphibian example J. Tomasz Giermakowski , Mason J. Ryan & Joseph A. Cook	Coll 10

Thursday 26th June 2014
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Rehearsal Room I (RR1)

Progress in Digitisation of Natural History Collections

08.50	Introduction	
09.00	Developing and Testing Tools and Processes for Creating a Swedish Digital Natural History Collection, e-BioColl.se Per Ericson , Fredrik Ronquist, Anders Telenius, Stefan Daume, Kevin Holston & Karin Karlsson	P1
09.20	From massive digitisation of Paris Herbarium to a nation-wide program Simon Chagnoux & Marc Pignal	P2
09.40	Barcodes, conveyor belts and laser scanners: putting the contents of the Geological Museum (South Kensington, 1935 - 1985) on the web Mike Howe , Bob McIntosh, Simon Harris, Michela Contessi & Graham Tulloch	P3
10.00	Automated mass-digitization line for individual insect specimens Ritta Tegelberg , Janne Karppinen, Tero Mononen, Mira Sääsikiähti & Hannu Saarenmaa	P4
10.20	Image segmentation in high throughput digitisation workflows Vladimir Blagoderov , Laurence Livermore, Ben Price, Stéfan van der Walt, Pieter Holtzhausen and Vince Smith	P5

Progress in Digitisation

11.00	Workflows in the cooperative IMLS Silurian Digitization project between Milwaukee Public Museum and The Field Museum. Patricia Coorough Burke , A. Caywood, M. James, E. Malueg & D. Miller	P6
11.20	Designing a Workflow to Help with Error Detection in a Paleontology (IMLS Silurian Reef) Digitization Project Paul S. Mayer , L. Connolly, N. Karpus & A. P. Layng	P7
11.40	Making molehills out of mountains: crowdsourcing digital access to natural history collections Laurence Livermore , Vince Smith & John Tweddle	P8
12.00	Exploitation of digital collection data at the Museum für Naturkunde Berlin Saskia Jancke , Dirk Striebing & Frieder Mayer	P9
12.20	ZooSphere - A tool for automated spheric image capturing and interactive 3D visualization of biological collection objects Alexander S. Kroupa , Martin Pluta, Bernhard Schurian & Falko Glöckler	P10

Poster Session

14.00	Official Poster session	
15.00	Posters & Pastries	
16.00	Official Poster session (Continued)	
16.30	Poster take down	

Thursday 26th June 2014
Wales Millenium Centre, Cardiff Bay

Room 6 (R6)

Bruker UK Ltd. Workshop 4

09.00 - 13.00 Bruker UK Ltd. Analytical techniques (XRD, XRF and IR/Raman)

Progress in Digitisation

14.00	Using optical character recognition (OCR) output in digitization: see your data before it's in the database and after Deborah L. Paul , Andrea Matsunaga, Miao Chen, Jason Best, Sylvia Orli & Elspeth M Haston	P11
14.20	Incorporating OCR into a digitisation and curation workflow Elspeth Haston , Robyn Drinkwater & Robert Cubey	P12
14.40	The virtually browseable collection: connecting GIS to whole drawer imaging Ann Molineux , Robert W. Burroughs, & Faye Geigerman	P13
15.00	Georeferencing Fish Collections from the FishNet Network: An Update of Progress and Evaluation of Collaborative Georeferencing Techniques Nelson E. Rios , Henry L. Bart & Michael H. Doosey	P14

Progress in Digitisation

16.00	iDigBio's Biospex System for Engaging the Public in Biodiversity Research Specimen Digitization Elizabeth Ellwood , Austin Mast, Greg Riccardi, Robert Bruhn & Jeremy Spinks	P15
16.20	Integrating High Throughput Digitization with Distributed Software: Supporting Data Flows in the New England Vascular Plant Network with FilteredPush Technologies Paul J. Morris , James Hanken, Maureen Kelly, David B. Lowery, Bertram Ludäscher James A. Macklin, Chuck McCallum, Robert A. Morris, Tianhong Song & Patrick Sweeney	P16
16.40	Using Complementarity to Improve Plant Specimen Digitization Rusty Russell , Elspeth Haston & Nicola Nicolson	P17
17.00	Seaweed Collections Online: Mobilising data from national and regional museums Jo Wilbraham & Juliet Brodie	P18
17.20	From Museum Specimen Database to Ecological Statement Christine A. Johnson , Richard K. Rabeler, & Charles Bartlett	P19

Presentations

A quantitative evaluation of natural history collection use in one university museum

Bethany L. **Abrahamson**

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This study, focused on the museum records held by the Museum of Southwestern Biology (MSB, a university-based research collection), analyzes museum-based publications, specimen loan records, and guestbook information from six divisions to determine how MSB's natural history collections (NHCs) have been used in scientific study over time. Using a novel methodology, I objectively sorted publications into ten research subjects via search phrases to determine how MSB has contributed to different kinds of research over time. I also tracked patterns in the kinds of specimens loaned over time, and explored how visitor affiliations and purpose of visit changed over time. The trends presented suggest that MSB's uses have changed and expanded over time as its specimens have been applied to new and innovative areas of study. This case study illustrates MSB's steps onto a larger stage in both research and public spheres, and sheds light on how the utilizations of NHCs might be studied in other museums. Analyses that quantify the use and impact of NHCs illustrate the importance of this key infrastructure to the scientific community and beyond.

Thurs -VSS - 14.20 - UC2

Rediscovering collection significance through historical research at the University of Iowa Paleontology Repository

Tiffany S. **Adrain**

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Rich history lies in a paleontology research collection that is over 150 years old. However, over time, the historic and scientific value of specimens can be forgotten as research focus changes and associated faculty retire. Under-utilized collections may be moved off-site to make way for new research material, or may be reduced in size through attrition by the agents of deterioration, loss of documentation, transfer to teaching collections, and inadvertent neglect. Assessment and re-curation of such material at the University of Iowa Paleontology Repository (UIPR), with the aid of newly digitized archive collections and a dash of serendipity, reveal material that represents institutional history (personal collections of 19th Century faculty, early 20th Century expedition collections), public history (historic fossil discoveries and donations by local amateurs), and the advancement of science (historic holotype

specimens and associated ancillary material). Enduring mysteries can be solved, documentation errors corrected, scientifically significant specimens recognized, and curatorial knowledge and collection context enhanced. Investigating and documenting historical significance and connecting collections with ancillary materials can help re-establish scientific research potential and widen the appeal of collections for other fields. The UIPR has rediscovered many historical collections, both specimen-based and archive-based, e.g., the Amana Mastodon, 1922 Fiji-New Zealand Expedition photographs, Macbride's cycadeoids, through externally funded projects and Museum Studies internship projects. Historical research will be included in the UIPR's latest project to curate the recently acquired University of Iowa fossil plant collection. A project to document "Iowa's Fossil Hunters," represented within the UIPR collections, is ongoing.

Thurs -VSS - 14.40 - UC3

Charles de Geer's collection of vertebrates: a lost and found story of type specimens described by Linnaeus and Pallas.

Erik **Åhlander**

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Charles de Geer (1720 - 1778), industrialist and amateur entomologist, was maybe the most important Swedish biologist, next to Linnaeus, during the 18th century. He obtained a large and valuable natural history collection and library at his mansion at Leufsta. After his death, the collection was donated to the Royal Swedish Academy of Sciences, but without a list of content. Except for the insects and a handful of reptile specimens, his collection was mixed with the Academy's, and later with the collection of the Swedish Museum of Natural History (founded in 1819). Not until very recently, with help from a couple of different recently unveiled sources of information, it has been possible to separate the de Geer collection. There are strong indications that included are parts of the lost Johann Albert Schlosser (? - 1769) collection used by Peter Simon Pallas (1741 - 1811) and material collected by Daniel Rolander (1722 - 1793) in Suriname 1754, described by Carl Linnaeus. Letters from de Geer shows that Linnaeus made several visits to Leufsta to study the collection. Through combining old archive material with modern databases and old literature sources now easily available on internet, a number of specimens, previously labelled "no data, from the old collection" now have more information and sometimes type status.

Wed - WS - 14.20 - H7

Mobilizing New England vascular plants to track environmental change

Dorothy **Allard**

University of Vermont

Mobilizing New England Vascular Plants to Track Environmental Change is a U.S. National Science Foundation supported Thematic Collections Network focused on digitizing herbarium specimens in the northeastern United States and funded through the Advancing Digitization of Biodiversity Collections program. The goal of the project is to provide data to support studies of the nature and consequences of environmental change in the New England region over the last three centuries. This project will digitally capture specimen data and images from about 1.3 million vascular plant specimens housed in 15 large to small herbaria located across the region and then share online the resulting images and data. The project operates under the umbrella of the Consortium of Northeastern Herbaria. The digitization process integrates with existing biodiversity informatics initiatives and has developed a novel high-throughput digitization workflow. The project provides an important example of how large collections can collaborate with and facilitate digitization in smaller collections through the extension of labor, protocols, techniques, and technology.

Wed - RRI - 15.00 - SCN15

Major study into the popularity of different disciplines in mixed museums finds natural history comes out on top

Jack **Ashby**

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In 2013 Arts Council England funded the Natural Sciences Collections Association to commission a comprehensive unbiased study to assess the relative popularity of different galleries in UK museums with mixed collections; to explore audience profiles for different galleries compared to museums as a whole; to interrogate the reasons why particular galleries are popular with their dominant audience; and to identify opportunities to present and market natural sciences to greatest effect.

Natural sciences were found to be highly valued by museum visitors, above all other disciplines. The results and analysis will be presented here. The study is a vital advocacy tool when championing natural history in a time when decision-makers are selecting where to direct their limited resources.

Thurs - VSS - 09.50 - NatSCA4

Natural Science collections in Wales - a Distributed National Collection

Christian **Baars**

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Collections are often bigger than individual museums. Each museum has its individual collecting strategy, and no museum is big enough to hold examples of everything. Accordingly, only the sum of the parts delivers a comprehensive collection. This applies to no discipline more than it does in the Natural Sciences. In Wales, the National Museum collects on behalf of the nation, while local authority and independent museums collect to reflect local culture and history. Combined, these collections are a national treasure, which, until recently, has been undervalued and underused. The partnership project 'Linking Natural Science Collections in Wales' captures information about Welsh Natural Science collections through a series of collections reviews (significance assessments) and digitizes collections-relevant data. In the process, local museum curators are up-skilled and the profile of these collections is raised, resulting in new exhibitions, fresh ideas for funding and renewed use of the collections. This is now leading to the creation of a Distributed National Collection in Wales, with far-reaching implications of how these collections can be accessed and utilized.

Thurs - VSS - 16.00 - Coll 6

What's your poison? Risk assessment and management of hazardous substances in the Economic Botany Collection, Kew.

Sheila B. **Banks**¹ & Mark Nesbitt²,

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² Economic Botany Collection, Royal Botanic Gardens, Kew, London, UK
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Ethnographic collections, including plant-based, i.e. ethnobotanical, collections, frequently include objects which may contain hazardous substances – both intrinsic and extrinsic. A significant amount of research has been undertaken on extrinsic hazards, such as pesticides, however less appears to have been undertaken on intrinsic/ inherent hazardous substances. This is particularly the case for ethnobotanical collections, which may include objects which contain a variety of toxins, corrosive substances and irritants.

The Museum of Economic Botany at Kew, now known as the EBC, which originally opened in 1847, now houses in excess of 90,000 objects. The diverse collection includes plant parts (seeds, fruits, bark), foods, fibres, gums, resins, oils, dyes, timbers, medicinal and narcotic drugs, clothing, weapons, ornaments and other utilitarian and ceremonial objects. Some work has previously been undertaken in terms of identifying & labelling potentially toxic specimens, however there remains a need to further assess objects within the collection to determine the real risks and thereby inform the development of an appropriate, pragmatic and cost-effective management strategy for handling and storage. Whilst on the face of it this is a health and safety issue, and to a lesser extent an environmental one, there is considerable overlap between collections review and preventive conservation activities.

The research described here will contribute towards a

dissertation for an MA in Preventive Conservation and draws upon work undertaken during a student placement at the EBC, Kew in March 2014.

Wed -VSS - 17.40 - Ha5

Shedding new light on Alfred Russel Wallace's insect specimens

George W. **Beccaloni**

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Alfred Russel Wallace (1823-1913) is best known as being the co-discoverer of evolution by natural selection and the 'father' of zoogeography, however, he was also one of the greatest collectors of tropical insects and other animals of the 19th century. Wallace collected specimens for his private collection and also on a commercial basis for four years in Brazil and eight years in South-East Asia (Indonesia, Malaysia, Singapore and East Timor). During the latter expedition he shipped back almost 110,000 insects to the UK, many of which were species new to science. My talk will give an overview of the insect specimens Wallace collected and where they are now. I will also discuss how my study of his data labels and collecting notebooks (recently digitised as part of the Wallace Correspondence Project) has shed new light on where and when the specimens were collected, adding much to their scientific value.

Wed - WS - 11.50 - H3

Oddy Tests – adding the analytical dimension

Beiner G.G., Lavi, M., Seri, H., Gunn, J. and Rabinovich, R.

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Materials testing is an important contributor to conservation knowledge. The so-called "Oddy Test" gained popularity because it is a cheap means of evaluating risks posed by volatile organic compounds (VOCs). However, it is also subjective and does not identify the pollutants. An interdisciplinary short research project aims at combining true analytical methods (GC-MS) with the familiar Oddy Test, in hope of identifying pollutants emitted by selected materials used in collections storage and verifying the usefulness of the traditional Oddy Test. Our research aims at bringing together information from manufacturers, conservation knowledge on materials testing and risks posed by certain substances to items in natural history and other collections, and sophisticated analytical means. Seven materials were tested and analysed for gaseous emissions, as well as for their effect on metal coupons. Our presentation will relate the procedure, problems dealt with throughout the experiment, and results.

Wed 25th - VSS - 09.20 - C2

Historical tomato collections in the herbarium of Naturalis Biodiversity Center: an important resource for genomics research

Roxali **Bijmoer** & Barbara Gravendeel

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Past processes that shaped the current genetic diversity of the domesticated tomato (*Solanum lycopersicum* var. *lycopersicum*) are still largely unknown. Whole-genome sequencing of historical tomato accessions from the herbarium of Naturalis Biodiversity Center was performed to gain more insight in the domestication of this crop in the Andes and subsequent industrial breeding in Europe and the US. Chloroplast, mitochondrial and nuclear genomes were recovered from a total of three historical collections with surprisingly high read depth and quality by mapping reads on the annotated genome of the modern *S. lycopersicum* Heinz 1706 cultivar. By comparing the three historical genomes sampled over a timeframe of 182 years with additionally sequenced modern genomes of eight wild relatives and six popular cultivars, evidence for introgression with taxa previously used to improve pathogen resistance, shape and taste of tomatoes, was gained. Results obtained elucidate man-made crosses made in the past. Museomics proves to be an effective tool for breeding history reconstruction of the modern tomato and provides new scope for tracing lost genome parts of this genetically impoverished crop.

Wed - WS - 12.10 - H4

Entomology Collections Network: A model for reaching out to small collections

Christy **Bills**

Natural History Museum of Utah/Entomology Collections Network

For many years, the Entomology Collections Network has been providing a platform for the exchange for ideas and information for entomologists, from collections large and small. The approach of ECN is to maintain an active listserv and an affordable, efficient annual meeting. These two methods are very effective for networking and sharing questions and concerns. Because there are no dues to be a member of ECN and the annual meeting is very accessible, small collections that may be underfunded can still access the wider entomological community. This has been an especially successful way to disseminate digitization information about software, workflow, funding, imaging and other relevant matters. Entomology collections have unique management issues and complex digitization problems to solve. To a small collection manager, these difficulties may seem insurmountable. However, with access to other entomologists who are resolving similar issues, these barriers can be overcome, resulting in a greater number of total specimens databased.

Wed - RRI - 14.00 - SCN12

Developing iCollections digitisation workflow

Vladimir **Blagoderov**

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iCollections is the first large-scale digitisation project at NHM, London, aiming to make accessible high resolution images and detailed collection data for all specimens of British and Irish Lepidoptera in the Museum's collection. It represents an integrated effort of curatorial, research, science facility and IT staff. In the talk we present the workflow and discuss its possible adaptation for the needs of smaller collections.

Wed - RRI - 09.40 - SCN3

Image segmentation in high throughput digitisation workflows

Vladimir **Blagoderov**, Laurence Livermore¹, Ben Price¹, Stéfan van der Walt², Pieter Holtzhausen² and Vince Smith¹

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Advances in imaging technologies have made the acquisition of high throughput, multi-specimen images a trivial task. However, the subsequent movement of specimens (e.g. due to curatorial or research activity) breaks the synchronisation between the physical collection and its digital representation, degrading the value of multi-specimen images over time. Furthermore, the data record of a single specimen cannot be unambiguously linked to its digital image with this approach. In order to realise the full potential of multi-specimen imaging technology, software is required to automate or semi-automate the segmentation of images into individual specimens and support subsequent annotation. We demonstrate a potential approach for two types of specimens: microscopic slides and pinned insects. This approach will form part of the large scale digitisation programme being developed at the NHM which has the ambitious goal of digitising 20 million specimens in the next five years.

Thurs - RRI - 10.20 - P5

Investigating the impact of late Quaternary environmental changes using ancient DNA from collared lemming

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The late Quaternary is a period associated with significant climatic and environmental change, with cycles of glacial advance and retreat throughout. This leads to vegetational turnover, and widespread faunal extinction and translocation. In particular, the large mammal biota experienced significant species extinctions at this time, an area that has spawned much pivotal research. Here, however, we focus on a less extensively studied small mammal, the collared lemming (*Dicrostonyx torquatus*).

Our study utilises a collection of collared lemming bone samples from a single location, Trou Al'Wesse, a prehistoric cave in the Belgian Ardennes, whence the collared lemming are samples through time. This chronological investigation follows an Arctic adapted species in Europe through glacial oscillations, with samples dating prior to the last glacial maximum through to the termination of the last cold phase, the Younger Dryas. We employ ancient DNA techniques to investigate potential turnover events as a cold adapted species responds to changing climate in Northern Europe.

Wed - RRI - 16.55 - EC4

Making Meaning with Museum Collections

Rich **Busch**

Education Collections Manager and Department Chair
Health Sciences Collections Manager Denver Museum of Science and Nature
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The museum world is changing. Just in the last 30 years, the museum community has seen a shift in their public audience base from passive observers to active participants. The transition into the digital age has also given the world unprecedented access to media and information. We must also consider academic audiences and how their research and collecting practices have changed with technology and the impact this has had on our collections. The Education Collections at the Denver Museum of Nature & Science has been exploring this topic of making our museum collections relevant and accessible to our audiences for the last 20 years. Education Collections Manager, Rich Busch, will share some insights and strategies on what has worked for this department, what we understand about our audiences, what challenges we have faced and what direction we hope to take in the future.

Wed - WS - 0900 - AOI

From massive digitisation of Paris Herbarium to a nation-wide program

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The Muséum national d'Histoire naturelle of Paris (MNHN) completed a massive digitisation program of the herbarium specimens (PPC). Nearly 6 million images went online between 2008 and 2012. The resulting database records contain only a minimum set of attributes (scientific name, catalog number and continent of origin). As many more information is most

often available from the photographed labels, optical character recognition and a crowdsourcing site have since been used to enrich the database without physical access to the specimen.

Building on the experience gained from these projects, a national program "e-ReColNat" was launched to extend the digitisation to the remaining herbariums and most zoological and paleontological types. The result will be available online for annotation and label retranscription to a broad audience mixing the general public and the scientific experts.

Thurs - RRI - 09.20 - P2

Arctos: A Collaborative, Cost-Efficient Solution for Managing and Publishing Biodiversity Data in Collections of all Sizes

Carla **Cicero**¹, Link Olson², Joseph A. Cook³, Michelle S. Koo¹, Dusty L. McDonald², Gordon Jarrell³

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Small, regional collections face particular challenges in managing and publishing their data due to resource and staff limitations. Nonetheless, biodiversity data in these collections have significant value for society, especially if widely available for research, education, and conservation. Furthermore, broad publication of data helps in the recognition and therefore sustainability of such collections. Arctos (<http://arctosdb.org>) provides a robust, web-based, collaborative, and cost-efficient solution for managing and publishing data in collections of all sizes. Currently, Arctos serves over 2.1 million records from 24 institutions and 78 collections. Collection sizes range from 1 to over 264K specimens, with 52% of the collections having <10K specimens. In addition to integrating access to diverse types of data and collections (e.g., vertebrates, invertebrates, plants, fossils, hosts and parasites, media, field notes), key features include collection-management and object tracking applications, projects and publications that track specimen usage, mapping tools, and partnerships with external web resources (e.g., GenBank). Records are published to biodiversity data portals such as VertNet, GBIF, and iDigBio. Arctos is co-managed by three large institutions but welcomes data from collections of all sizes, and provides services to help migrate and publish those data. All data are housed at the Texas Advanced Computing Center, and thus collection staff do not need to worry about servers, backups, or other technical support needs. Users form a strong community that contribute to data standards, application enhancements, and improved data quality. The collaborative, cost-efficient, and cross-disciplinary features make Arctos unique and well-suited for collections of all sizes and types.

Wed - RRI - 12.10 - SCN9

Uncovering and integrating archives for multidisciplinary research at the MVZ

Carla **Cicero**¹, Christina V. Fidler¹, Michelle S. Koo¹, & Kira L. Dodd¹

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Like biological specimens, archival material originating in natural history museums have a limited life span if not curated properly. Archival materials include a variety of formats such as field notes, maps, ledgers, card catalogs, original artworks, acetate negatives, nitrate negatives, 35mm slides and other formats which require specialized housing in order to ensure their preservation. Additionally, this type of material is traditionally described and cataloged in resources not typically used in natural history museums. The Museum of Vertebrate Zoology (MVZ), University of California, Berkeley, received a Hidden Collections grant from the Council on Library and Information Resources (CLIR) to catalog its archives and integrate those with Arctos, it's online specimen collection management information system. The museum is systematically identifying and processing the museum's archival collections, and is also enhancing traditional finding aids to link users to related data in Arctos. Thus far, we have processed 30 collections including a large collection of field notes with observational data dating to the 1930s from the Hastings Natural History Reserve, Monterey County, California. In addition, we are collaborating with another project (FromThePage) to engage citizen scientists in field note transcriptions. The CLIR project dovetails well with other informatics projects that are focused on cataloging and providing access to historical data from museum specimens and natural history observations. The MVZ project provides a strong case study on how primary source materials can be curated, cataloged and integrated with other natural history data using archival best practices.

Wed -VSS - 15.00 - ASO4

Forgotten molecules, long lost records

Matthew **Collins**

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What types of records lie forgotten in the collections? Taking as an example the ERC CodeX project (Decoding domesticated DNA in archaeological bone and manuscripts) I will explore the types of records that can be recovered using a combination of biomolecular methods. To do this I will examine what we understand about the rates of survival of different biomolecules such as proteins, lipids and DNA and the types of information we can recover from them. I will contrast targeted and shot-gun strategies and using examples highlight the unexpected places that high resolution records can be recovered.

Wed -RRI - 17.10 - EC5

Workflows in the cooperative IMLS Silurian Digitization project between Milwaukee Public Museum and The Field Museum.

Patricia **Coorough Burke**, A. Caywood, M. James, E. Malueg & D. Miller.

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Milwaukee Public Museum (MPM) is implementing a three-year IMLS grant in conjunction with The Field Museum to digitize our Midwest Silurian collections and create a shared online database. The first workflow was between the institutions. The joint nature of the project required information exchange between museums. To coordinate a shared online database an effort was made to use shared vocabulary and Internal Record Numbers (IRN) for lithostratigraphy, chronostratigraphy and taxonomy data. Internal Records were generated at The Field Museum and shared with MPM. After the first large data export smaller updates have been made. MPM maintains a shared Google Drive spreadsheet with corrections and new data to be updated at The Field. Sharing data creates an error check point.

The second workflow for the digitization project is within MPM. The collection is organized stratigraphically. The specimens all have a locality number but most do not have a unique specimen number. Workflow starts with data entry into KE EMu using specimen labels. Specimens without numbers are assigned the KE EMu Internal Record Number as specimen number. The photography station is divided into two parts, fossil photography and photo processing. The fossils are processed by drawers and include a photo of the drawer and photos of each fossil in the drawer. A batch process is used to convert the raw image to .dng, .tif and .jpeg formats. The .jpeg images are then associated with the KE EMu catalogue data and the .dng and .tif images are saved in MPM's image repository.

Thurs - RRI - 11.00 - P6

The systematic mineral collection of Lady Henrietta Antonia Clive (1758-1830), Countess of Powis: a rediscovered early 19th century treasure.

Tom F. **Cotterell**

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Collecting, and collections, of different objects come and go in and out of fashion. Mineral collecting is one such example where the reasons for establishing a collection have changed dramatically through time. A consequence of this is that the value, both scientific and commercial, of mineral collections has fluctuated, often dramatically.

In 2008 two handwritten catalogues pertaining to a mineral

collection belonging to the Countess of Powis in 1817 were discovered, serendipitously, within what was formerly the Department of Geology at Amgueddfa Cymru. Little was known about these catalogues, but a rather poorly documented collection of minerals had been donated to the museum by the 4th Earl of Powis in 1929. During the early 20th century the social and historic value of mineral collections was of less interest than the physical beauty of mineral specimens and this collection appears to have been overlooked.

Detailed research has now shown that the collection was assembled by Lady Henrietta Antonia Clive, née Herbert (1758-1830) who, until recently, was a largely unknown character in early nineteenth century Wales. Henrietta's collection is typical of the systematic style of mineralogy dating from the early 19th century: minerals are arranged by chemistry into 'Earthy Minerals' and 'Metallic Minerals'.

Her catalogues display a remarkable attention to detail: Henrietta recorded the names of people from whom she acquired specimens. This information has enabled one to establish the social circles within which minerals were being distributed.

Wed - WS - 14.40 - H8

'Once in a Whale': The conservation treatment of historic Cetacea at the Oxford University Museum of Natural History

Crompton, N. & Palumbo, B.

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The five Cetacean skeletons suspended from the magnificent glass roof at OUMNH are known from early photographs to have been in situ since the museum opened in 1860. During early 2013, the museum initiated a large scale restoration of its Victorian glass roof. The scaffolding required for this project enabled for easy access for the first time to the skeletons, providing the opportunity for a significant conservation and restorative treatment exercise.

150 years on display had left these specimens with varied types of deterioration, including the secretion of natural oils, accumulated acidic dust, and delamination and bleaching caused by the continuous exposure to UV and the general instability of the museum environment. Conservation treatment aimed to preserve and stabilise the specimens for a future on display as well as improve their scientific accuracy. Conservation treatment included the removal of dust, engrained dirt and dense sebaceous secretions. Specimens were consolidated for strength and corroded wires replaced. The treatment was completed within a 6 month period and documented thoroughly on the blog 'www.onceinawhale.com', providing the opportunity to communicate and instigate discussion with the public and other professionals in the field.

With thanks to the Arts Council England for providing funding for this project through the Preservation of Industrial and Scientific Material (PRISM) grant.

Wed - VSS - 10.20 - C5

Out of the dark: lighting scientific specimens for exhibit

Ronald **de Ruiter**

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In Naturalis there was a need to create guidelines regarding lighting scientific objects in exhibits. Lighting objects is necessary for display, but can cause irreversible damage (fading) to these objects. In the past collection managers, afraid of damaging specimens, often refused to display scientific objects. To avoid discussions that had plagued exhibit design in the past, both the Exhibits and Collections departments wanted to produce together simple guidelines with which it would be clear if and what dose of light could be used on different kinds of objects. Because exhausting testing was not possible, we decided to rely on existing literature.

Starting point for our discussion was not the minimum quantity of light needed for display, but the accepted quantity of damage (fading) over a certain time span. A standard for measuring light fastness is the ISO Blue Wool Fading Standard. Within that standard, 8 sensitivity categories are differentiated and every category has a (published) advised guideline for lighting. Based on test results found in literature, groups of objects were classified according to these categories. For measuring damage (fading) usually the 'Just Noticeable Fade (JNF)' unit is used. It was agreed that for collection specimens 1 JNF in 15 years would be acceptable.

Once objects were divided into sensitivity categories, advised lighting guidelines determined and the acceptable damage defined, we could determine the quantity of light we could use for different kind of objects. The results were presented in a single table, with which it will be easier to make decisions on lighting scientific specimens in exhibits and get them out of the dark and into the public's eyes.

Wed - WS - 16.40 - Ex2

The Timor Collection: from the ground to the cloud

N. **den Ouden**

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The Indonesian island of Timor is rich in sediments dating from the Permian period. These sediments are of marine origin and contain a very large amount of representatives of marine invertebrate groups (corals, brachiopods, ammonites, belemnites, blastoids, crinoids). At the beginning of the 20th century the species richness and outstanding preservation of the fossil material was recognized and several expeditions were organized. Most notable are the expeditions organized by Prof. Molengraaff (Delft University) from 1910-1912 and Prof. Brouwer (University of Amsterdam) in 1937. Both collections are now housed at Naturalis Biodiversity Center in Leiden, the Netherlands. Together they form the largest

museum collection of Timor fossils worldwide and they are of great importance for the study and reconstruction of Permian marine ecosystems.

As the material was collected a century ago, it was suffering from degrading packaging material and fading ink on labels. A special project to clean and repack the fossil material, digitize the information on the labels and photograph fading labels and type specimens was undertaken. The project was part of a larger digitization program where a total of 37 million museum objects (fossils, rocks and minerals, recent plants and animals, but also registers and antique books and drawings) housed in Naturalis are digitized and information made available on the internet. On top of this, our project was being carried out in the LiveScience hall of the museum, which means that visitors were able to see our work, monitor our progress and ask questions.

Thurs - VSS - 16.40 - Coll 8

Arsenic and Old Specimens: using a handheld XRF analyzer to determine arsenic prevalence at Naturalis Center for Biodiversity

Becky **Desjardins**

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The use of arsenic in preservation of biological specimens was a common practice prior to 1970, and later at some museums. In the summer of 2013, Naturalis Center for Biodiversity undertook two days of testing with a handheld XRF analyzer. This x-ray device can determine the amount of arsenic, lead, mercury, and other heavy metals within any object. The goal of this testing was twofold: to determine how late was arsenic used by preparators and also how prevalent arsenic was in work spaces. Floors, desks, keyboards, latex gloves, elevators and lab coats were tested to find out how much arsenic was coming out of the specimens and into other areas. Results indicate that many mounted specimens, do not "drop" arsenic. However, there is enough of an arsenic concern in study skins that we have changed our work spaces and honed our arsenic handling policy to minimize exposure by staff and collection visitors.

Wed - VSS - 16.40 - Ha2

Tales from the tanks: Management and accessibility of larger specimens in alcohol collections.

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When thinking about alcohol collections in natural history museums, we mostly think about shelves stacked with glass jars. However, specimens larger than 60 cm cannot be easily stored this way. For these larger specimens it can be very challenging to have a safe storage environment that still ensures the accessibility of this collection.

At Naturalis Biodiversity Center we have historically used stainless steel tanks to store larger specimens. These tanks were specifically designed for Naturalis and can contain up to 300 liters of alcohol each. Recently we undertook the enormous task of curating the 25 herpetology tanks for the first time in more than 15 years. Our work included conducting an inventory and databasing the specimens as well as checking alcohol levels and percentages. In many cases, nothing was known about the contents of the tank and often total alcohol replacement was needed.

This pilot study gave us the opportunity to consider all aspects faced when managing large alcohol storage systems, such as safety regulations, handling large specimens, the most convenient way to house large tanks, how to label specimens etc., as well as creation of a protocol for working with these tanks so we can keep their contents available for future research.

Thurs - WS - 10.00 - Coll 4

iDigBio's Biospex System for Engaging the Public in Biodiversity Research Specimen Digitization

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New web resources provide scientists opportunities to engage the public in ways and at scales not previously possible. Many ecological and environmental citizen science projects focus on generating present-day occurrence data on populations, species, and communities to address urgent societal challenges, such as the extinction crisis and biotic responses to climate change. Biodiversity research collections provide the opportunity to produce the important historical and present-day baseline data on distributions with which to compare the new observations and project future change. However, the majority of information about the specimens in these collections has yet to be digitized. Public engagement might provide an important strategy to accelerate digitization. Out of a 2012 workshop emerged the idea of an iDigBio public participation in digitization management system, which would permit the creation of record sets of incomplete specimen data and/or images from the iDigBio Cloud, management of their digitization using collaborating citizen science tools, monitoring of digitization progress, advertisement of the projects on the go-to sites for members of the public interested in citizen science, and return of the new data to the data providers and those involved in the digitization. We will introduce this emerging system, called Biospex for Biodiversity Specimen Expeditions. We will provide an overview of the management system and its interoperability with biodiversity specimen data management systems and citizen science tools via Darwin Core Archive and Ecological Markup Language files.

Thurs - R6 - 16.00 - P15

Developing and Testing Tools and Processes for Creating a Swedish Digital Natural History Collection, e-BioColl.se

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Natural history collections constitute the major source of data for research in phylogenetics and systematics, and provide crucial information for analyses of long-term trends in ecology and environmental sciences. Recent mass-digitization efforts have opened up such collections abroad for transformative e-science approaches, but research dependent on Swedish objects is left behind. Out of an estimates 33 million Swedish specimens, almost 90% are unavailable digitally, and it will take hundreds of years to eliminate this backlog at the current pace of digitization.

To address this problem and provide a proof-of-concept version of an e-science platform for Swedish natural history collections allowing complete digitization within 10 years we plan to develop and test standardized, re-usable, industrial-level digitization processes where innovation and automation will bring down the cost of obtaining specimen images and geospatial and taxonomic metadata from specimen labels. Robotic techniques employed to image insect collections, and automated text recognition and citizen-science based crowd sourcing for extracting information from specimen labels during the digitization of 1.4 million specimens in the Gothenburg herbarium will provide a full-scale feasibility test of tools and concepts. The digitized information will immediately support outstanding research in Sweden and elsewhere on this unique material, and boost international initiatives (e.g. GBIF, LifeWatch and IPBES).

Thurs - RRI - 09.00 - P1

Orca O319, the journey from beach to exhibit hall

Moe **Flannery**¹, Sue Pemberton¹, Laura Wilkinson¹, & Rebecca Peters¹

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The story of Orca O319 began with a stranding report to the California Academy of Sciences on Thanksgiving 2011. After the initial data collection, the carcass was identified by the Department of Fisheries and Oceans Canada as a juvenile, male orca (*Orcinus orca*) of the Offshore ecotype. O319 had been recorded multiple times off the coasts of British Columbia and Alaska between 2002 and 2011. There are three ecotypes of orca found along the west coast of North America, Resident, Transient, and Offshore, distinguished by morphology, geography, feeding ecology, behavior, and genetics. Due to the fact that very little is known about the Offshore ecotype, we collected the entire skeleton for archiving at the

museum. During the Summer of 2013, we had the opportunity to articulate the skeleton for display. A team of 37 volunteers and five staff built the entire skeleton on the exhibit floor in front of the general public. As far as we know, this is the first time the public has been able to interact with scientists while completing a project such as this. This presentation summarizes the entire process from initial beach response to final gallery installation. We will discuss the valuable lessons we learned about Offshore orcas, articulating a skeleton while on public display, and the importance of marine mammal stranding response outreach and education activities. This project resulted in the first complete skeleton of a known Offshore orca on permanent display in a museum in the contiguous United States.

Thurs - WS - 11.40 - C9

The European ABS legislation and its national implementation across the EU – implications for Natural History Collections in Europe and beyond.

Peter **Giere**¹, Ana Casino², Johan Bodegård³, Cornelia Löhne⁴, Christopher H. C. Lyal⁵, Anne Nivart⁶, China Williams⁷ & Dirk Neumann⁸

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The Nagoya Protocol (NP) on Access and Benefit sharing (ABS) is likely to become effective in 2014 – 90 days after submission of the ratification documents by 50 signatory

states. Concurrently, in preparation for ratification of the NP, the European Council and Parliament have agreed on an EU-wide regulation on ABS.

On the national level, this is complemented by national legislation specifying the European regulation. As with other European regulations, this national implementation is different in the different member states of the EU, which may contribute to further complications to be addressed. Since the implementation of the NP – both on the EU and on the national level – will affect many scientists and research projects across the EU and beyond as well as the management of biological collections, this new set of regulations will provide additional tasks and uncertainties for researchers and collection staff. Currently, relatively few scientists are aware of additional documenting and reporting requirements linked with ABS and the global policy changes behind it. This presentation will focus on the EU regulations and its requirements with respect to biodiversity research and museum collection. This will be complemented by highlighting national implementations in selected countries of the EU and effects, these regulations will likely have in international collaborations.

Wed - WS - 17.00 - Pr1

Collections as a source of data for education, conservation and monitoring change in a time of extinction: an amphibian example

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Natural history collections are libraries of biodiversity but too often are underused and poorly integrated into either applied research or classroom education. Curators and managers of collections can increase visibility of collections by enhancing specimen data, serving those data via the web, and demonstrating how data can be integrated into diverse applications. We present two such examples from amphibians, a taxon experiencing severe loss of species and populations. The recent rediscovery of in Costa Rica was facilitated by specimens and associated field notes. Similarly, a thorough evaluation of specimens and subsequent surveys of in New Mexico, USA resulted in a reassessment of its status. Examination of specimens has been central to key studies of changes in species distributions, changes in body size, and emergence of lethal diseases, but many other research and applied questions about changing environmental conditions remain to be explored if future investigators understand the potential of this resource. Thus, the value of museum specimens in conservation biology remains largely untapped. In addition, natural history collections have great potential to adapt to new trends in interdisciplinary education by directly integrating specimens and associated data into inquiry based learning as students learn diverse skills related to the complexity of spatial and temporal perspectives on environmental change. We discuss how these examples can be incorporated into higher education and ultimately increase the awareness of the vast scientific and educational potential of natural history collections.

Thurs - VSS - 17.20 - Coll 10

Discussing Evidence: Scientific Collections and Environmental Change

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During this panel discussion, experts in environmental change research highlight the use of scientific collections in their work. Following lightning talks discussing their research, the panel will discuss the following questions and additional comments and questions from the audience. What would a collections-based environmental change research program look like? Who participates in a collections-based environmental change research program? What kinds of data are produced or needed and how do you make it available for environmental change research? What funding sources and other resources are available to collections professionals? Are there currently established procedures for integrating collections-based data into environmental change research?

Wed - RRI - 17.30 - EC6

Natural history conservation: Conserving an endangered profession

Reflections of a trainee entering a dying profession

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The field of natural history conservation is greatly under resourced and there is no recurrent comprehensive system for training in the UK. Four years training towards a career in natural history conservation has given me much to reflect upon, in particular the void between the conservation and natural history fields and how they perceive each other. Both fields are supported by enthusiastic advocates for their profession, drawing in funding even during difficult times. Actively building symbiotic partnerships between conservation and natural history is vital for the future of this specialism. However underlying generalisations and stereotypes about both parties can be a barrier to this. With benefit of my experience as both an intern and trainee, I will share my observations of both fields, demonstrate how my thinking has been changed over time, and determine what we really need to know about each other. These lessons have shaped my own perception of the future of natural history conservation. Can challenging these stereotypes and breaking boundaries bring us all together to give this specialism a future?

Wed -VSS - 11.10 - C6

A Vast Machine: Biodiversity collections and cyberinfrastructure in the service of monitoring biospheric change

Robert **Guralnick** [**CANCELLED**]

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The climatological community has faced many challenges using legacy data from the last 100 plus years to try to assemble a globally coherent signal of climate and its change. These challenges are described in “A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming” by Paul N. Edwards. Edwards distinguishes between two related operations: first, “making global data” which requires data publishing networks and standards that reduce data friction; second, “making data global” which discusses integrating data into coherent views and dealing with issues of data quality and fitness for use. Analogous efforts exist in the domain of natural history and biodiversity, where data is much more heterogeneous. Moreover, natural history data addresses the most relevant question for humans – how does the living world respond to changing climates? To build the evidence base, we need to know the key challenges in developing the infrastructure to support bringing together biocollections in the service of documenting global change. How will we make biodiversity data global? And how will we make global biodiversity data? I present four key themes: 1) Growing the richness of our standards and knowledge representation of biodiversity collections; 2) More integrated publishing systems that bake in data quality improvement during and after the publishing steps; 3) Linking together data resources more effectively, in order to better track samples, specimens, derivatives, and interactions; and 4) Modeling frameworks and new tools for documenting trends in best case scenarios where data resources reach critical thresholds and can be effectively used.

Wed - RRI - 16.25 - EC2

The value of examining pins as part of assessing old insect collections

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There are a number of instances in which the physical characters of the pins in insects have been instrumental in confirming their status. This might be in placing them between certain date periods, as originating from one particular collecting event or confirming their place within a type series.

Recent research on William Hunter's (1718-1783) insect collection has added considerably to knowledge of early pinning practice. Provenanced insect collections from that time are rare. Before mass-production techniques became available pins were made using a series of labour intensive processes. Pins were relatively expensive items until the 1830s

when machinery was developed for mass production. No pins were made specifically for entomological use at the time Hunter's museum was being created.

Many insect collections of the time have not survived intact. William Hunter's private museum in London became the first Hunterian Museum, built in 1807 in Glasgow, specifically to accommodate his bequest to his alma mater. What is now the oldest public museum in Scotland was thereby created. The insect cabinets were part of this and retain their original arrangements; the specimens were named by J.C. Fabricius (1745-1808), engaged by Hunter as his zoological curator. Therefore it provides an important documented resource for historical entomological investigations. Detailed morphological pin descriptions and metallurgical analysis have now been conducted. Developing collections management technology for insects in the eighteenth and early nineteenth century, in which the role of pins was crucial, allowed entomology to progress as a descriptive science.

Wed - WS - 11.30 - H2

Digitizing Specimens in a small herbarium: A viable workflow for collections working with limited resources

Kari **Harris** & Travis Marsico

Arkansas State University

Small herbaria represent a significant portion of herbaria in the United States, but many are not digitizing. Of those that are digitizing, many are not yet making their data widely available. In the Arkansas State University (STAR) herbarium we have annotated all Arkansas specimens to update their nomenclature and imaged the 18,000 Arkansas collections accessioned. Students averaged 150 specimens per hour during the annotation and imaging stages, allowing the entire collection to be imaged in a little over a semester. We are currently databasing the collection using Specify 6.5, and students are averaging 30 specimens per hour. In the coming months these data will be made available through larger database portals as well as a local website component specific to the STAR Herbarium. As a small herbarium with limited resources, the implementation methodology described by our effort should assist curators of similar sized collections as they undertake the digitization process. At Arkansas State University, digitization efforts have gotten us far more than just a digitized collection. Through the process of digitizing the STAR Herbarium, student interest in collections has been sparked across the campus. We now have an on-campus student organization, collaboration with the computer science department, and a great amount of support at both departmental and college levels. We hope that other universities with small but significant collections will undertake similar methods to encourage student enthusiasm and involvement in the curation of natural history collections.

Wed - RRI - 09.20 - SCN2

Incorporating OCR into a digitisation and curation workflow

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The digitisation of natural history collections is a priority for many institutes for reasons including opening access to users around the world, incorporation of specimen data in research, disaster planning, etc. However, digitisation of natural history specimens is expensive and labour intensive. For this reason, digitisation of specimens has moved towards minimal data capture and imaging as part of large scale processes. The workflow can be summarised in the following steps: 1) minimal curation; 2) attach barcode as a unique identifier; 3) minimal data entry; 4) image specimen; 5) additional data entry. There has been some investigation by institutes into the use of Optical Character Recognition (OCR) within the digitisation and curation workflow. The Royal Botanic Garden Edinburgh (RBGE) now routinely processes all specimen images through OCR software. The OCR process is integrated into the overall digitisation and curation workflow and has been used to speed up the process of adding data to over 100,000 specimens. The following additional steps have been incorporated into the workflow at RBGE: 4a) assess condition of specimen; 4b) process image through OCR software; 5a) additional curation. The incorporation of OCR into digitisation workflows is being explored by the Synthesys project funded by the European Union within Framework 7, and by iDigBio funded by the United States Government within the National Science Foundation programme. The work being carried out at the Royal Botanic Garden Edinburgh to integrate OCR into the digitisation and curation workflow is discussed as part of the work of Synthesys and iDigBio.

Thurs - R6 - 14.20 - P12

Creating a healthy work environment for contaminated moth-ball containing entomology collections

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The use of moth-balls for the preservation of historical insect collections is well known. Moth-balls contain mainly naphthalene and may be contaminated with para-formaldehyde. Subsequently insect collections are frequently stored in wooden cabinets and/or drawers made of plywood. Therefore both the concentration of naphthalene and

formaldehyde in the repository may be seriously high, even above their counting threshold values. As only removing the moth-balls from the collection does not result into a clean environment, additional measures and actions should be taken. This work will present the environmental working condition related to the old and the new repository including the effects of different techniques of cleaning the indoor environment and what can go wrong if non-specific air purification media is being applied. Finally it will be shown how the environmental problem is being solved so that the historical insect collection can be consulted again.

Wed -VSS - 17.20 - Ha4

Reduction of mercury emission from historically treated mercuric chloride herbarium collections

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Due to the historical preservation treatment with mercuric chloride, herbarium collections may emit mercury. As the number of treated objects can be extremely high, the concentration of mercury indoor may reach the threshold limit value of work places. Especially when frequently used herbarium boxes are opened in poor ventilated areas. In our work we investigated not only the way mercury emits from the specimen, but also we developed a dedicated simple material that is able to adsorb mercury. Therefore now opening a box, the emission of mercury is seriously reduced.

This work will present the impact of mercury emission from the collection and a novel and simple adsorbing method for mercury in historical herbarium collections.

Wed -VSS - 17.00 - Ha3

Old rockswho needs them?

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The mineral, meteorite and rock and ore collections at Museum Victoria's were established in 1854 in the former National Museum of Victoria. Through amalgamations with other institutional collections they now form the largest geosciences repository in Australia. The aspirations of the founders of these collections were utilitarian and economic in outlook. For example, in 1855, Captain Andrew Clarke, of

the Philosophical Institute of Victoria, wrote "I hope to see in that Museum a complete collection of all the ores that are useful ...I desire to see the museum filled with objects that are peculiarly valuable in a new country to the exclusion of merely ornamental specimens".

In the present economic climate it is axiomatic that museum collections should be accessible and available to researchers and the public in order to justify the vast expense of housing and managing them. Advocacy begins by clearly articulating why we have collections. The users and uses of the collections provide the strongest arguments for their continued preservation and development. It is a worthwhile exercise to examine, in detail, collection access and use as a methodology for attracting funding (internal and external) and building relationships with other supportive organisations, collectors and the general public. Through their use in modern research and education programs, the collections are of considerable economic benefit.

This talk will examine some of these themes in relation to the geosciences collections at Museum Victoria.

Thurs - VSS - 09.30 - NatSCA3

Resurrecting orphaned collections

Gabriela **Hogue**

North Carolina Museum of Natural Sciences

As budgets shrink and the focus of academic institutions shift, small collections are often the casualty. Faced with declining staff and lack of institutional support to replace curators or preserve the space required to house natural history collections, these collections become a perceived liability to host institutions. In the worst cases, they are allowed to degrade or even be discarded. In other cases, larger institutions, usually regional museums, are asked to assume responsibility for these collections, which usually means transferring them to the receiving institution. The North Carolina Museum of Natural Sciences has been involved in resurrecting or transferring several orphaned collections. This presentation recounts the scope of this problem and the steps and resources required to save these endangered collections.

Wed - RRI - 15.20 - SCN16

Practical solutions for managing asbestos specimens in natural history collections

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Asbestos is a term applied to a group of six fibrous minerals with specific properties that render them a health hazard. Exposure may not result in presentation of symptoms until many years later. It therefore is important that the hazard

presented by these minerals is clearly understood and there is a clear and achievable methodology to manage them effectively and legally.

Management of asbestos is legally controlled and this is equally applicable to museum specimens as industrial uses. Within Europe the relevant legislation is Directive 2009/148/ECI, which within the UK is implemented as the Control of Asbestos Regulations 2012. This is designed primarily for the management and removal of industrial and constructional asbestos and its implementation and relevance to mineral specimens may not be immediately obvious.

Effective management is based on (i) identification of specimens that present a potential hazard (including those not covered in legislation) (ii) understanding when and where specialist advice is required (iii) confirming the hazard (iv) understanding who can undertake what work and the legal requirement for appropriate training (iv) measures that need to be taken if a wider storage area has been contaminated (v) effective procedures to ensure that the risk is contained and managed.

Thurs - WS - 10.20 - Coll 5

DOAD, NODE and NANODE: integrating ostracod collections and databases for environmental change research applications

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Ostracoda (Crustacea) are common in marine and non-marine aquatic communities and have an excellent fossil record. The Ostracod Metadatabase of Environmental and Geographical Attributes (OMEGA) integrates records from regional databases with the aim of creating a global distributional dataset, facilitating spatio-temporal approaches in, e.g., modelling of climate change effects on biodiversity and the calibration of taxa for palaeoclimate applications. Its development has been supported by the EU-funded BioFresh project aimed at building a global information platform with access to all available databases describing the distribution, status and trends of global freshwater biodiversity. OMEGA harvests metadata from regional databases, including species names and geographical coordinates (regarded as both data and metadata). Three major databases are currently the focus of attention:

- Europe: NODE (Non-marine Ostracod Distribution in Europe – c. 12,000 records)
- USA: NANODE (North American Non-Marine Ostracode Database – c. 3,000 records)
- Canada: DOAD (Delorme Ostracode Autecological Database – c. 30,000 records)

DOAD represents the work of Denis Delorme who donated

it to the Canadian Museum of Nature following his retirement; it is complemented by voucher specimens for every record in the database, comprising ostracods collected from more than 5,000 lakes and other waterbodies between 1963 and 1976, from British Columbia to the Ontario-Quebec border and the Northwest and Yukon Territories. The voucher specimen collection has proved particularly valuable in facilitating comparisons with European ostracods for taxonomic harmonisation purposes. Once checking and correction of geographical coordinates (largely in NODE) is completed, an OMEGA North American – European dataset of some 45,000 records is anticipated.

Wed - RRI - 16.40 - EC3

Barcodes, conveyor belts and laser scanners: putting the contents of the Geological Museum (South Kensington, 1935 - 1985) on the web

Howe, Mike P.A., Bob McIntosh, Simon Harris, Michela Contessi & Graham Tulloch

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The Museum of Practical Geology (Jermyn Street, 1851-1935) displayed most of the British Geological Survey's specimen collection. With the move to the Geological Museum and then to Nottingham (Keyworth, 1985 onwards) most items were consigned to drawers. The internet has provided the means to re-exhibit these collections. BGS has been at the forefront of collections digitization since the 1970s. By 2000, the collections had digital catalogues of varying completeness, and in October 2000 the borehole and rock catalogues went on line. By 2006, all the main collections had online text and GIS searches.

During the past five years, BGS has made high resolution digital images of various collections available, including building stones and 4000 early twentieth century glass plates of the Kidston palaeobotanical collection. 125,000 7216 × 5412 pixel images of UK Continental Shelf cores¹ were made available online in 2012, a project requiring a conveyor belt and extensive use of barcodes. 100,000 rock thin sections² were added in 2013. The most innovative project to date has been a collaboration between BGS, the National Museum Cardiff, the Sedgwick Museum Cambridge, the Oxford Museum of Natural History and the Geological Curators' Group (representing other national, university and local museums) to create an online database³ of British macrofossil types. The web portal provides data about each specimen, searchable on taxonomic, stratigraphic and spatial criteria. High resolution photographs, stereo anaglyphs and many 3d digital models are available. We are keen to share our experiences, particularly of 3d digital models.

¹ <https://www.bgs.ac.uk/data/offshoreWells/wells.cfc?method=searchWells>

² <http://www.largeimages.bgs.ac.uk/iip/britrocks.html?id=250000/258489>

³ <http://www.3d-fossils.ac.uk/>

Thurs - RRI - 09.40 - P3

A Simple Self- Assessment Tool for Collections Management and Care.

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In 2010 the EU SYNTHESYS project launched a simple to use, online self-assessment form to evaluate the status of natural history collections management. (www.synthesys.info/network-activities/synthesys3-na2/self-assessment/) Institutions self-assess at the level appropriate to their collections and resources i.e. institutional or departmental. The survey covers all areas impacting on collections from storage environment and use of materials to budget allocation. Institutions record performance against 63 benchmarks relating to managing collections and an automatically generated report is returned with suggestions for improvement. A criticality factor is applied to the results highlighting areas of greatest risk and also advice on non-urgent areas for improvement. Results were validated and consistency encouraged through audit visits by experts. Results suggested that variation between reported data and the auditors' assessment was a result of interpretation of questions or a correctable weakness in the scoring system and need for audits could be less once these have been addressed. Seventeen institutions from eight European countries completed the survey representing more than 200 million specimens. Of these fourteen were audited. The results were analysed and common strengths and weaknesses identified. Particular areas of strength or weakness were related to institution size. If more institutions complete the survey the more useful data will be available to help direct training, staff development and to support large funding bids to address common weaknesses. Several institutions used the exercise as evidence to support their funding bids. Naturhistoriska Riksmuseet, Stockholm and Naturalis, Leiden for example used the data to plan major improvements to collections management.

Wed -VSS - 12.10 - AC3

EuColComp Testing a European Competency Framework for Vocational Education and Training in Collections Management

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Museums across Europe have similar management, care and use of collections needs but delivery of vocational training and mobility is heterogeneous and exacerbated by variations in staff structure etc. This is a risk to preservation and access. EUColComp is a Leonardo da Vinci Transfer of Innovation

project aiming to reduce risk by helping organisations: identify competencies required for particular roles; identify individuals' levels of competence; identify vocational and educational training (VET) needs.

EuColComp will deliver: a) a web-accessible set of multi-language competencies that can be tailored to suit a range of museums; b) a learning needs surveys identifying existing training and gaps to assist staff in developing competencies; targeted training to help organisations apply them; c) a curriculum to enable institutions to establish staff development roadmaps.

The starting point is the NHM, London collections competency framework. This has been modified to make it widely applicable and readily translated into partner languages. The competencies will be tested in three institutions in three countries to evaluate how factors such as culture and organisational structure affect acceptance. Sociological factors are researched using focus groups and questionnaires.

The training element has gathered data on training provision by web survey. Findings to-date suggest that information is relatively hard to find and fragmented, especially for non-academic courses although new courses have become available in recent years thanks to associations and initiatives such as SYNTHESYS, NatSCA, SPNHC, GfBS, CollectionsTrust, and ICON

The project will also investigate the future application of accreditation to courses and competencies.

Wed -VSS - 12.10 - AC3

Achieving the digitization of biological collections from the Pacific

Shelley A. **James**

Bishop Museum

The Pacific Basin, with its more than 4,500 islands exhibiting a wide range of geology and ecosystems, is among the most threatened biodiversity regions in the world. Baseline species occurrence data is critical for conservation in the Pacific, for biogeographic studies, targeting regions for biodiversity surveys and discovering new species, invasive species documentation, and for taxonomic research. Despite the challenges of funding, infrastructure, and remoteness, numerous initiatives have been established to facilitate the digitization of biological collections from the region. Collaborations between the Bishop Museum, University of Hawaii at Manoa, National Tropical Botanical Garden, University of Guam, and other herbaria located in Hawaii, American Samoa, Samoa, Tonga, Palau, Fiji, and the US have resulted in the National Science Foundation (NSF) funded Consortium of Pacific Herbaria and Macroalgal Herbarium Consortium. Botanical collections from New Guinea are being digitized and made available through the PNGPlants project, and the Global Plants Initiative is making available Type specimens from the region. Other NSF-funded projects are enabling the digitization of insect and vertebrate collections from the region. Initiatives such as the Hawaii Biological Survey and Pacific Biological Survey are helping with the documentation of the biodiversity of the region,

and discussions are ongoing to secure funding to accelerate the digitization and collate biodiversity data from the Pacific, making it readily accessible to researchers, resources managers, and interested public across the world.

Wed - RRI - 11.50 - SCN8

Exploitation of digital collection data at the Museum für Naturkunde Berlin

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Item information of many collections in the Museum für Naturkunde Berlin (MfN Berlin) - as in many other museums - is often stored locally by each curator in different formats such as Excel spreadsheets. These files are often accessible exclusively by collection staff members. Within the project "Exploitation of digital collection data" funded by the Deutsche Forschungsgemeinschaft (DFG) the data from the MfN Berlin mammal collection were transferred from Excel spreadsheets to an SQL server using scripts developed by a database specialist at the MfN Berlin. The data were subsequently standardised, for example in terms of their taxonomic and geographical information. The revised data were then transferred from the SQL server into Specify - a museum database software application. Further aims of this project are the development and implementation of common transfer tools to achieve data migration to open-access databases such as BioCASE and GBIF as well as information retrieval like the current distribution of the specimen from databases like the IUCN redlist. This will allow external information retrievals of collection data and thus will open new avenues for scientific exploration of the collections. We have successfully applied our data transfer pipeline to the mammal collection of the MfN Berlin which is the 4th largest worldwide of its kind. These methods and tools can be used for the data migration of other collections of the MfN Berlin with its approximately 30 million collection objects, and also by other museums.

Thurs - RRI - 12.00 - P9

The historical collections of Alfred Gabriel Nathorst (1850-1921)

Ove **Johansson**

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The collection of plant fossils at the Swedish Museum of Natural History was developed to world-class by Adolf Erik Nordenskiöld and Alfred Gabriel Nathorst during the second half of the 19th century. As head of the Department of Palaeobotany at the Swedish Museum of Natural History from 1884 to 1917 Nathorst established one of the most important institutions for palaeobotany in the world. Nathorst's own collections and related scientific work began in Skåne with Quaternary glacial plant remains and later the Rhaetian-Liassic fossil flora of the coal bearing deposits of Skåne. In

1870 Nathorst went on his first of five scientific expeditions to the Arctic. From these expeditions he brought back comprehensive collections used to describe the fossil floras of the Arctic, e.g. Svalbard and Greenland. These fossils continue to be an invaluable resource for local and visiting scientists to the present day.

Wed - WS - 15.00 - H9

From Museum Specimen Database to Ecological Statement

Christine A. **Johnson**¹, Richard K. Rabeler², & Charles Bartlett³

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The goal of the Thematic Collections Networks, Tri-trophic Digitization Project (TCN-TTD) is to database and image, in part, plant-associated Hemiptera ("true bugs"), parasitoid insects associated with Hemiptera, and the plants on which Hemiptera feed, totaling approximately 2.5 million specimens from 18 insect and 14 plant institutional collections. Integrating these data with other extant datasets, particularly from diverse sources (databases, institutions) with diverse historical workflows and standards such as these, provide a unique opportunity to generate and test various biogeographical and ecological hypotheses. Here we present our progress to date on the digitization efforts and demonstrate the usefulness and some of the inherent challenges of these data with a relatively small dataset of treehoppers and their associated oak species derived from our efforts. We also demonstrate some simple ways to examine database data for quality problems.

Thurs - R6 - 17.20 - P19

Converting pharmaceutical manufacturing space into premier fluid preserved collections facilities.

Lynn A. **Jones**

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Former pharmaceutical manufacturing space, previously Bayer Pharmaceutical Corporation's North American headquarters, now in the Yale West Campus Collections Study Center, was released for use to the Yale Peabody Museum of Natural History for renovations. The goal was to create a shared fluid preservation laboratory and collections room to the highest museum standards. Space requirements were determined

by combining the number of users, most frequent uses, current collections requirements, and long-term projection of collections growth. The project, lasting 12 months, included: defining collections and laboratory requirements, design, construction, and installing mobile compact storage, all while fulfilling federal and local safety requirements.

Thurs - WS - 11.20 - C8

ZooSphere - A tool for automated spheric image capturing and interactive 3D visualization of biological collection objects

Alexander S. **Kroupa**, Martin Pluta, Bernhard Schurian & Falko Glöckler

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Entomological collections, particularly the type specimens therein, are the fundament of the taxonomic research on insects. Since the beginning of collecting activities in the 18th century, some million type specimens (e.g. holotypes, lectotypes, paratypes.) are stored in museums worldwide. There are various threats to these collections: Valuable type specimens are damaged or even destroyed by museum beetles (e.g.) or moths (e.g.). Also changes and fluctuations in light exposure, temperature and high humidity may have negative effects on the objects. Especially the types are even more in danger by shipping them from the museums to specialists for their taxonomic work.

To give full scientific access on the type specimens without shipping the valuable material across the globe, we developed a tool (ZooSphere) for automated image capture from about 400 positions around one specimen. A high resolution image with extremely high depth of focus is produced by using stacking technology in each position. The images will be freely available in the world wide web and will be displayed by a web-based tool developed for rotating and zooming the digital object in browsers. The same technology will be used for an interactive 3D presentation of the objects.

The next steps are 1) joining the ZooSphere images with microCT images from internal specimen structures and 2) creating 3D models of the specimens by applying photogrammetric methods on the ZooSphere images.

Thurs - RRI - 12.20 - P10

Making molehills out of mountains: crowdsourcing digital access to natural history collections

Laurence **Livermore**, Vince Smith and John Tweddle

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The development of cheap mass imaging techniques has made transcription the bottleneck in digitising natural history collections. Internet crowdsourcing has been successfully used across different scientific communities and has the potential to become an effective method for transcribing our natural

history data. We review current crowdsourcing platforms and communities, analyse their efficacy and discuss their potential role in improving digital access to natural history collections worldwide.

Thurs - RRI - 11.40 - P8

The Nagoya Protocol on Access and Benefit-Sharing: The concept, its implementation and its relevance for Natural History Collections and researchers.

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In 1993 the World changed. The Convention of Biological Diversity (CBD) entered into force, with its three objectives (1) the conservation of biodiversity, (2) its sustainable use and (3) the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. With this remarkable turning point, Parties to the CBD agreed that genetic resources (GR) of living and dead animals, plants, microorganisms and fungi fall under the sovereign rights of the states in which they occur and are no longer the common heritage of humanity. After controversial and complex negotiations the Nagoya Protocol governing access to GR and the fair sharing of benefits generated by "utilisation" of GR was adopted in 2010, and is expected to come into force in autumn 2014. The Nagoya Protocol provides an international legal framework

on for providers and users of genetic resources, requiring all participating countries to ensure compliance within their borders.

The Nagoya on Protocol Access and Benefit-Sharing is not a mere political or legal matter; it will strongly influence the way that researchers and scientific institution can acquire and work with biological material.

Therefore, it is crucial for all biodiversity researchers and holders of biological collections to become familiar with the concept behind the new ABS-system, the main features of the Nagoya Protocol and the resulting obligations.

Wed - WS - 17.20 - Pr2

Pitiable pins & lost labels: Issues in identifying historic type specimens

Darren J. **Mann**

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The Hope Entomological Collections contains a numerous important historic specimens from significant entomologists such as Burmeister, Castelnau, Dejean, Fabricius, Francillon, Kirby, Latreille, Leconte and Olivier; in fact the list of authors in the type collections reads like a who's who of nineteenth century entomologists. Sadly, past curators not understanding the value of a pin or the position of a specimen in its original drawer re-curated many parts of the collection thus losing the provenance and value of many specimens. This presentation will give an insight in to the world of being a historic type detective.

Wed - WS - 11.10 - H1

Designing a Workflow to Help with Error Detection in a Paleontology (IMLS Silurian Reef) Digitization Project

Paul S. **Mayer**, L. Connolly, N. Karpus, & A. P. Layng

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The Field Museum is implementing a three-year IMLS grant using summer interns to digitize approximately 15,000 Silurian fossil lots. Workflow for this project has each intern working on six drawers of fossils at a time; the fossils are all from the same geologic period and taxonomic group (as they are arranged in the collection). Interns cycle their fossils through three workstations: a label photography station, a fossil photography station, and a KE EMu data entry station. The average time per specimen to complete this cycle is 9.5 minutes with times ranging between 4 to 18 minutes. After cycling their cart through each workstation I edit, upload, and link the images to the catalogue records. In the first year 7,785 image were generated and linked to catalogue records.

During the process of connecting images to the catalogue there are three opportunities to check for errors. First, KE EMu generates an error log of images that fail to link during the batch input. The error rate is less than 2.2%. Common errors include simple format errors in the batch upload, specimens not entered into the catalogue, and typos in the specimen's catalogue number. Second, because specimens in each batch are from the same geologic period and taxonomic group it is easy to spot any inconsistencies or missing data when reviewing the records in a table format. Finally each record should have two images linked to it. Any missing images are easy to add.

Thurs - RRI - 11.20 - P7

What Species is That?: Museum Victoria's Scientific Art, Rare Books, Field Notes and Manuscripts, and Archives Collections

Maryanne **McCubbin**

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Like many major public museums founded in the nineteenth century, Museum Victoria has significant holdings of scientific art, rare books, field notes and manuscripts, and archive collections. Accumulated and acquired in association with the main business of developing scientific collections, many of these items are, by definition, rare, if not unique, and thus of national and international significance. The collections hold many public values – scientific, historical, exhibition – which may also shift and grow over time; certainly some of their values will only continue to appreciate. The respective types of collections have complex and changing relationships with each other; and the types of material held in each collection means that perhaps there has always been and always will be a blurring of boundaries between them, and indeed with more traditional specimen-based collections. Many museums will find that the ways in which we understand and manage these collections is many and varied, reflecting as they do the complex development and growth of major museums and collections through to the present. The important points are that our systems for the management of these respective collections mean that we can safeguard and account for them, while also allowing the easiest and most likely realisation of their scientific, historical and exhibition values; after all this is the only reason that we should hold such collections at all.

Wed -VSS - 14.20 - ASO2

The “Images of Nature” gallery at the Natural History Museum. From Solander boxes to public display.

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Since it was opened in 1881, the Natural History Museum's impressive building in South Kensington has housed a collection of natural history's artwork, manuscripts and fine books that

soon became one of the most rich and comprehensive in the world.

Until 2011 the collection was only accessible by appointment to the Library; academic researchers, artists, and students were the main users of the collection; in addition small displays were prepared by librarians and archivists for selected groups of visitors and Members of the Museum.

In February 2011, the Museum opened the "Images of Nature" gallery where amongst other displays that tell the story of the development of scientific and natural history illustration and visual imprint, the librarians are now able to display on a rotation basis a significant part of the fascinating collection we look after:

The intention of the talk is to give an overview of how the gallery was developed, and the reasoning behind the selection of the artwork and themes.

Wed - WS - 16.20 - ExI

Unlocking Evidence: Scientific Collections and Environmental Change

Ellinor **Michel**¹ & Eileen Graham²

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Evaluating and predicting change in the global environment is the largest scientific and policy challenge of our time. Forecasting the effects of future change depends on our understanding of changes in the past. Natural history and other scientific collections, such as core, soil and genetic libraries, offer relatively under-utilized or under-integrated sources of critical evidence about the past, and hold the potential for refining our understanding of how natural systems respond to environmental change. Key to obtaining maximal scientific impact from collections is to demonstrate their research value by engaging collections professionals, highlighting the successes, crediting collections sources, prioritising the digitisation of relevant collections, and developing future collaborations. Examples of collections-based environmental change research programs will be presented and to show how this interdisciplinary and innovative approach can be applied.

Wed - RRI - 16.10 - ECI

Unlocking Evidence: Scientific Collections and Environmental Change

Ellinor **Michel**¹ & Eileen Graham²

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Day - suite - Time - Code

The virtually browseable collection: connecting GIS to whole drawer imaging

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Accessibility is one of the most problematic aspects of offsite storage for collections. This project approaches that issue by creating virtual access to a large collection stored 8 miles from the main institution. To create virtual access, we used two elements that already exist for our collection. A GIS map of all cabinets in the repository and a Specify 6 database of records, which relates the specimens in those cabinets to their spatial locations. We combined database and spatial data using ArcGIS Online, because it has cross-platform compatibility. We related a third aspect, drawer and specimen images that are linked to the specimen records and can be viewed alongside the data and spatial records.

Our final result is an online resource that allows the user to virtually examine the collection, query a database file and view the drawer content, individual specimens, and label images when they exist. This product is useful for researchers, teachers and the general public. The latter group is important from an educational stand point but also because many of the collections were amassed using public funds. It fulfills an additional role in that it is a time stamp marker for each drawer: What was located in that drawer, what was its condition? Over time additional images of drawers will be taken providing an archival record of their content and condition.

Thurs - R6 - 14.40 - P13

Bringing ice age collections to lifeNigel T. Monaghan¹

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Excavations in Irish caves over the last 150 years have yielded a rich museum collection of mammal bones that has been used in recent decades for a number of research projects into the faunas and changing environments of late glacial Ireland. Our modern understanding of these island faunas on the northwest edge of Europe is based on AMS dating and genetic studies of bones from old excavations, where contemporary notebooks and recent curation are combined to reinterpret the original fieldwork.

AMS dating has allowed accurate results from small bones or precious specimens and given a chronology that before the mid-1990s was largely conjectural. Detailed analysis of ancient DNA from brown bear bones has identified discrete populations, with interesting signatures relating to extant polar bears, a project being actively developed with a team in California. In zoological collections, study skins have been used to identify the endemic nature of some mammals, linking to their long fossil record. DNA recovery from the giant deer *Megaloceros* has allowed for identification of its nearest living relative, the fallow deer.

Anatomical studies of giant deer based on our museum collections from caves and open sites have addressed antler growth and function, diet and ontogeny, also reconstruction for sculpture, art and animation. These various research projects have been publicised to general audiences through several television and radio programmes in addition to print media. This connects the scientific work in the museum, the public imagination and the value of the museum to society.

Wed - WS - 15.20 - H10

Undergraduates in natural history collections: What are the educational gains and how can we make the experience more impactful?Anna Monfils¹ & Shari Ellis²

¹Central Michigan University

²University of Florida

For small collections, undergraduate students constitute the major workforce utilized to curate collections and facilitate digitization. With the influx of funds from national digitization efforts, more undergraduates are being incorporated into large-scale digitization efforts. The goals of this study were 1) to determine the impact collections-based experiences are having on the students' understanding of the nature of science, and 2) assess how collection-based employment and/or research is impacting the students' undergraduate experience, and/or future career plans. Two surveys were conducted: a curator survey of natural history curators managing undergraduate workers and an undergraduate survey of students working in those collections. Student questions were

derived from the SURE III: Survey of Undergraduate Research Experiences and the URSSA: Undergraduate Research Student Self-Assessment. Results from 167 curators and 258 students reveal undergraduates working in collections are performing high order and critical curatorial tasks. Student responses indicate work in the collections contributes to understanding of core science concepts and influences course selection, choice of major and post-graduate plans. This study provides documentation that students are gaining significant educational and professional rewards from working in natural history collections. In light of the student gains from collections-based experiences, specific and applicable suggestions will be introduced to enhance the undergraduate experience.

Wed - RRI - 12.30 - SCN10

Integrating High Throughput Digitization with Distributed Software: Supporting Data Flows in the New England Vascular Plant Network with FilteredPush Technologies

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⁶ Yale Peabody Museum of Natural History, 170 Whitney Avenue, New Haven 06511, USA

FilteredPush is supporting digitization in two Thematic Collections Networks (TCNs), the Southwest Arthropods Collections Network (SCAN) and the New England Vascular Plant project (NEVP). In NEVP, minimal data records, including current taxonomic identification, state and town of collection, and date collected, are created during imaging at high-throughput digitization stations at digitization sites. Current identification is obtained at the folder level in a pre-capture step and associated with the specimens upon imaging. FilteredPush transports data from the digitization sites by wrapping DarwinCore terms in Open Annotation ontology documents, including metadata about the when, where, and who of digitization, typing as New Occurrence records, and minimal AudubonCore for the images. These annotations are ingested into the NEVP Symbiota portal. The annotations are then available for ingest into the databases of record through new occurrence ingest tools in the Specify 6 collections management system. Additional data will be transcribed, in Symbiota, from the specimen images, and, supporting the science goals of the project, flowering and fruiting state will

be coded for some taxa. These assertions will be wrapped in annotations, typed to reflect domain business operations, and transported to the relevant collections for ingest. Records harvested from network participants into datastores within FilteredPush will be subject to quality control from an Akka workflow that tests the taxon name, georeference, and date collected values of each record. Quality control issues (including proposed corrections) are reported in response to queries by researchers and transported through annotations to both, Symbiota and the databases of record.

Thurs - R6 - 16.20 - P16

Dredging the Memories: Oral Histories at the Peabody

Samantha **Murphy** & Maureen White

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Archiving oral histories as part of a Council for Library and Information Resources Hidden Collections grant is quickly becoming a standard at the Yale Peabody Museum of Natural History across the ten curatorial disciplines. Oral history is the systematic collection and recording of individual memories as historical documentation and original source material. We attempt to collect memories with the same respect used by the museum to collect specimens. Collecting and linking oral histories to collections allows us to better interpret our physical collections and objects, as well as our history as a museum and the development of particular scientific disciplines. A Best Practice has been developed to prioritize interviewees, conduct interviews, and how to catalogue oral histories after completion. The oral histories are managed in KEmu (museum wide database) and usage is based upon a governing agreement between the museum and the interviewee.

Wed -VSS - 15.20 - ASO5

Digitization workflow for a small herbarium

Chris **Neefus**

University of New Hampshire

Funded by the National Science Foundation's Advancing Digitization of Biodiversity Collections (NSF ADBC) Program, the Macroalgal Herbarium Consortium is in the process of digitizing 1.2 million specimens from 49 U.S. herbaria. Digitization is being done at 18 different herbaria whose macroalgal collections range in size from 3,500 to 150,000 specimens. The workflow for the project was designed to work effectively for small herbaria and to be scalable for larger collections. The equipment investment is fairly modest. Imaging uses a 21 megapixel digital camera, copy stand, light box, computer and software. Data transcription and georeferencing is done directly through the projects data portal (macroalgae.org), which was built using Symbiota software (symbiota.org). Most tasks in the workflow can be accomplished reliably by

student or volunteer workers. An overview of the workflow will be presented including: 1) barcoding and skeletal record creation, 2) specimen imaging, 3) image processing and quality control, 4) skeletal record and image uploading, 5) label transcription via OCR and voice recognition, 6) georeferencing via GeoLocate.

Wed - RRI - 11.10 - SCN6

The Role of small herbaria in large digitization projects

Chris **Neefus**

University of New Hampshire

In the U.S., the National Science Foundation (NSF), through its Advancing Digitization of Biodiversity Collections (ADBC) Program, has provided funding to more than a dozen Thematic Collections Networks (TCNs) for large-scale digitization projects. Most of the TCNs include a combination of small, medium and large collections. The presentation will examine how small herbarium collections are being digitized in two different TCNs. One of the TCNs is using two custom-built high through-put systems at centralized digitization facilities. The other TCN is using a more distributed approach in which smaller collections are using relatively inexpensive system to digitizing their own collections. The short- and long-term advantages and disadvantages of both approaches will be explored. Through-put and cost per specimen will be weighed against the long-term benefit of providing smaller herbaria with training and equipment that will allow them to digitize collections beyond the scope of the current project. The value of active involvement of small herbaria in terms of recognition within their own institution will also be considered.

Wed - RRI - 10.20 - SCN5

The place for biological research and field stations in biodiversity digitization

Gil **Nelson**

Florida State University, Tall Timbers Research Station

There are approximately 500 biological research and/or field stations worldwide, at least some of which maintain research collections of various types. These institutions typically focus on specific geographic regions, biodiversity hotspots, or ecologically important natural areas and the collections they hold are often similarly restricted in scope. The professionals who curate these collections are often ecologists, systematists, or field researchers and often do not see themselves as primarily collections professionals. Yet, the collections they manage could provide important data to the scientific community if their data and specimens were digitized. This presentation will consider two important biological research stations from Florida, USA, including Tall Timbers Research Station and Archbold Biological Station. The presentation will recount the ongoing digitization efforts being conducted at these stations and the methods utilized for distributing their digitized data to the larger scientific community.

Wed - RRI - 12.50 - SCN11

Access and Benefit Sharing – global implications for biodiversity research, collections and collection management arising from the Nagoya Protocol.

Dirk **Neumann**¹, Christopher H. C. Lyal⁵, Johan Bodegård³, Cornelia Löhne⁴, Ana Casino⁵, Anne Nivart⁶, China Williams⁷ & Peter Giere⁸

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With the entering into force of the Convention on Biological Diversity (CBD) in 1993 parties to the CBD agreed to a theoretical concept that genetic resources fall under the sovereign rights of the states in which they naturally occur. 20 years later, the entering into force of the Nagoya Protocol (NP) regulating the third pillar of the CBD - the fair and equitable sharing of the benefits arising out of the utilization of genetic resources – enters into force most probably end of 2014. This sets out a strong global legal framework on access to genetic resources, and obliges all CBD-countries to ensure that utilisation inside their national borders is in compliance with the international legal framework and its national implementation. With the entering into force of the Nagoya Protocol in 2015 and the implementation of European ABS legislation, illegal access and utilisation can be prosecuted.

This will affect traditional and modern biodiversity research from morphological comparison to advanced evolutionary biology which are dependent on accession and exchange of specimens stored in natural history collections worldwide. As the NP regulates genetic resources (GR) in general, it reaches beyond organismal research and also affects research disciplines

that are linked to biosciences only indirectly, such as earth or climate science (GR in drill cores, water or soil samples) and archaeo sciences (archaeobotany, archaeozoology and archaeology) exploring ancient DNA.

The permitting and documentation requirements stipulated by the NP adds additional bureaucracy to allow legal acquisition and utilisation of genetic resources accessed outside own national borders. Export, worldwide transfer and exchange of scientific samples will be subject to national and international monitoring and reporting. This effects natural history collections and collection management in signatory and non-signatory countries (such as the USA), but also biocontrol and unsolicited samples sent for identification without NP-conform documentation.

The European legislation acknowledges implementation of voluntary measures suited to reach ABS compliance showing due diligence prior of enforcement the European law. Currently, the Consortium of European Taxonomic Facilities (CETAF) as major European network of taxonomic institutions set up a group to examine the legal issues and to develop solutions how collections can meet the new requirements. The set of guidance documents developed so far include a common Code of Conduct and Best Practice for taxonomic collections. Natural History Collections and researchers worldwide are advised to revise processes and policies and to form networks of (taxonomic) institutions that have CBD-conform procedures in place.

Wed - WS - 17.40 - Pr3

Teachable Moments: the good, the bad, and the undergrads

Kirsten E. **Nicholson**, & Angela Riedel

Central Michigan University

We have a strong Museum Studies Undergraduate Minor program at Central Michigan University for which our museum is a living laboratory. We employ an average of ten undergraduate assistants in our museum every year and work with up to 30 additional volunteers each year (many of whom are in the minors program). Students are trained in all aspects of collections care (including taxidermy and collections digitization; we are working to get our collections fully uploaded to the web) for a wide variety of collections types, in developing and delivering educational programs and activities, in conducting background research for exhibits (as well as developing, constructing, and installing exhibits and displays that incorporate learning benchmarks for target K-12 student audiences), writing grants, and conducting original research. We successfully mentor these students and place them in jobs in the field, and have found that the relationships we establish with them are meaningful, strong, and replete with “teachable moments,” ranging from the very positive to the truly challenging. In this presentation I review our program and discuss lessons learned by them and us in the process of mentoring them from zero to state of the art in the museum field.

Wed - RRI - 11.30 - SCN7

When Popularity Isn't Enough: Advocacy for Natural History Collections in the 21st Century

Chris **Norris**

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Museums in the 21st Century must function in an environment where the costs of an aging population will place increased strains on public funding. In this environment, outreach and advocacy strategies based on largely on public popularity are unlikely to prove effective when museums are measured against essential services such as healthcare and basic education. As a community, it is critical that we develop strategies for advocacy that are based around the importance of collections as a tool for critical scientific research that underpins quality of life. These strategies need to be scaleable for all sizes of collections and adaptable for different disciplines. They need to emphasize use over preservation; be forward-thinking rather than backwards-looking; and involve narratives of success not crisis. Most importantly, we need to develop and articulate the concept of the "collection-centred museum," where education, exhibit, and outreach programs are rooted in well-curated and actively-used collections.

Tues - 12.30 - Inaugural Lecture Session

Preserving highly reactive lignitized woods: issues related to sulphur oxidation

Giliane **ODIN** ⁽¹⁻²⁾, Dario DE FRANCESCHI ⁽²⁾, Ronan ALLAIN ⁽²⁾, Renaud VACANT ⁽²⁾, Véronique ROUCHON ⁽¹⁾

⁽¹⁾ Centre de Recherche sur la Conservation des Collections (Muséum national d'histoire naturelle, Centre national de la recherche scientifique, Ministère de la Culture et de la Communication) USR3224, CP21, 36 rue Geoffroy-Saint-Hilaire, 75005 Paris

⁽²⁾ Centre de Recherche sur la Paléobiodiversité et les Paléoenvironnements (Muséum national d'Histoire naturelle, Centre National de la Recherche Scientifique, Université Pierre et Marie Curie), UMR 7207, CP 38, 8 rue Buffon, 75005 Paris, France

The conservation of lignitized fossil woods remains a true challenge, because of their susceptibility to evolve quickly after their excavation. Actually, these materials are often soaked with water and may contain reduced carbon and sulphide species that are highly reactive in the presence of oxygen. During drying, these materials may evolve undesirably, as attested by efflorescence formation, by mechanical damage and in the most spectacular cases, by combustion phenomena.

To render lignitized fossil woods more stable while limiting the use of impregnating resins, the conservators of the Museum national d'Histoire naturelle, Paris, often use water washing (for periods ranging from one hour to a couple of years) before storage in dry environment. An alternative to these treatments consists in wrapping the wood with a cling film, and letting it slowly dry during few months.

This work was undertaken to evaluate efficiency and side effects of these two approaches. Lignitized woods were sampled on

two different paleontological sites: Angeac (Charente, France, 130 Ma) and Rivecourt (Oise, France, 60 Ma). They were stored within their original sediment in air tight containers and placed at 6°C before experiment. The two woods behave quite differently: The wood from the site of Angeac presents isolated pyrite macro-crystals that remain unchanged when dried without any particular caution. No efflorescence is noticed but the wood splits because of mechanical stress. On the contrary the wood from the site of Rivecourt remains relatively compact but is subject to efflorescence growth when dried in ambient conditions.

Several drying conditions were tested like nitrogen flux, dry air, humid air but none of them gave satisfactory results. Samples were then placed in sealed bags made of cellulosic and nitro-cellulosic films of different air/water permeability. One of these films (335-MS, cellophane, Innovia film, UK) gave encouraging results. In particular, the samples from Angeac could be dried within a month without visible mechanical damage.

Washing was additionally tested for a period of 6 months. This was done in water or in 1% hydrogen peroxide solutions, changing baths every month and monitoring the pH, dissolved oxygen amount and conductivity of solutions. Elemental measurements were additionally performed by inductively coupled plasma atomic emission spectroscopy, on solution and wood samples in order to estimate elemental losses during treatment. Finally, in order to get a better knowledge on the evolution of sulphur speciation, S K-Edge X-ray absorption spectrometry measurements were performed on the beamline Lucia of the Synchrotron SOLEIL (St Aubin, France). This talk aims to report the progress of these experiments.

Wed -VSS - 10.00 - C4

Coding Q?rius: Ranking Education Collections using Safety, Preservation, and Legal Documentation

Lisa **Palmer**¹, Kathryn Makos², Deborah Hull-Walski¹, and Catharine Hawks¹

¹Smithsonian Institution National Museum of Natural History

²(Retired) Smithsonian Institution Office of Safety, Health and Environmental Management

At the Smithsonian National Museum of Natural History (NMNH), an interactive and experimental 10,000 square foot learning space, called Q?rius, opened in December 2013 to bring science, researchers, and collections out from behind the scenes. During the 2012 SPNHC meetings, Bill Watson, then Chief of NMNH Onsite Learning Venues, publically tasked the collections team to prepare specimens using best museum practices. The team was given approximately one year to fill cabinets in the Collections Zone, an area within Q?rius, with more than 6,000 objects representing NMNH's seven scientific departments. Ideally the NMNH Educators desired that all objects be directly handled by the public. However, because of the nature of natural history collections which includes the historic use of pesticides as well as the inherent fragility of many objects, coupled with the dearth of acquisition data among education collections, a scheme was developed to address these concerns. Specialists in public health and safety, conservation, collections management, and legal issues collaborated to develop a three-prong ranking system to assess

the “public handling fitness” of each item. The hazard posed by an object was evaluated against questions of risk: can it be handled or displayed without restriction, restricted to docent-assisted handling, restricted to handling via an enclosure only, or returned to collections? The team implemented rankings by using color-coded labels, similar to the universal traffic stoplight system, to indicate whether the public can handle specimens directly (green), handle with assistance from a trained volunteer (yellow), or view only through barriers (red).

Wed - WS - 09.40 - AO3

Exposing data from small collections: common questions and solutions

Deb **Paul**¹ & Richard Rabeler²

¹ Florida State University

² University of Michigan

Two challenges faced by the curator of a small collection are 1) incorporating digitization into the collection as standard practice and 2) getting digitized data exposed to the community. For any number of reasons, these may appear to be daunting tasks – ones that may be more often avoided than confronted. In a question-answer format, we will explore common questions we heard during a recent CollectionsWeb, SCNet, Central Michigan University, and iDigBio-sponsored small collections workshop and provide a variety of answers that may help put these collections on the “digital map.”

Wed - RRI - 14.40 - SCN14

Using optical character recognition (OCR) output in digitization: see your data before it's in the database and after

Deborah L **Paul**¹, Andrea Matsunaga², Miao Chen³, Jason Best⁴, Sylvia Orli⁵ & Elspeth M Haston⁶

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Before iDigBio, that's Integrated Digitized Biocollections, others began the work of figuring out how to use OCR output with machine learning (ML) and natural language processing (NLP) to improve the efficiency and speed with which data from museum specimen label images can be captured and validated. The Augmenting Optical Character Recognition (aOCR WG) Working Group at iDigBio is pleased to be building on that foundation. Improvements have been realized in parsing algorithms and visualization of data. Recently, researchers at The Royal Botanic Garden Edinburgh (RBGE) successfully used word clouds from OCR output to reveal useful data, otherwise dark, until a specimen label was digitized completely (Haston, et al TDWG 2013). Their work indicates this method results in greater transcriber job satisfaction. Inspired by this work, the OCR Integration Track Team at the iDigBio Citscribe Hackathon showed how indexing, scoring, and visualizing OCR output reveals otherwise hidden search terms, uncovers errors, and can improve the data transcriber and data validator experience. Using open-source software, we presented these ideas to those with transcription tools up-and-running including Notes From Nature, Biodiversity Heritage Library (BHL), ALA Biodiversity Volunteer Portal, Smithsonian Digital Volunteers, and the Lichen, Bryophytes and Climate Change Volunteer Portal using Symbiota software. The aOCR WG is working collaboratively with the Joint Research Activity (JRA) Synthesys3 Project to share expertise for automated data collection for digital images. Got text in your images? How might OCR output work for you? Come talk to our aOCR WG to find out and to share your expertise.

Thurs - R6 - 14.00 - PI1

Preserving botanical specimens treated with mercuric chloride

Melinda **Peters**, Deborah Bell, Catharine Hawks, Linda Hollenberg, Kathryn Makos & Michelle Powell

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The US National Herbarium continues to develop safe handling practices of specimens treated with mercuric chloride. This treatment was used for over two centuries to control insect and fungal infestations in herbarium collections. A lasting effect is the accumulation of vapor within a closed herbarium case, which can contaminate previously untreated specimens if they are stored with treated specimens. A procedure to mitigate elemental mercury sources from botanical specimens in 108 cases was developed in conjunction with the Smithsonian Office of Safety and Environmental Management. Initial baseline mercury concentrations inside each case were measured with a Jerome 431-X Mercury Vapor Analyzer. Specimens were removed systematically to a covered cart and transported to a fume hood where the original pressing papers with each specimen were replaced with new interleaving to reduce residual mercuric chloride treatment and elemental mercury deposits. The specimen bundles were then returned to clean cabinets for a time period and measurements for mercury vapor were retaken. To date, approximately 44% of

the contaminated specimens measured indicate less than 25 ug/M3. This is the American Conference of Governmental Industrial Hygienist recommended Threshold Limit Value for an 8-hour workday exposure average. These have been released for unrestricted access storage. The remaining specimens still exhibiting higher concentrations will remain in restricted storage until further measurements are taken. Other methods of driving off the mercury vapor are being tested in order to secure the safe handling of the remaining treated specimens.

Wed -VSS - 16.20 - Hal

Preserving botanical specimens treated with mercuric chloride

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Day - suite - Time - Code

A novel and effective way for housing cryptogamic collections

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When the California Academy of Sciences (CAS) moved into a new building in 2008, we updated the storage of our cryptogamic collections. The collections were reorganized

following current taxonomy and segregated into separate moss, liverwort, and hornwort collections. Individual packets were rehoused from index-card style to lying flat in acid-neutral palm folders. The collections are organized alphabetically by family, genus, and species. These are sorted into geographic regions when there are sufficient specimens at any taxon level; geographic regions are subdivided as needed. Each palm folder is labeled to indicate which taxon and geographic area it contains. Our standard-sized packets fit in side-by-side rows; however, special sized packets or sheets are accommodated easily. Since packets lie flat within the palm folder, their contents are protected from accidental crushing during filing/retrieving and contents don't settle to the bottom of the packet as when filed "shoebox style." Individual packets suffer less handling wear; packets can be removed easily for loans, and if a specimen is returned and annotated with a new name, it is easily transferred to the appropriate folder. An entire taxon group can be retrieved easily. Depending on the thickness of specimen packets, up to 35 packets can fit comfortably within a palm folder. A standard herbarium cubby will easily hold five folders and can be filled to the top unlike the shoebox method which leaves space the top of each cubby.

Thurs -VSS - 17.00 - Coll 9

Teaching Evolution Using Natural History Collections: How can we do it better?

Jane **Pickering**¹ & Janet Stott²

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Evolution through natural selection is the central organizing idea for the biological sciences and natural history collections, and is the focus of renewed interest in the formal education systems in both the U.K. and the U.S. In September 2014 the topic enters the U.K. Primary National Curriculum for the first time. Evolution is also one of four disciplinary core ideas in the life sciences for the middle and high school level of the U.S. Next Generation Science Standards, which are being adopted on a state-by-state basis over the next few years. But how effective are we at engaging audiences with concepts of biological evolution? This presentation will give a review of recent learning research on why evolution is often rejected as scientific fact, and how that research is being used to inform effective strategies for teaching evolution in two university museums, including case studies of successful programs. The role of digital interpretation within evolution displays will also be examined.

Wed - WS - 10.00 - AO4

New focus on old Indonesian fossil mollusc collections

Ronald **Pouwer**

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Naturalis Biodiversity Center houses the probably single largest collection of cainozoic molluscs from Indonesia. The collection, made up of several subcollections, was for a large part brought together roughly between 1880 and 1950, when Indonesia was colonized by the Netherlands. It was extensively studied in the same period up till the 1960's. Thanks to these studies the collection contains about 2500 type lots. From 1969 onwards the focus of collecting and studying cainozoic molluscs was shifted to European fauna's and the Indonesian collections were slowly gathering dust and only occasionally getting attention of researchers.

Since 2005 large parts of the collections have been upgraded in various ways. The very important Martin-subcollection has been digitised and a type catalogue has been made. The Mijnwezen-subcollection is digitised and has received new labels with extended locality information. Most other subcollections have been digitised and new collections from other (dismantled) university institutions were integrated. Today new research is done on these old collections and new expeditions result in a further expansion of the collection. Much work has to be done, but in the past ten years large steps have been made to open up this scientific treasure box.

Wed - WS - 14.00 - H6

This is how we do things around here – Broadening skills and competencies through staff exchange and training-on-the-job

Christiane **Quaiser** & C., Anja Friederichs

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The Museum für Naturkunde (MfN) holds about 30 million biological, paleontological and geological specimens. Requirements for their preservation, accessibility and management are as diverse as the specimens themselves, and new techniques such as molecular research methods have even increased the demands on the support staff concerned with curation of these collections. In Germany, there are a few apprenticeships for technicians, but there are no follow-up training opportunities. Skills are mostly acquired through learning by doing and exchange of experiences with colleagues. On EU level appropriate training is scarce as well.

The EU framework of Leonardo da Vinci enables two-week training-on-the-job visits of technicians and collections managers in collaborating institutions. These visits help collection management staff operating at all levels in the management and conservation of scientific collections to broaden their skills and expertise and significantly raise

their awareness of alternative approaches to collections management as applied in other European institutions. Much of the learning experience revolves around observing how and why particular procedures are adopted and implemented with "hands-on" effort. Benefits also include the exchange of ideas, protocols and procedures, e.g. on the development of new facilities or digitization strategies. Apart from that, the visits are an important factor for personal motivation.

We will give an insight in our training-on-the-job programme Daubenton DE, effects on staff development and motivation, and we will put it in a broader picture of a European network of collection management staff, staff exchange and harmonized competencies.

Wed - WS - 10.20 - AO5

Michigan Small Herbarium Initiative: the trail from an idea to specimen digitization

Richard **Rabaler**¹, Anna K. Monfils², Timothy M. Evans³

¹ University of Michigan

² Central Michigan University

³ Grand Valley State University

The Michigan Small Herbarium Initiative, a project focusing on digitization of specimens in ten small herbaria, arose from a long chain of events that began at an NSF-sponsored workshop in 2004. We will detail the history, development, current status, and future goals of the project as well as focus on the benefits and challenges that may result from forming such a group and alignment with at least one major collection.

Wed - RRI - 14.20 - SCN13

Georeferencing Fish Collections from the FishNet Network: An Update of Progress and Evaluation of Collaborative Georeferencing Techniques

Nelson E. **Rios**, Henry L. Bart & Michael H. Doosey

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FishNet2 (www.fishnet2.net) is a global network of fish collection databases that gives researchers access to data on roughly 4 million fish species lots, representing over 30 million specimens. Before this project began, only about two-thirds of the records in Fishnet2 were georeferenced. The goals of this collaborative project were to georeference all localities without geographic coordinates and repatriate the results to data providers. The Collaborative Georeferencing Client (CoGe) of the GEOLocate Platform was used to georeference and verify the roughly 250,000 localities in FishNet2 lacking coordinates at the start of the project. Each of the twelve collaborating institutions hired a full-time georeferencing technician to verify and correct the CoGe generated geographic coordinates for localities assigned to his or her institution. Since January 2013, when the georeferencing phase of the project began,

more than 244,000 localities of have been processed (214,000 corrected), and over 1 million specimens records have been processed (935,000 corrected). Records that could not be georeferenced were skipped and reasons for not correcting the coordinates were recorded. Every corrected record includes geographic coordinates in decimal degrees, an uncertainty radius, and most of the records have a user generated error polygon to define the uncertainty in the determinations.

Thurs - R6 - 15.00 - P14

Using Complementarity to Improve Plant Specimen Digitization

Rusty **Russell**¹, Elspeth Haston² & Nicola Nicolson³

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Unlike most zoological specimens, botanical collections distinguish themselves by having duplicates, that is, multiple specimens generated from the same collecting event. These are either from the same plant or from a close population and are distributed among multiple herbaria. Over the last two decades, as digitization has become a significant part of doing business in systematics collections, it's become clear that a great deal of "duplication" of effort has followed "duplication" of plant collections. Aggregators of specimen data, such as GBIF and iDigBio, recognize this phenomenon, as do individual herbaria. In 2005, a GBIF Workshop in Crete, led by the late Larry Speers, addressed this topic and Rusty Russell was tasked with investigating the issues surrounding "duplication". More recently, a joint effort is underway at RBG-Kew, RBG-Edinburgh and the Smithsonian Institution to develop tools to harness the potential that plant duplicates offer toward making digitization a more efficient enterprise. Past and present activities to address this issue will be described.

Thurs - R6 - 16.40 - P17

History of Plant Collecting in southern Alaska (1868-1908), with tangential mentions of extinct sea cows, a mysterious death, political wheeling and dealing, the power of social media, and the Great Conflagration.

Rusty **Russell**

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The turn of the century (the one before this last one) and the preceding three decades in southern Alaska witnessed a remarkable increase in plant collecting that can be attributed

to a variety of interesting events in history. The colonization of Alaska by Russia, the purchase of Alaska by the United States, and the rush to capitalize on vast natural resources and commercial opportunities all contributed, sometimes in obtuse ways, to the collection of herbarium specimens. The result is an outstanding representation of collections in the United States National Herbarium from this period for this locality. A story that will be very familiar to most collections managers is that of "one thing leading to another". What started as a small project to document a specific ethnobotanical collection from Kodiak Island grew into an exhaustive undertaking that will be presented here. And the related stories, as intimated in the title, make this a fascinating account.

Wed -VSS - 14.40 - ASO3

Q?rius: New Methods for Housing Hands-On Education Collections

Leslie **Schuhmann**, Christine Geer Chagnon, Kerry Button

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The Smithsonian National Museum of Natural History has recently opened Q?rius, a new natural history education and lab center focused on engaging teenagers with natural history research and collections. Our challenge was to design and develop methods to house a variety of natural history collections so that they could be safely handled by visitors exploring Q?rius and participating in their collections based programs and activities. The solutions developed allow unprecedented access for the general public to actual collections while preserving the integrity of the objects. We are presenting a step-by-step visual guide to these housing methods.

Wed - WS - 09.20 - AO2

University museums of natural history: whence and whither?

Paul **Smith**

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Within Europe, museums based within universities frequently have collections that date back into the 1600s and occasionally into the 1500s, rooting into the Renaissance origins of modern collections and cabinets of curiosity. The Enlightenment and Industrial Revolution saw an increase in the size and scope of collections, but also in the number of museums within institutions. At the present day there is a rich landscape of museums and collections located within universities, but to what degree are they relevant to modern research agenda? A recent survey, by academics, of a large zoology collection in a UK university concluded that it had no potential for contributing to the research activity of the academic department. Natural history collections do, of course, have an essential role in taxonomy and systematics but, at least in the UK, this type of research is increasingly difficult to fund and the number of practitioners is in decline. It is therefore

incumbent upon the museum community to advocate strongly not only for their collections and usage, but also for the development of the scientific disciplines. This can be achieved in part by extensions of activity that are already museum strengths, such as encouraging young people to study science and view the field as an attractive career path, and having an active volunteer programme. But natural history museums in universities also have a responsibility to act as a lens and focus the research power of their institutions in tackling societal issues and controversies in an authoritative but balanced way that is increasingly difficult to access through everyday media.

Tues - 09.45 - Inaugural Lecture Session

Title to be announced

Mark **Spencer**

The Natural History Museum, Cromwell Road, London SW 7 5BD, UK

Wed - RRI - 16.25 - EC2

“Experience will soon teach you how much arsenic you require...” Old natural history conservation techniques

Sophie **Stevens** & Robert M. Entwistle

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The day book or Receipt Book of George Nathan Maynard is in Ipswich Museum. George Nathan was the curator of Saffron Walden Museum and his son was later the curator of Ipswich Museum. The book dating from the 1880's, details all his procedures but also contains information on the conservation of natural history materials. He details his recipes for making glues used for sticking fossils and bones, and for sealing spirit jars. He writes of his procedures for killing insects in cabinets, "stuffing reptiles and birds", and preserving "stout bodied moths". Tests have been made on some of the procedures with some interesting results. It is hoped that specimens treated by these methods can be identified, and the methods employed by George Nathan will be of interest to delegates.

Thurs - WS - 09.40 - Coll 3

Application of GIS analysis to historical fish collections for research and collection planning

Laura **Tancredi**¹ & Diane Pitassy²

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The USS Albatross, a United States Fish Commission steamer in service from the 1880s through the 1920's, conducted some of the most important marine collecting efforts of the

19th and 20th centuries. These important historical collections, housed at the National Museum of Natural History, are a valuable resource for researchers. The Albatross Philippines Expedition from 1907 – 1910 resulted in one of the largest single acquisitions of fish specimens in the museum's history. With over 23,000 lots currently databased and more being digitized each year, the Philippines expedition provides a comprehensive view of the marine life of this region from the turn of the century. Using GIS to compare collections data from the Philippines Expedition with subsequent collecting efforts in the Philippines over the past 100 years provides researchers with valuable information regarding species richness in local and regional areas over time and may help elucidate larger shifts in biodiversity within the archipelago. With the increased interest in building genetic voucher collections, mapping historic data can be used as a tool to prioritize collecting efforts. The largest challenge to tapping into this invaluable data resource is that historical data must often be enhanced in order for comparative studies to be conducted. The challenges associated with enhancing historical collection data, including vague locality descriptions and inconsistent recording of coordinates, can be mitigated with a combination of georeferencing tools and staff time. Optimizing these efforts can allow limited collections staff to effectively improve the utility of historical collections data for modern research.

Thurs - VSS - 16.20 - Coll 7

Rockband – linking Fossils, Fabrics and Folklore

Christine **Taylor**

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Most museums have geology collections, but many lie unused, often despite requests for sessions linked to the local landscape, through lack of geological knowledge and expertise. A partnership of five museums in South East England, known as Rockband, was set to enable the delivery of geology sessions by staff and volunteer within their museums.

Using funding provided by the Heritage Lottery Fund (Your Heritage Programme), the Rockband partnership was able to bring in expert advice to provide new ideas to help interpret and communicate about the geology collections in innovative and exciting ways, as well as promoting partnership working. The funding also enabled the partnership to learn from best practice elsewhere and to reach out to new audiences including blind and partially sighted people.

A suite of high quality, innovative activities, one for each partner, have been produced, linking the geological resources to the local areas around the partner's museums and their collections.

Thurs - WS - 09.00 - Coll 1

Automated mass-digitization line for individual insect specimens

Riitta **Tegelberg**¹, Janne Karppinen, Tero Mononen, Mira Sääsikilähti, Hannu Saarenmaa

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We present a novel solution for mass-digitization of individual insects. Each specimen will receive a unique ID, and the basic metadata including taxon name will be databased with the ID. A specially designed conveyor belt is being used in the imaging. On the imaging line, plastic pallets made with 3D-printers carry the specimens to the imaging unit. The insect is automatically imaged from above, and the labels attached to the pin are imaged from the side. The underside of labels will be visible through a mirror. At the moment, imaging line is applied to objects between 0.5 – 30 mm in length, and the peak performance is around 500 specimens /day.

This system is being used to process collections donated to the Finnish Museum of Natural History. Digitarium receives collections, and disassembles them, driving them through the automatic digitization line and placing them in units. After digitization, the specimens and produced data will be delivered in taxonomical order to FMNH. The original collection cabinets and drawers will not follow the specimens to the museum. From images, further metadata from the labels can be transcribed.

Thurs - RRI - 10.00 - P4

US National Herbarium: A Plan for APG Conversion on a Large Scale

Meghann **Toner** & Rusty Russell

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The US National Herbarium, one of the premier herbaria in the world, is continuously utilized by researchers. In order to facilitate this research demand into the 21st Century, the management of the herbarium must actively update the taxonomic organizational schema. This updating involves the conversion of our modified De Dalla Torre et Harms plant classification system that was first published in 1908 into the modern Angiosperm Phylogeny Group (APG). Various herbaria around the world are embarking on this conversion and those experiences are being analysed. Small sections of the US National Herbarium have been annotated and from these small-scale rearrangements valuable lessons were learned. One of the greatest challenges to be faced is the lack of space to stage collections as they are reorganized. ArcGIS, a mapping program, is a tool being used to help overcome this issue. This program can create maps of the collection space to provide an easier way to visualize physical space and can be utilized to construct a blueprint for potential specimen shifting. By combining all of this information we can create a plan to curate this collection for future generations.

Wed -VSS - 11.50 - AC2

The use of 3D scanning and printing in the production of replicas for the Stonehenge Visitor Centre

Annette **Townsend** & Caroline **Buttler**

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Three Late Neolithic artefacts owned by Salisbury and South Wiltshire Museum were wanted for display in the new Stonehenge Visitor Centre. The objects, a ceremonial mace head, an incised chalk plaque and a bone skewer pin were not available because the Salisbury Museum wanted to display the originals. Good quality replicas were therefore needed but the owners would not allow them to be moulded directly. The use of 3D scanning and printing was investigated in collaboration with Cardiff Metropolitan University.

The objects were 3D scanned using equipment at AC-NMW and the digital files sent to Cardiff Metropolitan University for printing. The quality of the prints was not precise enough to use for the Visitor Centre display but moulds could be made from them. Silicon rubber moulds were made of the printed replicas and then casts were produced. The materials used were chosen to best imitate the original objects and the casts were painted to produce almost perfect copies. The results of this project are a result of a fusion of new technology and skilled artistry.

Wed -VSS - 09.40 - C3

A sustainable data connection between culture and natural history – OpenUp!

Okka **Tschöpe** & Walter G. Berendsohn

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Natural history collections are keen on publishing and having used their data, because this is a main point in the justification of the rather costly long-term preservation of their collections. The OpenUp! initiative continues to function as an information infrastructure channeling multi-media data from natural history collections to Europeana and other European digital libraries. By the end of the EU co-funded project period in April 2014, 2.1 million multimedia objects were provided to Europeana. Content served includes mostly specimen images, but also animal sound files, drawings, movies and some original texts. OpenUp! implemented a sustainable data pipeline using well established BioCAsE (Biological Collection Access Service) and GBIF technologies. Data are harvested from BioCAsE providers that also function as access points for other networks, such as GBIF, BioCASE, GeoCASE and the Global Genome Biodiversity Network. Collections have been provided with tools for data quality control, and format controls for the mapping of local databases to the ABCD and ABCDEFG standards. The OpenUp! Harvesting and Transformation Component realizes the harvesting of ABCD

data and transforms it into the Europeana data standard EDM (Europeana Data Model). The resulting aggregated database is harvested by Europeana and other virtual libraries using an OAI-PMH standard interface. During transformation, the data is enriched with additional data on synonyms and multilingual common names as well as geographical area names, which greatly improve the possibilities of semantic linking of natural history content with other domains in Europeana.

Thurs - WS - 09.20 - Coll 2

Processing large cetaceans stranded on the Dutch coast: Whale we do this forever?

Karen **van Dorp**

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The executive body of the Dutch Ministry of Infrastructure and the Environment (Rijkswaterstaat) considers large stranded cetaceans environmental pollution.

Naturalis Biodiversity Center has been authorized by the government to be the sole institute for managing and conserving the remains of these stranded cetaceans.

When a whale or a large dolphin strands and dies, our Whale Strandings Team goes to the beaching location. The team assists veterinary pathologists in conducting an autopsy of the animal, takes samples of exoparasites and prepares the animal for maceration which is done in house at NBC. After maceration is complete, the skeleton is stored in the scientific collection. Whale strandings on the Dutch coast are being monitored since the year 1255 and can be consulted on www.walvisstrandingen.nl.

In 2012-2013, five great whales stranded on the Dutch coast. The enormous amount of work involved, combined with an upcoming review of workplace health & safety standards, as well as changing views on the development of Naturalis' collections, has resulted in discussions about the entire protocol around strandings and large cetacean specimen preparation. Issues under consideration include specimen preparation and preservation, conservation of historical cetacean collections, and how to optimize collaboration between research institutes that are involved, while having to deal with limited financial resources and storage space.

Thurs - WS - 11.00 - C 7

Fix for Life: The Development of a New Embalming and Fixation Method to Preserve Life-like Morphology

Andries J. **van Dam**¹, J. Conny van Munsteren², and Marco C. DeRuiter²

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In medicine, the use of embalmed bodies is essential for studying anatomy and for training (new) surgical skills. Almost all embalming fluids worldwide in use contain formalin and phenol of which formalin is responsible for fixation and phenol for preservation of the cadaver. Fixation with standard concentrations of formaldehyde hardens the tissue and severely decreases the flexibility of tissues and joints. Due to its high reactivity, phenol seems to have a negative effect on tissue colour differentiation. Both are hazardous substances which conditions of use and disposal routes are strictly regulated.

As the anatomical community is more aware of the occupational risks involved and of the high costs to reduce levels of exposure, the interest for low-hazardous alternatives grows. Furthermore, in surgical training there is a growing demand for embalmed cadavers with life-like morphology as a safer and more durable alternative for fresh (frozen) cadavers. The newly developed and experimentally tested "Fix for Life" method can provide in well preserved cadavers with life-like morphology for education and training uses over a prolonged period of time without the risk of exposure to pathogens when using fresh (frozen) cadavers or to toxic levels of formaldehyde and phenol when applying conventional embalming methods.

Thurs - WS - 12.20 - C I I

Rising to the challenge

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The last few years have been difficult across our sector, but as all good natural scientists know, survival depends on the ability to adapt to changing situations. NatSCA has embraced this biological truism and has been reviewing its structure and activities, with the aim of streamlining procedures and improving communication to help better support the sector.

With funding from Arts Council England, two paid posts have allowed NatSCA to develop a strategic plan and build the infrastructure required to deliver it. Many of the changes seem small, such as setting up a functional website, organising online payment facilities and creating social media platforms, but these steps will improve support for the sector and have enabled NatSCA to start bigger projects, such as the Natural History NearYou crowdsourcing project.

This project allows us to gather information about the locations of natural science collections in the UK & Ireland and is only possible through integration of our new infrastructure and tailoring of existing freely available systems. This project is itself a stepping stone feeding into the development of a larger collaborative project, through which we hope to gain a better understanding of the composition of collections across the nation.

Achieving big goals takes many small, considered and manageable steps. With support from our membership and our ACE funded posts, NatSCA are taking the steps needed to rise to the challenges we face.

Thurs - VSS - 10.10 - NatSCA5

When Common Taxa Become Endangered: Changes in the Collection Care Strategy of Dry Corals

Wachs, K.^{1,2}, Johnson, C.A.^{1,3}, Nunan, E.^{1,4}, Stenzel, J.^{1,5}, Surovy, M.^{1,6}, Elkin, L.^{1,7}, & Rodriguez, E.^{1,8}

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Corals are marine invertebrates in the Class Anthozoa of the Phylum Cnidaria. Colonial species of the stony corals (Order: Scleractinia) are vital to coral reef formation and home to a vast array of vertebrate and invertebrate organisms with which corals have symbiotic relationships. In recent decades, there has been an alarming global decline in coral reefs, and species once regarded as common are now threatened with extinction. The scientific value of these corals in natural history museum collections is now greater than ever. The Division of Invertebrate Zoology at the American Museum of Natural History houses approximately 4000 dry and fluid-preserved coral specimens that date back to the late 1800s. Museum dry collections are often considered "safe" relative to fluid collections because these specimens do not risk desiccation, which can quickly render fluid-preserved specimens scientifically useless. Thus, collection management prioritization towards fluid specimens has left this minor yet important collection of dry corals in need of a new, long-term preservation strategy. Here, we present a first step in the curation, digitization and re-housing of this historical, dry coral collection.

Wed - WS - 12.30 - H5

What's to lose? Eliciting judgments of future value losses in object and collection values.

Waller, R.¹, Mendez, A.², Portela, R.², Sherlock, E.². & Tomsett, L.².

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Museum collections are vulnerable to damage and loss from a wide range of events, where events may be statistical possibilities, repeated incidents, or ongoing processes. In recent years, application of a risk analysis model has enabled near-comprehensive identification of risks and calculation, estimation, or at least informed guestimates of the magnitudes of specific risks. Any such quantification requires a judgment in the value that has been lost as a result of a change in the state of an object or collection. These judgments are typically made by seeing, or imagining, objects that have already suffered

through the risk event or process being considered. Even as cultural property risk assessment was developed through the 1990's this perception of value lost due to a past event or process as the basis for evaluating future risk was seen only as an expedient means of moving collection risk modelling forward.

Since that time the field of judgment and decision making has made considerable progress in appreciating the complex interrelations between cognitive and emotional contributions to risk perceptions. Also, difficulties from employing judgments of loss in value due to past events to set preferences for avoiding future damage have been encountered. In response to these challenges we attempt to establish a framework for eliciting direct judgements of preference for avoiding specific kinds of damage and loss from collections.

Our presentation first highlights the difficulties in considering changes in value due to past events. Given those sometimes irreducible difficulties, we present a framework for judging preference between alternate futures based on direct comparison of possible future states of a collection.

Wed -VSS - 12.30 - AC4

Using ESP to understand collection needs: Environmental Sensitivity Profiling (ESP)

Robert Waller

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Conservators and related collection care professionals are under increasing pressure to understand and express the environmental requirements for the preservation of their collections. This is necessary both for ensuring the preservation of, especially, the most sensitive parts of collections and for enabling energy and cost saving reductions in climate control demands to be made where those changes will not compromise preservation. For some collections there are strict environmental requirements that must be respected. An ice core collection, for example, must always be maintained below 0°C or it will immediately begin to suffer damage which could quickly lead to complete loss in value for the entire collection. For most collections, however, there will be a part of the collection, sometimes only a very small part, that is most vulnerable to changes or extremes in environmental conditions.

Because the distribution of sensitivities to environmental variations and extremes is so important to collection care professionals it behooves us to develop our ability to recognize at least key characteristics of this kind of distribution. Discriminating not just vulnerable and non-vulnerable collections but also more and less environmentally susceptible objects within a collection ought to be a fundamental skill to be developed to an expert, intuitive degree. This can be achieved by recognizing a set of basic forms of distributions.

Wed -VSS - 11.30 - AC1

Specimen preparation in fast-forward: Time-lapse as a training tool

Gregory J. **Watkins-Colwell**¹ & Geoffrey Giller²

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The use of audio-visuals as training tools in Best Practices is not new. Frequently training, especially training provided in an on-line setting, involves still photographs or video. These forms of imagery have benefits, but are not necessarily useful in teaching procedures that take extended periods of time. We have been experimenting with the use of time-lapse photography as a training tool in vertebrate skeletal specimen preparation. Time-lapse photography has the benefit of showing the entire process of specimen preparation in a condensed time. Additionally, the playback can be done in a way to permit frame-by-frame viewing, which is useful when illustrating important moments during the specimen preparation process, such as removing tissues for molecular collections, or measuring morphological characters such as snout-vent length.

Wed -VSS - 09.00 - C1

Bone Maceration & Bone Degreasing - a Necessary Tool for Preserving Natural History Collections

Günther **Weber**

MEDIS Medical Technology GmbH, Germany
A new method has been developed for use in museum bone preparation 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 fat extracted) to assure proper preservation and longevity of the specimens.

Maceration is the procedure of dissolution of organic tissue. It is best accomplished by the standard enzyme-maceration, whereby 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.

The Issue: 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 preservation 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.

Thurs -WS - 12.00 - C10

The Anatomy of a University Natural History Museum: The Yale Peabody Museum of Natural History

Russell D. “Tim” **White**

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Founded in 1866 the Peabody Museum of Natural History serves Yale University as a resource for research, teaching, and graduate education. Long seen as an avenue for training the next generation of scientists, the Peabody is active in community outreach and engagement since the opening of the Whitney Avenue building in 1926. Eight generations of faculty and curators have shaped the collections and affiliated research of the natural sciences at Yale. Over the past 40 years, changes in the structure of curatorial appointments from the faculty and the appointment of professional collections management staff have shaped the focus of the Peabody’s curatorial divisions and the Museum’s ambitions. Commitments to collections stewardship, collections improvements and digitization in the early 1990s have fostered the adoption of standards and the development of best practices for long-term collections care and informatics. Facilities improvements and new purpose-built facilities have allowed the Peabody to grow in new and exciting ways leveraging student involvement in the Peabody and the birth of the Ecology and Evolutionary Biology Department at Yale.

Thurs -VSS - 14.00 - UC1

Enhancing the Value of Natural History Collections through Original Source Documentation: An example from the Yale Peabody Museum

Russell D. “Tim” **White**

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The value of natural history collections can be greatly improved with the use of original source documentation. Original source documentation, such as field notebooks, maps, photographs, correspondence and personal specimen or locality catalogs can enhance the quality and precision of collecting events and locality information. A variety of documentation has

been used to document specimens and artifacts in museum collections but it is not uncommon to have partial or incomplete information on specimen labels which can lead to false assumptions about an organism's biogeographic range, geological age or stratigraphic range or the provenience of archeological or ethnographic objects. Information from original source documentation can not only augment descriptions but can also place specimens or objects in precise geo-spatial and stratigraphic content. In March 20014 iDigBio and the Yale Peabody Museum of Natural History hosted a three day workshop focused on the development of a best practice for original source documentation. The value and use of archives and original source documentation depends on, in part, preservation, copyright and intellectual control of these materials. Standards from the archival community rely on classification of these materials in a hierarchical arrangement and descriptions of materials following the archival standard Encoded Archival Description (EAD). In many instances numerous specimens or artifacts can be linked to an individual collecting event, which is often described in the original source documentation and serve as an authority for defining these events.

Wed -VSS - 14.00 - ASO1

Seaweed Collections Online: Mobilising data from national and regional museums

Jo **Wilbraham**¹ & Juliet Brodie²

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The seashores and shallow seas around Britain support an important component of UK biodiversity with over 650 species of red, green and brown seaweeds which represent c. 7% of the described seaweed flora of the world. However, over 55% are Data Deficient according to IUCN criteria, there is increasing evidence that large brown habitat-forming seaweeds (kelps and fucoids) are disappearing and invasive seaweed species are increasing. Consequently there is an urgent and increasing need for good quality, verifiable data on past and present species occurrence to inform research into these issues. Museum collections provide crucial evidence points for mapping changing patterns in species distribution around the UK. For this project we aimed to capture seaweed collections data from UK national and regional museums, focussing on our target list of seaweed species which we prioritised by their relevance to environmental change and conservation research. The project also enabled us to develop a network of persons responsible for seaweed collections at the participating institutions. These collections data are disseminated online via the project website. We used a Scratchpad for this purpose (<http://scratchpads.eu>) which provided tools for delivering specimen data and associated information in a customisable website: <http://seaweeds.myspecies.info/>. Fifteen institutions participated in the project over the course of one year and over 8000 records were received, 4334 of which were newly generated as part of the project. This project was funded by the Esmée Fairbairn Collections Fund.

Thurs - R6 - 17.00 - P18

The iCollection model for digitising small collections of natural history

Peter **Wing**, Elisa Cane, Lyndsey Douglas, Joanna Durant, Gerardo Mazzetta, Flavia Toloni

Natural History Museum, London

Modern curation requires digitisation in order to preserve the specimens by reducing the amount of handling and to mobilise and make the data available efficiently. iCollections has digitised 125,000 British Lepidoptera, 15,000 British flowering plants, 8,000 Psyllids and 12,000 beetles in nearly 18 months, and it is, among other projects, piloting the mass digitisation of all collection at the NHM. iCollections aims to mobilise and disseminate through biodiversity informatics portals the data associated with the specimens, and to assign a unique identifier to each specimen. Small natural history collections contribute to increase scientific knowledge applicable to societal needs and interests in the same way as large collections do. In order to test the work flow and pipelines involved, collections of different size of particular interest to NHM researchers have been used; these comprised a variety of specimens on pins, slides, and herbarium sheets. Having achieved a balanced compromise between the need of speed and cost-effectiveness, the work flow adaptation to small collections is proposed and possible solutions for achieving a robust data management system are suggested.

Wed - RRI - 10.00 - SCN4

Posters

Digitising Historic Conservation Records at the Natural History Museum, London

Lu **Allington-Jones**

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The Natural History Museum uses KE EMu as its electronic collection management system. This is a partially off-the-shelf system with bespoke modifications tailored to accommodate the requirements of the individual museum. Modules to record new treatments and the current condition of specimens have been designed by staff from the Conservation Centre. This poster describes a project which aimed to upload all of the centre's treatment and condition records from the last 40 years. Different styles of records required different approaches. The project encountered several problems, and compromises on record quality had to be made.

The project has influenced how we collect bulk data from volunteer projects and has also fed back into the terminology of the database. 23,217 historical records are now electronically accessible and the project is now expanding into records from other departments.

The Lepidoptera Project in the Hope Entomological Collections

Gina **Allnatt** and Molly Carter

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The Lepidoptera Project is a large scale collections management and curation project at the Oxford University Museum of Natural History's butterfly and moth collections. The first phase of this project is the re-arrangement and cataloguing of the collection of butterflies and moths and will primarily focus on moving collection drawers into systematic order and digitally cataloguing their contents (imaging and databasing), as well as undertaking labelling and remedial conservation of specimens where required. The Project is six months into the first phase, and over 30,000 specimens have been catalogued so far. In addition, numerous type specimens that were previously unrecognised have been found within the collections during re-curation. The collections are rich in provenance and contain specimens collected by Charles Darwin, Alfred Russel Wallace and Henry Walter Bates. The Lepidoptera Project has made it possible for these specimens to be rediscovered. The data and image capture of the collections will eventually be made available online.

Happy Accidents: Collateral advantages from developing major projects

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In 2013 the Anthropology Department at the Carnegie Museum of Natural History received NEH grant monies to develop a plan to improve storage of the archaeological collections. The planning process led to identifying issues that are collateral to the main purpose but can significantly affect the environment – even before the main project begins.

During the planning stages we researched and solved the feasibility study by answering such questions as: floor loading, efficient space design and storage furniture needs. Working with outside designers and architects pointed out and reinforced areas of concerns – such as code issues. The process also encouraged staff to come up with good ideas on how to reorganize space for more functional work flow and additional storage. It also enabled us to recognize outdated and unnecessary furniture and materials, for removal and recycling. This poster will explore these revelations.

Significance reviews of Natural Science collections in Wales

Christian **Baars**

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The ongoing project 'Linking Natural Science Collections in Wales' has undertaken a series of collections reviews in museums across Wales. The reviews follow a significance assessment template and capture data about the level of documentation, collections care, value and significance of objects and specimens. Each review was thoroughly prepared in advance. Usually, each museum collection was reviewed in a single day, resulting in the maximum amount of information generated with a minimum input of resources. The reviewers were subject specialists from Amgueddfa Cymru – National Museum Wales, supported by local staff and volunteers. Due to a strictly standardized methodology, the results of all reviews are comparable with those of other museums within

the same partnership. This is one of the important features distinguishing the Welsh Natural Science collections reviews from those undertaken at other museums in recent years, and an important element of the implementation of a Distributed National Collection in Wales.

New Audiences & New Science for Old Fossils

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This poster will present a smorgasbord of projects from the many and varied palaeontology collections of the National Museum of Wales. Results from collaborative work with volunteers, and work experience and PhD students will be displayed on :

Multi-focus imaging of Amber inclusions, using Microfossils in schools workshops, developing handling collections for public interaction, and the laser ablation sampling of brachiopod shells for palaeoclimate research.

I'll also be looking for delegates to share their advice and experience to help with the next project – increasing access to specimens collected from a recently discovered Carboniferous (Duckmantian) fossil forest site at Brymbo, near Wrexham, North Wales.

The Oskar Vogt bumblebee collection - a rich and easily accessible resource for the future

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A large bumblebee collection was established by Prof. Dr. Oskar Vogt between 1887 and 1960. Vogts' collection includes about 300.000 bumblebees from many species and from all over the world, and contains many type specimens. As Vogt aimed to use his collection to study natural variety, he collected large series of species from several parts of their geographic ranges. His collection is potentially a valuable resource in terms of taxonomy, population genetics, ecology and evolution. Recently, all specimens from Vogts' collection have been digitized and published on GBIF, making the data easily accessible to a wide audience. Oskar Vogts' bumblebee collection is thus a rich and easily accessible resource for the future!

Untold Human Stories from the NHM Porifera Collection

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The individual human stories hidden within the collections

of Museums around the world are fascinating, and at times heart breaking. A very small scale study was undertaken in our Porifera collection to document the provenance and localities of unregistered historical material from the collections of two prominent Porifera scientists, James Scott Bowerbank (1797-1877) and Henry John Carter (1813-1895). The research enriched the scientific information, and unexpectedly it also helped to show a previously unknown social history aspect of these collections, as it indicates that the material had originally been gathered by Bowerbank and Carter from a wide range of sources. Although credited to the two individual collectors, the labelling of each collection showed that there had been contributions from corresponding friends and scientists, professional collectors, natural history dealers and by Bowerbank and Carter sampling from specimens in other Museums, Cabinets and Private Collections. Specimen collectors working overseas sometimes risked their lives to collect unusual, valuable material and the historical material provides evidence of careers that were to be tragically shortened in the pursuit of science or financial survival. The collection happily also contains correspondence and labelling which indicates an interdisciplinary exchange of information between Bowerbank and malacologists and botanists who would collect sponges alongside their own work. There was even an unexpected guest appearance by Charles Darwin! The research has shown that even a small cross section of a historical collection is likely to contain much additional useful documentation that is not included in original accession records.

Blaschka marine invertebrate glass models: new techniques to evaluate 19th century glass recipes and condition in order to aid conservation, display and storage

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The Blaschka marine invertebrate glass models are amongst the most unique objects in the collections of the Natural History Museum. They were purchased from father-and-son glassworker team Leopold and Rudolf Blaschka between 1866 and 1889 the models show the diversity of marine life in delicate glass artworks with impeccable accuracy and detail. These objects are made from a variety of materials brought together in glass, skilfully applied paints and enamels conveying

the feel of genuine marine creatures. They served for many years as the only means of displaying the true nature of marine invertebrates and microscopic organisms to the general public, other than spirit collections. Currently a new interdisciplinary research team at the Museum are studying the Museum Blaschka collection (187 specimens) using different non- and micro-destructive techniques. Compositional fingerprinting of the glasses and enamels via Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS), the investigation of the structural properties and morphological features of the models with X-ray micro-computer-tomography (μ CT), will greatly enhance knowledge of these specimens, including details on the manufacturing methods employed, which still represent a mystery. This study will also investigate the surface condition of the models, aiding future conservation, improve storage and display conditions. The range of acquisition dates of the Museum's collection make its useful for studies of changes to raw and coloured glass recipes revealing the manufacturing techniques used throughout the Blaschkas career. The results will greatly facilitate and encourage future collaborations between the NHM and museums worldwide that hold these inspiring Blaschka collections.

A risk assessment to determine whether amber is altered by microCT or confocal microscopy studies: using optical microscopy, FTIR and Raman spectroscopy.

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Amber represents an invaluable "time capsule" preserving fossil inclusions in three-dimensions. As such, amber collections are subject to considerable demand by researchers wishing to examine the specimens trapped within. Many institutions, however, restrict the analysis of important inclusions using state-of-the-art imaging methodologies yielding high quality three-dimensional reconstructions, including micro-computed-tomography (μ CT) and confocal microscopy. This is because it is presumed that both techniques have the potential to physio-chemically alter the amber matrix, but the short-term and/or long-term effects of these analytical methodologies

are unknown. In this study, the chemical characterization of a number of samples of different types of amber was carried out using Raman and FTIR spectroscopy, prior to and after exposure to X-rays in a μ CT scanner and to laser illumination using confocal microscopy. Additional exposure to synchrotron X-rays was carried out on a few sub-samples. Subject to the parameters specified in this study, neither μ CT nor confocal microscopy appeared to alter the amber matrix chemically or visually. Hard synchrotron X-rays, however, imparted a visible discoloration to irradiated amber and copal samples.

Caring for our primates: conservation of the Osman Hill wet specimen collection, Royal College of Surgeons of England

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The Osman Hill Collection housed at the Royal College of Surgeons of England represents an important scientific resource containing several hundred examples of comparative anatomy. Within this unique collection, a large amount of exotic species, many of them endangered or under serious environmental threats, are represented. This material can play an important role in research and education and it is vital that the collection is maintained adequately in order to safeguard its long term future. An initial condition survey in 2011 indicated that many of the fluid-preserved specimens within this collection were in poor condition and in need of remedial conservation in order to secure this resource for future generations. This paper presents an ongoing project aiming at the conservation, cataloguing and storage of this collection. The methods used, including fluid transfer and relabelling, are described as well as the rationale behind these processes.

Preserving Endangered Specimens and Endangered Skills: A progress report

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Although comparative anatomy and pathology collections have historically played a significant part in medical education in the UK, many of these collections have suffered neglect towards the end of the last century. As specimens were used less for teaching and research, collections declined – and with them their documentation and the requisite preservation skills. Recent interest in object-based learning and practical teaching sessions have revived the use of zoological and human pathology and anatomy collections, but there are fewer collections and staff available to facilitate this learning. In order to safeguard fluid preserved specimens and conservation skills, a three-year conservation initiative was launched by the Museums and Archives department of the Royal College of Surgeons of England. 'Endangered Specimens, Endangered Skills' nearing its goal of training new conservators, preserving 900 specimens from the College's collections including many displayed in the College's Hunterian Museum and injecting more 'wet' preparation skills into the sector through a bespoke training programme. This poster outlines the current progress of the conservation work and training carried out at the Royal College of Surgeons of England within the 'Endangered Specimens, Endangered Skills' project.

Insect repairs the eighteenth century way

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In the eighteenth century rapidly developing exploratory voyages were bringing back to Europe large numbers of new animals and plants. The naturalists and others on the ships could spend several years away from home collecting and preserving the fauna and flora. Despite the good condition of many specimens some inevitably suffered damage and continued to do so after they were placed in the museums of both governments and private collectors. William Hunter's insect collection, transferred from London to Glasgow in 1807, was built up from about 1755 through the 1780s. Within it can be seen a wide range of repairs and replacements of parts of specimens to make them presentable for the cabinet. It was not feasible at the time simply to go and collect another, better example. Particularly remarkable and innovative techniques were adopted such as thin sheets of mica for wing support. Examples are illustrated using these old specimens from Hunter's collection.

Pins and pinning insects the eighteenth century way

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Recent research on William Hunter's (1718-1783) insect collection has added to knowledge of early pins and pinning methods. Before mass-production (that began in about 1830) pins were made using a series of labour intensive

processes. These manufacturing techniques are described and the kinds of pin that were marketed are delineated. Pins were made for use in lacemaking, haberdashery, dress-making, banking and in lawyers' offices, etc., but none were made by hand specifically for entomologists.

Detailed morphological pin descriptions have been made and metallurgical analysis conducted using examples from Hunter's cabinet. Some other techniques such as the use of sewing needles and plant spines are included.

Moving Marine Mammals Collections

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The Smithsonian Institution National Museum of Natural History has the largest research collection of marine mammal specimens in the world. Due to the large size of the collection and the large size of some of the specimens, the collection has historically been stored in multiple locations throughout the Smithsonian until recently. The Museum Support Center - Collections Support team was responsible for moving the collections to the Support Center over the course of several years. This poster outlines the challenges of that move and some of the solutions.

The increasing complexity in shipping, receiving, accessioning, and the rise of MTAs: The process and pitfalls at the Smithsonian Institution

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In an effort to protect the biological resources of sovereign nations there has been a push over the last decade to establish agreements that govern the movement and possession of natural history collections used for genetic research. The actions of the Convention on Biological Diversity have led many nations to formulate law and policy governing the use, transport, and ownership of their biodiversity heritage. These agreements called: Material Transfer Agreements (MTA), have proliferated and present a significant challenge to a large and multifaceted research institution. In an institution where international and interdisciplinary collaboration is key, navigating the establishment of such agreements has presented a host of unforeseen challenges from language barriers to ethical

concerns. These issues are reviewed through the experiences of the Smithsonian Institution, United States National Museum of Natural History, Department of Botany.

Integrating a condition survey of herbarium specimens into the digitization workflow

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Introduction of a rolling condition survey of RBGE Herbarium specimens was recommended in the 2010 RBGE Synthesis Self-Assessment Collections Care Report, part of the Synthesis project to improve standards of collections care in European natural history collections.

This pilot survey demonstrated that it is possible to integrate a basic level of systematic condition assessment of herbarium specimens into the digitization workflow, making good use of limited staff time, and raising awareness of preservation issues. In 2011 – 2013, over 8000 specimens in the Zingiberaceae family were assessed, and where necessary referred for preventive or remedial conservation treatments. The survey was subsequently used to record condition of specimens in the Gesneriaceae family; from Chile, Argentina and Uruguay; and for selected collectors.

Assessment of consolidant properties for the stabilization of fossiliferous paper shales from Florissant Fossil Beds National Monument, Colorado

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The Florissant Formation in Colorado, as evidenced at Florissant Fossil Beds National Monument (FLFO), is famous for its exceptionally preserved fossils of tiny insects and plants. The main beds are comprised of 3 paper shale units, each composed of smectite and diatomite couplets. Each couplet is

0.05–2mm thick. The layers split along the bedding planes easily. Because the diatomite and smectite couplets in the shale layers that can be split along the bedding plane to expose fossils, there is a problem with stabilizing the matrix on which these fossils are preserved. Typically, when the shale is first excavated, it is moist from water seepage through the porous shale. If the shale is then exposed to high temperature, the moisture will evaporate quickly, causing microflaking and cracking, usually cutting through fossils, or warping and rippling much like wet paper. This poses two problems, stabilization of fossils that have already been damaged by drying, and keeping newly excavated fossils from drying too quickly and cracking. This study focuses on identifying a good preservation and consolidation regimen for these extraordinarily fragile fossils.

Label imaging workflow from the KU Invertebrate Paleontology collection – a quality-control measure.

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The Invertebrate Paleontology collection at the University of Kansas specializes in fossils from the mid-continent USA collected in the early to mid 20th century. Recently databasing has increased as part of a large-scale digitization project: NSF Advancing the Digitization of Biological Collections (ADBC) Paleoniches Thematic Collections Network (TCN). Undergraduate staff work on a drawer-by-drawer basis and enter data directly from the specimen labels. Many of the labels are handwritten, some are damaged and frequently there are multiple generations of label with one specimen, which can lead to mis-interpretation. Here we describe a label-imaging workflow, using relatively inexpensive point-and-shoot digital cameras with quick upload via the Specify6 attachment interface, which allows for quicker error checking, and reduces the need for verbatim fields. Once labels have been imaged they are enclosed in mylar for protection. Label images are exported along with specimen data to portals such as iDigBio and GBIF, allowing data users to verify the information for themselves.

Moving Marsh's Dinosaurs into the 21st Century

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Stored on custom-built shelving from 1926, the dinosaur collections of the nineteenth century paleontologist Othniel Charles Marsh - including the type specimens of such iconic taxa as *Apatosaurus*, *Stegosaurus*, *Triceratops* and *Camarasaurus* - have historically been difficult to access and study. Though the original storage facility was ground-breaking for its time (featuring an innovative design of adjustable pull-out shelving) aging components increased the risk of mechanical damage to the specimens, while a lack of climate control resulted in fluctuations in temperature and humidity that added stress to

already failing 1870's hide glue joints. Funding from the U.S. Save America's Treasures program, matched by Yale University, has enabled the Peabody Museum to move these historically and scientifically important specimens to compactorized storage in a newly renovated, climate-controlled space. The move allowed the Peabody to complete treatment and stabilization of specimens begun on previous projects and to completely reorganize the collection, reuniting specimens whose elements were previously dispersed to different parts of the original room. This poster presentation describes the long process through which, step-by-step, we have been able to improve the accessibility and stability of these specimens.

AIM-UP! New specimen-based approaches to higher education

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Natural history collections provide invaluable resources for higher education by allowing teachers and students to explore biodiversity directly through examination of specimens and their associated datasets, thereby promoting multiple core competencies in biology. AIM-UP! is a Research Coordinating Network funded by the United States National Science Foundation and developed to increase awareness of natural history collections as critical resources for higher education. Specific goals include (1) training students in museum-based research, (2) developing instructional tools based on online databases, (3) informing educators at non-museum institutions about the instructional power of museum collections, and (4) interacting with the public to increase awareness of the educational importance of natural history museums. Preliminary data indicate that students are unaware of the immense repositories of information contained in natural history collections. To address this, AIM-UP! is developing concept-based and hypothesis-driven educational modules that allow students to use existing museum databases to explore many topics in biology, such as geographic variation, genome evolution, impacts of environmental change. These modules

are targeted to students in bachelor programs and are freely accessible online. Because modules revolve around queries of dynamic museums databases, they can also be tailored to fit specific conceptual, geographic, temporal, or taxonomic interests. Using intensive pre- and post-implementation surveys of student participants as well as extensive interaction with instructors, we plan to evaluate the effectiveness of these modules in (1) promoting core competencies, (2) enhancing understanding of evolutionary and environmental biology, and (3) increasing awareness of the vast educational potential of natural history museums.

Broadening horizons for treatment: The conservation of a taxidermy fish using paintings conservation technique

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In the UK, the expertise and skills of the natural history conservator are increasingly under threat of loss with the reduction in specialist positions and lack of comprehensive training. Whilst undertaking a placement in natural history conservation at the Lancashire Conservation Studio, I found great benefits in working in a multi-disciplinary environment with laboratories covering a range of conservation specialisms. Collective discussion about work projects is encouraged and has resulted in interesting and productive inter-disciplinary skill exchanges. A particular success has been the sharing of expertise with paintings conservation, to take a known technique for consolidation of flaking paint on canvas and develop it to treat a taxidermy fish with loose and lost scales. This method proved highly effective in the treatment of consolidating fish skin; and following further analysis of its longevity for this application, it would appear to have further potential for use on other scaled skins. A lateral viewpoint from a non-specialist who understands the requirements of the work can introduce a new perspective for problem solving, and encourage a crossover of methodology. No matter how separate the disciplines may appear, developing fluid communication of ideas across the conservation sector would benefit us all more than we may imagine.

Specimen riddle- treating a 19th century herbarium to enable substantial analysis.

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Two years ago Museum of Agriculture in Ciechanowiec, Poland, decided to send their 19th century herbarium item to a conservation treatment. The condition of the item of anonymous origin was so poor that it could not be subjected to any analysis or even digital documentation, as each attempt to browse it ended up with replacement of detached specimens and risking further damages. Having a form of an album, the herbarium had broken covers, dismantled construction and

weakened spongy paper support with a lot of tears and losses. The most serious problem though, was the condition of the specimens. According to the handwritten descriptions and stains in the paper support that indicated former specimens' locations, on each page there should be located from 4 to 9 specimens, but over a half of them had fallen off their places and could be found in the area of the spine, often disarrayed within pages. This caused damage to brittle plants, from little cracks to severe breakages or even crushing. However a considerable number of specimens remained in their intended place. The owner wanted to bring the item to the state enabling safe handling and examination and finally, to make it a part of the permanent exhibition.

It soon became obvious that basic examination work must be done during the conservation treatment and led to the close cooperation of the conservator and ethnobotanist. Fascinating treatment process included many typical paper conservation solutions and re-arrangement of puzzle-like assemblage of specimens based on constant interdisciplinary consultation.

Analysis of William Hunter's Eighteenth Century Insect Cabinet in a Scientific and Cultural Context

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William Hunter's (1718-1783) collections, bequeathed to the University of Glasgow, are a fruitful ground for research. Having become a successful doctor and obstetrician in London, Hunter invested in his private museum that housed initially his anatomical teaching preparations. It expanded to cover numismatics, art, books, anthropology and natural history material. His insect cabinets contain about 7,500 specimens including more than 500 primary types of taxonomic significance.

As an entomological resource it is extremely important and was used by contemporary scientists, principally Johann Christian Fabricius (1745-1808). A specimen-based catalogue is on-going <<http://www.hunterian.gla.ac.uk/>>. As a source for other studies it has more potential. This poster describes some ways in which a collection can be treated beyond its own subject-based context. This approach, using broader viewpoints applying new interpretations to this old collection, has been supported by a Leverhulme Trust research grant.

Return of the native (gold): The Wreck of the Royal Charter, Anglesey, Wales -A Welsh - Australian connection.

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Every museum specimen has a story, or, more accurately, many stories to tell. Elements of these stories typically revolve around scientific importance, places, historical or significant people and/or events, social history or dark tales of acquisition. One such set of stories emerges from a small gold nugget within the collection of Museum Victoria.

In October 26, 1859, on the final leg of its journey from Melbourne to Liverpool, with its cargo of gold, the Royal Charter was struck by hurricane force winds and foundered off the Welsh coast at Anglesea. Many of the passengers were returning home after striking it rich in the central Victorian goldfields. Only about 40 of the 490 passengers and crew survived. Some of the precious cargo was recovered at that time.

Recently renewed salvage operations at the wreck of the Royal Charter prompted local media reports of the recovery of gold and treasures from the Victorian goldfields. These triggered a small project that unearthed a link with the disastrous voyage, its cargo and the collections of Museum Victoria. This story was blogged and the specimen record enhanced within the database.

With the expansion of mass communication, through an ever-increasing choice of social media outlets, museums can rapidly respond to items within the main media cycle to get snippets of information from the collections to the public. Collection and Curatorial staff need to be vigilant to take these opportunities to advertise the collections when they present.

Selling future researchers short: are we doing enough to safeguard research material?

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Considerable resources are vested in mineralogical and petrological samples used in research programmes, however equivalent resources are not always put in place to ensure the custodianship of these samples once research is completed. An exception to this is where the samples concerned are registered museum specimens or the research involves the identification of a new mineral species. In the UK, NERC, the government research funding body for earth science, supports the Earth Science Academic Archive (ESAA) which promotes the long-term open access to data.

Research undertaken outside NERC funding does not need to make submissions to ESAA, and so there is no comprehensive means to safeguard samples. It is therefore suggested that a route to reinforce ESAA best practice more widely would be to encourage learned societies to promote responsible deposit, and as a minimum to ensure that all samples published in peer reviewed journals state the repository and relevant information for them to be identified. We aim to gain a better understanding of current practice through (i) A review of where research samples have been deposited, and their

subsequent custodian, from (i) Research projects including PhD studies involving petrological material, within the last 10 years (ii) Petrological and mineralogical papers, relating to Wales, published over the last 10 years and (iii) NERC funded geoscience projects from certain specific years.

A Vital Resource: The Volunteer Program at Cambridge University Museum of Zoology

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Cambridge University Museum of Zoology is currently undergoing a major 3 year redevelopment of both the stores and gallery spaces. This involves the packing and moving of over 4 million specimens into new storage facilities, as well as moving 5000 specimens out of the gallery into temporary storage while the gallery is being refurbished. For the past 12 months we have been using a team of over 30 volunteers to pack up the specimens. Each volunteer undertakes a 2 day intensive training course led by the museum conservators. Once trained they work through a variety of tasks including packing large skeletal mounts, taxidermy, spirit specimens, fossils, etc. under the guidance of in house conservators. This will also include moving the specimens later in the year. They are an integral part of the project contributing not only to the preservation of the collections but to a change in culture at UMZC. This poster will detail how a volunteer program can be a vital resource in museum practice and can be instrumental in the success of a redevelopment project.

An Alternative Preservative: A Comparison of Kaiserling III and Alcohol Solutions

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The majority of natural history spirit collections we have encountered throughout our working experience have been preserved in alcohol or formalin solutions. On a recent training course at the Royal College of Surgeons Hunterian Museum we were introduced to the Kaiserling three part method of preservation. Historically Kaiserling is used within medical collections while natural history collections favour alcohol or formalin methods of preservation. This poster will discuss the use of Kaiserling III in comparison with alcohol, the pros and cons of each preservative, including the cost difference of materials, upkeep and maintenance. It will look into whether we should be using the Kaiserling III method of preservation within natural history collections. We hope to use this poster presentation as an opportunity to gather feedback on the use of Kaiserling III within other institutions and amass thoughts

and ideas on its use.

2000 Birds: The Packing and Moving of Cambridge University Museum of Zoology's Mounted Bird Collection

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Cambridge University Museum of Zoology is currently undergoing a major redevelopment of both the store and gallery spaces. One of the challenges presented to us was how we were going to pack the museums vast collection of mounted bird specimens which number approximately 2000. The methods applied had to be quick, effective, non-invasive and economical. They also had to be compatible for both skin and skeletal mounts, varying in size, fragility and stability. This poster will detail an overview of our techniques and how they evolved over the course of the packing project. It will discuss methods for packing large taxidermy mounts, smaller and more fragile skeletal mounts as well as delicate weaver nests. It will include a how-to guide, pro and cons of each method, and an interactive video of how we decanted the bird gallery.

18,000 Jars: The Packing and Moving of Cambridge University Museum of Zoology's Spirit Collection

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Cambridge University Museum of Zoology is currently undergoing a major redevelopment of both the store and gallery spaces. The spirit store will be the only store to be refurbished, consequently the entire spirit collection of 18,000 jars will be moved into temporary storage facilities while the redevelopment is underway. We have encountered many complications and difficulties throughout the move. This includes the health and safety implications, working with unknown chemicals due to a historical lack of documentation, ensuring an intrinsically safe temporary store and accommodating the necessary weight loading required for the collection. Another challenging factor was ensuring the architects and contractors understood the nature of the collections, their fragility and hazardous properties. The working conditions within the store also caused many problems examples of which are space constraints for both staff and packed specimens, low level lighting, and a precarious route of transportation to the temporary store. This poster will give an overview of all the challenges we have faced throughout the packing process, detailing solutions and short term conservation methods.

Laser Technology in Natural Sciences Conservation: Selecting Appropriate Parameters and Techniques

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Despite being a firmly established technology in other scientific and cultural heritage disciplines, laser technology and its applications to the conservation of natural science specimens are presently limited in the USA. The use of lasers in the wider field of museum conservation continues to gain momentum due to the level of unmatched precision and control that laser ablation offers for removing coatings, corrosion, and contaminants from surfaces without the need for chemicals or abrasive media. The possibility of cleaning a surface without mechanically touching it presents new possibilities for treating friable and fragile surfaces. Such precision would be an asset in the natural sciences for the removal of aged or disfiguring coatings, field preparation materials, or other deposits where traditional methods prove coarse or ineffective. Laser parameters such as wavelength, fluence, and pulse duration need to be fine-tuned to achieve optimal cleaning of organic and inorganic surfaces. Depending on laser parameters chosen, a range of photomechanical, photochemical, and photothermal phenomena may be observed. Selecting the ideal parameters for minimizing physical or chemical change to a specimen while optimizing cleaning effects, however, can be daunting and are not universal to all materials or applications.

This research explores the effects of modifying various laser parameters such as wavelength, fluence, pulse duration, and frequency on the surface of fossil material to determine material sensitivity, damage thresholds, and to help identify optimal settings for safe cleaning protocols. The effects of wet and dry ablation are compared as well.

Salvaging an Historical Herbarium

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Thomas F. Lucy (1844-1906), a medical doctor by trade, lived and collected plants in the Chemung County area in New York for over 30 years. In 1900 he moved to Buffalo and continued collecting plants in Erie Co. for six more years before his death in 1906. His collection of the Chemung County area (with those of other botanists) became part of Clute's (1898) *Flora of the Upper Susquehanna and its Tributaries*. This collection, fully

labeled in meticulous detail and mounted, eventually became the foundation of the Elmira College Herbarium (ECH) where it was databased in 1986. Lucy's collection that went to Buffalo was un-mounted, unlabeled, and eventually found its way to the Buffalo Museum of Science (BUF) where it was housed in newspaper for over 75 years. Without collecting notebooks or labels this collection was almost worthless. Having just databased the ECH herbarium, Kelloff and Kass visited BUF, examined the collection, and originally thought they were the un-mounted duplicates of the ECH. With Lucy's practice of penciling the Patterson (1892) and/or Heller (1898) taxa number along the bottom of the newspapers and including small annotation slips in with the specimens with other collecting information, it was felt that labels could be reconstructed. This historically important collection represented more than the un-mounted duplications of the ECH herbarium. Although 78% constituted Lucy's collection, in the end there were over 2700 records in the database, over 2500 plant collections representing 123 individual collectors.

Rescuing data at risk of getting lost: the reBiND project

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Data generated in studies and smaller projects are often not integrated into institutional data curation processes but stay with the authors on their own data storage systems, often on personal computers. The researchers mostly don't have the capacity to ensure the long-term availability of their primary research data. Since only a part of these data are available in publications, the rest of the raw data are at risk of becoming outdated. These data however could be of great value for the scientific community and should be made accessible and shared for re-use.

This is why the reBiND project (<http://rebind.bgbm.org>), funded by the Deutsche Forschungsgemeinschaft (German research foundation) started. The reBiND team develops a workflow to simplify data rescue. It combines software tools for transforming outdated database systems into well-documented, standardized and commonly used XML formats, like ABCD (Access to Biological Collection Data) with a system for storing, documenting, and publishing the information as web service. The software includes data correction, a review interface, metadata storage using the EML format (Ecological Metadata Language) and an API for making the data retrievable. The data will be connected to the Global Biodiversity Information Facility (GBIF) and BioCASE.

Safety Risk Management of Residual Pesticides in Collections

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Collecting institutions have the primary responsibility to provide a safe environment to anyone accessing their objects or specimens. Potential adverse health effects associated with toxic collections may be mitigated through a disciplined reliance on safe work practices, engineering controls, and proper training. The Health and Safety Committee of the American Institute for Conservation of Historic and Artistic Works (AIC), in collaboration with MuseumPests2014 Conference, has outlined specific procedures to help create an Occupational Safety and Health Plan to protect persons from exposures during work involving artifacts contaminated with pesticide residues. Key components include identifying tasks and their hazards (current treatments plus legacy hazards from residual pesticides), assessing the degree of risk through industrial hygiene/safety/medical exposure surveys, and minimizing risk through remediation, safety protocols, and training.

Policies and practices must also address: (a) practical postings/methods for alerting users that objects have been treated, (b) as-needed access restrictions for cabinets or collections, (c) legal requirements for disclosing known or suspect hazards to the recipient of an object, (d) legal rights to request hazard disclosures from lenders or collectors, (e) decontamination and/or disposal of hazardous materials, (f) effective storage area cleaning and (g) prevention of inadvertent contamination.

Once the commitment is made to create a proactive safety program, hazard control practices are accessible, well-developed, and often inexpensive. Safety investments are not just a legal requirement, but also a positive factor in productivity.

Digitizing a major fungus herbarium using a diversity of tools

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Cornell University's Plant Pathology Herbarium houses about 400,000 fungus specimens (including 7,000 types), making it the fourth largest collection of fungi in North America. Nearly half of our specimens will soon be digitized thanks to three very different National Science Foundation-funded projects: (1) "Atkinson's Fungi" captured data on nearly 45,000 historic specimens collected by prominent Cornell mycologist George F. Atkinson (1854-1918). For this project,

over 30 undergraduates were employed in the time-tested, time-intensive tradition of transcribing individual specimen data into our herbarium database. (2) In contrast, "Lichens and Bryophytes: Sensitive Indicators of Environmental Quality", an Advanced Digitization of Biological Collections (ADBC) project, is making use of rapid-digitization techniques to database our 6,000 North American lichen specimens. First, digital images of their labels are produced; next, data from these images will be transcribed into our database by citizen scientists. (3) "The Macrofungi Collection Consortium", another ADBC project, is also making use of rapid digitization techniques. One goal of this project is the generation of high-resolution TIFF images of all our type specimens. Another goal is scanning and reading the 135,000 index cards of our card catalog, an indispensable finding aid in an herbarium such as ours, where most specimens are ordered numerically by accession number. Optical character recognition (OCR) software is being employed to read the cards. Once the data held in these index cards are parsed, edited and uploaded, our existing herbarium database (currently 71,000 records) will nearly double.

A Tale of Two Mysticeti

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In 2009 the partial skeleton of a large and fragile 5,200 year-old baleen whale was excavated in coastal sediments in Abu Dhabi (UAE). In 2013 a similar sized (70-ft long) skeleton of a 150 year-old finback whale that had been suspended from a ceiling for 25 years outside the Zoology Museum of Cambridge University was cleaned, dismantled and moved into temporary storage for the duration of a refurbishment project. In Abu Dhabi the 4m long fragile skull was in a few pieces due to taphonomic processes in the burial environment. In Cambridge the 4.5m long skull was complete and weighed over a tonne.

Despite the whales' very different contexts and ages and the fact that one skeleton had to be lifted from desert sediments and transported several miles whilst the other skeleton had to be removed from its mount and moved fifty metres, some of the processes used were very similar. The excavated skeleton had to be cleaned and recorded, assessing the sediments and taphonomic processes evident at the site. The displayed skeleton had to be cleaned and the way it was mounted and suspended had to be recorded in detail to facilitate remounting in a couple of years. Interesting pathologies exhibited by the bones were noted in both cases. In particular, both projects necessitated constructing protective and supportive frameworks around the skulls and mandibles, bolting together lengths of galvanised steel 'Unistrut' to enable the large and heavy yet fragile specimens to be safely moved with airjacks and cranes.

The Childs Frick Abyssinian Expedition (1911-12): Enhancing Collection Data with Archives and GIS

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In 1911-12, Childs Frick, son of Pittsburgh industrialist Henry Clay Frick, led an expedition to Abyssinia and British East Africa collecting mammals for Carnegie Museum of Natural History (CMNH). Later, Frick was named an honorary CMNH curator and became curator at the American Museum of Natural History. In the course of an IMLS funded project to inventory and document the African holdings of the Section of Mammals at CMNH, we realized that there is little information associated with the specimens from this expedition. Our first task was to georeference the localities, which we discovered were not consistently spelled by the collectors, were not found on modern or even old maps, and did not present a clear itinerary. We consulted vintage maps and books, archives of our museum and other institutions, and GIS and Web resources. Our findings not only contributed to our permanent specimen records but allowed the production of a map showing a reconstructed itinerary. Once we determined credible localities, our research on individual sites allowed the construction of a Website putting the expedition in the context of its time of African exploration after the turn of the twentieth century.

Preventing humidity and direct water damage in a dried plant collection (DAO)

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Leakage and flooding can result in direct damage by wetting specimens leading to destruction of tissues as well as vastly increasing problems associated with high humidity. Increased humidity in an herbarium, or any dried collection, can also result from natural causes, malfunction of dehumidifier or climate control systems and changes to parts of a building that result in increased moisture accumulation. The risk of the latter includes chemical, biological and mechanical deterioration and health hazards. Recent authors and herbarium risk assessments have called for 40% relative humidity (RH) and none recommends over 60%. Less than 40% RH may lead to brittleness. Molds such as *Erotium herbariorum* can grow within a range of 72-85% RH. This damages material and human exposure to molds can cause allergies, infection and irritation. Even if humidity levels are below the threshold of growth of molds, higher levels may

still facilitate damage by insect pests. Chemical deterioration is equivalent to natural aging and its rate increases under conditions of higher humidity, so any increase above the preferred level is harmful. Mechanical stress occurs when water absorption changes size and shape leading to cracking, splitting and warping as a result of RH fluctuations. A solution to the concern of damage due to overhead water pipes at the AAFC National Collection of Vascular Plants (DAO) included installation of a new cooling system without water pipes. High efficiency dehumidifiers were also installed and humidity levels monitored.

Palaeontology at the Radnorshire Museum: the benefits of major collections in local museums

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Traditionally, the most important palaeontological collections have been placed automatically in national museums, because of their guaranteed long-term security and accessibility. However, there are compelling reasons to support local museums as repositories for internationally-important local collections. The Radnorshire Museum (Llandrindod, Wales) houses a major local collection of Ordovician fossils of the Builth Inlier. Comprehensive displays are accompanied by extensive, detailed interpretation, providing a major reference resource, and the displays are a regular venue for local geological societies. The concentration of these fossils in one place also makes the collection more accessible to specialists than if only the best specimens were deposited in national collections, and the collection forms a coherent ecological sample rather than a selection of only the finest examples.

The importance of the collections helps to solve potential problems with supporting major collections in local museums. Funding for enhanced storage facilities can more easily be obtained, and collection significance may help to insulate the museum from closure during financially difficult times. Voluntary support from local residents is more forthcoming if the community is proud of the local collections. Encouraging local museums to maintain important local collections therefore enriches public displays, enhances the cultural importance of local museums (and their resilience), and reinforces community appreciation of local heritage. Support from national museums and subject specialists is an important part of maintaining a major local collection, but enhancement of local collections increases the resilience and relevance of museums as a whole.

The Museum is Not Wearing Any Clothes, the impact of a General Conservation Re-Survey

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Conservation General Survey Reports are essential documents for seeking preservation funding in the USA. The Survey and subsequent report, completed by an outside party, identify and prioritize the preservation needs of a collection. Many institutions completed surveys 20 years ago or more. A re-survey is helpful in assessing the implementation of previous recommendations, especially when personnel and facilities have changed significantly.

The Science Museum of Minnesota completed its first General Conservation Survey in 1991. In 2012, the museum undertook a re-survey after moving into a new building, with new staff and a new mission statement. The resulting report found that the greatest risks to the collection were not to be found among the Agents of Deterioration. Rather, the report found that administrative decisions impacting staffing levels and funding have marginalised preservation support and collections access. This finding reflects wider trends in the museum world, shifting institutional support from collections to education and exhibit programs.

How do you write a report that tactfully informs your administration to increase collections support without damaging the political capital of collections and conservation staff? How do you leverage the findings to create real change within your institution? And finally, how do you address funding for collections preservation and care?

Integrated Pest Management for cultural heritage – creating a European Standard

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The standard is part of *CEN/TC 346 Conservation of Cultural Heritage, Working Group 4 – Protection of Collections*.

Scope for the IPM standard

Defining IPM principles and describing procedural as well as physical and practical methods for preventing and reducing pests and responding to pest infestations/contaminations within cultural heritage.

Being a comprehensive standard method of managing pest problems for end users such as museums, archives, libraries, historic houses, art dealers and auction house, art transport companies, and commercial storage companies.

Content

IPM strategy

Policies and procedures, IPM coordinator, training and information

Preventive measures – avoid, block, detect and respond

Annexes: General characterization of insect pests, rodents, mould and other pests, as well as descriptions of treatment methods, check lists, etc.

Study of the degradation of Autunian pyritic shale specimens by artificial ageing

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The collections of the Muséum national d'Histoire naturelle (Paris, France) and the Muséum d'Histoire naturelle d'Autun (Autun, France) include many fossils preserved within Autunian shales. They contain unstable sulphur compounds, such as pyrite, whose oxidation results in cracks and efflorescence, mainly related to iron sulphates.

This work aims to reproduce this alteration by artificial ageing of newly excavated shale samples, collected in the Autunian of the Autun Basin, place of origin of the damaged specimens. A special attention was paid on a fossiliferous level called "the layer of Muse" in which pyritized fishes (actinopterygians attributed to *Aeduella*) are currently excavated.

Newly excavated shale samples were artificially aged at 50% or 80% relative humidity (RH) and at 40°C or 90°C. Gypsum (calcium sulphate dihydrate) is the major crystalline phase produced during ageing, which was first considered as problematic, as iron sulphates largely predominate on damaged specimens. An exception was however observed on a shale sample where jarosite, an iron III sulphate, had grown additionally to gypsum. It concentrates around a thin black shiny layer, identified as vitrinite. Looking back to specimens, it was observed that iron sulphates often grow near black shiny matter that present a similar aspect. These observations suggest a possible link between the presence of organic matter and the formation of iron sulphates. Complementary ageing are currently performed in order to validate this hypothesis and to evaluate the efficiency and side effects of resins used by conservators to "protect" the specimens.

Rediscovering Historic Invertebrate Collections at the University of Iowa Museum of Natural History

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University of Iowa expeditions around the world in the late 1800s and early 1900s collected thousands of natural history specimens for research and science education. UI explorer and University of Iowa MNH curator Charles C. Nutting directed most of these expeditions, including voyages to Laysan Island, the Caribbean, and Fiji/New Zealand. Nutting's own research was focused on marine invertebrates, and he described hundreds of new species and wrote extensively on the subject of hydroids. While much of Nutting's material was sent to the Smithsonian, 46,000 marine invertebrate specimens remain at UIMNH. Many were stored and displayed in the museum's Invertebrate Hall until Nutting's retirement in 1926, when the space was assigned to a different university department and the specimens were boxed up and tucked away in the attic. Recent interest from faculty in the Department of Earth and Environmental Sciences has sparked a collaborative project to identify and evaluate specimens in the UIMNH coral collections. With help from EES faculty, staff, and students, UIMNH coral collections are coming to light, and data will soon be available to support global invertebrate research. Plans are underway to begin similar projects to evaluate and identify historic gastropod and insect collections at UIMNH.

Establishing Best Practise: The design and implementation of museum-wide IPM at the Oxford University Museum of Natural History

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The Oxford University Museum of Natural History houses many historically and scientifically important specimens in the fields of Life and Earth Sciences. These specimens, composed of organic materials, are naturally vulnerable to damage by pests. The collections, housed in a 19th century building, means that storage facilities do not always reflect best practice. The result of this has been continuous pest infestation and in the worst cases, irreversible damage to specimens.

In August 2012, the OUMNH began to implement a museum-wide IPM policy for the first time in its history. The museum appointed an IPM co-ordinator who had the task of designing and implementing the policy. Primary research was undertaken, including a widespread monitoring and trapping programme to identify the types of pests inhabiting the building. An assessment was also conducted to examine the existing quality of the buildings' maintenance and housekeeping. With this data assembled, areas of weakness were identified and the necessary preventive measures selected. This includes a 'risk-zone' strategy for all collections, the creation of a quarantine space, and a 'reduced-bin' quota, aiming to decrease the

quantity of general waste. Improvements were also made to the building structure and a deep-clean conducted in all areas. Overall, the new IPM policy for the museum has been a success. The biggest challenge was to change the existing perception of IPM and promote the importance of collaborative effort among all museum staff. An increase of communication, transparency and training has allowed the preventive measures to be more easily implemented and accepted.

Large Vertebrate Preparation and Quarantine Facilities. Latest additions to the NHM Collections facilities.

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Just over a year after the opening of the estate-of-the-art Quarantine Facility in South Kensington, the Natural History Museum now has a new quarantine area in our store building south of the river and a brand new Preparation Facility for large vertebrates.

The project is presented from from design to completion

Making collections work for their keep

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The 21st century has seen growing pressure to increase levels of engagement with museum collections, and need to identify their relevance to external users. This has come about at a time of dwindling numbers of specialist curators who have the knowledge and expertise to add value to collections, and consequently to widen their use.

Petrology specimens feature little in most public displays, have a narrow range of users, and are generally under-exploited. Building and decorative stone collections have the potential to buck this trend because their use in buildings and artefacts throughout human history bridges the arts and sciences.

The Corsi Collection of historic decorative stones is now, thanks to an Esmée Fairbairn Foundation grant, accessible online. All 1,000 samples are imaged and enriched with contemporary and modern data, making it an accessible resource for a very diverse range of users, worldwide.

Interest in the varied local buildings stones in Wales has promoted use of the AC-NMW building stone collections. This interest is underpinned by the activity of the Welsh Stone Forum, of which curatorial staff is a major contributor. This

has also assisted with developing the collection further and documenting otherwise poorly characterised stones.

By promoting the applied use of building and ornamental stones, we provide a vehicle to raise the profile of our collections and museums generally.

We plan to build new networks to scope the type and level of information currently known about building and ornamental stones, and to identify what information will be relevant to other users such as archaeologists, architects, and building and furniture conservators.

Insanity's legacy – the Richard Simmons mineral collection

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When physician Dr Samuel Foart Simmons chose to specialise in the treatment of insanity in the late 18th century, he was called to administer to the most prestigious patient in the country, King George III. In subsequent years as 'physician extraordinary' to the King, he built both reputation and fortune. That fortune enabled his physician son Richard to give up practice and enjoy the life of a gentleman, collecting minerals and works of art. Dr Richard Simmons presented a number of fine mineral specimens to the University of Oxford in 1839, and bequeathed the remainder of his collection in 1846.

Although cataloguing of the Oxford collection only began at the end of the century, procedures were introduced that ensured collectors' labels still extant were carefully preserved. These have enabled us to identify 310 specimens, nearly all of exceptional quality, as coming from Simmons. Many were purchased at the sales of fine minerals held by dealer Henry Heuland in London. As well as selling choice specimens from UK mines and quarries, Heuland obtained exceptional overseas specimens through his associates in Russia, central Europe and South America. This is reflected in the classic nineteenth century localities represented in Simmons's collection. Nearly all these sites are now closed and lost to mineralogists, making the collection an important historical and scientific record as well as a superb resource for exhibition specimens.

Novel Detection and Removal of Hazardous Biocide Residues Historically Applied to Herbaria

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The author has, as part of her doctorate, undertaken research into the detection and removal of hazardous biocide residues applied to herbarium collections to help mitigate the risks of

working within herbaria.

There were two main aims:

- To develop a rapid, cost-effective and non-destructive screening method for identifying toxic residues on herbarium sheets; and
- To establish the most suitable decontamination method for the removal of naphthalene from herbarium collections.

The research concluded that a hand-held UV-A lamp (365nm) provides a rapid and effective method of identifying the presence of fluorescent marks on specimen sheets throughout the herbarium, at Amgueddfa Cymru - National Museum Wales (AC-NMW). These fluorescence are indicative of mercury(II) chloride contamination. Compelling evidence is given to support the hypothesis that the observed fluorescence is due to the reduction of Hg(II) to Hg(I) during the oxidative degradation of cellulose, occurring as part of the natural ageing process. The rate of fluorescence development is shown to be increased by the presence of naphthalene, and is estimated to take at least 30 years to develop.

The decontamination studies demonstrated that air-drying of contaminated specimen sheets in a fume cabinet is a more efficient method of removing naphthalene, than either freeze-drying or oven-drying. It is also the most cost-effective, and the least damaging to the specimen.

This research has raised awareness of the issues surrounding working with contaminated collections and has helped to identify and enable the removal of a large amount of hazardous chemical from the herbarium environment.

Big Fish – the Tale of a Tuna

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The Zoology Section of the Hunterian Museum is home to a large stuffed bluefin tuna, *Thunnus thynnus*. The remarkable history of this specimen was revealed in the course of undertaking collections research to assist in the production of a new account of the life of Dr John Scouler, explorer, botanist and former keeper of the long-gone Andersonian Museum in Glasgow. This nine foot (2.7 m) specimen was caught in the Firth of Clyde and subsequently acquired by Scouler in 1829 for the Andersonian. It was transferred with to the Hunterian with other zoological material in 1888 when the Andersonian museum closed. It may be the oldest existing tuna mount in a museum anywhere in the world and is of interest in fish distribution, fishing records and angling history.

Give a hoot! The conservation treatment of a *Bubo scandiacus* (Snowy Owl) and a *Bubo bubo* (Eurasian Eagle owl) at the Horniman Museum and Gardens.

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In February 2014, the Horniman Museum opened "Extremes", a touring temporary exhibition that focused on animals and their adaptations to extreme environments. The Horniman Museums supplemented the exhibition with specimens and objects from its own natural history and anthropology collections. A variety of specimens were chosen for display, including two taxidermy mounts of owls, both of which were in need of interventive conservation. Pre-treatment condition assessments highlighted that the iconic white and brown feathers of the female *Bubo scandiacus*, were grey and discoloured due to a build up of dirt from years of London pollution. The tail feathers were also damaged with the tip of one feather detached. For *Bubo bubo*, the biggest issue was structural damage to the mount. Sections of the wooden base were missing and the papier-mâché structure had suffered loss, exposing the newspaper inside. As well as obvious aesthetic issues, these factors made the *Bubo bubo* vulnerable to further damage during movement or handling. For *Bubo scandiacus* the heavy dirt layer obscured the colour of the feathers that demonstrated its adaptation to cold snowy climates and therefore made a wet clean of the specimen necessary. This poster discusses the treatment of both specimens; describing the alcohol based cleaning technique used, the simple repair to rejoin the damaged feather tip back to the rachis and mount stabilisation and reconstruction.

William Smith Online: changing the preservation of natural history archive collections

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The increasing use of digital archives has resulted in significant changes in the way research is done. While the use of primary sources has long been recognized as crucial to research in the humanities and social sciences, they have never played as significant a role in the sciences. It is likely because of this that the preservation, access to and use of archival collections within scientific disciplines is so varied.

The recent launch of William Smith Online has seen a complete change in the way archives are preserved, catalogued and made accessible to users at Oxford University Museum of Natural History. It has also contributed to a growing trend in digital archives that have seen the collections of some of the great early scientists in Britain made available online to researchers around the world. The implications of this access have yet to be fully assessed, but the flurry of interest they attract speaks to the potential these collections may have to future research. This poster also reflects on the impact of the digital preservation of archives found in natural history collections

and the considerations that must be made when embarking on a project of this type. An evaluation of the process and the potential for more formal research on these topics is discussed.

Dispelling bias- the use of experiments in Risk assessments to obtain meaningful , and sometimes surprising, values

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Permanent microscope slides have been an essential part of the Natural History Museum's (NHM) collections since the days of Sir Hans Sloane (1660–1753). Today, the extensive zoological slide collections cover a wide range of different taxa, sample types and are housed in a large number of locations, with differing qualities of housing, conditions and documentation.

In 2012 we were tasked with collating a report on the state of the collection within the old Zoology department, including a comprehensive risk assessment.

To make informed decisions on risk it is necessary to know the likely outcome of the risk occurring to that specimen, and it appeared early on in the process, that it was very easy to bring your own bias to this. There appears to be very little literature available on this topic. therefore we set up a range of experiments to more accurately and openly assess the 'real' risk of such scenarios. This poster details the experiments set up and some of the results found.

Orphaned Collections: No Specimen Left Behind

Jamie M. **Smith**

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The world that we live in is diverse and new plant, animal, fungal, and bacterial species are discovered every day. Museum collections, like that of the North Carolina Museum of Natural Sciences (NCSM), provide access to specimens that are integral to understanding the Earth's biodiversity. This library of life helps to facilitate data to address the ever-changing environmental, economic, agricultural, and public health problems. Collections are received from all over the world but recently one collection in particular has become the highlight of the NCSM. In 2007 the NCSM received the Museum of Fluvial Mollusks collection that contained over 29,000 lots. This collection has begun to address many research questions and has provided new information about distribution, morphology, genetics, and introductions of species.

Divining for 'critical elements' in historical geological collections.

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Critical elements are naturally occurring metals and rare earth elements that are vital for our economy and modern technological developments, but which are scarce. They can be found in everyday items such as touch screens and high performance rechargeable batteries, and in more specialised applications such as surgical tools, solar cells and wind turbines. However, the supply of the world's critical elements are restricted to reserves in only a few countries. The rising cost of these elements due to growing demands from developing economies in Asia and South America is unsustainable and governments have provided a new funding stream to find alternative sources for these vital elements.

With over 150,000 rock samples, preserving almost 200 years of collecting, the rock collections at the Natural History Museum, London have recently been a focus for research into critical elements. Many early explorers and pioneers covered large areas to map new territory and collect samples representative of the geology. It is now these historical collecting styles of the past that offer researchers a low cost opportunity to explore the world's geology for, as yet undiscovered, occurrences of critical elements, to understand the geological process that resulted in their concentration, and to research methods for viable, low-cost extraction and processing.

Discovery of unrecognised J. E. LeConte specimens in the UK

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During re-curation of the historic Histeridae (Clown beetle) collection, a series of specimens were noted as needing further investigation, due to the style and content of the handwritten labels. After research into the handwriting, using comparisons with archival material, it was determined that the specimens were sent to F.W. Hope, the Founder of the Hope Entomological Collections, from J.E. LeConte (1784 - 1860). A prominent early American entomologist, these are the first confirmed specimens attributable to LeConte outside the USA. Further research into the specimens is required, as there is a strong possibility that some of the specimens are types.

Building the Thailand National Insect Collection-Queen Sirikit Botanic Garden, Entomology Section (QSBGE)

Wichai **Srisuka**

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The Entomology Section at Queen Sirikit Botanic Garden (QSBGE) was established in 2005 with the objective of becoming Thailand's premier National collection and to provide a sound taxonomic platform for biodiversity conservation in Thailand. Since then the collection has grown to a total of 93,900 specimens (including 149 holotypes and 1380 paratypes) housed in modern facilities within the Botanic Garden complex in Chiangmai, northern Thailand. Much of the growth of QSBGE has been achieved through world-wide collaboration and partnership leading to capacity-building in the facility. A synopsis of past and ongoing collaboration is presented showing how these have supported the development of the skills-base, taxonomic infrastructure and facilities. Building through collaboration and partnership is a model that QSBGE is enthusiastic to further develop.

Mold and Herbarium Specimens: Towards Effective Remediation

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² New Mexico State University and Smithsonian MCI Conservation Intern (2013)

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In 2011 the Smithsonian Institution's U.S. National Herbarium, National Museum of Natural History (NMNH) sent 1747 plant specimens on loan to a non-USA institution. These holdings were from the Guianas (Guyana, Suriname and French Guiana) and included all the collections from three genera of flowering plants. The collection was inadvertently exposed to water which resulted in fungal infestation. Upon return of the collection to the U.S. National Herbarium, the NMNH Botany Department staff and the Smithsonian's Museum Conservation Institute (MCI) developed a remediation strategy.

The project goal was to remove the fungi and salvage the specimens for research purposes. The most frequently encountered types of fungi were imaged with standard digital camera and a scanning electron microscope. Using these images, the fungal residues were categorized by color and intensity/amount of deposits and this information was reported in a summary chart. The second phase of this project will focus on the identification of the fungal specimens in collaboration with the U.S. Department of Agriculture's

National Fungus Collection, Beltsville, Maryland.

Collaboration among MCI and the U.S. National Herbarium, the NMNH Collections Program, and Safety Office has resulted in the development of a protocol for removal of fungal residues from herbarium specimens. A summer intern was trained in fungi remediation and handling of botanical specimens, successfully implementing the protocol. The work included: systematic conservation imaging of specimens infested with fungi, cleaning of botanical specimens and labels to remove fungal residues, separating of herbarium specimens from infested paper mounts and archival rehousing.

Digitizing the Historical Collections of the John Torrey Herbarium

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One of the fathers of American botany, John Torrey's personal herbarium contains valuable historical specimens collected by many prominent American botanists of the 19th century, and includes early collections from most regions of North America. Torrey donated his collection of 40,000 specimens to the Columbia University herbarium in 1860 and he continued to access the collection there until his death in 1873. The entire Columbia University herbarium, including the Torrey collection, became the nucleus of the New York Botanical Garden herbarium when it was established in 1891. As we finish up digitizing our type collections for the Global Plants Initiative, we have turned our attention for this project to digitizing our North American historical specimens collected before 1873, presuming that many of these specimens were consulted by John Torrey and used in the species descriptions in publications such as Torrey and Gray's Flora of North America.

The past is the key to future-proofing the Mineral Deposits Collection.

Helena C. **Toman**

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The Natural History Museum's Mineral Deposits Collection has its roots in the Museum of Practical Geology which was founded in 1838 by Sir Henry de la Bêche. Acquired over a period of 175 years, the collection now consists of 16,000 specimens from mineral deposits around the world. The strength of these historic specimens lies in the preservation of a historical record for global mining activities.

Curators of the past tended to retain select 'one-offs' of the more interesting material and sufficient information to answer basic enquiries dealing with the 'what', 'where', 'when' and 'who'. However, the focus and requirements of modern research are fundamentally different from those of the past. A knowledge and understanding of the wider geological context of each specimen/deposit is now paramount. The absence of such

metadata can inhibit the use of historical specimens within current research.

In order to meet the needs of our diverse users from within the museum, the wider academic community, and industry we must establish consistent practice governing the acquisition and documentation of mineral deposit specimens. The Natural History Museum has achieved this by moving to the acquisition of suites of rocks – and only those suites that provide a complete geological context for each deposit. This will ensure that the historic collections of the future will be of value for a multitude of uses that are presently not appreciated.

Loss Rules! Taking the measure of collection damage and loss scenarios.

Waller, R¹., Mendez, A²., Portela, R²., Sherlock, E². & Tomsett, L².

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2: Natural History Museum, Cromwell Rd, London, SW7 5BD,

Managing risks to collections assumes, implicitly if not explicitly, that we can develop a set of consistent preferences for avoiding particular kinds of damage and loss from a collection. In most areas of risk analysis preferences are converted to monetary units in order to set them to a common scale. It is placement on a common scale that allows verification of consistency as well as rational ordering. Still, there are many problems associated with monetizing cultural and scientific collections. Fortunately this appears to not be necessary. We propose a system of comparing diverse forms of collection damage to a scale based on equivalence to complete loss of a certain number of objects from the collection.

This poster invites viewers to make loss equivalent judgements and to provide reactions, critiques, and suggestions to help guide the further development of this work.

Insights into saving orphaned collections

Daniel B. **Wylie**

Illinois Natural History Survey, Champaign, Illinois, USA

Due to budget cuts and lack of administrative interest, many smaller natural history collections at North American institutions are being neglected, abandoned, or given away. This is concerning due to the potential loss of valuable information contained in these collections. Over the past two years the Illinois Natural History Survey has rescued collections from three taxonomic groups: ichthyology, herpetology and astracology. Over 23,000 specimens were accessioned; these collections not only contained many threatened and endangered species, but also novel distributional data. Rescuing collections involves considerable financial and time commitments. In this presentation I will discuss the specific time and monetary resources used in the accessioning of orphaned collections and problems encountered with improper preservation and curation.

Collection digitalisation at Naturalis Biodiversity Center

Karen **van Dorp**

Naturalis Biodiversity Center, P.O. box 1917, 2300 RA Leiden,
The Netherlands

Naturalis Biodiversity Center runs one of the largest projects for natural history collection digitization to date. At least 7 million objects will be digitized in detail from a total collection of 37 million. The poster explains how and why Naturalis is undertaking this project, what the challenges are and 'digitization on demand'

DemoCamps

Specify 7 for the Web, Specify Insight for the iPad, and other Novelties

Andrew **Bentley**¹ & Specify Software Project¹

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The Specify 7 web application takes the robustness, power, and flexibility of the Specify thick client and moves them to the web browser. Specify 7, available now, addresses the need for individual collections and collaborative digitization projects to share hosted databases and make them web browser accessible with a trivial amount of software installation and management for the end user. Specify 7 uses the same database design as Specify 6 and can be run concurrently with thick client installations installed on Windows, Linux and MacOS X workstations. Specify 7, like Specify 6 is licensed and managed as an open source project; it utilizes Javascript, Python, Django, JQuery and Apache for software infrastructure. The Specify Project web site is located at: www.specifysoftware.org.

Specify Insight for iPad (2+) distils the contents of a collection catalogue database into a data browsing and image discovery app. It highlights the holdings of a collection with gesture-based queries, maps and image browsing, and of course the traditional tabular display of collection object data. Specify Insight is an exceptional tool for curators, directors, institution presidents, provosts, and ministers of science to carry and showcase institutional holdings in settings and professional circles beyond the usual collections data channels. Specify Insight is written in Objective-C, open source licensed and obtainable from the Apple store.

Other novelties to be demonstrated will include updated capabilities of the Specify Web Portal for publishing collections to the web, Specify image attachment handling, and other recent enhancements.

Thurs - WS - 14.10 - Demo 1

GB/3D fossil types online – not only the largest collection of 3D digital fossils, but also major format, schema and vocabulary conundrums.

Howe, Mike P.A.

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The ICZN and the International Code of Nomenclature for algae, fungi and plants require that every species or subspecies has a type specimen to define its characters. Many were described over a century ago, and with time, collections have been moved or amalgamated, and type specimens can deteriorate or become lost. The project partners, the British Geological Survey, the National Museum Cardiff, the Sedgwick Museum Cambridge, the Oxford Museum of Natural History and the Geological Curators' Group (representing other national, university and local museums) have collaborated to

create an online database of British macrofossil types: www.3d-fossils.ac.uk.

The web portal provides data about each specimen, searchable on taxonomic, stratigraphic and spatial criteria. High resolution photographs, stereo anaglyphs and many 3D digital models are available. The portal is equally accessible to academia and the public, and represents the largest online collection of virtual fossils. It is improving the quality and efficiency of research, reducing unproductive loans and visits, and providing a valuable resource for amateur palaeontologists and the public.

The project has highlighted the problems in combining museum databases – even different implementations of the same product – and hence the need for common schemas and dictionaries. Likewise, the lack of general agreement over file formats necessitated careful consideration of the many available choices. JPEG2000 was selected for images, because of its speed in accessing large files, and .PLY and .OBJ were chosen for 3D digital models - .OBJ because of its flexibility and .PLY because of its relatively small file size.

Thurs - WS - 16.00 - Demo 4

Infrared thermal imaging as a collections management tool

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Natural history collections often contain specimens with conflicting environmental requirements. Therefore the (sometimes subtle) differences in environmental conditions within a collections storage area should be exploited appropriately - if the different microenvironments can be identified and quantified.

Digital infrared thermal imaging cameras can be used to instantly and accurately measure and visualise even subtle temperature gradients within a store, to provide a much more detailed understanding of the complexities of a three-dimensional space than any other datalogging equipment can currently provide. The differences in temperature can be used to infer likely differences in relative humidity levels as well.

Digital infrared images present their temperature data in a highly visual format that is generally intuitively understood and is easily analysed with proprietary software. Using an infrared camera to investigate storage or display areas will reveal, for instance, temperature gradients due to stratification, hot spots, cool drafts, damp patches and unlagged heating pipes under floors etc – all of which would otherwise be invisible. Some of these differences will be subtle but some can be surprisingly abrupt and extreme, and none would be picked up by 'traditional' methods unless a huge amount of time and money were deployed.

Whilst infrared cameras are sometimes used in museums to investigate where energy (and finances) can be conserved, their application for collections management purposes is rare simply due to a lack of awareness of how the technology can

be usefully applied. Several factors influence the accuracy of the interpretation of the data so training is required.

Thurs - WS - 16.20 - Demo5

FP-DataEntry, a tool for bringing community knowledge into data transcription applications.

Chuck **McCallum**¹, Paul J. Morris^{1,2} (Presenter), James Hanken¹, Maureen Kelly¹, David B. Lowery^{1,5}, Bertram Ludaescher⁴, James A. Macklin³, Robert A. Morris^{2,5}, Tianhong Song⁴

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Similar versions of botanical duplicate and paleontological locality records are often held in multiple natural science collections. In such cases, data quality and capture rates can be enhanced by access to pooled data at the point of data transcription. In the FilteredPush project, we have built a generic tool, FP-DataEntry, designed to integrate with existing web-based data transcription or data management applications.

FP-DataEntry provides a server-side indexing service plus a web interface that queries the index and transfers data to an existing client web application. The server is domain independent, designed for configuration with a description of a data set to be indexed, the fields available in the index service, and the user interface. The index service can be invoked from any software in object-to-image-to-data workflows, or, FP-DataEntry's user interface can be integrated with an existing application with a bookmarklet or a small amount of code. After populating one or a few fields (e.g. collector name, collector number) in their native data entry application, the user invokes (in an iframe) the FP-DataEntry interface, which queries the index and retrieves potential matches, from which the user can select or edit values to conform with the paper records being transcribed. The selections are transferred back to form fields in the client.

We have configured a server (with a client at Yale) for botanical duplicate information from the Northeast Vascular Plants project, another for lichen exsiccata, and others as demonstrations outside the biodiversity domain. FP-DataEntry is available from sourceforge and <http://wiki.filteredpush.org/FP-DataEntry/>

Thurs - WS - 16.40 - Demo6

The Field Book Project: The Starting Point of Natural History Collections

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For over 25 years, natural history collections have been funding efforts to digitize specimen data and, more recently, create digital image surrogates for literally millions of specimens. Ironically, little attention was being paid to a large number of original field books and related documentation (maps, photos, sketches, diaries, etc.) produced by the collectors of these objects. These materials describe, in first-hand accounts, the actual specimen collecting events. Although some have been managed in a controlled fashion by libraries and archives, a greater number (fide our experience at SI) were stored in less than optimal conditions. The Field Book Project was begun as a means of addressing this issue for the sake of these materials and for the good of science. The Field Book Project has four goals: 1) locate and catalogue all Smithsonian field books and related materials, 2) make this content universally available, 3) image and transcribe field books to provide even greater accessibility, and 4) design a Field Book Registry that will coordinate efforts among collections to expose their content. In early 2013, the Field Book Project loaded more than 7,000 field book records to the Smithsonian Collections Search (SCS) site <collections.si.edu>. Hundreds have been fully imaged and scores have been fully transcribed ... two processes that continue with available funding. The SCS contains millions of records from all corners of the Smithsonian, including art, history, and science. We will demonstrate how to search for field book content in this heterogeneous mix.

Thurs - WS - 14.30 - Demo2

Historical Expeditions Website (Botany) at the Smithsonian

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The relevance of natural history collections is measured most often by its value to the scientific enterprise. In support of studies in evolution, systematics, biotic and physical change, we have built enormous collections to document the physical and biological world in which we live. Our ability to bore into the earth, launch ourselves into deep time, and enter the sub-molecular world of living organisms has allowed us to understand our world like never before. However, our ability

to reach out to a much larger public, one that has the capacity to support our scientific endeavour in a significant way, depends on discovering a more personal connection. To this end, the United States National Herbarium has constructed a site that describes the details of over 40 journeys of exploration, each of which has produced a collection of plant specimens which are now deposited at US. Our link to history is one to which most people can relate. The words explore and discover evoke a special, almost romantic, reaction. Expeditions are about people and events; they are about struggles against adversity; they are about a time now long behind us. The content for this website was produced almost exclusively by summer interns, and the resulting presentations are both fun and informative.

Thurs - WS - 14.50 - Demo3

Symbiota crowdsourcing module for the Lichens & Bryophytes TCN

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The project 'Lichens Bryophytes and Climate Change (LBCC)' is funded by the NSF-Advancing Digitization of Biological Collections (ADBC) Thematic Collections Network (TCN) program and aims to digitize ca. 2.3 million North American lichen and bryophyte specimens from over 60 collections representing well over 90% of the remaining North American specimens from Canada, the United States and Mexico. In its third year of digitizing > 1.2 million lichen records are available at <http://lichenportal.org> and > 1.8 million bryophyte records at <http://bryophyteportal.org>. Digitization involved imaging the specimen labels and uploading them into the open source online collections management system 'Symbiota' (<http://symbiota.org>) where they become immediately available for transcription. The project was able to expand the already very sophisticated editing interface in Symbiota and developed functionality for citizen science to access the data. Employing the Drupal content management system, we developed simple querying tools in which volunteers can find specimens collected in a geographic area or taxonomic group of interest. The query utilizes information gathered from the label images via optical character recognition, presents the user with a set of records and forwards him/her to an abridged Symbiota screen for editing. In contrast to other citizen science interfaces that accomplish this task of transcribing information from an image, this approach allows the data to remain within the overall management framework, become available immediately, and do not have to be pulled out of the database and reintegrated later. This provides for seamless collaboration between volunteers, imagers, collections managers, and anyone interested in the data for research. In addition, this approach can take advantage of sophisticated quality control mechanism

and search for duplicates already built into Symbiota, while not overwhelming the citizen scientist with the entire complexity of this system. The Drupal site allows for social networking among the volunteers and with the collections managers, plus posting of help specific for lichen and bryophyte labels. We will be demonstrating the functionality of the volunteer interface which can be accessed from <http://lbcc.lichenportal.org> and <http://lbcc.bryophyteportal.org>, as well as Symbiota's editing interface.

Thurs - WS - 17.00 - Demo7

AnnoSys - an online Tool to annotate Biodiversity Data

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Annotations are an important quality control mechanism in biodiversity research. The increasing accessibility of specimen data via the Internet calls for a general online annotation system that ensures the continuance of traditional data sharing and documentation of specimen data after their mobilisation through digitisation.

The AnnoSys project (<https://annosys.bgbm.fu-berlin.de>) developed an annotation data repository for complex and cross-linked data including back-end server functionality, web services, a message system and an on-line user interface. AnnoSys is an open-source, web-based application. The intended audience includes scientists and curators as well as citizen scientists. Based on the W3C Open Annotation Data Model, annotations are accessible via web services supporting SPARQL and Linked Open Data.

The AnnoSys interface allows researchers to create and search for annotations. If a record has been annotated, annotation and original record are stored together in the annotation data repository and are accessible through the AnnoSys user interface. A message system informs curators and scientists specifically interested in a subset of data about new annotations.

Unlike simple annotation systems that allow only unstructured comments associated with records, AnnoSys allows structured annotations of specific elements of a record. AnnoSys has been implemented using ABCD-standardised data from botanical collections and is now integrated into the Virtual Herbarium Berlinense and the BioCASE portal.

In contrast to the Filtered Push project, which pursues a distributed approach in facilitating and communicating online annotations, AnnoSys provides a central web interface and data repository that can be queried externally.

Thurs - WS - 17.20 - Demo8

NatSCA Panel Session

Thurs - VSS - 11.00 - NatSCA6

Chair of panel - Clare **Brown**, Curator of Natural Science, Leeds Museum Discovery Centre

"As the outgoing Chair of NatSCA I have had the pleasure of overseeing three years of a dedicated committee delivering inspiring projects. My day job is Curator of Natural Science for Leeds Museums and Galleries in the north of England - the largest local authority museum in the UK. NatSCA, through its volunteer committee, has been working hard behind the scenes: improving the way we work, improving our communications, commissioning visitor surveys, monitoring collections at risk and establishing a peer-reviewed journal amongst many other things. All of this has been with the firm aim in mind of being an effective and important advocate for the natural science collections of the UK and the staff that work with them. I will be chairing this session, not representing NatSCA – I'm sure the discussions will crossover with much of NatSCA's recent advocacy work."

Henry A **McGhie**

An examination of 'what advocacy is', debunking any ideas that it is some kind of 'dark art'. This presentation will discuss work we are doing in the North West, reviewing collections and developing advocacy materials.

Henry A McGhie is Head of Collections and Curator of Zoology at Manchester Museum, University of Manchester

C. Giles **Miller**

The Geological Curators' Group is an affiliated group of the Geological Society of London and was founded in 1974 to advance the education of the public in geology, in particular by improving the standard of geological curation and by improving displays and information in public museums and other institutions. This is achieved by holding meetings for exchange of advice and information, surveying collections, drawing up codes of practice, furthering the conservation and documentation of geological sites and conducting surveys for the promotion of the aims of the group. The group publishes a journal, *The Geological Curator* and a newsletter *Coprolite*, and these are our most traditional methods of advocating geological collections. More recently we have used our regularly updated website and social media such as Facebook, Twitter and blogs to communicate our activities and those relating to the importance of geological collections management. In these times of limited resources and lack of funding for collections positions, we are looking for 'quick wins' to make our vast archives of information from our journal more widely available and relevant. The signing of an MoU between ourselves, NatSCA and SPNHC is a good step forward towards working together so that we can share information about our successes in a co-ordinated manner and better reach those responsible for making the decisions about the future of our collections.

Giles Miller is Senior Curator, Micropalaeontology, at the Natural History Museum and currently Chair of The Geological Curators Group

Luanne **Meehitiya**

Advocacy has been an important part of the role of the natural sciences curator at Birmingham Museums Trust. Taking on this previously vacant post, it has been important to explain the uses of natural science collections and involve people with them both inside and outside the organisation. At the same time, an ACE funded review has started of biological collections in the West Midlands running from 2013 to 2015. The aim of this is to develop a snapshot of the significance, care and use of biology collections across the region, one outcome of which is to create a tool for advocacy. The consortium project will also be discussed which aims to develop specific projects through which the Natural History Museum and UK regional partners can work together to support and promote natural science collections.

Luanne Meehitiya is Natural Sciences Curator at Birmingham Museums Trust

Chris **Norris**

The Society for the Preservation of Natural History Collections (SPNHC) is an international organization whose mission is to improve the preservation, conservation and management of natural history collections to ensure their continuing value to society. In contrast to other organizations with a disciplinary focus, or which represent and advocate for collections at an institutional level, SPNHC concentrates on the people who work with collections – curators, collection managers, conservators, registrars, etc. – and the development of resources to train and support them in that work. Increasingly, SPNHC seeks to work in partnership with other organizations with complimentary missions (e.g. AIBS, AIC, NSCA, NatSCA, GCG, iDigBio) to develop cooperative approaches to outreach and advocacy.

Chris Norris is Senior Collections Manager at Yale Peabody Museum of Natural History and currently President of SPNHC

Rob **Huxley**

One of the key aims of the Collections strand of the NHM UK National Programme has been to seek opportunities for collaboration in the UK to address the challenges facing collections. A consortium of some 30 natural history museums and herbaria and organisations such as NatSCA and GCG has been formed and working groups are addressing developing support networks and advocacy. The latter group led by Dr Nick Merriman, Director Manchester Museum is exploring the advocacy and who are we seeking to influence, inform and at what scale. For example a portfolio of the many case studies could be pulled together that emphasise the value of natural history collections and then arrayed and targeted particular audiences. In essence: “What are we trying to say and to whom are we saying it?”

Rob Huxley is Principal Curator at the Natural History Museum, London and a past president of SPNHC

Leonard **Krishtalka**

Three factors make natural history museums/biodiversity institutions and their collections powerful advocates for environmental stewardship. First, authoritative knowledge—our collections and associated data voucher and document the life of the planet for repeatable research and education. Second, potency—computational informatics now enables deployment of the collection-based data in powerful simulations and forecasting of environmental phenomena. Third, trust—the public consistently most trusts information in museums, among all institutions, which endows museums with a powerful responsibility and voice.

Leonard Krishtalka is Director of the Biodiversity Institute, and Professor of Ecology and Evolutionary Biology at the University of Kansas.

SPNHC Special Interest Groups

Collections Digitization and Opportunities for International Collaboration

Fri - Loc.TBC - 11.00

iDigBio Working Groups + SPNHC SIGs: Collaborating to further digitization efforts

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In this age of increasing focus on specimen digitization, the number of initiatives and methodologies are both increasing. We feel it is essential to foster a larger integrated network among participants in these initiatives, by encouraging members to get involved in each other's groups across continents and across domains. One aspect that will help focus this effort is enhancing networking between iDigBio Working Groups, SPNHC in general, and SPNHC Special Interest Groups (SIGs) to both encourage, and benefit from, international collaboration. We will present an outline of the work of the iDigBio working and interest groups to date and address the potential for all interested SPNHC members to participate. We are especially interested in meeting with any SIGs that have digitization of museum specimens / related data as part of their raison d'être.

Standards Working Group

Fri - Loc.TBC - 11.00

Clothworkers Standards Project

The aim of this project is to establish standards, improve knowledge, enhance sharing of skills and the establishment of a standardized training structure in areas of life science conservation. Development of standardized training modules and skill sharing will assist in the development of capacity and knowledge in this area of conservation. This project has brought together groups and individuals interested in best practice in natural history conservation to develop a structure for developing a new national training program. The subject focus for each of the subjects covered has been on establishing best practice in the conservation of spirit, skin and taxidermy collections and herbarium collections. The teams (drawn from all sectors of the profession) have established standards for collection care and a standardized training syllabus for the subjects. The documentation produced to date is seen as living documentation that will evolve as knowledge improves around these areas. The documentation and notes will be launched as wikis for the conference and belong to the community and no one particular group

The results are being shared for development through the engagement of stakeholder groups including NatSCA, SYNTHESYS, ICOM and SPNHC and EU-Com. Following the development of the standardized syllabus further two-day workshops will be established to outreach the skills and knowledge along with the

Workshop will involve presentations and discussion :

Overview of Clothworkers Project - Chris **Collins**

Overview of wet Collections Standards Document - Julian **Carter**/Andries **van Dam**/Simon **Moore**

Overview of Botanical workshops - Vicky **Purewal**/Donna **Young**

Overview of skins and taxidermy document - Catherine **Hawks**

Practical discussion on syllabus - Chris **Collins**

Discussion on Practical Aspects covered by the project

3 short practical demonstrations (on wet collections, botanical conservation and cleaning of skins) may follow.

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SPNHC 2015

May 17-23, 2015 | Florida Museum of Natural History



The Florida Museum of Natural History and partners are honored to host the 30th Annual SPNHC General Meeting. The meetings will be a week long and are scheduled for May 17, 2015 to May 23, 2015. Traditional symposia, general sessions, tradeshow, demo camps and workshops are currently being planned. These will be held at the Hilton University of Florida Conference Center across from the UF campus and the Florida Museum of Natural History. In addition to the above conference events, we will have various fieldtrips, a plenary session and social events culminating in the 30th Annual SPNHC gala!

The overall theme of the conference will be Making Natural History Collections Accessible through New and Innovative Approaches and Partnerships, which we hope will be an opportunity to link the collections at the heart of our institutions to the demands and uses these collections are addressing in the 21st century. In addition, there will be a range of other themed and open sessions. The program for the conference is beginning to take shape with offers to host sessions, demos and workshops. We are, however, very early on in this endeavor and look forward to hearing from you about your ideas and wishes for the SPNHC 2015 conference.

Over the course of the coming months we will be adding more information and updates to the web site and social media sites for SPNHC 2015, but in the meantime please feel free to contact us at spnhc2015@flmnh.ufl.edu, on any SPNHC 2015 related matter.

We look forward to making your 30th Annual SPNHC conference one that you will enjoy and long remember!

Precious little survived the Impact of 2058

But once a great city thrived here.
And a museum. Shattered columns,
fractured statues and fragmentary
artifacts tell us so. Not much to go on.

But what's this?

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