The LINNEAN SOCIETY of London

Report on Linnean Society Taxonomy & Systematics Symposium Friday 7th September 2018

"How are we communicating the importance of taxonomy and systematics?"

Background to the meeting

This day meeting brought together educators, content producers and academics to explore the ways in which we communicate the importance of taxonomy and systematics in different settings and to different audiences, including not only taxonomists/systematists, but also all professionals involved in science, technology, engineering and maths engagement, in both formal and informal settings. As an outcome, the meeting sought to identify successes and failures in communication, to pave a way to improve engagement for all audiences.

The meeting was divided into four themes, as summarised below. The full programme with abstracts can be found on the Linnean Society website and downloaded here.

DIGITAL MEDIA - *How can we make best use of video and audio content?*

- Animating the inanimate: using the moving image book format to engage audiences with Richard Spruce's botanical collections. **Gemma Burditt (Freelancer, Berwick Visual Arts, artist in residence**)
- Going Digital: a new approach to talking about taxonomy. **Chris Thorogood (University of Oxford) and Ross Ziegelmeier (The Linnean Society of London)**

MUSEUMS AND LEARNING CENTRES - *What are we doing to engage our visitors with the naming of the natural world?*

- Whales, dinosaurs, 'mini-beasts' and biological recording: a varied approach to understanding taxonomy at Tullie House. **Simon J. Jackson (Tullie House Museum) and Deborah Muscat (Cumbria Biodiversity Data Centre)**
- Subliminally there: interpreting the modern museum display. **Yvette Harvey (NatSCA)**
- Entomological Necromancy. **Darren Mann (Oxford University Museum of Natural History)**
- Conversations with the dead: old trails lead to new discoveries. **Maxwell Barclay (NHM)**

FORMAL EDUCATION - *With such a tiny part of formal education being dedicated to taxonomy and systematics, how can we communicate our message most efficiently?*

- Taxonomy is fun so why keep it secret? **Alastair Culham (Reading University)**
- Integrating taxonomy in research-lead MSc programmes - not only a possibility, but a necessity. **Christophe Eizaguirre (QMUL)**

IDENTIFICATION RESOURCES - *Are the days of searching through* Systema Naturae *gone and replaced with apps?*

- INSIDE WOOD – A demonstration of a multiple entry key for identifying hardwoods. **Peter Gasson (Kew)**
- How to identify a Cornflake. **Sue Townsend (FSC) and Sarah Whild (BSBI)**
- Do people know more Pokémon than real species? **Joe Burton (The Linnean Society of London)**

The meeting was introduced and chaired by Professor David Cutler, Past President of the Society and Chair of the T&S Committee. There were 50 delegates: 22 Fellows and 28 non-Fellows participated.

The full programme and abstracts are appended. Due to an unfortunate AV failure on the day, we are unable to share video or audio recordings. The Powerpoint presentations have been uploaded separately onto the Society's website, here. Brief notes from the discussions following the presentations are also included, while the key outcomes and areas where action is needed are listed below.

Outcomes and Areas for Action

- In identifying successes and failures in communication regarding taxonomy, it was highlighted that the keys to success were:
    - An engaging story/narrative delivered in an innovative way, whether F2F or digitally
    - Use of objects/specimens as far as possible
    - Use of humour, mystery, language hooks, make the experience fun
    - Ensuring that volunteers and staff engaging with the public are properly trained/briefed and adopt an engaging approach so the audience finds it enjoyable
    - Not to assume that children are afraid of Latin names
    - Making sure that any ID tools/keys, etc, have relevant characters that people can easily discern, and get to an ID (even if just to the level of family) relatively quickly
- One key impediment in getting children (or adults) to engage with taxonomy/ID in the natural world is the fact that they are no longer allowed to collect things in the field because picking wild flowers or finding birds eggs is effectively outlawed, and mucking about in the field is discouraged as 'dirty'. **NEED:** there is a need to encourage more people outside into green spaces and away from their digital handheld devices/TVs/computers
- It was recognised that the speakers were preaching to the converted. **NEED:** need a means to draw in the decision/policy-makers, politicians and funders and other stakeholders to convey the importance of taxonomy

Note: The GDPR prevents the Society disclosing delegate details, so a list of participants cannot be included in this report. However, delegates may of course request contact details from the Society and we will undertake to obtain the necessary permissions to release them from the relevant individuals.

Points from presentations & discussions

- **Burditt on Spruce e-book:** Challenges in developing this project to create this e-book were:
  - The overwhelming quantity of data/research, and the fact that Gemma had to fulfil all the roles: research, animation, editing, etc
  - Marketing – getting people to read the e-book
  - Future edition might use augmented reality with a printed edition + phone app
  - It was suggested that it would be good to have the option to 'stop' the rapidly-changing images, and get more information on the image. Pausing was possible.

- **Thorogood & Ziegelmeier on going digital:** Challenges/learning points
  - CT: How to find a voice in this Information Age? Surmounting 'plant blindness' – so used 'wow' plants, challenging people's perceptions, and leveraging existing brands such as harvesting the mandrake plant from Harry Potter . Venus flytrap video (can plants count?) had over 100k views.
  - RZ: in 'hooking' and audience, vital to focus on 'the story' – it's not just a question of imparting facts
  - Use of humour – people will remember better
  - Use of mystery/intrigue
  - Use of physical objects
  - Use of language 'hooks' such as sex, drugs, crime, etc, when naming/title
  - Can be difficult to find an academic to support a story about plants & fear, for example – don't want to put plants in a bad light, but need a hook
  - LSL Video stats: Linnaeus' herbarium cabinet 897 views; curious cases/hydra 648 views; CT on orchid/insects 3306 views; IC on Systema naturae 4424 views. Av. 750 views; subscribers in 6m from launch increased from 16 to 348.

- **Jackson & Muscat on museum collections:**
  - Collections stats: 300k specimens, 2.2m records on 20k species (Cumbria); have applied for ACE accredited status for their collections; have just installed a 12m whale skeleton
  - Audiences are very wide: schools, public, universities, vulnerable adults, young people
  - Have developed a taxonomy engagement matrix framework, including National Curriculum relevance
  - Tend not to use formal taxonomic terms for lay audiences but still get the concept of taxonomy/heirarchies across
  - Get kids/students to draw, and also hold eg whale ribs, get them to work out the evolutionary context
  - Make use of volunteers, both for conservation and public engagement (need to ensure get the right people on engagement – they need to be able to tell the stories well)
  - Emphasised importance of having appropriate ID kit – needs to be portable and waterproof and not depend on wireless signal when in the field in Cumbria
  - Use 'search & find' game with rubber toys which are hidden
  - Do Bioblitz's with taxonomic experts & the public
  - Kids love using microscopes
  - Do training courses – not necessarily delivered by museum staff but by recorders; and liaise with local natural history societies and FSC – try to instill how to look at critical [diagnostic] features – importance of sharing and learning – adapting approach to the audience
  - Importance of making the engagement experience enjoyable

- **Harvey on interpretation in museum displays:**
    - Drew a parallel with the song titles in *Les Miserables*, illustrating how approaches to museum displays have changed across the ages from Renaissance to the present day, as the target audiences have evolved to become less elitist and behaviours have changed – demand for more interactive diplays (eg extracting DNA from strawberries)
    - Examples included the Clore Centre in Liverpool, labs being built with viewing areas for the public to observe scientists, lates/sleepovers in museums, immersive experiences, books which do not patronise non-scientists (eg Erica McAllister's on flies; Jack Ashby's on 100 museum specimens); use of blogs if people cannot get the museum; Brain Scoop on YouTube, Emily Graslie's channel has 477 subscribers
    - Key to success is in coaching staff (noting taxonomy) to ensure engagement is enjoyable

- **Mann on entomological necromancy:**
    - Importance of engaging the person with the object and having/weaving the narrative, tell the story around the nomenclature/relationships; can bring in public health, ecosystem services, conservation, etc
    - Let people hold specimens, get people behind the scenes, connect them
    - Microsculpture.net (Levon Biss) – enormous visual impact of photography
    - Internships are good, eg Nuffield Science placements and/or work placements
    - Youth Forum, natural history investigators, for the CREST award (students on 3-4 week projects)
    - OUMNH has c. 200 volunteers (20-30 in the live collections)
    - OUMNH hosts natural history societies AGMs and members' days
    - OUNHM does field sampling skills – 5-week intensive course for postgrads UK & international (India, Cyprus) which is NERC-funded – teach how to use keys
    - Human body louse project (BBSRC-funded); Darwin Fuegian human migration; collaboration with Reading & Bangor
    - HOPE (Heritage, Outreach and Public Engagement) HLF bid; use pooters in school grounds – ID/blog
    - Summer schools – 5days, sweep-nets in the arboretum – found 'new' (thought extinct) species
    - GB Scarab Review DUMP (Dungbeetle UK Mapping Project); dungbeetle value to UK [cattle] economy is £367m.
    - OUMNH is all about advocacy, outreach and teaching – getting out & about, talking to people; rely on ID guides; get the public to discover wildlife
    - Use iRecord; 73k records in 3 years

- **Barclay on data on insect specimen labels:**
    - The data labels in collections provide a link to taxonomy, biogeography and ecological history
    - Taxonomy = verification of hypotheses; collections make taxonomy a verifiable science
    - Collections are the conscience of the world – they show us what we have lost; collections are the new fossil record
    - There's an urgent need to describe biodiversity but apparent [political] indifference – why don't we care?
    - NHM project ALICE (digitising labels)
    - Use knowledge of where insect comes from to find potential parasitoids
    - Suggested Nagoya protocol is misguided as natural history collections are not necessarily for financial gain but can be 'purely to enhance human knowledge'
    - Recent [fire] destruction of museum in Brazil was a loss for humanity

- **Culham on re-engaging students with taxonomy:**
    - The National Curriculum includes:
        - KS1 naming
        - KS2 classification
        - KS3 variation
        - KS4 ID methods
    - But teachers lack skills and don't see taxonomy as fun
    - Kids are not afraid of Latin names – but need to engage with them when they are young
    - Need to understand when the love of taxonomy is lost – need to teach it in a more interesting way, step-by-step friendly/fun eg 'scratch & sniff' botany (tactile, habitat, smell)
    - *@RNGherb* brings people together
    - *UROP* (Univ Reading Opps Programme) paid placements – eg. how to barcode specimens
    - Use YouTube a lot (how to ID a woodlouse received 7k views)
    - #Advent Botany (25 plants in December, so 100 to-date) , initiated 5 years ago, attracted 186k engagements/tweets – helps outreach
    - Reaching out to alumni, as 50th anniversary of MSc course (moved from Liverpool to Reading [David Cutler actually initiated it!]) – will be a reunion on 29th June 2019
    - Reviewing Ugrad teaching, will be adding a plant module – aiming for integration not isolation of taxonomy (it's fascinating and can become addictive!)

- **Eizaguirre on MSc programmes:**
    - Although Linnaeus predicted 26,500 species, we still don't know how many there are
    - Taxonomy is a language which allows people to communicate, and it's an integrated science (if you don't know what it is it might kill you)
    - Taxonomy is necessary for effective decision making (eg CBD)
    - So how to teach taxonomy? QMUL and RBG Kew joined on this MSc, relying on using the collections and stae-of-the-art facilities, providing hands-on training including field work and interdisciplinary modules (evobio, conservation/ecology, research projects, etc)
    - Taxonomy is a science that needs no other purposes – it should not be ignored

- **Gasson on 'Inside Wood':**
    - See insidewood.lib.ncsu.edu database, developed by Elisabeth Wheeler at North Carolina
    - Has 9331 entries, providing a snapshot of the world's [commercial] woods [and palaeobot?]
    - Database is deemed to be more sustainable as it's hosted by the university library
    - Audience comment that kids like microscopes/patterns/aesthetics

- **Townsend & Whild on taxonomy of the cornflake**
    - Used the recent exhibit at the RA's Summer Exhibition by Anne Griffiths entitled ***'Taxonomy of the cornflake'*** as their starting point
    - Had put containers of cornflakes of differing provenance out during the lunch break, asking delegates to classify what they saw; then asked about other characteristics that might be used, such as taste/sweetness, etc.
    - Discussed the taxonomic impediment lack of skills documented
    - Reconciling field characters with collections characters – the importance of using characters that people can easily discern
    - Need a means to assess field ID skills, so FSC has developed a Field ID Skills Certificate qualification which is being recognised, by Natural England, for example: students need to ID 10 plants with no aids, and then 20 plants using available resources, after which they go into the field and record [vascular] plants on site. They are then scored on a scale of 1-7.

Professional eco consultants usually score around level 4. To date, some 600 individuals have taken the test.
    - Still a lot to do to develop ID skills, share aids, leverage new technologies, evaluate skills, enhance collaboration between the IDers and taxonomists – connectivity to fill gaps; multi-access/lateral keys have their role

- **Burton on Pokemon:**
    - Showed stats which show that, as children get older, their ability to ID Pokemon species is greater than their ability to ID real species
    - We should not necessarily be depressed by this – there is hope, as children are obviously engaged with the concept of classification – we just need to find a way to engage them more with the natural world
    - iNaturalist is a great tool – you take a pic, send it off and the ID comes back (usually on the right lines)
    - A lot of ID resources are emerging
    - It was pointed out that children are no longer allowed to collect things because picking wild flowers or finding birds eggs is outlawed, and mucking about in the field is discouraged as 'dirty' – whereas, Pokemon spp are 'clean'
    - However, there is concern about children being too focused on things digital and not going outside to really look at things like leaves, etc
    - The Pokemon inventor was(is) actually a bughunter

- **Cutler Summing Up/General discussion:**
    - Good meeting but need a means to draw in the decision/policy-makers, politicians and funders and other stakeholders to convey the importance of taxonomy. We are tending to preach to the converted.
    - Need to fill gaps in information transfer
    - Current stats on students studying taxonomy (at RU, about 10% of biology undergrads, so 30-40/yr) – there is an appetite for taxonomy – we need to play to it

Appendix – Programme and Abstracts

HOW ARE WE COMMUNICATING THE IMPORTANCE OF TAXONOMY AND SYSTEMATICS?

Linnean Society Taxonomy & Systematics Committee Plenary Session

Friday 7th September 2018

PROGRAMME AND ABSTRACTS

10.30 Coffee and Networking

11.00 **Welcome and Introduction**

David Cutler PPLS, Chairman of the Linnean Society Taxonomy & Systematics Committee

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DIGITAL MEDIA: HOW CAN WE MAKE BEST USE OF VIDEO AND AUDIO CONTENT?

11.10 **Animating the inanimate: using the moving image book format to engage audiences with Richard Spruce's botanical collections**

Gemma Burddit, Freelance Animator and Illustrator

Richard Spruce was an intrepid explorer who made huge leaps in the botanical understanding of the Amazon region collecting over 7000 new species and made a key contribution in bringing to light that the quinine bark in the Amazon was the first antidote in the prevention and cure of malaria. This talk will outline how animator and illustrator Gemma Burditt sought to collate some of his collections, observations and journals in an innovative interactive style graphic novel combining original quotes from Spruce's journals and letters, archive images and custom made video and illustration. The story recounts how he endured impossible conditions, narrowly avoided getting involved in civil war and struggled with a series of illnesses both real and imagined.

Gemma will recount how she attempts to engage audiences with Spruce's findings in a highly visual and experiential journey of this determined hypochondriac whose obsessional eye for detail, and passion for botany made him one of the largest contributors towards 19th Century Pharmacy and the botanical sciences.

11.30 **Going Digital: a new approach to talking about taxonomy**

Chris Thorogood, University of Oxford; Ross Ziegelmeier, Linnean Society of London

We live in the Information Age. But what does this mean for communicating the importance of systematics - a seemingly dry subject - amid a digital revolution? Ross and Chris will tackle this conundrum with a series of bite-size case studies to show how they have animated the inanimate together.

MUSEUMS AND OTHER LEARNING CENTRES: WHAT ARE WE DOING TO ENGAGE OUR VISITORS WITH THE NAMING OF THE NATURAL WORLD?

12.00 **Whales, dinosaurs, 'mini-beasts' and biological recording: a varied approach to understanding taxonomy at Tullie House**

Simon J. Jackson, Tullie House Museum and Art Gallery Trust; Deborah Muscat, Cumbria Biodiversity Data Centre

Museums work with all sorts of different people, with different backgrounds and prior levels of knowledge; so how do we engage them with the potential complexities of taxonomy and systematics? We discuss here a varied approach, used by the Museum ranging from exhibition content to engage broad audiences about the wonders of biodiversity, to introducing visitors to the physical taxonomic arrangement of collections ('behind-the-scenes') through to more formal teaching introducing school and university students to principles of classification and systematics. Tullie House is also very fortunate to host its Cumbria Biodiversity Data Centre, which engages visitors with mini-beast activities and field days through to species identification and activities using taxonomic keys.

12.30 **Subliminally there: interpreting the modern museum display**

Yvette Harvey, Natural Science Collections Association (NatSCA)

From the Renaissance, through the Classical, to the Modern episteme, Taxonomy and Systematics were at the forefront of Natural History Museum displays, enlightening audiences with the latest way of thinking. Since the 1960s, in our Post-Modern age, visitors, our consumers, have been seeking a more immersive experience. Museums and Learning Centres no longer just show, they also interpret in new ways to ensure that the visitor can have a multi-sensory time. This talk will discuss how curators past and present have, and still seek to inspire their audiences.

12.50 **Entomological Necromancy**

Darren Mann, Oxford University Museum of Natural History

Museum collections house millions of specimens creating the largest biodiversity database and the primary source for most taxonomic research. The majority of these specimens are behind closed doors away from the public eye and are therefore unconsidered by all, except for a few dedicated enthusiasts and researchers. This talk will discuss how museums can bring specimens back to life through displays, object based learning, outreach and public engagement with research. It will also demonstrate how knowing a species name can unlock an entertaining narrative.

13.10 Lunch and Networking

14.00 **Conversations with the dead: old trails lead to new discoveries**

Maxwell Barclay, Natural History Museum

Natural history collections have been described as a last great frontier of exploration. The labels of the millions of specimens must comprise one of the largest archives of unpublished scientific data in the world, concentrating the observations of past generations of naturalists, together with the specimens they refer to. Ongoing efforts to make this vast data-bank accessible electronically are predicted to hugely accelerate rates of taxonomic discovery, and give museum collections even greater relevance in a changing world.

Max Barclay and his team look after ten million Coleoptera, some 250,000 species, almost half of them represented by types. He will discuss this collection, the changing research it has inspired and generated over its 300 year history, and how it is adapting to the challenges of the future.

FORMAL EDUCATION: HOW CAN WE COMMUNICATE OUR MESSAGE MOST EFFICIENTLY?

14.30 **Taxonomy is fun so why keep it secret?**

Alastair Culham, Reading University

Children at primary schools are now expected to learn the names of some common plants. Those names are forgotten at secondary school and by the time they reach higher education, students find taxonomy to be a taboo subject amongst many academics. Where have taxonomists gone wrong? As taxonomists we should be able to identify the rot and might find a way to cure it. What approaches can re-engage students with the pleasure of identification, classification and study of the diversity of life? Through some worked examples at undergraduate and masters level in a Higher Education environment, Alastair Culham will explore some ways of taking taxonomy out of the dusty cupboard and making it an acceptable subject.

15.00 **Integrating taxonomy in research-lead MSc programmes - not only a possibility, but a necessity**

Christophe Eizaguirre, Queen Mary University of London

Recent advances in molecular techniques have significantly impacted the field of evolutionary biology. It is now possible to sequence genomes rapidly and cheaply. After the promises that genomics would solve all questions in evolutionary biology, many organizations now look back and recognize that with advances came new questions but also knowledge gaps, particularly in taxonomy. We have therefore created programmes that integrate taxonomy with genomics and statistics to emphasise the multifaceted role of taxonomy in many fields, including evolutionary biology. Here, Christophe Eizaguirre will explain how QMUL's programmes were developed and will highlight a few success stories.

IDENTIFICATION RESOURCES: ARE THE DAYS OF SEARCHING THROUGH *SYSTEMA NATURAE* GONE AND REPLACED WITH APPS?

15.20 **INSIDE WOOD – A demonstration of a multiple entry key for identifying hardwoods**

Peter Gasson, Kew

Peter Gasson will demonstrate how to use Inside Wood, which is a freely available website hosted by the library at North Carolina State University (http://insidewood.lib.ncsu.edu/search), and constantly updated by Elisabeth Wheeler. The main feature of the website is a multiple entry key using the character states provided by the IAWA list of hardwood features, which is an illustrated glossary of the anatomical characters most useful for hardwood identification.

Although the audience may not be specifically interested in wood anatomy and identification, Peter aims to show the value of a multiple entry key, which has the advantage over dichotomous keys in that you can choose characters in any order.

15.50 **How to identify a Cornflake**

Sue Townsend, Field Studies Council; Sarah Whild, Botanical Society of Britain & Ireland (BSBI)

An interactive session linking taxonomy with users to explore how we can best use a variety of resources to help accurate identification. We will use traditional keys, interactive identification tools and materials to demonstrate how taxonomy and field recording can work together fruitfully. We will also examine how to quantify identification skill.

16.20 **Do people know more Pokémon than real species?**

Joe Burton, Linnean Society of London

Linnean Learning is the education arm of the Linnean Society, creating resources, media, events and competitions to engage people of all ages with the natural world. This talk will highlight some of the work that goes on behind the scenes and try to answer the question in the title (there may be a quiz!).

16.30 Conclusions and Recommendations

16.45 Wine Reception and Networking