



Entomological Collections Network

www.ecnweb.net



Annual Meeting
25 – 27, October 2021
#ECN2021

BioQuip

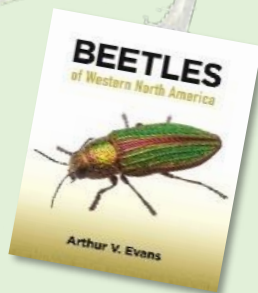
PRODUCTS

Thank you for an amazing 75-year entomological adventure!

Your source for quality entomological equipment, supplies and specimens since 1947.



www.BioQuip.com
www.BioQuipBugs.com
310-667-8800



ACKNOWLEDGMENTS

Thank you so much to our corporate and institutional sponsors for their continued generosity in helping our meetings be successful. Our members and officers greatly appreciate their support.

BioQuip Products, iDigBio, ESA-SysEB, Delta Designs Ltd., Furth Museum Consulting, HH Elements, Sakura Pigma, The Lepidopterists' Society, Macroscopic Solutions, Pacific Coast Entomological Society, Species File Group, The Coleopterists Society, Spacesaver

Thank you also to our personal sponsors for their continued generosity
(in alphabetical order)

Megan Ayers, Victoria Bayless, William Clark, Julian Donahue, Michael Ferro, David Furth, Chris Grinter, Lynn Kimsey, Ondra Kouklik, Sangmi Lee, Scott Miller, Steven Paiero, Edward Riley, Zoe Simmons, Stephanie Skipp, Catherine Tauber, Margaret Thayer, David Ward, Todd Waters, Jacki Whisenant, Jim Whitfield

ECN 2021 Organizers: Chris Grinter, Nicole Gunter, Christy Bills, Isabelle Betancourt, Ashleigh Whiffin, Karen Wright, Oliver Keller, and Patrick Gorrington

Cover Photograph: Brood X Periodical Cicada specimens at the Academy of Natural Sciences of Drexel University in Philadelphia, Pennsylvania, United States. Photo by Isa Betancourt and courtesy of the ANSP Entomology Department.

ECN Social Media Team: Isabelle Betancourt, Ashleigh Whiffin, and Jennifer Girón

Program layout and design: Oliver Keller and Karen Wright

We are also very thankful for our continued partnership with iDigBio and the SysEB section of the Entomological Society of America (ESA).



MONDAY, October 25th

(All times in Pacific Standard Time (GMT-8))

8:30 am – 8:40 am **Introduction**

Chris Grinter

The California Academy of Sciences, San Francisco, CA, U.S.A.

Contributed Talks

Moderator: Kristin Jayd, *University of Maryland, College Park, MD, U.S.A.*

8:40 am – 8:45 am **Introduction**

Kristin Jayd

University of Maryland, College Park, MD, U.S.A.

8:45 am – 9:15 am **Advances in capturing and parsing label data from images using OCR and machine learning techniques**

[Peter Oboyski](#)¹, [Vijay Singh](#)², [Tracey Tan](#)², and [Cameron Ford](#)²

¹*Essig Museum of Entomology, UC Berkeley*; ²*Doxie.AI*

Data capture from insect labels relies heavily on human transcription and interpretation to parse data elements into their proper fields. Although citizen science platforms, like Notes from Nature, and TCN collaborations using shared data portals have spread the process of data capture to a broader base of participants, these efforts do not adequately scale for the monumental task still ahead for completely digitizing arthropod collections. Targeted extraction of labels from images, preprocessing of images to enhance OCR accuracy, along with text processing workflows that include domain specific Lookup Tables, Regular Expressions, and Question-Answer or Named Entity Recognition (NER) machine learning techniques have allowed us to capture location, date, and collector for over 80% of specimen labels at considerable speed. Suggested standards for capturing label images to improve automation success are presented.

9:15 am – 9:25 am **Introducing “Advances in Insect Evolution”**

[Sandra R. Schachat](#)¹ and [Sallqa-Tuwa Bondoc Mafla](#)²

¹*Department of Geological Sciences, Stanford University, Stanford, CA, U.S.A.* ²*Rutgers University Newark, Newark, NJ, U.S.A.*

9:25 am – 9:43 am

Building an Insect Photogrammetry Set Up: What Worked and What Didn't

[Nicole Gunter](#)¹ and Rick Wherley¹

¹Cleveland Museum of Natural History, Cleveland, OH. U.S.A.

The digitization of museum specimens has numerous societal benefits including improving access to type specimens through the generation of high resolution images. However many characters may be hard to assess from 2D images, obscured or may not be considered informative at the time of imaging and thus not captured. Photogrammetry generates 3D models through the alignment of multiple overlapping photographs, promoting the digital exploration of museum specimens. The Invertebrate Zoology lab at the Cleveland Museum of Natural History recently designed a portable photogrammetry setup that is built upon the Cognisys StackShot 3x Deluxe kit. This presentation outlines lessons learned, setup modifications, and software that best suited our needs. 3D models are published on the Ento360 website <https://specimens.mantodearesearch.com/360/>



The Lepidopterists' Society

Proudly supports the
Entomological Collections Network.
Ask about our student research grants!

www.lepsoc.org



Ross Winton¹¹*Nongame and Rare Species Program, Wildlife Division, Texas Parks and Wildlife Department, Austin, TX. U.S.A.*

Insect Conservation in the U.S. has largely been driven by species petitions under the ESA. Funding priorities and conservation actions are not often broadly applied to many of our native invertebrates species and field surveys are often prioritized over evaluations of collection holdings. Recent efforts to digitize many collections has revealed a large amount of entomological data that can be used to assess the conservation status of many of our native species. Recent efforts in Texas have expanded the state level support of collections and the digitization of collections both large and small. Many states in the U.S. have identified insect Species of Greatest Conservation Need (SGCN) but often lack data to inform decisions about which species to include and focus conservation actions. Texas and many other states will soon be revising their SGCN lists and feedback on species to include is requested from the entomological community especially from collections, who retain most of the known information on these species. Digitization support may be expanded with new anticipated funding and the inclusion of insect species on these lists will allow for leverage among states to fund additional collaboration with collections, taxonomists, and conservation entomologists.

Collections and Museum Consulting Services



FMC

Furth Museum Consulting

Dr. David G. Furth
5901 Mt. Eagle Dr #1516
Alexandria, VA 22303 USA
furthmuseums@gmail.com
1-703-869-2077
furthmuseumconsulting.com

10:01 am – 10:15 am **BREAK**

10:15 am – 10:33 am **U.S. National Pollinating Insects Collection: Overview, History, and Updates**

[Michael Branstetter](#)¹, Jonathan Koch¹, Terry Griswold¹, Harold Ikerd¹, Frank Parker¹, and Diana Cox-Foster¹

¹*U.S. Department of Agriculture, Agricultural Research Service, Pollinating Insects Research Unit, Utah State University, Logan, UT, U.S.A.*

The U.S. National Pollinating Insects Collection is a large government research collection devoted to the study of wild bees and other insect pollinators. Started in 1946 to support agricultural research and the development of wild bees as pollinators, the collection has grown to over two million specimens and is now one of the largest bee collections in the world. Here we provide an overview of the collection, a summary of its history and management, and updates on recent events, including two major re-locations. We also highlight and discuss some of the unique challenges faced by a government research collection that operates separately from a major museum or institution.

10:33 am – 10:51 am **How a Small Collection at a Community/State College Survives with only Undergrads: Benefits and Challenges**

[David Serrano](#)¹ and Christine Sammon¹

¹*Broward College/Broward Insect Collection, Davie FL, U.S.A.*

The Broward College Insect Collection is a small collection supporting a BS program at a primarily AA granting state college. I share how our collection is 100% powered by undergraduates while highlighting successes, the unique challenges they have, and provide various solutions .



**The Pacific Coast
Entomological Society**



10:51 am – 11:16 am **NSF Research and Training Opportunities for Entomologists and Entomological Collections**

[Matthew Herron](#)¹

¹*National Science Foundation, Washington DC, U.S.A.*

Join NSF Program Officers to learn about new and ongoing NSF funding opportunities of relevance to entomologists at all career stages, with a focus on funding for entomological collections. This session will cover how NSF funds research, the grant proposal process, and funding opportunities through Biology core programs and current special solicitations. Overviews of the Division of Biological Infrastructure's Capacity: Biological Collections program, Research Experiences for Undergraduates (REU) opportunities, the Graduate Research Fellowship Program (GRFP), Postdoctoral Research Fellowships in Biology (PRFB), the Faculty Early Career Development Program (CAREER), and the Mid-Career Advancement (MCA) program will be provided. A question-and-answer session will follow the overview of the funding and training opportunities.

11:16 am – 11:41 pm **Past, Present, and Future of the Entomological Collections Management Workshop: An Evolving Training Tool for Collections Professionals**

[Floyd Shockley](#)¹, **[Nico Franz](#)**², **[David G. Furth](#)**¹, **[Lawrence F. Gall](#)**³, **[Patrick Gorring](#)**⁴, **[Christopher C. Grinter](#)**⁵, **[Nicole Gunter](#)**⁶, **[Aaron D. Smith](#)**⁷, **[Jennifer M. Zaspel](#)**⁸.

¹*Smithsonian Institution, Washington, DC, U.S.A.*, ²*Arizona State University, Tempe, AZ, U.S.A.*, ³*Yale University, New Haven, CT, U.S.A.*, ⁴*Michigan State University, East Lansing, MI, U.S.A.*, ⁵*California Academy of Sciences, San Francisco, CA, U.S.A.*, ⁶*Cleveland Museum of Natural History, Cleveland OH, U.S.A.*, ⁷*Purdue University, West Lafayette, IN, U.S.A.*, ⁸*Milwaukee Public Museum, Milwaukee, WI, U.S.A.*

In 2015, ESA Section SysEB and ECN collaborated to form the first series of workshops designed specifically by collections staff for collections staff managing Entomological Collections. That 3-workshop series ran from 2016-2018 and was very well received and supported, filling to capacity each of the three years it was offered. Although primarily offered for students and postdocs reaching the end of their programs and looking for employment in collections, it actually attracted museum administrators, seasoned collections staff, and younger participants transitioning to careers in collections management. This talk will review the history of the program, discuss administrative and topic changes to it since the program ended in 2018, and serve as the official announcement of the program's return in a new hybrid format (both physical and virtual) for 2022-2024.



Majkowski
Woodworking Company

Entomology Unit Trays and Drawers

11:41 am – 11:50 am **Sponsor Videos**

11:50 am – 1:00 pm **BREAK**

From the Cabinet to the People

Moderators: Jennifer Girón, *Purdue University, West Lafayette, IN, U.S.A./ Museum of Texas Tech University, Lubbock, TX, U.S.A.* and Alyssa DeWaele, *Museum of Texas Tech University, Lubbock, TX, U.S.A.*

1:00 pm – 1:05 pm **Introduction**

Jennifer Girón^{1,2} and Alyssa DeWaele³

¹Purdue University, West Lafayette, IN, U.S.A., ²Museum of Texas Tech University, Lubbock, TX, U.S.A. ³Museum of Texas Tech University, Lubbock, TX, U.S.A.

1:05 pm – 1:23 pm **Tiny Tunnels, Big Connections: Making Ants Larger than Life at the Centennial Museum**

[Vicky Zhuang¹](#)

¹UTEP Biodiversity Collections, The University of Texas at El Paso, El Paso, TX, U.S.A.

A common challenge for displays featuring insect specimens is making very small animals relatable to the public. Left unmagnified, small fascinating details of insects are easily missed. However, specimens also represent the opportunity to connect the public with the real objects entomologists work with. In early 2020, the UTEP Biodiversity Collections collaborated with the Centennial Museum to celebrate the digitization of the Mackay Ant Collection in the new exhibit, “Tiny Tunnels, Big Connections: Ant Relationships Shape the World”. The exhibit design team had a goal of centering products from the digitization project. The team worked to bring patrons close to these ant specimens through a combination of 3D prints, specimens in dioramas, augmented reality, high resolution images, and stories situating ants and their relationship partners. In this presentation, I also discuss how the digitization process benefited creating parts of the exhibit and how students were involved in the exhibit curation. The exhibit represented the first introduction of the UTEP insect collections to a large audience through exhibition. Methods of specimen display in this exhibit can serve as models for museums and outreach programs of smaller budgets.

1:23 pm – 1:41 pm

Expanding Access: Creating Outreach Tools for Entomological Collections

[Alyssa DeWaele](#)¹

¹*Museum of Texas Tech University, Lubbock, TX, U.S.A.*

The Invertebrate Zoology Collection at the Natural Science Research Laboratory at the Museum of Texas Tech University currently has roughly 4.6 million specimens in its holdings. Further curatorial and digitization work has been conducted to provide access to the bee (Hymenoptera) collection through the SCAN database. By using free digitization tools, the workflow for digitizing specimens has reduced the amount of time spent to process specimens. While these records are becoming available online, further access for the general public is needed. This presentation will explore ways in which outreach tools in a museum setting can further expand access to entomological collections.

1:41 pm – 1:59 pm

Communicating through Specimens at the Frost Entomological Museum

[Laura Porturas](#)¹ and [Andrew R. Deans](#)¹

¹*Frost Entomological Museum, Department of Entomology, The Pennsylvania State University, University Park, PA, U.S.A.*

Recently the Frost Entomological Museum at Penn State reopened their public space after a six-year hiatus, with more square footage and completely new exhibits. We exhibit thousands of objects in this space, including entomological tools, collecting gear, historical artifacts, and specimens. Our overarching goal is for visitors to walk away with a positive perception and deeper knowledge of arthropods and entomology. Specimens are incorporated into many of the exhibits to underscore textual information conveyed to visitors, such as how specimens are preserved and how entomological collections contribute to science. We also use specimens to share natural history with the public and to bring clarification to biological concepts. In this talk we take you through some of our exhibits, to show how we have incorporated specimens and use them to enhance visitor understanding of both collections and entomology.

1:59 pm – 2:17 pm

Dung Beetles in the Dome: New Outreach Opportunities for Digitized Data

[Nicole Gunter](#)¹

¹*Cleveland Museum of Natural History, Cleveland, OH. U.S.A.*

Global efforts to digitize collections have accumulated an incredible amount of metadata associated with specimens. While this digitized data is publicly available and well known within the collections and biodiversity data research communities, arguably, it is yet to reach a broad public audience. Planetariums are useful tools for exploring complex spatial data and recent technological advances in planetarium software promotes the high-definition exploration of the Earth, making them an ideal platform to bring digitized data to a new public stage. Through a collaboration with Evans & Sutherland, two new plug-ins in Digistar 6 & 7 were developed that bring digitized data to the dome and provide an immersive setting to spotlight specimens, collections, and research. This presentation highlights the development of the new software and some examples that bring research and collections to the forefront of planetarium programming. From dung beetles in the dome to migrating monarchs, we are now able to easily bring endless stories on biodiversity and the importance of natural history collections to planetariums around the world.

2:17 pm – 2:30 pm **BREAK**

2:30 pm – 2:48 pm **In-person, Virtual, Partnership, and through the News Outlets: An Overview of how the Entomology Department at the Academy of Natural Sciences of Drexel University makes its Collection Accessible Beyond Scientific Research**

Isabelle Betancourt¹

¹*Academy of Natural Sciences of Drexel University, Philadelphia, PA, U.S.A.*

Scientific research is the main purpose for maintaining the 4-million-specimen entomology collection at the Academy of Natural Sciences of Drexel University, a public museum and research institution founded in 1812. However, the collection serves the local and even global community in many ways, and the collection staff make the collection's contents accessible to the public through a variety of approaches. Welcome to a tour of our activities beyond research. They can roughly be broken into four main categories: the more traditional in-person presentations; media outlets inquiries, which usually occur when insects make the news; partnerships with outside organizations; and finally, with the rise of the internet, virtual programming. This presentation will use a communication theory lens to identify scientifically supported strategies that contribute to programs' effectiveness.

All in all, we hope this tour might spark some ideas in you for connecting with the public.

ENDURING SOLUTIONS

Precision-crafted entomological storage.



Spacesaver's entomology cabinets create efficient and enduring collections care solutions. Our designers, engineers, and skilled craftspeople can design and build cabinets to suit any collection, in any space.

- Cabinets accommodate new drawers or legacy drawers (Cornell, USNM, California Academy, Smithsonian — or custom drawer sizes)
- Solid, heavy-gauge welded steel framework
- Lift-off doors
- Sealed for proven protection
- Engineered and manufactured in the USA
- Expert space planning assistance, installation, and long-term service

Visit us at [Spacesaver.com/ento](https://www.spacesaver.com/ento) to learn more.

Spacesaver is proud to support the Entomological Collections Network.



Storage Solved®

[spacesaver.com](https://www.spacesaver.com) | 800.492.3434

2:48 pm – 3:06 pm

A Tribute to Pope Francis - Specimens from Two Hundred Years of Natural History Collection

[Greg Cowper](#)¹

¹*Department of Entomology, The Academy of Natural Sciences of Drexel University, Philadelphia, PA, U.S.A.*

The Academy of Natural Sciences of Drexel University, the oldest Natural History Museum in the Americas founded in 1812, mounted an exhibit in September 2015 to honor Pope Francis' visit to the United States and Philadelphia. The exhibit, The Clergy and the Academy's Collections, highlighted specimens and contributions made by people of faith throughout the Academy's (at that time) 203 year history. A variety of religious beliefs were represented revealing natural history specimens donated across eight Academy collections: Entomology, Botany, Mammalogy, Malacology, Ichthyology, Herpetology, Ornithology, and the Library and Archives. The exhibit brought people of all walks of life together in the hallowed setting of a natural history museum to reflect on the wonders of the natural world supported by more than 200 years of collections and science.

3:06 pm – 3:24 pm

Insects on Display at the Queensland Museum - Past, Present and Future

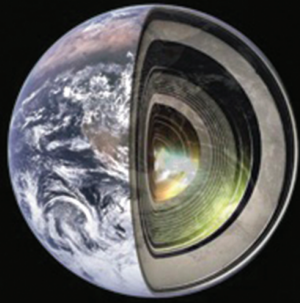
[Susan Wright](#)¹

¹*Entomology, Queensland Museum, Queensland, Australia*

With a 150 year history, subtropical climate and the most biodiverse state in the country, the Queensland Museum is perfectly placed to explore people's fascination with the insects of our region. Looking into the static displays of old and how they compare to the displays of the 80's and 90's, then onto the change in the "modern" museum with its interactive and digital focus, I will discuss some of the displays I have been involved with in the 25 years I have been with the museum entomology section. Considerations for museums don't only involve which specimens or species to choose and stories to tell, but also access, commercialization and some of the more practical aspects of putting on an insect display. I will also touch on future displays and what we hope to be our biggest and best insect exhibition yet.

3:24 pm – 3:40 pm

Sponsor Videos and End of Day 1



MACROSCOPIC SOLUTIONS

Inspiring Discovery

WWW.MACROSCOPICSOLUTIONS.COM

For over 5 years, we've been honored to serve the academic, industrial and research communities by offering turn-key and customized solutions for individuals with complex imaging requirements. Innovative methods, unique optical configurations and proven techniques allow our range of products to offer a superior imaging performance that is capable of being integrated into the latest research applications. It has been a pure joy of ours learning the needs and requirements of our customers and we're happy to continue serving them and their colleagues for the foreseeable future. Thank you for choosing Macroscopic Solutions, we look forward to working with you.

Atkins

Mark R. Smith



Portable, High Performance Imaging and Microscopy Systems

“Attached is probably the nicest color plate I have ever made, all thanks to the Macropod!”



- Dr. Matthew Buffington



Figure by the Hymenoptera Unit, Systematic Entomology Laboratory, ARS-USDA

www.macroscopicssolutions.com / info@macroscopicssolutions.com / (410)870-5566

TUESDAY, October 26th

(All times in Pacific Standard Time (GMT-8))

9:00 am – 9:10 am **Introduction**

Mass-digitization of Insect Collections to Support Research: State of The Art and Challenges

Moderators: Hannu Saarenmaa, *Bioshare Digitization, Joensuu, Finland, www.bioshare.com*, Erica Krimmel, *iDigBio, Florida State University, Tallahassee, FL, U.S.A.*, and Deborah Paul, *Species File Group, University of Illinois, Illinois Natural History Survey, Champaign, IL, U.S.A.*

9:10 am – 9:15 pm **Introduction**

Hannu Saarenmaa¹, Erica Krimmel² and Deborah Paul²

¹*Bioshare Digitization, Joensuu, Finland* ²*iDigBio, Florida State University, Tallahassee, FL, U.S.A.*

9:15 am – 9:33 am **A Matter of Scale - Mass Digitisation of Pinned Insects**

[Jeroen Bloothoofd](#)¹ et al.

¹*Picturae, Netherlands*

Picturae has accepted the challenge of digitising half a million pinned insect specimens from the Hymenoptera collection (ants, wasps and bees) for the The Museum für Naturkunde Berlin in the first half of 2022. Our development of the solution for this is an accumulation of technology and the skill to handle entomological specimens. We will take a closer look at the workflow, the system and how the design choices came to be.

9:33 am – 9:51 am **Five Years of Using Insect Imaging Conveyor System at the Finnish Museum of Natural History (Luomus), and Future Perspectives**

[Jere Kahanpää](#)¹, Zhengzhe Wu¹, Hannu Saarenmaa², and Toivo Ylinampa²

¹*Finnish Museum of Natural History, Helsinki, Finland, www.luomus.fi*,

²*Bioshare Digitization, Joensuu, Finland, www.bioshare.com*

In 5.5 years, some 420.000 pinned insect specimens have been digitized using an Insect Imaging Conveyor System at Luomus. The average annual amount of sample processed is 76.000 specimens. Almost all of the material has been Lepidoptera, but a pilot project of ca. 5800 sawflies of family Argidae has also been done. Each

entry was done concurrently with the imaging. Simple specimen metadata (collecting locality, time, collector, taxon name) for each sample has also been entered into a database system for a majority (>90%) of specimens. After data review and georeferencing, the data was uploaded into the Finnish Biodiversity Information Facility (FinBIF). The presentation explains the workflows, technology used and experiments made to boost performance further.

9:51 am – 10:09 am **LightningBug, An Integrated Pipeline to Overcome The Biodiversity Digitization Gap**

[N. S. Cobb](#)¹, D. M. Boyer², M. W. Denslow³, N. J. Ferrier⁴, L. F. Gall⁵, R. P. Guralnick³, M. Hereld⁴, C. A. Maier⁶, N. E. Pierce⁶, N. E. Rios⁵

¹Biodiversity Outreach Network, Flagstaff, AZ, U.S.A., ²Duke University, Durham, NC, U.S.A., ³University of Florida, Gainesville, FL, U.S.A., ⁴Argonne National Laboratory, Lemont, IL, U.S.A. ⁵Yale University, New Haven, CT, U.S.A., ⁶Harvard University, Cambridge, MA, U.S.A

The LightningBug project seeks to create an end-to-end pipeline for high-throughput data acquisition from pinned insects in entomological collections. To accomplish this goal, it will: (1) further develop an existing hardware and software platform to capture multi-view imagery of both labels and specimens; (2) build robust algorithms to automatically process fragmentary views of multiple labels into separate integrated “virtual labels;” (3) connect virtual labels to structured text extraction services; and (4) apply photogrammetric analysis to assemble the 3D shape and structure of specimens. Guided by science use cases, the entomological collections of the Yale Peabody Museum and the Harvard Museum of Comparative Zoology will be used in rigorous test-case implementations. Results will include robust sets of annotated multi-view images, 3D models of specimens, 2D reconstructed “virtual labels” and digitized specimen metadata generated from those labels. These digital specimens will present new challenges for data preservation and access and will be addressed via a partnership with MorphoSource to develop a linked institutional repository model for data access to large digital assets such as those produced by multi-view imaging. Ultimately, the ability to capture multi-view image suites and generate virtual specimens at scale will permit new avenues for remote access to research resources, and enable the application of computer vision and machine learning to trait identification and evolution, species recognition and new species discovery. Label data from pinned insects will give researchers access to critical temporal and geospatial information necessary for relating changes in biodiversity to other biotic and environmental variables. More information and results from this project can be found at <http://lightningbug.tech>

10:09 am – 10:20 am **BREAK**

10:20 am – 10:38 am **From Rows to Things: The Consequences of a Digital Object Model for Specimen Curation and Digitization from a TaxonWorks Perspective**

[Deborah Paul](#)¹ and [Matt Yoder](#)²

¹*DigBio, Florida State University, Tallahassee, FL, U.S.A.* ²*Illinois Natural History Survey, Champaign, IL, U.S.A.*

Some things never change. With the inexorable digitization of the World's Natural History Collections comes a parallel, seemingly eternal, discussion of identifiers and their role in this process. Most recently this discussion has focused on the concepts of the Digital Specimen, or Extended Digital Specimen, a digital twin of a physical collection object. Infrastructure, data-modelling, and planning around the Digital Specimen concept has re-ignited a discussion of identifiers, this time not on catalog numbers, or occurrenceIDs, but those "tied" to the digital doppelganger, created to facilitate linking and access to data.

A collection object, and its digital twin, are just a few example of many Things that people will seek to attach (new classes of) identifiers to. If we imagine a row of Darwin Core (DwC) data we can think of numerous other Things in that row, collectors, locations, determiners, preparators, biological associates, images and more. All of these Things can be tied to identifiers, however rows of data are not particularly well adapted to the inclusion of multiple identifiers on the Things they index.

Some things change slowly over time, or in punctuated bursts. In support of "describing life" TaxonWorks has been evolving collection object and collection digitization tools for around 5 years. These types of tools are critical not only to collections, but also to individuals (e.g. Taxonomists) as part of their day-to-day work. With special attention to how many identifiers on all Things are handled in TaxonWorks we highlight where the software and community around it is at with respect to collection object digitization. We highlight the new DwC importer and exporter, core functionality that will facilitate collections moving into, and out-of TaxonWorks.

10:38 am – 11:10 am **Symposium Panel**

11:10 am – 11:20 am **Sponsor Videos**

11:20 am – 1:00 pm **BREAK**

Collections of the World

Moderator: Nicole Gunter, *Cleveland Museum of Natural History, Cleveland, OH. U.S.A.*

1:00 pm – 1:05 pm **Introduction**

[Nicole Gunter](#)¹

¹*Cleveland Museum of Natural History, Cleveland, OH. U.S.A.*

1:05 pm – 1:20 pm **Natural History Museum of Denmark (NHMD)**

[Alexey Solodovnikov](#)¹, **Lars Vilhelmsen¹, Aslak Kappel Hansen¹, Sree Gayathree Selvantharan¹ and Vinicius Ferreira¹**

¹*Natural History Museum of Denmark, Zoological Museum, University of Copenhagen, Copenhagen, Denmark*

1:20 pm – 1:35 pm **Wisconsin Insect Research Collection (WIRC)**

[Craig Brabant](#)¹

¹*Wisconsin Insect Research Collection, University of Wisconsin Madison, WI, U.S.A.*

1:35 pm – 1:50 pm **Canadian Museum of Nature (CMNC)**

[Bob Anderson](#)¹, **Andrew Smith¹ and François Génier¹**

¹*Canadian Museum of Nature, Ottawa, Canada*

1:50 pm – 2:05 pm **Universidade Federal do Paraná**

[John Lattke](#)¹, **Rodrigo Feitosa¹ and Renato Machado¹**

¹*Universidade Federal do Paraná, Curitiba, Brazil*

2:05 pm – 2:20 pm **Museo de Zoologia, Universidade de São Paulo**

[Sonia A. Casari](#)¹, **Gabriel Biffi¹, Thiago Polizei¹ and Juan Pablo Botero¹**

¹*Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil*

2:20 pm – 2:30 pm **Break**

2:30 pm – 2:45 pm

Entomological Collection of the Tecnológico de Antioquia (CETdeA)

[Luz Miryam Gomez](#)¹

¹Entomological Collection of the Tecnológico de Antioquia, Medellín, Colombia

2:45 pm – 3:00 pm

Museum of Comparative Zoology (MCZ)

[Crystal Maier](#)¹

¹Museum of Comparative Zoology, Harvard University, Cambridge, MA, U.S.A.

3:00 pm – 3:15 pm

Illinois Natural History Survey (INHS)

[Tommy McElrath](#)¹

¹Illinois Natural History Survey, Champaign, IL, U.S.A.

3:15 pm – 3:30 pm

Central Victorian Regional Insect Collection (CVRIC)

[Bert Candusio](#)¹

¹Central Victorian Regional Insect Collection (CVRIC), Australia

3:30 pm – 3:40 pm

Sponsor Videos and End of Day 2



DELTA DESIGNS LTD.

BUILDING BEYOND

THE STANDARD

Delta Designs' cabinets are the standard for durability and longevity. They are right the first time and for a long time because in your work there are no second chances.

DELTADESIGNSLTD.COM | 800-656-7426 | sales@deltadesignsltd.com

WEDNESDAY, October 27th

(All times in Pacific Standard Time (GMT-8))

10:00 am – 10:05 am **Introduction**

10:05 am – 11:05 am **Tricks of the Trade "Social"**

Karen Wright¹

¹*Texas A&M University, College Station, TX. U.S.A.*

11:05 am – 11:15 am **Break**

Contributed Posters

Moderator: Oliver Keller, *Florida Department of Agriculture and Consumer Services, Department of Plant Industries, Entomology, Gainesville, FL, U.S.A.*

11:15 am – 11:20 am **Introduction**

Oliver Keller¹

¹*FDACS, DPI, Entomology, Gainesville, FL, U.S.A.*

Poster 1

11:20 am – 11:30 am

What are the best pins for entomotaxy?

Muhammad Ishak¹, Laura Porturas¹, Darran Pagan¹, and Andrew R.Deans²

¹*Department of Materials Science and Engineering, The Pennsylvania State University, University Park, PA, U.S.A.,* ²*Frost Entomological Museum, Department of Entomology, The Pennsylvania State University, University Park, PA, U.S.A.*

Mounting specimens on steel pins remains one of the most common methods for preserving winged insects. The pin provides a handle for specimen manipulation and allows for unambiguous association of data labels. Aside from the transition from brass to steel and a gradual lengthening of the pin, the practice of pinning insects remains virtually unchanged since 1700. Collectively, there are probably more than 100 million pinned specimens worldwide, with >100,000 added annually. Despite the ubiquity of this practice, there is no consensus on which type and brand of pins is best. To fill this knowledge gap, we accumulated pins of different brands and styles (e.g., enameled vs. stainless steel) and designed tests to measure their mechanical response (4-point bending), pin head integrity (pull out test), and corrosion resistance (salt spray). Here we present early results of the 4-point bending test and discuss plans for future experiments.

Poster 2

A Survey of Arthropod-Associated Objects (AAOs) in Entomological Collections

11:30 am – 11:40 am

Louis F. Nastasi¹ and Andrew R. Deans¹

¹Frost Entomological Museum, Department of Entomology, The Pennsylvania State University, University Park, PA, U.S.A.

Arthropod-associated objects (AAOs) including galls, leaf mines, exuviae, and others are valuable for many research purposes. We devised a 23-question survey to investigate AAOs amongst entomological collections. The survey received 24 responses which generally indicate wide taxonomic scope, wide representation of object types, and consistent curation and preservation across collections. Two collections with exceptional AAO holdings are showcased.

Poster 3

SQL and Python methods for cleanup and standardization of locality and collection event data in MCZbase

11:40 am – 11:50 am

Charles Farnum¹

¹Museum of Comparative Zoology, Harvard University, Cambridge, MA, U.S.A.

The global pandemic of 2020 required a rapid shift to remote work, and resulted in a new focus on data quality improvements for entomological collection label data. Automated tools can speed up the process of searching for duplicate localities and collection events, exploring the data, and standardizing label text.

Here, we present Python classes that aid in performing data quality control external to a collections database. We have developed a class called MCZBaseSQLQuery that provides a flexible method of creating large SQL queries with multiple OR statements from a list of criteria. It allows a simple template to be reused for multiple searches and allows the user to perform flexible searches. The MCZBaseDataSet class includes methods for basic quality control to test for value duplication in a column, shared values across columns, detecting non-numeric entries, items in a relational database having more than one parent, verifying all required columns are present in the data, counting the frequency with which sets of values occur, and returning error reports. The newly cleaned data has a significant impact on later data entry efficiency, reducing the need to georeference localities multiple times, and allowing for better searching of the data downstream.

Poster 4

Jarred Potential: A Nation-wide Survey of Fluid-Preserved Entomology Collections and Management Best Practices

11:50 am – 12:00 pm

Genevieve Anderegg¹ and Christy McCain^{2,3}

¹Department of Museum and Field Studies, University of Colorado, Butler, CO, U.S.A., ²CU Museum of Natural History, University of Colorado, Butler, CO, U.S.A., ³Department of Ecology & Evolutionary Biology, University of Colorado, Butler, CO, U.S.A.,

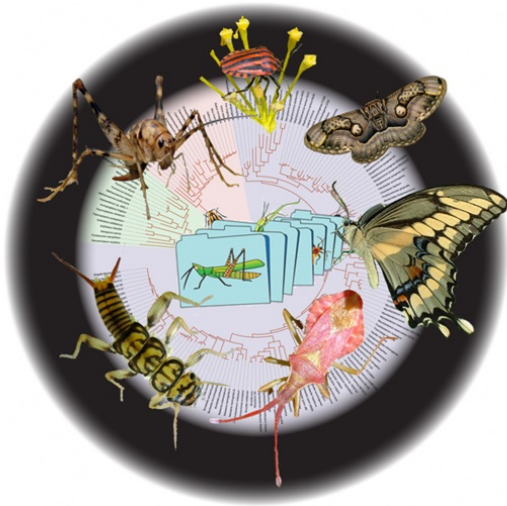
Despite the emphasis on pinned specimens in most entomology collections, specific insect taxa and life stages are preferentially preserved in fluid. While wet preservation has been primarily used for soft bodied and aquatic taxa as well as immature individuals, it is becoming more common for insects of all sizes and forms to be stored in ethanol for DNA preservation, ease of curation, and occasionally as an intermediate stage after bulk collecting (e.g., pitfall, malaise traps) before target taxa are sorted out and pinned. Much of the best practices of fluid preservation are informed by the traditions of vertebrate specimen preparation, but the smaller size and fragility of insects requires special care and methodology that is yet unexplored in the literature. The proper techniques for monitoring fluid levels, measuring preservative solution concentration, and replenishing (“topping off”) vials with new solution when a portion of the original fluid has evaporated need to be determined for wet insect collections. Here, I outline the current methods for managing insect fluid collections, adapted from literature on non-insect taxa, and highlight where entomological expertise is needed to develop robust recommendations for entomology wet specimen management. I will also present my online survey and invite curators and collections managers from the United States to respond anonymously and detail their collection’s techniques for storing and managing fluid preserved specimens. This survey will be included in my master’s thesis and summarize the state of the field of wet insect preservation and collections management.

12:00 pm – 12:15 pm **Break**

12:15 pm – 1:30 pm **ECN Business Meeting**

1:30 pm – 1:35 pm **ECN Annual Meeting Concluding Remarks**

Species File Group



The [Species File Group \(SFG\)](#) is an endowment-funded collective of specialists whose broader goal is the advancement of biodiversity informatics. We are located at the University of Illinois, Illinois Natural History Survey. Our group supports the following software/activities:

- [TaxonWorks](#) - a workbench for taxonomists from the TaxonWorks Community
- [Global Names Architecture](#) - finding, parsing, and resolving taxon names from literature. Lead Developer: Dmitry Mozzherin.
- [Catalogue of Life](#) - editorial group, and data assembly hub. Executive Editor Yury Roskov and Database Manager Geoff Ower.
- Taxonomic/Systematic Research supporting taxonomic research on [Plecoptera](#) (DeWalt), [Cicadellidae](#) (Dmitriev), and [micro-Hymenoptera](#) (Yoder).

Our Biodiversity Informatics Community Liaison, Deborah Paul welcomes and invites you to bring your questions, and add your expertise and insights. See our [Events page](#) for ways to contact us and explore opportunities for us to serve your biodiversity research needs. For example:

Grant Opportunities!

The [Catalogue of Life](#) contains over 2 million species, but it is not yet complete. The SFG is collaborating to fill the remaining gaps and needs your help. We provide modest grants (up to \$5,000) to build global species checklists for missing or incomplete taxa in COL. This year we continue our focus on Coleoptera and extend our offer to those who propose significant updates of existing Coleoptera sectors.

Grants run 1 or 2 years and may fund student wages, travel, publication charges, or other reasonable costs. Use the [TaxonWorks](#) platform to build your new resource! It is endowment-funded, open access, and we provide training. We also welcome data curated in other platforms. Deliverables include a taxonomic checklist with accepted names, synonyms and combinations arranged in an up-to-date classification, with distribution data, basic bibliographic references and common names (where appropriate) in a database format.

Past winners are Thomas McElrath, Matthew Gimmel, and Gareth Powell working on Cucujoidea and Marcin Kaminski working on [Sepidiini](#) <https://doi.org/10.48580/d4sl-3gm>

We encourage [applications via this form](#).

Please apply by 31 December 2021. Applicants will be informed by January 15, 2021. If you have questions please contact Ed DeWalt (dewalt@illinois.edu)



Entomological Collections Network

Code of Conduct

The ECN seeks to promote a welcoming environment that is safe, collaborative, supportive, and productive for all participants. We expect all ECN members to adhere to this code, which applies to all forums hosted by the society including but not limited to: conferences (in-person or virtual), social media, and the Listserv. The ECN values the diversity of views and backgrounds reflected among all attendees, as such we are committed to providing a positive environment for all, regardless of gender, sexual orientation, ability, religion, socioeconomic status, career status, or ethnicity.

Our respectful dialogue policy asks that participants make every effort to maintain constructive discourse with other conference attendees at all times. This includes speakers honoring designated time limits, attendees being aware of balancing speaking and listening time and welcoming newer members into conversation.

Capturing, Sharing, and Posting without Permission

Presenters and attendees cannot photograph, screenshot, capture, or otherwise share images or presentation data without a presenter's expressed written permission. Presenters are encouraged to use our share (downloadable)/do not share (not downloadable) icons. Presentations without "share" icons should be considered privileged and should not be shared outside the virtual platform.

Expected Behavior

- Treat everyone with respect and consideration.
- Respect the rules and policies of the conference center and all venues associated with the conference.
- If you see inappropriate or disrespectful behavior or language, please speak up, either to the offender or conference organizers.

Unacceptable Behavior

- Harassment and intimidation, including any verbal, written, or physical conduct designed to denigrate, threaten, intimidate, or coerce another attendee, conference organizers or staff;
- Discrimination based on gender or gender identity, sexual orientation, age, disability, physical appearance, body size, race, religion, national origin, or culture;
- Physical or verbal abuse of any attendee, speaker, volunteer, exhibitor or service provider

Consequences

- Anyone requested to stop unacceptable behavior is expected to comply immediately.
- ECN officers may take any action deemed necessary and appropriate, including immediate removal from the meeting without warning and without refund.
- ECN reserves the right to prohibit attendance at any future meeting.

Reporting Unacceptable Behavior

- If you are the subject of unacceptable behavior or have witnessed any such behavior, please immediately notify any ECN officer.
- Contact info may be found here: <https://ecnweb.net/about/officers/> or email board@ecnweb.org.

Thank you for attending ECN. We are grateful for your contributions in making ECN a welcoming place of many diverse voices.

