



## **Symposium**

### **Recruiting, Retaining, and Supporting Small Collections in Digitization Initiatives**

SCN1

8:40-9:00 a.m.

#### **Introductory comments**

**An Introduction to iDigBio** (Gil Nelson, Florida State University/iDigBio)

**Why Focus on Small Collections?** (Anna Monfils, Central Michigan University)

SCN2

9:00-9:20 a.m.

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

**Presenters:** Kari Harris (Arkansas State University), Travis Marsico (Arkansas State University)

**Abstract:** 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.

SCN3

9:20-9:40 a.m.

#### **Developing iCollections digitisation workflow**

**Presenter:** Vladimir Blagoderov (iCollections team, Natural History Museum, London)

**Abstract:** 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.



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SCN4

9:40-10:00 a.m.

### **The iCollection model for digitising small collections of natural history**

**Presenters:** Peter Wing, Elisa Cane, Lyndsey Douglas, Joanna Durant, Gerardo Mazzetta, Flavia Toloni (Natural History Museum, London)

**Abstract:** 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.

SCN5

10:00-10:20 a.m.

### **The Role of small herbaria in large digitization projects**

**Presenter:** Chris Neefus (University of New Hampshire)

**Abstract:** 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.

### **10:20-10:50 a.m. Morning break**

SCN6

10:50-11:10 a.m.

### **Digitization workflow for a small herbarium**

**Presenter:** Chris Neefus (University of New Hampshire)

**Abstract:** 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



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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.

SCN7

11:10-11:30 a.m.

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

**Presenters:** Kirsten E. Nicholson, Angela Riedel (Central Michigan University)

**Abstract:** 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.

SCN8

11:30-11:50 p.m.

**Achieving the digitization of biological collections from the Pacific**

**Presenters:** Shelley A. James (Bishop Museum)

**Abstract:** 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



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from the Pacific, making it readily accessible to researchers, resources managers, and interested public across the world.



SCN9

11:50-12:10 p.m.

**Arctos: A Collaborative, cost-efficient solution for managing and publishing biodiversity data in collections of all sizes**

**Presenters:** Carla Cicero (Museum of Vertebrate Zoology, University of California, Berkeley), Link Olson (University of Alaska Museum), Joseph A. Cook (Museum of Southwestern Biology), Michelle S. Koo (Museum of Vertebrate Zoology), Dusty L. McDonald (University of Alaska Museum), Gordon Jarrell (Museum of Southwestern Biology)

**Abstract:** 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.

SCN10

12:10-12:25 p.m.

**Undergraduates in natural history collections: What are the educational gains and how can we make the experience more impactful?**

**Presenter:** Anna Monfils (Central Michigan University), Shari Ellis (University of Florida)

**Abstract:** 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



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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.

SCN11

12:25-12:40 p.m.

**The place for biological research and field stations in biodiversity digitization**

**Presenter:** Gil Nelson (Florida State University, Tall Timbers Research Station)

**Abstract:** 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.

**12:40-2:00 P.M. Lunch**

SCN12

2:00-2:20 p.m.

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

**Presenter:** Christy Bills (Natural History Museum of Utah/Entomology Collections Network)

**Abstract:** 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.

SCN13

2:20-2:40 p.m.

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

**Presenter:** Richard Rabeler (University of Michigan), Anna K. Monfils (Central Michigan University), Timothy M. Evans (Grand Valley State University)

**Abstract:** 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



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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.

SCN14

2:40-3:00 p.m.

**Exposing data from small collections: common questions and solutions**

**Presenter:** Deb Paul (Florida State University), Rich Rabeler (University of Michigan)

**Abstract:** 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.”

SCN15

3:00-3:20 p.m.

**Mobilizing New England vascular plants to track environmental change**

**Presenter:** Dorothy Allard (University of Vermont)

**Abstract:** 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.

SCN16

3:20-3:40 p.m.

**Resurrecting orphaned collections**

**Presenter:** Gabriela Hogue (North Carolina Museum of Natural Sciences)

**Abstract:** 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.