**Symbiota Collections of Arthropods Network (SCAN)**

A Data Portal Built to Visualize, Manipulate, and Export Species Occurrences
Broader Impact Digitizing: 1.68 million

Records Entered (Hundreds of Thousands)

Months

2012
2013
2014
2015

2017 Project Goal (PENS included)

637k (39 non-ADBC funded)

96k (3 PEN collections)

954k (10 original SCAN collections)
Towards a Complete Arthropod Portal

6,250,725 specimen records served

Added Value Data
1. Allows users to map, summarize, download data from either SCAN or iDigBio
2. Increases participation for inputting data
Challenges Using Digitized Arthropod Data for Global Change Research

- Achieving critical mass: 250 million specimens in North American collections, but <10 million digitized (~4%)
- 62% of specimens in North American collections identified to species
- 10% of North American arthropod species have “enough” occurrence data (n=30).
  Arthropods comprise ~65% of described species, only 15% of climate impact studies
- Most data providers do not actively conduct global change research
- No collaborative repository extensively used for vetted research-ready data

Strategy to Promote Global Change Research

- “If you build it they will come”
- Identify and promote research groups
Digitized Data for Arthropod Research:

- SCAN Focus on North America – United States > Canada > Mexico
- 5-25 thousand species can be modeled today! (10 to 30 records per species)
- Key Ground-Dwelling Groups with data

<table>
<thead>
<tr>
<th>Ground-Dwelling Groups with Data</th>
<th>Estimated NA species</th>
<th>Occurrence Records</th>
<th>Number &amp; Percentage of Species w/ &gt;10 records</th>
<th>w/ &gt;30 records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ants (Formicidae)</td>
<td>1,000</td>
<td>134,348</td>
<td>600 60%</td>
<td>412 41%</td>
</tr>
<tr>
<td>Ground Beetles (Carabidae)*</td>
<td>2,000</td>
<td>372,311</td>
<td>1,211 61%</td>
<td>861 43%</td>
</tr>
<tr>
<td>Darkling Beetles (Tenebrionidae)</td>
<td>850</td>
<td>66,208</td>
<td>425 50%</td>
<td>239 28%</td>
</tr>
<tr>
<td>Grasshoppers (Acrididae)</td>
<td>550</td>
<td>109,742</td>
<td>258 47%</td>
<td>196 36%</td>
</tr>
<tr>
<td>Spiders (Araneae) *</td>
<td>3,000</td>
<td>99,478</td>
<td>994 33%</td>
<td>566 19%</td>
</tr>
</tbody>
</table>

Other Groups

<table>
<thead>
<tr>
<th>Ground-Dwelling Groups with Data</th>
<th>Estimated NA species</th>
<th>Occurrence Records</th>
<th>Number &amp; Percentage of Species w/ &gt;10 records</th>
<th>w/ &gt;30 records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scarab beetles (Scarabaeidae)</td>
<td>1,100</td>
<td>210,000</td>
<td>623 57%</td>
<td>450 41%</td>
</tr>
<tr>
<td>Bees (Apoideae)*</td>
<td>4,000</td>
<td>576,000</td>
<td>1,800 45%</td>
<td>1,200 30%</td>
</tr>
<tr>
<td>Butterflies &amp; Moths (Lepidoptera)*</td>
<td>15,000</td>
<td>254,000</td>
<td>3,000 20%</td>
<td>1,900 13%</td>
</tr>
<tr>
<td>Plant Bugs (Miridae)*</td>
<td>1,600</td>
<td>236,000</td>
<td>1,200 75%</td>
<td>700 44%</td>
</tr>
</tbody>
</table>
RESOURCES

Here you can find a compilation of resources related to ecology and evolutionary biology, including R code and relevant data sources. This is by no means a comprehensive list of resources or techniques and represents the biases of the BRAIN Lab personnel, but should get you on the right track. Click on any of the headings below to find resources on that topic.

Species Distribution Modeling

Modeling species distributions is a rapidly expanding area of research with applications in ecology, evolution and conservation biology. Operationally, species distribution models (aka climate envelope models) typically seek to estimate the set of environmental conditions that best describe a species’ realized niche. A variety of tools exist for extracting species occurrence records, relating them to environmental layers, generating/testing models and projecting them spatially.

SPECIES DISTRIBUTION MODELING: STEP-BY-STEP

Step 1: Occurrences & Presence-Absence Data
Step 2: Spatial Projections
Step 3: Environmental Data (Predictor Variables)
Step 4: Data Cleaning & Formatting
Step 5: Extent Selection
Step 6: Model Algorithms & Other Decisions
Step 7: Model Evaluation
Step 8: Geographic Projection
Step 9: Range Maps
Step 10: Migration
Step 11: Niche Overlap Tests
Goals: Final Year and Beyond

1. Create “research-ready” data (i.e., >30 records per species) for 1,000s of target taxa

2. Achieve 90% identification of specimens digitized to species within five years of project end (ground-dwelling taxa).

3. Promote research groups.