

Introducing Biology Students to Digitally Available Insect Collections Data

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Fall 2024 BIO 251 Entomology class

Abstract

Insect biodiversity data digitized from insect collections housed in museums, research labs, and educational institutions provide a wide range of opportunities for students. This poster describes an exercise undertaken by Luther College biology students in BIO 251: *Entomology* that introduces them to on-line digitized specimen data and ask several questions of those data. Beginning first with the Luther Entomological Research Collection that is digitized through Symbiota on the Ecdysis portal, the students then search the full Ecdysis database, and then larger iDigBio and GBIF data portals. Students generate species checklists at the locality or county level, and see how species distributions have changed geographically over time (e.g. *Bombus affinis*, the rusty-patched bumble bee).

The Luther Entomological Research Collection (LCDI-LERC)

The insect collection at Luther College is housed in 16 12-drawer cabinets in the biology department. Student workers participate in the accessioning of specimens digitally into the collection by photographing specimens and entering all available data into the LERC Ecdysis database.



The Luther entomological research collection, one of the collections of the Hoslett Museum of Natural History at Luther College in Decorah, Iowa, is an important repository of Northeast Iowa insect biodiversity and includes many state record specimens (insect species not previously found in Iowa) not found in the Iowa State University insect collection. The LERC has a unique role specializing in the documentation of insect biodiversity of the driftless region in NE Iowa, SE Minnesota, and SW Wisconsin.

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Collection Type: Preserved Specimens

Management: Live Data managed directly within data portal

Global Unique Identifier: 0a2d1691-227d-402d-82e0-47cdfd569a6f

DWC-Archive Access Point: <https://ecdysis.org/content/dwca/LCDI-LERC-DwC-A.zip>

Live Data Download: [DwC-Archive File](#)

Digital Metadata: [EML File](#)

Usage Rights: **CC BY-NC (Attribution-Non-Commercial)**

Rights Holder: Luther College

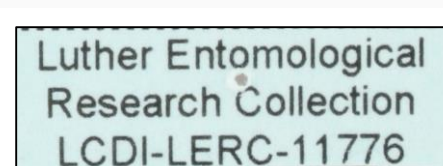
GBIF Dataset page: <http://www.gbif.org/dataset/a0344d4c-1618-4765-9964-595269c8b334>

Cite this collection:

Luther Entomological Research Collection. Occurrence dataset (ID: 0a2d1691-227d-402d-82e0-47cdfd569a6f) <https://ecdysis.org/content/dwca/LCDI-LERC-DwC-A.zip> accessed via the Ecdysis Portal, ecdysis.org, 2024-10-23.

Collection Statistics

- 13,044 specimen records
- 10,036 (77%) georeferenced
- 1,047 (8%) with images (3,686 total images)
- 8,232 (63%) identified to species
- 301 families
- 697 genera
- 1,385 species
- 1,387 total taxa (including subsp. and var.)

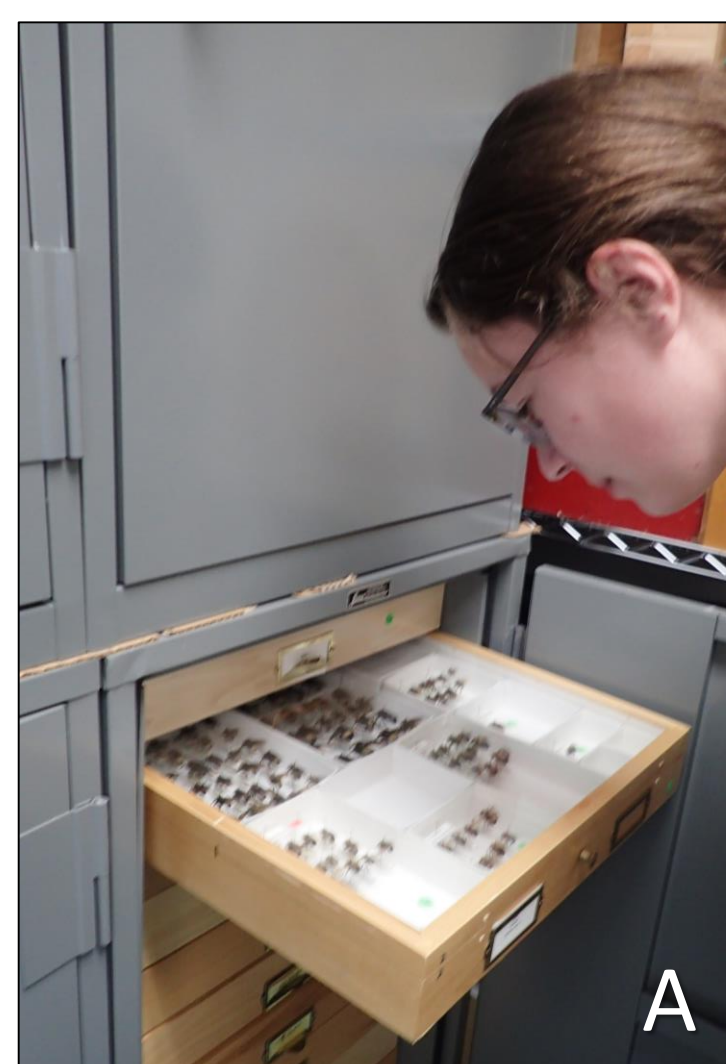


Sample LERC accession label

Students Working with the Collection

Luther biology students used the LERC to find the actual specimen for one of the records found in the Ecdysis database (A) such as our rusty patched bumble bees. They were also encouraged to explore other parts of the collection they found interesting (B).

Several Luther biology students are hired each semester to accession new specimens into the collection and digitally image specimens to upload to our Ecdysis database (C).



Examining individual records of *Bombus affinis*

This exercise uses the federally endangered rusty-patched bumble bee, *Bombus affinis* as one of several focal species. Students search the LERC Ecdysis database to find local records of this species both on campus and in the Decorah area that are housed within the LERC.

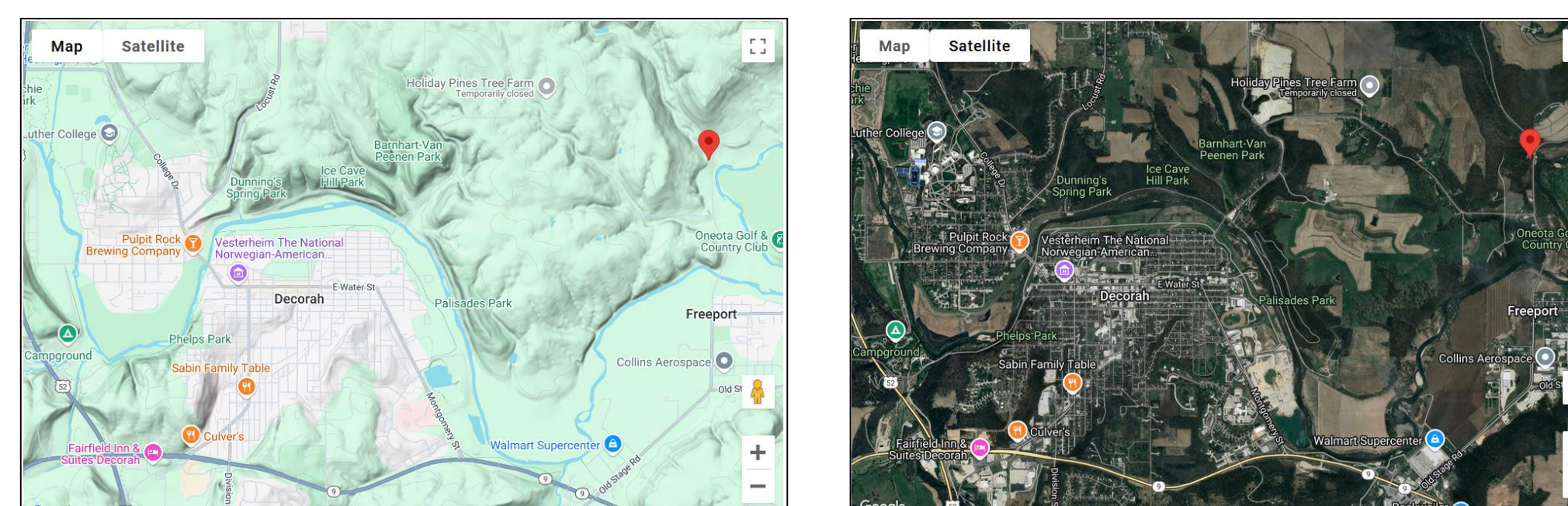
Luther Entomological Research Collection (LCDI:LERC)

Catalog #: LCDI-LERC-04383
 Occurrence ID: 4f8cd65b-9605-4399-b133-e35f92a2c2dd
 Taxon: *Bombus affinis* Cresson, 1863
 Family: Apidae
 Determiner: Abigail Miller
 Collector: S. Tsui
 Date: 1982-06-15
 Verbatim Date: 6/15/1982
 Locality: United States, Iowa, Winneshiek, Decorah, Freeport Marsh
 43.31363 -91.743696
 Verbatim Coordinates: 43.31363, -91.743696

Specimen Images

Usage Rights: **CC BY-NC (Attribution-Non-Commercial)**
 Rights Holder: Luther College
 Record ID: df802265-539b-4f1f-892f-050bf42bfa9
 For additional information about this specimen, please contact: Kirk Larsen (larsenkj@luther.edu)
 Do you see an error? If so, errors can be fixed using the [Occurrence Editor](#).

Individual specimen records such as this one for LCDI-LERC-04383 include Darwin core locality data, taxonomic data, and for a growing portion of the collection, macrophotographs of the specimens.



The majority (77%) of specimens in the LERC are georeferenced, which allows students to see maps with the approximate collection location indicated on the map. Symbiota used Google maps and satellite imagery to create maps indicating the location where specimen LCDI-LERC-04383 was collected. This specimen was collected at Freeport Marsh, a Luther College property on the east edge of Decorah, Iowa.

Generating checklists of taxa present

Students can search the database to generate taxonomic lists of all species present in a specific locality. They can choose either to use just the LERC or all collections hosted in Ecdysis or iDigBio and designated a locality such as Winneshiek County, Iowa, where Luther College is located, to generate a species list. Although five different collections in Ecdysis have specimens from Winneshiek County, only 10 additional species are added outside of the 1,098 species already in the Luther insect collection found from Winneshiek County.

To the right is the beginning of this Winneshiek County taxa list, with 16 species shown of the 1,098 taxa listed.



Cicindela pulchra (LCDI-LERC-01659) South Dakota state record

Species List

Taxa Count: 1098

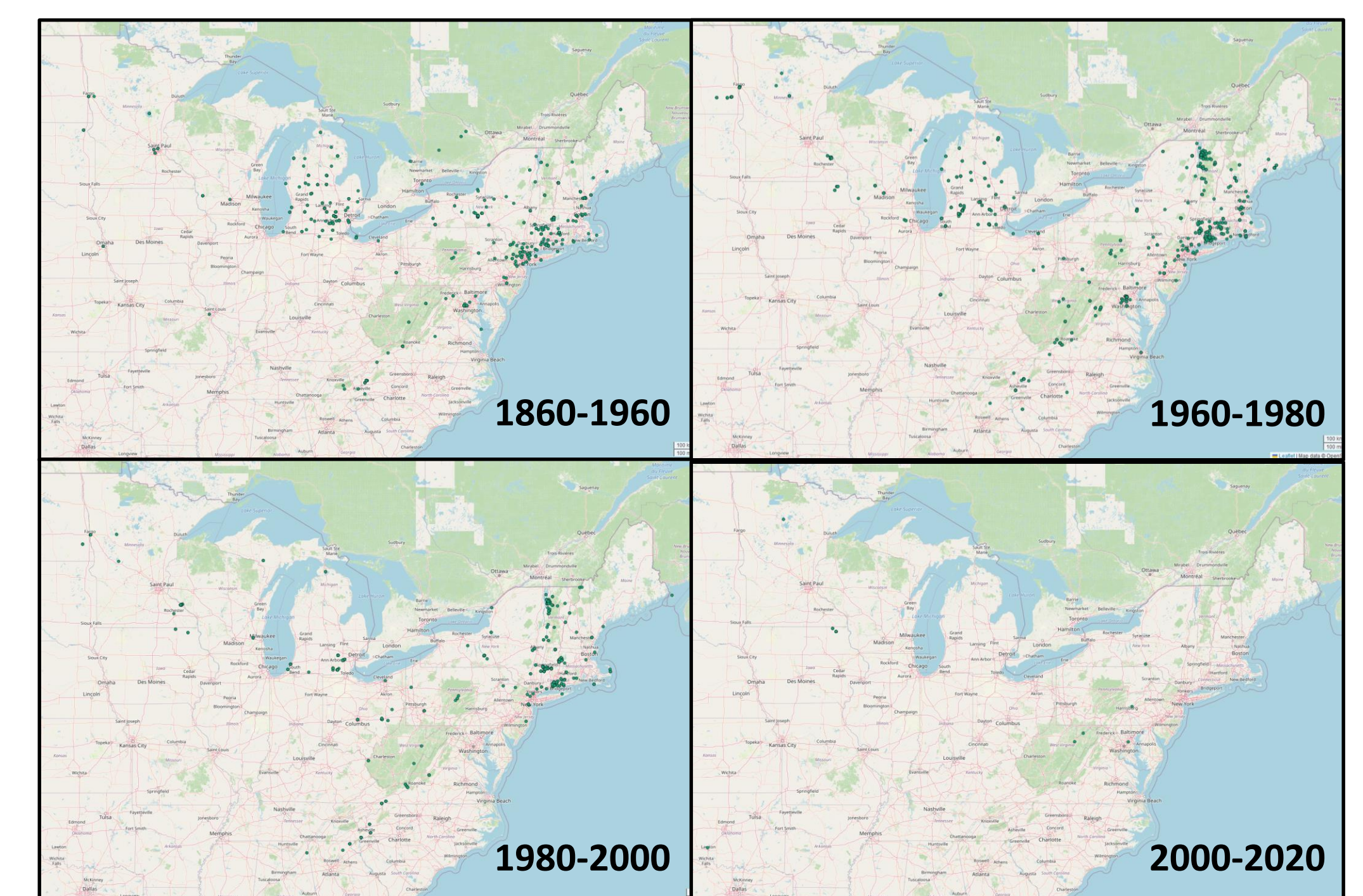
- ACRIDIDAE
- Arphia pseudonietana*
 - Chortophaga viridifasciata*
 - Melanoplus*
 - Melanoplus bivittatus*
 - Melanoplus differentialis*
 - Melanoplus femurrubrum*
 - Melanoplus walshii*
 - Orphulella speciosa*
 - Phoetaliotes nebrascensis*
 - Schistocerca damnifica*
 - Spharagemon collare*
- AESHNIDAE
- Anax junius*
- ANDRENIDAE
- Andrena aliciae*
 - Andrena arabis*
 - Andrena carlini*
 - Andrena chromotricha*

How has the distribution of *Bombus affinis* changed over time?

One of the most dramatic uses of digital data can be showing changes in distribution patterns over time. For this exercise, having more records are useful in generating distribution maps, so we introduce iDigBio and GBIF as two larger data portals.



The range distribution of *B. affinis* records was fairly consistent until around 2000. Since 2000 there has been a dramatic reduction in records of *B. affinis* until its listing in 2017 by the U.S. Fish and Wildlife Service as endangered. When students use the date criteria in the search menu, they quickly realize that something dramatic has happened during their lifetime.



Range maps produced by iDigBio of *Bombus affinis* records from 1860-1960, 1960-1980, 1980-2000, and 2000-2020. A major reduction in records occurred after 2000, with only 1 record from West Virginia recorded after 2017 when *B. affinis* was listed.

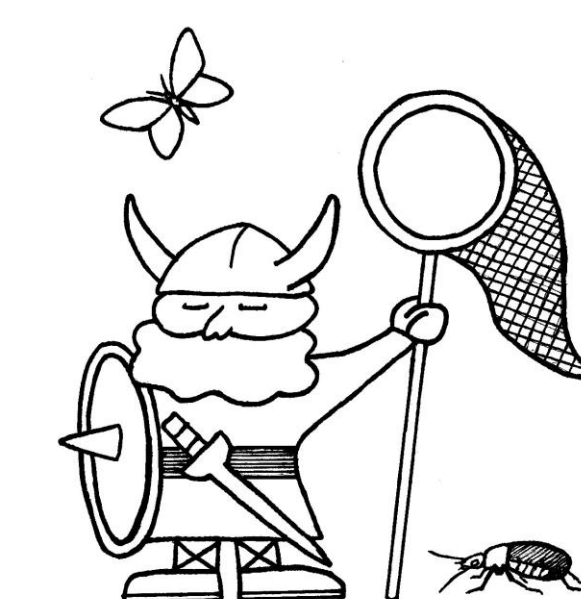
Summary

This class exercise both introduced students to the physical Luther Entomological Research Collection, but also opened their eyes to the value of natural history collections and global biodiversity data available through digital portals to answer important questions such as how species distributions are changing over time and what species live in a given locality.



Dorsal, lateral and anterior views of *Agapostemon sericeus* (LCDI-LERC-12660)

To download a copy of the handout used in class for this exercise, scan this QR code



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Entomological
Research
Collection