The Macrofungi Collection Consortium: Unlocking a Biodiversity Resource for Understanding Biotec Interactions, Nutrient Cycling and Human Affairs

Report submitted by: barbara.thiers@gmail.com
Report Submitted on: 03/02/2016 - 12:01

Progress in Digitization Efforts

So far, approximately 831,964 items have been digitized for this project (131,000 more that originally estimated). The major product of the project is the MycoPortal. To date 2,118,767 specimen records have been added to the portal. The Portal contains about 67,000 skeletal records (i.e. locality data yet to be added); and approx. 350,000 records have geocoordinates.

We are now in the one year no-cost extension for the project, so most institutions have already completed their digitization. Only the Farlow Herbarium of Harvard University and San Francisco State University have more than 10,000 specimens left to digitize. The focus of the work this year is completing that digitization, and completing records by adding geographical information.

Share and Identify Best Practices and Standards (including Lessons Learned)

Our best successes were in the initial training and orientation for the project. Keeping the participants in the habit of regular project updates were largely unsuccessful. Despite repeated attempts to get very simple monthly reports from participants (using a form that was distributed to all or even bi-monthly reports was mostly a failure. However, progress on the project has been steady and mostly satisfactory, I would have been much happier if the collaborators had stayed in closer touch but I was unsuccessful in finding a way to make this happen.

Identify Gaps in Digitization Areas and Technology

Nothing new to report

Share and Identify Opportunities to Enhance Training Efforts

Nothing new to report

Share and Identify Collaborations with other TCNs, Institutions, and Organizations

We collaborate closely with the Microfungi TCN, which has now assumed management of the MycoPortal, since the MaCC project no longer has a project coordinator.

Share and Identify Opportunities and Strategies for Sustainability

This is an on-going topic of discussion with Dr. Andrew Miller, PI of the new Microfungi TCN. Our long-term objective is to convince the Mycological Society of America to form a committee to provide oversight for the MycoPortal.

Other Progress (that doesn't fit into the above categories)

N/A

Attachment

N/A

iDigBio is funded by a grant from the National Science Foundation's Advancing Digitization of Biodiversity Collections Program (#EF1115210)

Southwest Collections of Arthropods Network (SCAN): A Model for Collections Digitization to Promote Taxonomic and Ecological Research

Report submitted by: neilscobb@gmail.com
Report Submitted on: 03/06/2016 - 17:40

Progress in Digitization Efforts

See Attached

Share and Identify Best Practices and Standards (including Lessons Learned)

See Attached

Identify Gaps in Digitization Areas and Technology

See Attached

Share and Identify Opportunities to Enhance Training Efforts

See Attached

Share and Identify Collaborations with other TCNs, Institutions, and Organizations

See Attached

Share and Identify Opportunities and Strategies for Sustainability

See Attached

Other Progress (that doesn't fit into the above categories)

See Attached

Attachment

https://www.idigbio.org/sites/default/files/webform/tcn-reports/SCAN_February_2016.docx

Southwest Collections of Arthropods Network Update

April 13, 2016

Neil Cobb

Progress in Digitization Efforts:

We have exceeded our quota for digitizing labels from pinned specimens, which is 736,736 records from the original 10 institutions and 958,736 total records when we include the three PEN projects. T**able 1** presents four sets of statistics derived from our data portal as of December 28, 2015. These contain the following data: 1) institutions that are funded by the NSF-ADBC program, including the 3 PEN grants; 2) institutions that have entered data into the SCAN portal but not funded by the NSF-ADBC program; 3) the total of these first two categories; and 4) the total records in the SCAN portal. The fourth column includes records from the first three columns as well as arthropod records we have ingested from InverteBase TCN, as well as providers that already provide data to aggregators GBIF and iDigBio. The purpose of serving this latter category of data is to provide as complete as information as possible to persons that are considering research projects. We do not serve all arthropod data available on aggregator portals, we focus on providers that have North American occurrence data that we have established an IPT link and the provider gives us explicit permission to serve their data. The only exception is North American spider data from GBIF.

Table 1. Number of specimen records digitized and associated summary statistics. From http://symbiota4.acis.ufl.edu/scan/portal/index.php . SCAN-funded numbers refers to the 13 museums receiving ADBC funding. SCAN non-funded numbers include 20 museums contributing cataloged specimen data and non-cataloged moth specimen data from 33 collections (5 private collections and 28 public museums). Total Served includes all SCAN data and other datasets with North American arthropod records (e.g., GBIF, Tri-Trophic TCN).

	SCAN funded	SCAN non-funded	TOTAL SCAN	Total Served
# Specimen Records	1,945,196	763,276	2,708,472	7,216,116
# Georeferenced	1,424,536	318,069	1,742,605	5,257,173
# Identified to species	838,123	400,005	1,238,128	3,590,144
# Families	4,983	1,343	3,006	3,252
# Genera	20,492	9,650	13,959	16,468
# Species	52,379	38,048	59,213	84,334
# All Taxa	54,051	38,501	60,470	87,354
% Georeferenced	73%	42%	64%	73%
% Identified to Species	43%	52%	46%	50%

Although we have technically reached our goal for the 13 SCAN museums, we have not thoroughly reviewed all records produced by SCAN-funded museums to determine how many of those strictly ground-dwelling arthropods, but we have 871,127 (90%) records to date for target ground-dwelling arthropod taxa and thus we expect to exceed our project goal. Ten museums are in a one-year no-cost extension and the one PEN museum (BYU) is in their second year. We estimate that we will digitize at least 200,000 more ground-dwelling arthropod specimens by the end of the project and over 1.7 million total specimens for the original 10 museums. The three additional PEN grants (Harvard, BYU, and Ohio State University) are on track to meet their quotas. For the purpose of the bi-monthly reports I lumped all data provided by PEN institutions. Ohio State University provided data prior to becoming a PEN collaborator and they have produced 405,702 records to date, of which only ~40,000 records represent the two focal taxa (Carabidae and Tenbrionidae) that they have targeted in their PEN project.

A subset of SCAN museums are creating high-resolution images and three museums are creating low resolution images that include the specimen and labels in the same image. **Table 2** lists the number of images posted on SCAN by participating museums. Our goal was to produce 15,125 high-resolution images suites. An image suite consists of 1-3 images representing different aspects of a specimen. This will translate into approximately 40,000 images. Three museums are producing low-resolution images (University of Hawaii, University of Arizona, and Texas Tech University).

Share and Identify Best Practices and Standards (including Lessons Learned):
We are identifying best practices on a weekly basis and sharing those with respective people within SCAN.
Identify Gaps in Digitization Areas and Technology:
We need to harvest additional data (i.e. beyond SCAN) to better understand the biogeography of arthropod taxa. We are partially meeting this need by incorporating GBIF into the SCAN database.
Share and Identify Opportunities to Enhance Training Efforts: Nothing new to report, we are working on activities already described in previous reports
Share and Identify Collaborations with other TCNs, Institutions, and Organizations:
We are primarily working with Tri-Trophic TCN in order to develop questions for analyzing ADBC data.
Share and Identify Opportunities and Strategies for Sustainability:
We have a sustainability plan for Colorado State University, they are finished using their NSF funding http://scan1.acis.ufl.edu/content/sustainability .

Table 2. Number of images posted on SCAN portal from SCAN museums that are focused on producing high-resolution images of specimens and non-ADBC funded museums. Data are recorded from http://symbiota1.acis.ufl.edu/scan/portal/imagelib/photographers.php

Institution	# Images
Arizona State University Hasbrouck Insect Collection (ASU-ASUHIC	3,085
C.P. Gillette Museum of Arthropod Diversity (CSU-CSUC	49
Colorado Plateau Museum of Arthropod Biodiversity (NAUF-CPMAB	2,796
Denver Museum of Nature & Science (DMNS-DMNS	627
Museum of Comparative Zoology, Harvard University (MCZ	23,089
Museum of Southwestern Biology, Division of Arthropods (UNM-MSBA	193
New Mexico State Collection of Arthropods (NMSU-NMSU	1,500
Ohio State C.A. Triplehorn Insect Collection (OSU-OSU	2,655
Texas Tech University - Invertebrate Zoology (TTU-TTU-Z	27,064
University of Arizona Insect Collection (UA-UAIC	81,691
University of Colorado Museum of Natural History Entomology Collection (UCB-UCMC	2,035
Essig Museum of Entomology (EMEC-EMEC	1
Hymenoptera Institute Collection (UKY-HIC-HIC	2,300
SDSU Terrestrial Arthropods Collection (SDSU-TAC	130
The Albert J. Cook Arthropod Research Collection (MSU-MSUC	804
UAM Insect Collection (UAM-UAM_ENT	5,791
United States National Museum, Entomology Collections (USNM-USNMENT	38
University of Hawaii Insect Museum (UHIM-UHIM	96,568
University of Kansas Natural History Museum Entomology Division (KU-SEMC	4,445
University of Tennessee at Chattanooga (UTC-UTCI	145
Virginia Polytechnic Institute and State University Insect Collection (VPI-VTEC	204
University of Vermont Zadock Thompson Zoological Collection-Invertebrates (UVM-VTZT	3
Yale Peabody Museum, Entomology Division (YPM-ENT	10,078
Florida Museum of Natural History, McGuire Center for Lepidoptera and Biodiversity (FLMNH-MGCL	88
SCAN Funded Musuems (All Images)	**142,749**
SCAN Funded Musuems (High Resolution Images)	**45,680**
Non-SCAN Funded Musuems (All Images)	**120,595**
Total Images Servged on SCAN	**265,379**

Other Progress (that doesn't fit into the above categories): We continue to provide North American data we have obtained from other sources to increase the quantity of data available to SCAN users. We have grown from serving 10 collection datasets to serving 87 data sets through SCAN (**Table 3**). There are five categories of data sets listed; 1) SCAN ADBC funded collections; 2) SCAN collaborator collections, 3) Moth data collected from non-cataologed specimens, 4) Aggregator collections (Data served directly to iDigBio/GBIF but also on SCAN) and 5) Arthropod records produced through InverteBase. These latter two categories will greatly increase the usability of the existing SCAN data, especially understanding species distributions and more complete species lists. We are re-building our data harvested from North American data from GBIF and are in the process of hosting data from other non-TCN arthropod data sets that have been harvested by iDigBio.

Table 3 List of Collection data sets being served on SCAN data portal (specimen data from December, 2015 for non-SCAN funded collections).

	SCAN ADBC-Funded Collections	**Specimens**
1	Museum of Comparative Zoology, Harvard University	487,397
2	Ohio State C.A. Triplehorn Insect Collection	411,518
3	Texas A&M University Insect Collection	231,480
4	Texas Tech University - Invertebrate Zoology	149,112
5	Denver Museum of Nature & Science	124,734
6	University of Arizona Insect Collection	90,239
7	University of Colorado Museum of Natural History Entomology Collection	80,836
8	C.P. Gillette Museum of Arthropod	80,391
9	New Mexico State Collection of Arthropods	76,114
10	Arizona State University Hasbrouck Insect Collection	74,091
11	Colorado Plateau Museum of Arthropod Biodiversity	58,112
12	Brigham Young University Arthropod Diversity Museum	48,252
13	Museum of Southwestern Biology, Division of Arthropods	32,920
	SCAN collaborator collections (not funded through ADBC SCAN Project)	**Specimens**
1	California Academy of Sciences Entomology	272,005
2	The Sam Noble Museum Department of Recent Invertebrates	111,582
3	University of Hawaii Insect Museum	92,854
4	The Albert J. Cook Arthropod Research Collection	76,007
5	Scarab Central: World Scarabaeoidea	37,999
6	Entomology Collection at the Natural History Museum of Utah	28,931
7	K-State Museum of Entomological and Prairie Arthropod Research	17,367

8	Hymenoptera Institute Collection	16,167
9	R. M.Bohart Museum of Entomology	11,653
10	University of Tennessee at Chattanooga	8,852
11	Essig Museum of Entomology	5,838
12	SDSU Terrestrial Arthropods Collection	3,432
13	University of Georgia Collection of Arthropods	3,343
14	The Purdue Entomological Research Collection	2,917
15	Virginia Polytechnic Institute and State University Insect Collection	2,804
16	University of Vermont Zadock Thompson Zoological Collection-Invertebrates	2,599
17	United States National Museum, Entomology Collections	2,483
18	Academy of Natural Sciences, Entomology Collection	1,983
19	Dugway Proving Ground Natural History Collection	753
20	Western Washington University Insect Collection	656
21	Gregory P. Setliff Collection - Kutztown University	577
22	University of Delaware Insect Research Collection	563
23	Utah Department of Agriculture and Food Entomology Collection	425
24	Oregon State Arthropod Collection	420
25	Denver Botanic Gardens Collection of Arthropods	275
26	Milwaukee Public Museum, Invertebrate Zoology-Insect Collection	79
	Collections set up in SCAN but no records to date	**Specimens**
1	BLM Mother Lode Field Office: The Bees of Pine Hill Preserve	0
2	Clemson University Arthropod Collection	0
3	ColecciÃ³n ZoolÃ³gica de la Universidad AutÃ³noma de QuerÃ©taro	0
4	Ed V Gage Collection	0
5	Enns Entomology Museum	0
6	Florida Museum of Natural History, McGuire Center for Lepidoptera and Biodiversity	0
7	LTER Central Arizona Phoenix Arthropod Collection	0
8	M. Andrew Johnston Collection	0
9	The Mississippi Entomological Museum	0
10	University of Minnesota Insect Collection	0
11	University of Nevada, Reno, Museum of Natural History	0
12	Wichita State University Collection	0
13	William F. Barr Entomological Museum	0
14	Wisconsin Insect Research Collection	0
	Collections from Moth specimen survey (Chris Grinter - Coordinator)	

1	Moth Observations Database: UC Berkeley	10,580
2	Moth Observations Database: UC Davis	5,145
3	Moth Observations Database: Denver Museum of Nature & Science	4,118
4	Moth Observations Database: LA County Museum of Natural History	4,097
5	Moth Observations Database: California Academy of Sciences	2,847
6	Moth Observation Database: Field Museum of Natural History	2,319
7	Moth Observations Database: California Department of Food and Agriculture	1,646
8	Moth Observations Database: Canadian National Collection	751
9	Moth Observations Database: Tom Dimock Personal Collection	689
10	Moth Observations Database: National Museum of Natural History	567
11	Moth Observations Database: UC Riverside	335
12	Moth Observations Database: Paul and Sandy Russel Personal Collection	315
13	Moth Observations Database: University of Connecticut	235
14	Moth Observation Database: Santa Barbara Museum of Natural History	211
15	Moth Observations Database: American Museum of Natural History	182
16	Moth Observations Database: San Diego Natural History Museum	155
17	Moth Observations Database: Peter Jump Personal Collection	63
18	Moth Observation Database: Kansas State University	61
19	Moth Observation Database: David L. Wikle Personal Collection	49
20	Moth Observations Database: Colorado State University, Fort Collins	25
21	Moth Observations Database: Chuck Harp Personal Collection	1
22	Moth Observations Database: Illinois Natural History Survey	1
	Aggregator Collections (Data served directly to iDigBio/GBIF but also on SCAN)	**Specimens**
1	University of Kansas Natural History Museum Entomology Division	1,227,972
2	Tri-Trophic TCN	759,378
3	AntWeb	545,759
4	UAM Insect Collection	458,432
5	North American Bee Collections	351,520
6	University of Alberta Museums Entomology Collection (UASM)	303,837
7	Yale Peabody Museum, Entomology Division	192,309
8	Tri-Trophic Interactions - Texas A&M	139,170
9	GBIF NA spiders Extract without Location Information	65,362
10	GBIF NA spiders Extract with Location Data	56,263
	InverteBase TCN Records	**Specimens**

1	Field Museum of Natural History Collection of Insects, Arachnids, and Myriapods	262,928
2	Cleveland Museum of Natural History Invertebrate Zoology Collection	12,686

Documenting Fossil Marine Invertebrate Communities of the Eastern Pacific - Faunal Responses to Environmental Change over the last 66 million years

Report submitted by: eclites@berkeley.edu
Report Submitted on: 03/18/2016 - 17:08

Progress in Digitization Efforts

As of 3/4/2016, the TCN has digitized 70602 specimens and photographed 4257 specimens. 3767 TCN specimens are currently being served to iDigBio via the Berkeley Natural History Museum's IPT. We have also georeferenced 2878 localities. Working locality data has been received from five of the TCN institutions (CAS, LACM, PRI, UCMP, University of OR) and three partner institutions (University of California, Riverside; University of Oklahoma Sam Noble Museum, Yale Peabody Museum). A draft list of specimens has been received from NMNH, but it is still being vetted internally before it will be combined with other TCN data. This combined locality data is being used to compile lists of formations and to batch georeference localities.

Formations: Concordances have been created for formations in California (~230 unique names), Washington (28 formations) and Oregon (20 formations). These will be revised internally before being made available to the public via our TCN webpage.

Georeferencing: Combined all OR localities from the TCN's collection into one spreadsheet of 2148 localities, 614 that need to be georeferenced. Sent this spreadsheet to Univ. OR for georeferencing via GeoLocate.

Taxonomy: LACM produced a taxonomic dictionary for Eastern Pacific invertebrates that continues to grow daily, and is imported in Microsoft Access database weekly. This is being intermittently shared with the TCN. CAS created an updated taxon tree for EPICC relevant molluscan fauna to be applied to newly acquired, as well as legacy specimen records. They also developed an image driven resources/references database for aid in taxonomic identification of EPICC specimens, which will be shared with TCN partners via a private Flickr account. At the conclusion of the project, they aim to update this database with EPICC specimen images and provide public access to this resource.

Original source material digitized: various field notes, field photographs and 1 entire dissertation was scanned at the Burke. CAS digitally scanned and transcribed the R. Arnold and H. Hannibal "North Pacific Collection" field notebooks. Ongoing digital scanning of CAS Geology Catalogues. One of eight CAS catalogues has been transcribed (1,235 unique records). The Cooper Center photocopied their mitigation reports prior to scanning. LACM has begun working on a plan to scan and transcribe archived specimen and locality ledgers from a number of the orphan collections (e.g., UCLA) accessioned by LACMIP during the 1980's-2000's. Archived specimen records will be used to create skeleton records, and images will be amended to those records. Likewise locality ledger's images (which include maps) will be amended to existing site records and will assist with georeferencing.

Data cleaning: Continued cleaning of currently databased locality data at CAS (4,250 unique records) for batch georeferencing. Database fields have been updated to comply with DarwinCore terms and standards. Continued cleaning and restructuring of currently databased records (FileMaker Pro) for conversion to Specify7 via MySQL (approx. 50% complete). LACM is currently formatting their existing locality register to conform to DwC field formats, which includes parsing out field and previous location numbers, township & range values, and collector/date data. Locality tables are being updated daily, and imported into Microsoft Access database weekly.

Workflows: NMNH has completed preliminary planning for their digitization workflow and are planning to do equipment testing as soon as targets and other new equipment arrives. PRI has continued to segregate material by locality number to improve efficiency of data entry. They have also written and are testing their photographic workflow.

IPT progress: OR has a working IPT and is sharing data directly with GBIF. They are waiting to 1) get photographs linked on their IPT and 2) have a TCN decision on georeferencing precision to share online before serving data to iDigBio. VertNet has agreed to be PRI's IPT for pushing data to iDigBio. All the Burke specimen data is available from the Burke Museum website and is uploaded daily.

Inventory of collections has continued at LACM. Pleistocene (120 lane cases) and Pliocene (90 lane cases), and Paleocene (11 lane cases) are now complete. They are currently working on the Eocene.

Share and Identify Best Practices and Standards (including Lessons Learned)

Curation and data cleaning: Adoption of Darwin Core terms and standards. Printing labels directly from the database as we go, so that every species entered now has a new label (plus all the old labels). UAM has a smaller collection so they are breaking up some lots. Their policy is that if a rock has two discrete samples and they could be prepared out separately (i.e. are not touching) then we give them different specimen numbers. Finally, if there is a lot being split into different specimens and a number of them are less than 40% preserved these specimens will be lumped as a lot of poorly preserved specimens. The better preserved specimens will be given their own catalog number. At UCMP, we have a revised cataloging workflow to label all specimens before entering the identification information into a spreadsheet, which greatly improved cataloging speed and accuracy. Reduced number of fields to be entered into spreadsheet during cataloging process due to lack of utility or accuracy of some terms (i.e. Taxon Authors). Standardizing data entry procedures to ensure that data entry practices are consistent with how UCMP database is used by other collections managers, as well as with DwC standards (how these fields are used by other aggregators such as GBIF and iDigBio). The Cooper Center does in-depth training on fossil-handling practices. LACM has identified areas of high throughput cataloguing (i.e. minimized workflow) through inventories.

Georeferencing: Compilation of TCN locality records then geographic division of records amongst institutions for efficient and effective georeferencing.

Photography: Development of an agreed upon standard of diagnostic "views" for imaging key invertebrate groups with shared documentation to follow via TCN Wiki. Univ. OR is implementing a batch photograph upload in Specify, because the standard attachment workflow through the main DB interface is extremely slow because of multiple page loads and keystrokes. Using large f stop and a high quality macro lens is helpful in achieving quality specimen images.

Identify Gaps in Digitization Areas and Technology

Workflow: At the Burke, the very varied quality of information with each specimen it makes it hard to have a single protocol that works. Large number of older collections without specimen identifications also slows our progress considerably. Work flow is very uneven.

Database software: LACM is still awaiting arrival of KE-Emu platform, but they now anticipate testing in 2-3 months. Since the last reporting period they have developed, tested, and have begun data entry in a basic Microsoft Access database.

Photography Equipment/Storage: NMNH is still gathering equipment for their imaging workstations. They will be doing testing of the capture equipment with Golden Thread targets to ensure quality and efficiency. PRI is in the process of getting a cloud storage account for photo storage. Until they have this account, they will not be able to share their photos with any data aggregators, including IDigBio. UAM must be certain photograph files are removed from the local drive once they are online, as the hard drive is close to full. High quality versions of the photos are also backed-up at TACC. UCMP is currently assembling a dedicated imaging station on campus to use for project photography. Without a dedicated station, setup and take down each require 30 minutes every time photos are taken.

Staffing: Univ. OR: Right now, our biggest stumbling block is simply the person-hours that are required to verify GeoLocate results. The Cooper Center is trying to increase their number of photographers.

Share and Identify Opportunities to Enhance Training Efforts

Trained 33 undergraduate and graduate students in techniques including: pre-digitization curation, cataloging, taxonomic identification, digitization standards, georeferencing and handling. CAS also trained 2 Careers in Science high school interns in specimen image acquistion, photo stacking and editing, and cataloguing techniques. Trained 7 CAS Careers in Science high school interns in cataloguing techniques and collections handling protocols. Held our second virtual TCN meeting via AdobeConnect March 15. Audio was much improved thanks to conversations with Kevin Love of iDigBio, the purchase of headsets by some partners, and audio tests conducted beforehand. Hosted two day Data Carpentry workshop for 19 staff, graduate students and undergraduate students at UCMP and 6 participants from a remote site at Univ. OR. Videos, links and techniques learned will be shared with the entire TCN. Many participants in the TCN, including students, also participated in iDigBio-led online trainings in georeferencing and digitization.

Share and Identify Collaborations with other TCNs, Institutions, and Organizations

Requested feedback on our standard views of invertebrates for imaging from Roger Burkhalter (who is working on more detailed documents for each invertebrate taxonomic group as part of an iDigBio working group). This document will be made available via our TCN webpage.

Austin Hendy attended the EPPANDA workshop in Boulder, CO, LACMIP will be intimately involved in development of EPPANDA API and will be a test case in data linkages between Paleobiology Database, iDigBio, and collections. EPPANDA is a collaboration with J. Sessa, D. Smith, S. Butts, and G. Nelson.

LACM interacted with the Fossil Insect Consortium (D. Smith, T. Karim, S. Butts) in preparation for PEN grant submission. A. Hendy also identified valuable Californian material in collections of U Colorado-Boulder Museum of Natural History.

Explained UCMP database, EPICC grant and database management best practices with staff from the University of California, Riverside and the University of Montana during their visits to the UCMP.

Share and Identify Opportunities and Strategies for Sustainability

The Geological Society of America Cordilleran section meeting will be held in Ontario, CA in April. The Cooper Center will have a booth at the meeting with a display on the EPICC project.

Credit-earning museum studies internships through LACM. They now have 6 students working in this program, and contributing, collectively, 40 hours per week. Some of these students will be retained through paid student assistantships, and will mentor another cohort of interns in the next semester. Interactions with local universities have resulted in stipend master STEM teachers being embedded in collections for 8 weeks over summer. These mature teachers will be integral components of our pre-digitization and digitization workflows. Volunteers do much of our pre-digitization effort at this stage (e.g., inventory).

Other Progress (that doesn't fit into the above categories)

Internal TCN discussions on georeferencing and how to proceed with "special collections" that are currently separated out from the normal stratigraphic system.

Creation of the TCN also leads to more internal discussion among TCN partners. This has facilitated the return, and agreement to return, hundreds of specimens from UCMP to other institutions where they will be easier for future researchers to access.

An additional full time staff member (assistant collections manager, ACM) joined the EPICC team at LACMIP on March 14. This addition will make significant improvements to operation of workflow, and in particular georeferencing efforts. Additionally, the ACM will be integral to design of KE-EMu platform and data migration.

Attachment

N/A

DIGITIZING FOSSILS TO ENABLE NEW SYNTHESES IN BIOGEOGRAPHY- CREATING A PALEONICHES

Report submitted by: blieber@ku.edu
Report Submitted on: 03/24/2016 - 16:52

Progress in Digitization Efforts

Paleoniches Update, March 2016

Regarding the University of Kansas portion of the project, led by PI Bruce S. Lieberman, we now have a total of 240,255 specimens databased. Further, we now have a total of 198,081 databased specimens that are also georeferenced. In addition, a total of 7,960 localities have been georeferenced. Since the last update to iDigBio, we are continuing to database and georeference our cnidarian holdings. Other major taxonomic groups have been completely databased and georeferenced.

Regarding the Ohio University portion of the project, led by PI Alycia Stigall

Cincinnati museum center:

Since 12/15/15, the University of Cincinnati student intern on the project, Ian MacAdam, has been focusing on georeferencing locality records from the United States. He has worked a total of 55.5 hours. In total, we now have 7,376 sites georeferenced resulting in 45,366 catalogue records in Emu with georeferencing data. This is 64.28% of our digital database georeferenced to date.

Miami University:

We currently have about 2400 specimens transferred from our paper-based database to electronic format.
One of my two student workers has recently chosen to quit to focus on her studies, so things will move a bit more slowly from here out unless I can convince another student to work for me.

Ohio University:

Our team of undergraduates continue to add new data to the Ordovician Atlas website. The current focus is to fill in gaps in bryozoan and molluscan taxa with difficult synonymy. Initial phases of accessioning, specimen cleaning and locality georeferencing, are ongoing for the newly acquired Stocker Collection. Between January and March, the Ordovician Atlas website received 14,196 views from 4,702 visitors. During the month of March, this included visitors from 66 countries.

Regarding the San José State University portion of the project, led by PI Jon Hendricks:

Since the last report, SJSU has continued to add species-level descriptions to the taxa already on the Neogene Atlas. Some additional effort has also been focused on adding overviews of higher level taxa to the Neogene Atlas; for example, see: http://neogeneatlas.org/families/glycymerididae/.
Additionally, vase shells (e.g., http://neogeneatlas.org/genera/Hystrivasum/) were very recently added to the Neogene Atlas, bringing the total species count to 512.
Between now and the next report, the primary focus at SJSU will be to continue adding species-level descriptions to the Neogene Atlas.

Finally, for our PEN partners. First, Texas, PI: Ann Molineux, Co-PI: James Sprinkle

They have completed their work on this project and are in the process of submitting the final report to NSF for their PEN. I have included that here. (Thus, this will probably be their last update for iDigBio for this project.)
In particular, the invertebrate and plant fossil collections of the University of Texas at Austin document geological research spanning the past 150 years. These four million fossils range in age from Precambrian to the Holocene, encompassing critical intervals of geologic time and geographic areas and certain well-studied organisms. Such huge collections are of little value unless the objects along with related documentation, images, and analytical data are digitized and made globally accessible. This NSF project connected digital data from these UT collections to institutions that are part of the PaleoNICHES TCN and to the national data resource (iDigBio.org). The geologic 'deep' time slots selected were the Cambrian-Ordovician (530-420 million years ago [Ma]), the Pennsylvanian (350-300 Ma), and the Paleogene-Neogene (65-0 Ma). The major groups of organisms included brachiopods, echinoderms, and molluscs. These digital records link the specimen's scientific name to its collection site and geological time period. The collection site is recorded in current and deep time

geography, thus allowing the researcher to examine organisms from the perspective of distinct 'plate 'configurations. High quality multi-focus imagery with digitally embedded scales provides researchers with a functional image that can be analyzed in open source software. The final data resource presents a more robust database for future analytical studies on a broad range of topics within the history of life. This data set illustrates long-term effects of major global changes in the distribution, migration, and extinction of organisms. The rich geological record is available to researchers, educators, and the general public. The project has provided training for many students and volunteers.

Specific scientifically important collections held at the Non-vertebrate Paleontology Laboratory (NPL) at the University of Texas at Austin were digitized. The selected collections were transferred and upgraded into our database, Specify 6, thus expanding and enhancing the data resources available to the PaleoNICHES TCN. All collecting localities were georeferenced in both present-day and paleo geographies, and a selection of key specimens imaged. The project continued our strategy to conserve rare and important collections in the repository and make digital surrogates available for collaborative research. We also continued to stimulate public interest and education in science through the use of innovative web and mobile broadband technologies. Our project extended the work previously restricted to type specimens and historic collections. New specimen images along with supplemental metadata (from interviews with emeritus curators and professors, field notebooks, peels, and thin sections) are attached to the specimen records.

Collection records are accessible through our types PaleoCentral.org web access with remote access to view and download images and related data, and the flexibility to explore collection localities in a variety of contexts, including geology and global paleogeography. They are also available through GBIF and iDigBio data aggregators enabling multi-collection and cross-discipline searches. The repository GIS system is updated and increasingly a user can view the contents of drawers linked to the relevant data for specimens.

Intellectual merit:

This project has furthered objectives to digitize useful fossil records by fostering connection to and growth of the NSF HUB (iDigBio) and TCN strategic goals. It encouraged innovative research: images and geocoding for dynamic and scholarly analysis of specimens by on-and off-site students and researchers. We have improved the underlying infrastructure with a stable database with persistent digital metadata, a vital and integral part of the future of our repository. Previously many specimens in the research collections were unknown to the research community, significant information relating to them is now digital and available through GBIF and iDigBio. Improved interconnection has generated data for research in biodiversity, climate, and pollution. Dissemination continues with publication of project methods and results promoting institutional vitality and feedback.

Broader impacts of the project:

We have continued to promote public education especially with our Fossil Roulette Tumblr app. Access to such resources promotes interest in, exploration of, and contribution to science, vital to underrepresented groups many of whom rely on cell-phone access to the internet. Progressive job training continues with all students and volunteers participating in learning, aspects of data collection and quality control, digital imaging techniques, georeferencing, and conservation practices, giving them stronger career and research skills. Community involvement continues with volunteers, drawn from community and business organizations, playing a vital role in funneling expertise in both directions.

Links to sample data:

https://www.idigbio.org/portal/records/9f39e688-50eb-4c83-bf33-0575629c109e
http://www.gbif.org/occurrence/search?taxon_key=4877598&dataset_key=1f2cfb6f-c91b-498e-80f3-8eeeec688292
http://fossilroulette.tumblr.com/post/135916749500/name-volutilithes-petrosa-age-38-48-million
http://fossilroulette.tumblr.com/post/136876871140/name-seleneceme-bakeri-age-472-488-million
http://www.paleocentral.org/Map/view/table

Further, here are more precise statistics:

Of the 142444 records now in Specify, 70324 of them are relevant to the TCN/PEN project. They can be divided up into:

a) Paleozoic - 27159 records, 13967 georeferenced and 2557 with stage/age resolution
b) Cenozoic - 43165 records, 15457 georeferenced and 3894 with stage/age resolution

For Localities, there are:

Paleozoic unique events: 6531; number of georeferenced events: 3042
Paleozoic unique localities: 2701; number of georeferenced localities: 1062
Cenozoic unique events: 6776; number of georeferenced events: 2919
Cenozoic unique localities: 3310; number of georeferenced unique localities: 1228

For Images, there are:

4807 whole drawer images. About half are Paleozoic and Cenozoic of relevance to the TCN, 218 drawers have been imaged by specimen with labels, with over 12K image files.

Attachments within Specify become potential data for researchers. Our current attachments total 12763. These breakdown into specific categories:

8477 attachments that are attached to Collection Objects
227 attachments that are attached to Localities
1945 attachments that are attached to Storage
829 attachments that are attached to Field Notebook pages
61 attachments that are attached to Preparations"

And at Yale: From PI Susan Butts:

(They have almost completed their work on this project, there are < $500 in funds remaining, and are getting ready to submit the final report to NSF for their PEN. Thus, this will probably be their last update to iDigBio for this project.)

Students from SciCorps (the long-standing members of the Peabody Evolutions afterschool program) are being trained to engage Peabody Museum visitors and guide visitors through identification of a dozen real fossils from the Ordovician Cincinnati Arch alongside a touch-screen kiosk (completed). The remaining funds from the participant support (less than $500) will go toward SciCorps interns manning the kiosk in the exhibit halls on weekends. The kiosk also links to the Ordovician Atlas, landing on the Geological Setting page. The interface can be seen at http://collections.peabody.yale.edu/invertebrate-paleontology/paleo-cart/#/?_k=lccled.

YPM-IP is submitting all catalog records to iDigBio (over 350,000 records). For the two geographic areas specified in the grant, the Ordovician Cincinnati Arch (Indiana, Ohio, and Kentucky - 38.22 Lat, -85.62, 283 km radius) has 10,383 specimen catalog records (some may also be lots), 3,469 have been imaged (many from two or more orientations) the Pennsylvanian Mid Continent has 30,620 cataloged objects (Lat/Lon Bounds Rectangle NW 48.80, -104.24; SE 27.53, -98.80) and 8,496 have been imaged (many in multiple orientations). All objects are georeferenced. Less than $200 remains in our grant funds (excluding participant support costs) which is used for one undergraduate worker to continue photographing previously cataloged objects. At the time that funding is exhausted, we will do one final ingestion of locally-stored images (a few hundred) to our database and IPT.

Share and Identify Best Practices and Standards (including Lessons Learned)

N/A

Identify Gaps in Digitization Areas and Technology

N/A

Share and Identify Opportunities to Enhance Training Efforts

N/A

Share and Identify Collaborations with other TCNs, Institutions, and Organizations

N/A

Share and Identify Opportunities and Strategies for Sustainability

N/A

Other Progress (that doesn't fit into the above categories)

N/A

Attachment

N/A

Fossil Insect Collaborative: A Deep-Time Approach to Studying Diversification and Response to Environmental Change

Report submitted by: talia.karim@colorado.edu
Report Submitted on: 03/24/2016 - 21:44

Progress in Digitization Efforts

CU-Boulder:
• Acquired 873 images from Jan 1st, 2016-March 22rd, 2016
• 903 new specimen records were added to Specify.
• We have trained one new graduate student (K. Iyoob) on our imaging station and she has started working on imaging our general collection of Florissant specimens.
• D. Zelagin, collections assistant, continues to image our type specimens and has completed imaging our Hymenoptera from the D. Kohls Green River Formation collection. He has also successfully digitized all of our ant types and has worked with V. Perrichot (Université Rennes 1) on publishing them to Antweb.org.

Harvard-MCZ:
• Since our last report (mid January) we have taken about 2,400 images more, accounting for about 2,200 specimens from the collection. The total of images taken so far is about 22-23k (accounting for about 20k fossil specimens).
• Assigned about 100 new catalog numbers to unnumbered fossils found as we imaged the collection.

Yale-Peabody:
• We have digitized an additional 304 specimens, which are new acquisitions (using divisional funds). Overall, we are contributing 12,877 specimens to iDigBio, which is 1.5 times what we proposed. This material is 100% georeferenced and 86% has images.

VMNH:
• Since November we have imaged 100 specimens, updated 1,811 database records, and added 27 new database records.

• Challenges include: No public server at institution; Modifying workflow and adjusting for use of Flickr as public resource for images; Unexpected metadata export challenges in photo manager. Had to manually move data around into fields that would share to Flickr and export in spreadsheet form for sharing to iDigBio efficiently.

• Breakthroughs include: VMNH is now a GBIF publisher; VMNH record in the Global Registry of Biodiversity Repositories is up to date; Deciding to use Flickr as public resource for images (1546 images shared online); Successfully set up an IPT account with VertNet and published first dataset (651 records, all with images; in DarwinCore-Archive format). Second dataset is ready and awaiting VertNet data quality check (1796 records). Working on refining workflow efficiency and repeatability; 651 records successfully acquired by iDigBio; Data usage tracking available to VMNH via VertNet IPT

Berkeley PEN:
Stewart Valley digitization — All 1667 Stewart Valley (SV) Insect|Arachnid specimen records, plus the specimen metadata of 1100 UCMP SV insects on loan to University of Colorado, Boulder are digitized and now being published via the Berkeley Natural History Museum (BNHM) IPT. The metadata is being harvested by iDigBio, GBIF and soon will be ingested by iDigPaleo for incorporation into the ePANDDA (Enhancing Paleonotological and Neontological Data Discovery API) project. The BNHM IPT updates the UCMP records weekly. This is important as the BFIP team will continue to update locality and taxonomic fields and to upload images as the project progresses. There are currently 1677 high resolution images of the SV insects available online via the UCMP and Calphotos databases. There are still ~250 images we discovered that still need processing and uploaded. These will be done by the end of April thus completing the SV collection digitization portion of the grant. The iDigBio portal will ingest the SV images once the issues with their media uploads is resolved. With respect to the iDigBio site, initially it was thought there might be a problem with our Darwin Core Archive multimedia extensions but we learned through email correspondence between our BNHM IT person Joyce Gross and iDigBio's Joanna McCaffrey that the iDigBio cyberinfrastructure team is behind in their media ingestion and they will be looking to resolve the problem soon:

Subject: Re: iDigBio: issues with your Darwin Core Archive - multimedia extension
Date: Thu, 10 Mar 2016 15:29:01 +0000
From: McCaffrey,Joanna <jmccaffrey@flmnh.ufl.edu>
To: Joyce Gross <joyceg@berkeley.edu>

Hi Joyce - I'm following up to let you know the cyberinfrastructure team is looking at it now (there is a ticket) and I'll let you know when it is resolved. Best regards, Joanna.

Amber digitization — The BFIP team completed the imaging of both the type and non-type whole specimens with their associated label data. All the amber metadata records (2131) and 440 images of the whole amber specimens are now uploaded and web-accessible via the UCMP and Calphotos online databases and published via the BNHM IPT. Click on this link http://ucmpdb.berkeley.edu/cgi/ucmp_query2?&spec_id=I12612&one=T to view an example image of a whole amber specimen with associated label data currently accessible via the linked UCMP and Calphotos databases. The metadata is being harvested by iDigBio, GBIF, and will soon be ingested by iDigPaleo for incorporation into the ePANDDA (Enhancing Paleonotological and Neontological Data Discovery API) project. The BFIP data are also accessible to any data aggregator site capable of ingestion via the BNHM IPT. Removal of the amber from their old housing will be completed end of April, 2016 with the digitization of the amber to begin in the first part of May, 2016.

Digitization of tar pit insects — We have started imaging the southern Californian Rancho La Brea and McKittrick asphalt seep insect collections. The Canon 5D Mark III camera with the MP-E 65 mm lens attached to the StackShot focusing rail and Dell laptop computer running the Helicon Remote and Helicon Focus stacking software has produced spectacular high resolution images of these three-dimensionally preserved specimens (clink link to view an example specimen image in Calphotos http://calphotos.berkeley.edu/cgi/img_query?enlarge=0000+0000+0316+0119). Currently, ~700 tar pit specimens are digitized and the metadata available via the UCMP online database. These metadata are being harvested by iDigBio, GBIF and iDigPaleo (soon). Additional specimens (~150) from McKittrick and Ranch La Brea were found in the Pleistocene section of the UCMP invertebrate collections. These are currently being cataloged and the metadata should be online by mid-May. At present, 389 high resolution specimen images are accessible through the Calphotos online database. This number reflects our taking an image of both the top and bottom of each specimen in most cases. These images will be also ingested by the iDigBio once the cyberinfrastructure teams for these sites have worked out the issues with web-serving the ingested media files. The tar pit insect data and images are also accessible through the UCMP database by searching the UCMP Collections>Search the Collections online>UCMP Specimen Search>select “Specimens (advanced)”>then select Class=Insecta>State=California. To access through Calphotos (http://calphotos.berkeley.edu/) go to the Custom Query page>select Type of Photo=Fossil-Invertebrate>US State=California>Project=Berkeley Fossil Insect PEN.

Share and Identify Best Practices and Standards (including Lessons Learned)

Harvard-MCZ:

• Shared a technique for photographing fossil specimens preserved in shale (like those from Florissant) using a polarizing filter in order to enhance the contrast of fossils. See http://fossilinsects.colorado.edu/blog/polarizing-filters-and-florissant-imaging/

• Developed a technique for dissolving lacquer that was originally applied to the surface of compression fossils to increase its contrast, and that as it fractured over time was today hampering the observation of the specimens. Used a combination of ethanol and acetone.

Identify Gaps in Digitization Areas and Technology

There is nothing to report.

Share and Identify Opportunities to Enhance Training Efforts

There is nothing to report.

Share and Identify Collaborations with other TCNs, Institutions, and Organizations

CU-Boulder:

• Images and associated specimen data from our type collection are now available on Ant Web as of January 2016. The addition of this data filled some major gaps in the fossil data available on antweb and will make it easier for researchers to know where these type and figured specimens are reposited.

• D. Smith and T. Karim met with CU Libraries special collections and archives divisions to discuss possible collaborations related to digitization of the T.D.A. Cockerell archives. The library has 120 boxes of material including field notes and photos, lantern slides of specimens (many of which we have in our collection), and lab notes associated with many of our fossil insect specimens.

• T. Karim along with G. Nelson and S. James (iDigBio), and H. Little and A. Millhouse (Smithsonian) submitted a topical session proposal for the 2016 GSA annual meeting “Fossil 0’s and 1’s - Databases, Standards, & Mobilization.” The proposal was accepted and the organizers are in the process of inviting speakers for the session.

• T. Karim was part of a proposal submitted to the Society for Vertebrate Paleontology (SVP) to hold a town hall meeting on digitization at the SVP annual meeting (October 2016). The proposal was accepted and she will participate and share experiences learned from this TCN.

Share and Identify Opportunities and Strategies for Sustainability

Yale-Peabody:

• The YPM PIs have meet (virtually and in person) with Seth Kaufman to fine-tune functionality and long term solutions for the iDigPaleo database. The PIs have also represented iDigPaleo in the development in ePANDDA (NSF EarthCube) in discussions with developers and at the GSA Steppe-hosted ePANDDA workshop held in Boulder, Colorado February 29-March 1.

Other Progress (that doesn't fit into the above categories)

Yale:

• YPM-IP hosted Richard Kelly, from University of Bristol and the National Museum of Scotland, for 5 days to work on Triassic and Jurassic insects from New England. Gwen Antell, a Yale undergraduate who had worked on the FIC TCN, has submitted a paper to the Peabody Bulletin on new strepsipterans from the Green River Formation.

Harvard-MCZ:

• Shared images of the holotype of Elmothone martynovae with Dr. Jo Wolfe, from the MIT, working on arthropod phylogenies.
• Shared images of the holotype of Psecadia mortuella with Dr. Maria Heikkilä, from the Smithsonian Institution, working on fossil moths.
• Assisted Mr. Gareth Powell, from Purdue University, in examining fossil Nitidulidae (Coleoptera) during his visit to the MCZ (March 14th-18th).

VMNH:

• 2 students conducting research on a subset of the Solite insects

Berkeley PEN Update:

• A broader impact of the BFIP has been Dr. El-Faramawi's growing interest in the UCMP amber collection archives. She has now scanned the contents (i.e., correspondence, manuscripts, loan paperwork, and other related documents) of 75 of the 85 folders. The associated metadata and pdfs will be uploaded to DocuBase (https://docubase.berkeley.edu/) and linked to the UCMP online finding aid for the "Amber Files" currently hosted by Archon (ArchivesSpace). The metadata will be batch uploaded followed by the pdf uploads. The pdfs will be downloadable from either DocuBase or ArchivesSpace. This resource will be used in highlighting the rich history of the amber collection, is useful to the current curatorial staff and for developing outreach and education activities relating to the archives. In this latest batch of scanning we now have the original detailed maps made/used by Frans Blom on his Mexican amber collecting trips. Dr. Faramawi's work on the archives will also be a part of the CalDay BFIP exhibit.

Attachment

N/A

The Microfungi Collections Consortium: A Networked Approach to Digitizing Small Fungi with Large Impacts on the Function and Health of Ecosystems

Report submitted by: akuhn@illinois.edu
Report Submitted on: 03/25/2016 - 15:49

Progress in Digitization Efforts

- Added CHSC and WSP to the portal.
- See attachment for digitization progress of participants (369,363 records).
- See attachment for existing datasets uploaded to MyCoPortal (416,664 records)

Share and Identify Best Practices and Standards (including Lessons Learned)

- Progress is being made on standardizing substrate and hosts fields.

Identify Gaps in Digitization Areas and Technology

- Altered Symbiota Edit Existing Occurrence Records search module to include the ability to search by "modified by."

Share and Identify Opportunities to Enhance Training Efforts

- Trained CHRB (1 total) for digitization and data upload processes on 01/13, all day.

Share and Identify Collaborations with other TCNs, Institutions, and Organizations

- PI serves as Co-Chair of the Symbiota Working Group (SWG) and hosted meetings on January 27 and March 3.

Share and Identify Opportunities and Strategies for Sustainability

- Working with Alex Thompson to revise iDigBio Image Ingestion utility for ease of use for future sustainability among collections.

Other Progress (that doesn't fit into the above categories)

The MyCoPortal was mentioned in a recently funded NSF DEB award (DEB-1554375, Collaborative Research: Evolutionary genomics of plant-fungal symbiosis: coevolution of Pinaceae and their ectomycorrhizal fungi in the genus Suillus)

"H2: The diversity of Suillus (diversity = both species richness and phylogenetic breadth) will be highest in areas where Pinaceae diversity is highest. Within Pinus, Suillus diversity will be highest in Mexico, which is the epicenter of Pinus diversity in North America.
To test hypothesis two, we will parse location and host metadata from the 10,209 collection records for Suillus that we have identified through the Mycology Collections Portal (MycoPortal) consortium (http://mycoportal.org). We will then correlate those collection data with the distribution and richness of Pinaceae and Pinus richness for different biomes in North America using standard correlation functions in the statistical package R (R Core Team 2013)."

Attachment

https://www.idigbio.org/sites/default/files/webform/tcn-reports/Microfungi_Jan_Feb_Mar2016_stats_report_merged.pdf

Institution	Stage	2015-7	2015-8	2015-9	2015-10	2015-11	2015-12	2016-1	2016-2	2016-3	Total
Ada Hayden Herbarium, Iowa State University	Specimens	2	11	5	1548	804	727	516	1186	669	5468
	Stage 1	0	0	0	2	0	0	0	5	2	9
	Stage 2	0	8	2	1508	777	717	512	1176	660	5360
	Stage 3	0	0	0	0	0	0	0	0	0	0
	Images	0	0	411	1404	463	455	0	697	946	4376
Arthur Fungarium, Purdue University	Specimens	0	0	0	48	149	427	2343	1327	93	4387
	Stage 1	0	0	0	0	0	0	0	0	0	0
	Stage 2	0	0	0	0	0	0	0	916	90	1006
	Stage 3	0	0	0	48	149	427	2343	411	3	3381
	Images	0	0	0	0	0	0	0	0	0	0
Brown University Herbarium	Specimens	0	0	0	0	0	2563	1049	2183	3037	8832
	Stage 1	0	0	0	0	0	0	0	0	0	0
	Stage 2	0	0	0	0	0	2561	1047	2183	3037	8828
	Stage 3	0	0	0	0	0	2	0	0	0	2
	Images	0	0	0	0	0	3121	494	2181	2586	8382
Chrysler Herbarium	Specimens	0	0	0	0	0	0	246	503	808	1557
	Stage 1	0	0	0	0	0	0	0	4	808	812
	Stage 2	0	0	0	0	0	0	0	0	0	0
	Stage 3	0	0	0	0	0	0	0	0	0	0
	Images	0	0	0	0	0	0	0	0	0	0
Cornell Plant Pathology Herbarium	Specimens	661	51	4354	16	1974	107915	3454	4322	4472	127219
	Stage 1	632	0	1152	1	1047	105410	1938	1743	2208	114131
	Stage 2	0	0	3191	1	277	1638	1505	2532	2163	11307
	Stage 3	0	0	0	0	0	0	1	0	0	1
	Images	4	0	35	581	780	45992	51712	1556	2120	102780
Field Museum of Natural History	Specimens	0	294	507	496	1551	0	6237	2030	10003	21118
	Stage 1	0	0	44	183	3	250	1320	1014	1254	4068
	Stage 2	0	240	395	309	1544	1024	679	745	942	5878
	Stage 3	0	0	0	0	0	0	0	0	0	0
	Images	0	55	650	1150	725	17164	3596	2660	5345	31345
Illinois Natural History Survey	Specimens	0	0	0	1	0	0	0	18	5228	5247
	Stage 1	0	0	0	0	0	0	0	0	0	0
	Stage 2	0	0	0	0	0	0	0	0	5228	5228
	Stage 3	0	4	0	1	0	0	0	0	0	5
	Images	0	1100	0	1	0	0	0	0	0	1101
Julian H. Miller Mycological Herbarium, University of Georgia	Specimens	0	0	28	104	695	461	2881	2577	2454	9200
	Stage 1	0	0	0	1	3	0	6	874	1342	2226
	Stage 2	0	0	28	103	450	4	707	564	1079	2935
	Stage 3	0	0	0	0	242	457	2168	1102	32	4001
	Images	0	0	0	5	309	2278	2352	7814	1886	14644
Louisiana State University Bernard Lowy Mycological Herbarium	Specimens	20	4824	2675	1055	709	2432	2246	1285	437	15683
	Stage 1	0	0	0	18	0	641	462	968	400	2489
	Stage 2	15	2171	653	180	54	20	675	299	31	4098
	Stage 3	0	2030	1941	827	627	1740	1046	1	0	8212
	Images	0	1	0	415	0	1750	1498	2177	829	6670
New York Botanical Garden	Specimens							9407	9519	7582	26508
	Stage 1							5756	5472	1933	13161
	Stage 2							2689	2604	2962	8255
	Stage 3							1325	1908	4322	7555
	Images							5090	7576	1023	13689

SUNY College of Environmental Science and Forestry Herbarium	Specimens	282	7097	52	54	63	56	335	1029	480	9448
	Stage 1	1	9	51	53	60	54	331	1021	478	2058
	Stage 2	280	7084	0	0	0	0	2	0	0	7366
	Stage 3	0	1	0	0	1	0	0	0	0	2
	Images	0	0	0	0	52	57	272	892	551	1824
University of Florida Herbarium	Specimens	15	36	5	1028	13	2737	28	14944	1369	20175
	Stage 1	2	5	2	13	0	24	0	1734	1349	3129
	Stage 2	0	1	0	0	11	6	3	14	1	36
	Stage 3	0	0	0	0	0	0	0	13193	5	13198
	Images	6	0	64	1521	829	377	1362	2053	468	6680
University of Illinois Herbarium	Specimens	11649	7690	2676	2600	2751	9647	1682	2222	2929	43846
	Stage 1	9053	2880	1645	0	0	1453	0	51	1089	16171
	Stage 2	2421	4803	1031	2574	2709	4133	1678	2200	1633	23182
	Stage 3	0	1	0	2	0	1	0	0	0	4
	Images	8326	12417	6493	2689	2569	0	0	0	1081	33575
University of Michigan Herbarium	Specimens									9672	9672
	Stage 1									6757	6757
	Stage 2									2600	2600
	Stage 3									35	35
	Images									0	0
University of North Carolina Herbarium	Specimens	115	819	0	13048	3594	419	85	1789	917	20786
	Stage 1	0	0	0	0	0	0	0	1111	515	1626
	Stage 2	0	13	0	90	21	25	21	161	36	367
	Stage 3	75	689	0	12876	3532	365	45	495	338	18415
	Images	29	0	1	0	1131	306	691	476	1794	4428
University of Wisconsin-Madison Herbarium	Specimens	0	1395	2754	5251	2894	3282	3065	4596	3903	27140
	Stage 1	0	0	0	0	0	0	0	1	1157	1158
	Stage 2	0	1386	2754	5246	2889	3280	3055	4590	2741	25941
	Stage 3	0	0	0	1684	115	7	4	656	5	2471
	Images	0	0	820	3035	4240	4419	2864	3537	3140	22055
Wilhelm G. Solheim Mycological Herbarium, University of Wyoming	Specimens	19	2609	195	694	470	454	1095	2691	1871	10098
	Stage 1	0	19	194	693	413	343	1043	2545	1765	7015
	Stage 2	7	2459	0	0	57	111	51	142	102	2929
	Stage 3	0	106	0	1	0	0	0	0	0	107
	Images	0	0	0	434	566	242	717	2001	2936	6896
Willard Sherman Turrell Herbarium, Miami University	Specimens									2979	2979
	Stage 1									1723	1723
	Stage 2									435	435
	Stage 3									662	662
	Images									1886	1886

TOTALS	**Specimens**	**369363**
	Stage 1	**176533**
	Stage 2	**115751**
	Stage 3	**58051**
	Images	**260331**

Existing Datasets

Collection Codes	Collections in NSF proposal	Number of records
NEB	C.E. Bessey Herbarium, University of Nebraska State Museum	2,135
WSP	Charles Gardner Shaw Mycological Herbarium, Washington State Univ	71,107
BISH	Herbarium Pacificum, Bishop Museum	7,801
ILLS	Illinois Natural History Survey	54,280
KANU	R. L. McGregor Herbarium, Kansas State University	2,945
PUR	Arthur Fungarium, Purdue University	96,000
BPI	United States National Fungus Collections	56,336
UACCC	University of Alabama Chytrid Culture Collection	111
	TOTAL	290,715

	Collections in addition (not in proposal)	
CFMR	Center for Forest Mycology Research, USDA Forest Service	53,479
CMMF	Cercle des Mycologues de Montreal Fungarium	10,606
CHSC	Chico State University	10,400
ACAD	E. C. Smith Herbarium, Acadia University	9,079
NFL	Fungarium of Foray Newfoundland and Labrador	1,503
TRTC	Royal Ontario Museum Fungarium	11,129
UBC	University of British Columbia Herbarium	29,753
	TOTAL	125,949

GRANT TOTAL	416,664

SERNEC: The Key to the Cabinets: Building and Sustaining a Research Database for a Global Biodiversity Hotspot

Report submitted by: michael.denslow@gmail.com
Report Submitted on: 03/28/2016 - 07:56

Progress in Digitization Efforts

All SERNEC:
There are 66 collections serving data through the SERNEC portal. There are currently 1,031,807 specimens records and 86,366 (8%) of those records are georeferenced.
Of the total records 347,959 are skeletal or partial records. There are currently 236,480 specimen images available.

Arkansas:
Since our last reporting, Arkansas has digitized a large number of specimens. UAM has completed the imaging of all 27,000 of their specimens. HXC hired two student workers in February. 1,856 of their ~5,000 specimens have been imaged with skeletal data uploaded on the SERNEC Portal. A total of 14,282 specimens (~14%) of the UARK collection is now imaged with skeletal data uploaded on the SERNEC Portal. UARK has hired 6 new part-time (mostly student) workers to work on the project since December 2015. The number of images each week is now greatly improved over the previous reporting periods when we only had one student working on the project.

Georgia:
GA imaged 29,950 specimens during the reporting period (98,500 for the project to date). A total of 3,523 sheets have been imaged at COLG. An estimated 21% of these specimens were annotated by Richard Carter (Curator VSC) and 10+% were repaired by VSC student workers.
Stephanie Harvey (GSW) has identified two student workers to work on imaging, and Carter is working on set up so that they can be paid by VSC.

A total of 2,919 GAS specimens now have been imaged. Three undergraduate workers have been hired and trained. GAS installed the latest version of Specify. CoPI Alan Harvey has been in touch with Curator Melanie-Link Perez to set up imaging of AASU. The content and layout of barcode labels has been determined and general protocols and timetables have been set up.

Kentucky:
EKY has imaged 28,644 images. Currently 19,121 of these images are available on the SERNEC Portal.

Mississippi:
Image capture and label transcription for IBE has been ongoing. Additional georeferencing will resume during the summer months.

South Carolina:
Over 30,000 specimens from three collections; FUGR, CLEMS and USCH. FUGR currently has one student worker supported with TCN funds and work is expected to be completed in May. CLEMS will continue to process specimens through May using work-study students. CLEMS has hired one student to resume digitization work over the summer, and has also identified a second potential student worker. USCH currently has two work-study students involved in the project and has plans to hire two more students to work this summer. This summer imaging will begin at CONV and USCU.

West Virginia:
MUHW has completed barcoding and imaging of its southeastern specimens. They are now beginning to image non-southeastern specimens. Transcription of state and county fields for southeastern specimens in preparation for inclusion into Notes from Nature has begun.

WVU has completed barcoding of non-West Virginia southeastern specimens (24,666). Over half of these specimens (13, 375) have been imaged at an average rate of 53 per hour. Image uploads to iPlant have been completed for 5,882 specimens.

Share and Identify Best Practices and Standards (including Lessons Learned)

All SERNEC:

The SERNEC – TCN protocols continue to be updated as needed and are posted on the SERNEC resources site (http://sernec.appstate.edu/resources).

Arkansas:
Links to two protocols from Arkansas (one using a Nikon camera and one using a Canon camera) are now posted on the SERNEC website at: http://sernec.appstate.edu/resources. These workflows are highly detailed and specific to be used to train student who are imaging and uploading skeletal data. They are then used as reference documents during imaging sessions. The advantage of these protocols is that they are streamlined to generate a high-quality image without time-consuming post-capture image processing.

South Carolina:
We have found it useful to periodically update all the herbaria involved in the project (both those whose collections are currently being processed and those scheduled for future years) about the ongoing work and scheduling.

West Virginia:
MUHW has developed a guest log for barcoding during spring semester 2016 in order to facilitate volunteer record-keeping. WVU has separated tasks in the workflow, with a student specialist/trainer for each. This also allows more students to work simultaneously (while only 1 can work at imaging station).

Identify Gaps in Digitization Areas and Technology

All SERNEC:
Nothing to report.

Mississippi:
We have had some issues with processing images through the SilverImage software recently. Most of these have been resolved, but the future of SilverBiology is uncertain at this time. This has not been a major impediment to capturing data up to this point, but could impact our efforts in the future.

Share and Identify Opportunities to Enhance Training Efforts

All SERNEC:
The SERNEC – TCN Project Manager presented a webinar for the iDigBio Symbiota working group on February 18th. The webinar focused on record creation in Symbiota including skeletal record creation and image linking within a Symbiota portal.

Share and Identify Collaborations with other TCNs, Institutions, and Organizations

See Symbiota webinar above.

Share and Identify Opportunities and Strategies for Sustainability

All SERNEC:
Nothing to report.

Arkansas:
The Arkansas group plans to make the mobile imaging station perpetually mobile even after the life of the grant. They estimate that herbaria in Arkansas take in specimens at a rate that would allow for annual imaging and data uploads of new accessions. With two imaging stations in the state, all 8 institutions could have the imaging station for 3 months per year (as needed).

Mississippi:
Lisa Wallace participates in the Museum and Galleries Committee at Mississippi State University. This entity is tasked with enhancing exposure of the administration to all collections owned by the university and with determining solutions for long-term curation of all collections.

Other Progress (that doesn't fit into the above categories)

All SERNEC:
Noting to report

Arkansas:
During this period, Co-PI and State Lead, Dr. George Johnson, passed away unexpectedly. Marsico wrote a tribute that will appear in the Journal of the Botanical Research Institute of Texas (JBRIT) and the Journal of the Arkansas Academy of Science. We are honoring the

legacy of Dr. Johnson's contributions to Arkansas Botany in a special Arkansas Botany Symposium at the 100th annual meeting of the Arkansas Academy of Science on April 1, 2016. He is greatly missed.

Attachment

N/A

Mobilizing New England Vascular Plant Specimen Data to Track Environmental Change

Report submitted by: p_sweeney@att.net
Report Submitted on: 03/28/2016 - 11:25

Progress in Digitization Efforts

Capture of collection level-information (i.e., "pre-capture") is complete. Approximately 800,000 specimens have been pre-captured -- with at least current identification captured. As part of the primary digitization phase, approximately 679,337 records and 695,948 images have been captured. We have begun to capture phenology data using new functionality in Symbiota.

Share and Identify Best Practices and Standards (including Lessons Learned)

nothing to report

Identify Gaps in Digitization Areas and Technology

nothing to report

Share and Identify Opportunities to Enhance Training Efforts

nothing to report

Share and Identify Collaborations with other TCNs, Institutions, and Organizations

We continue to collaborate with, iPlant, the FilteredPush project, the Symbiota team, and iDigBio. In collaboration with Ed Gilbert, we recently implemented trait attribute scoring functionality within Symbiota. PI Sweeney participated in the iDigBio herbarium specimen phenology workshop in Berkeley, CA.

Share and Identify Opportunities and Strategies for Sustainability

nothing to report

Other Progress (that doesn't fit into the above categories)

nothing to report

Attachment

N/A

Great Lakes Invasives: Documenting the Occurrence through Space and Time of Aquatic Non-indigenous Fish, Mollusks, Algae, and Plants Threatening North America's Great Lakes

Report submitted by: kmcameron@wisc.edu
Report Submitted on: 04/04/2016 - 10:54

Progress in Digitization Efforts

See attached

Share and Identify Best Practices and Standards (including Lessons Learned)

See attached

Identify Gaps in Digitization Areas and Technology

See attached

Share and Identify Opportunities to Enhance Training Efforts

See attached

Share and Identify Collaborations with other TCNs, Institutions, and Organizations

N/A

Share and Identify Opportunities and Strategies for Sustainability

N/A

Other Progress (that doesn't fit into the above categories)

N/A

Attachment

https://www.idigbio.org/sites/default/files/webform/tcn-reports/GLIReport_3292016.pdf

GREAT LAKES INVASIVES TCN – Bi-Monthly Report **Through Mar. 29, 2015**

Our four regional processing centers (NY Botanical Garden, Field Museum, Univ. of Michigan, and Univ of Wisconsin-Madison) report the following from their constituents:

1) **Progress in Digitization Efforts TO DATE**

PLANTS:

- Specimens Barcoded Only (not photographed yet): **0**
- Imaged only AND image uploaded to the portal (i.e., no data record yet): 6604 (OSU) + 9804 (ALBC) 180 (BUT) **= 16588**
- Imaged only but image not yet uploaded to the portal: 102,646 (NY) **= 102,646**
- Databased only (skeletal or complete record) AND data uploaded to a portal (i.e., but not imaged yet): 3840 (MOR) **= 3840**
- Databased only but not yet uploaded to a portal: 98,519 (NY) + 9200 (F) + 7741 (MOR) + 17000 (ILLS) **= 147,848**
- Imaged and Databased but not yet uploaded to a portal: 20,775 (MICH)
- Both Image AND a Data Record Uploaded to iDigBio, to the GLI portal directly, or to another Symbiota portal: **567,494**

PLANT IMAGING SUMMARY: At least 686,728 images taken. Target stated in grant proposal is 637,000. Imaging goal is 108% complete.

FISH:

- Specimens Barcoded Only (not photographed yet): 519 (MIN) **=519**
- Imaged only AND image uploaded to a portal (i.e., no data record yet) 66 (MIN): **66**
- Imaged only but image not yet uploaded to a portal: **0**
- Databased only (skeletal or complete record) AND data uploaded to a portal (i.e., but not imaged yet): 15200 (ILLS) + 4185 (WIS) + 3185 (F) **= 22,570**
- Databased only but not yet uploaded to a portal: 200,000 (MICH: UMMZ) complete, but waiting for corresponding images to be completed before uploading + 4709 (F) **= 204,709**
- Both Image AND a Data Record Uploaded to iDigBio, to the GLI Portal directly or to another Symbiota Portal for editing before transfer to GLI Portal: 128 (MICH: UMMZ) + 9237 (OSU) + 3298 (MIN) + 1670 (F) + 8800 (ILLS) + 330 (WIS) **= 23,463**

FISH IMAGING SUMMARY: Five institutions making progress so far. At least 23,529 images have been taken. Target stated in grant proposal is 102,000 lots. Imaging goal is 23% complete.

MOLLUSKS

- Specimens Barcoded Only (not photographed yet): 200 (WIS) **= 200**
- Imaged only AND image uploaded to a portal (i.e., no data record yet): **0**
- Imaged only but image not yet uploaded to a portal: 9341 (MICH: UMMZ) + 640 (ILLS) **= 9981**
- Databased only (skeletal or complete record) AND data uploaded to a portal (i.e., but not imaged yet): 5716 (ILLS) + 306 (WIS) **= 6022**
- Databased only but not yet uploaded to a portal: 15,668 (MICH: UMMZ) + 640 (ILLS) **= 16308**
- Both Image AND a Data Record Uploaded to iDigBio, to the GLI Portal directly or to another Symbiota Portal for editing before transfer to GLI Portal: 855 (MICH: UMMZ) + 137 (WIS) + 1488 (OSU) **= 2480**

MOLLUSK IMAGING SUMMARY: Three institutions making progress so far. At least 12,461 images have been taken. Target stated in grant proposal is 44,000 lots. Imaging goal is 28% complete.

2) **Share and Identify Best Practices and Standards (including Lessons Learned)**

MOR - added a new field to the data entry form. We needed to note when a skeletal record needs an annotation to be added to the record after importing to main database. This way we'll have the original and most recent determination of the specimen in our system. Our digitization intern is currently working on a streamlined imaging protocol to help volunteers work more easily and efficiently.

WIS – All institutions should be making backups of their Symbiota data on a regular basis. We came upon an issue of data being overwritten incorrectly, and we were able to restore it due to having an earlier restore point saved, but institutions having their own backups will make this process much easier and more efficient.

The FileZilla server is close to being filled, so we've had to institute a new procedure to upload images to Symbiota. This process involves several more steps, but is rather straightforward, though a bit more intensive on being computer savvy.

3) Identify Gaps in Digitization Areas and Technology

MOR - continuing the transition from our old database to BRAHMS. Exporting a complete data set to Symbiota will be possible in the very near future.

4) Share and Identify Opportunities to Enhance Training Efforts

MOR - the Outreach Coordinator is writing tutorials for databases receiving records from the TCN. These will be used in teacher training and professional user workshops.

Native and invasive look-alikes identification materials' first draft is almost complete. The guide includes line drawings, herbarium specimen images, and in-situ photos. The ID guide will be included in the Experience Boxes and will be available online.

5) **Share and Identify Collaborations with other TCNs, Institutions, and Organizations**

MOR - continuing work with The Field Museum in creating an aquatic invasives Experience Box. Scientific content of the Experience Box was reviewed by Dan Larkin at the University of Minnesota. Educational content was reviewed by the Field Museum. We are on track to have the Experience Box in classrooms mid to late 2016.

The Outreach Coordinator began sharing data with MISIN, GLANSIS, and GISD. We shared select images with GLANSIS and Bugwood depending on which species they wanted. More images will be uploaded to Bugwood in the future.

The Outreach Coordinator is attending iDigBio Education and Outreach working group webinars and is collaborating with other members of the working group to submit proposals for the 2017 National Science Teachers Association Conference and the 2016 meeting of the National Association of Environmental Educators.

6) Share and Identify Opportunities and Strategies for Sustainability

MOR - found that volunteers work best when they have a specific goal or individual project. After communicating the size and purpose of the TCN digitization efforts, we had two volunteers ask to double their data entry shifts. We noticed a small dip in volunteer enjoyment after working with one genus for weeks at a time. After switching around the order of taxa digitization, they were more engaged and excited to work with the specimens.

7) **Other Progress (that doesn't fit into the above categories)**

MOR - hired a digitization intern, Michael Stuart. Mike is working around 30 hours per week for a total of 300 hours. He enters data, images specimens, and assists volunteers with those same tasks. He is enthusiastic about the project and is fully engaged in helping to improve workflows and imaging quality.

InvertNet: An Integrative Platform for Research on Environmental Change, Species Discovery and Identification

Report submitted by: chdietri@illinois.edu
Report Submitted on: 04/22/2016 - 09:01

Progress in Digitization Efforts

Whole drawer digitization is ongoing at the lead and collaborating institutions with 51,669 images including 3,448 whole drawer image sets. Because of the delay in implementing our whole-drawer digitization workflow, most collaborators will request a no-cost extension to allow an additional year to finish digitizing their collections.

Share and Identify Best Practices and Standards (including Lessons Learned)

Nothing to report.

Identify Gaps in Digitization Areas and Technology

Nothing to report.

Share and Identify Opportunities to Enhance Training Efforts

Nothing to report.

Share and Identify Collaborations with other TCNs, Institutions, and Organizations

See previous report.

Share and Identify Opportunities and Strategies for Sustainability

See previous reports.

Other Progress (that doesn't fit into the above categories)

N/A

Attachment

N/A