SCAN-LepNet TCNs

1. Overview and growth of SCAN

2. LepNet is adding PENs

3. The need for “Deep Digitization” (iDigBees)

4. Highlight PEN grants

LepNet

A. SDNHM – Leps of Southern California & Baja Mexico (Michael Wall)
B. U of Wisconsin – Lepidoptera across stress zones in the upper Midwest (Craig Brabant)
C. UNH – New England Lepidoptera (Istvan Miko)

SCAN (Southwest Collections of Arthropods Network)

A. ANMH – Ground-dwelling arthropods of the Southwest (Chris Johnson)
Seeding Sustainable Digitization

SCAN TCN  2012-2016 (Active PENs continue)

1. 10 Collections, 7 funded PEN Projects, 1 pending
2. Original focus on Southwest Ground-Dwelling Arthropods
3. 2,252,066 records to date (2X expected)
4. 65 non-ADBC funded collections, 1,040,293 digitized records
5. 36 pubs on SCAN or using data
6. Current focus = North American Arthropods,
   253 collections, 25 million records and 5.2 million images
Core TCN Collections  2016-2020-1

1. Focus on North American Lepidoptera - ~142,000 species
2. 26 Collections, 3 PEN grant, 1 pending
3. 1.5 million records, 172k images

Broader Impacts

1. 132 collections contribute > 2.2 million Lepidoptera records
2. 148 families represented
3. 93% of records from North America, but 358 countries/regions represented
1. Data Portal
   - Tri-Trophic
   - InvertEBase
   - LepNet
   - Parasite Tracker
   - Original SCAN
   - North American collections & Larger North American data

2. Most Complete Occurrence data for North America
   (25 million records)
   (5.2 million images)

3. WordPress site

4. The Arthropod Index Database of 933 arthropod collections
Data Adequacy: Deep Digitization in Terrestrial Insects

Goal for all insects (records per species)

Average # of Records per Species

- SCAN TCN
- LepNet TCN
- iDigBees TCN

All Bees in US collections transcribed

Model for Insect Groups

2025

iDigBees Research Collections

- University of Wyoming (113,990)
- University of Colorado (183,740, 1,604)
- Washington State University (697,779, 3,896)
- Oregon State University (76,466)
- Brigham Young University (212,480, 4,958)
- University of California - Berkeley (103,250, 2,282)
- Boise State Biological Lab (39,609, 4,006)
- University of California - Riverside (42,480, 9,004)
- University of Arizona (59,145, 8,295)
- Southwest Research Station (18,400, 200)

Total specimens records = 1,860,000
Total image suites = 5,684
Partners to Existing Networks (PEN) Summaries

**LepNet**
San Diego Natural History Museum – Leps of Southern California & Baja Mexico (Michael Wall)
University of Wisconsin – Lepidoptera across stress zones in the upper Midwest (Craig Brabant)
University of New Hampshire – New England Lepidoptera (Istvan Miko)

**SCAN (Southwest Collections of Arthropods Network)**
American Museum of Natural History – Ground-dwelling arthropods of the Southwest (Chris Johnson)
### PEN Filling Gaps

*(based on Tortricidae)*

<table>
<thead>
<tr>
<th>Category</th>
<th>SDNHM</th>
<th>All other SCAN</th>
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</thead>
<tbody>
<tr>
<td>Temporal (specimen records)</td>
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<td>0.2% from 1900-1915 (n=7)</td>
</tr>
<tr>
<td>Taxonomic (species-level taxa)</td>
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<td></td>
</tr>
<tr>
<td>Geographic (specimen records)</td>
<td></td>
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</tr>
</tbody>
</table>

- **34,714 new specimen records**
- **7922 specimens with images**
- **16% from 1900-1915 (n=307)**
- **0.2% from 1900-1915 (n=7)**
- **16 of 87 species level taxa (18%) are new for CA in SCAN**
PEN: Digitization: Enhancing LepNet: Digitization and integration of significant butterfly and moth collections from the upper Midwest Tension Zone region

- Provide digitized and georeferenced data for nearly 70,000 North American Lepidoptera specimens
- High-resolution images will also be generated for ~1,500 adult exemplar specimens
- Inclusion of the WIRC dataset will significantly increase the number of species-level occurrences for the Great Lake Tension Zone region for most Lepidoptera superfamilies, which will...
- ...greatly enhance the target number of species for ecological niche modeling

Wisconsin Insect Research Collection (WIRC) • University of Wisconsin-Madison
Digitization PEN: Integration of data from the UNH Insect Collection with LepNet.

- Focus on New England Lepidoptera collected before 1965
- Image and transcribe labels for 30000
- Increase New England species in LepNet by 63% and specimens by 40%
- Cell phone-based imaging workflow
NSF PEN: Filling gaps with AMNH Ground-dwelling NA Orthopteroids (Polyneoptera)

Goal:
- Digitize ~54K North American ground-dwelling orthopteroids (crickets, grasshoppers, earwigs, roaches)

Scheme:
- Expert Visits (Hojun Sung, Jeff Cole) to rectify mis-indentifications
- Hired Interns to image specimens & labels, use OCR to assist with data entry, & georeference localities
- PI management of data quality (taxonomy, localities, names) & data sharing

Product:
- Filled taxon, locality & temporal gaps in SCAN dataset with AMNH specimens
  - Added records for >55 unique species, doubled locality records, 65-95% increase in records prior to 1965
- Wing & cerci images for data visualization projects looking at variation within & between sex & species across gradients & populations.