

Group 8 Proposal

Members: Mindy Ketchum, Brittney Oleniacz, Adrian Strecker

Title: Mesozoic Pseudoscorpions: past, present, and future

Repository: <https://github.com/BrittneyOleniacz/Project-2>

Introduction

We will be creating a website that will provide background information on an unfamiliar and unpopular order of Arachnids: the pseudoscorpions. These minute organisms, no more than a few millimeters in size, superficially resemble scorpions but lack the weaponized tail. From there, we will dive into fossil pseudoscorpions, paying close attention to those from the Mesozoic Era. We will present the locality data of the known and described specimens, review the work that has been done on extant and fossil pseudoscorpions, and then provide a launchpad for the first descriptions of two pseudoscorpions from the United States. This scientific discovery will provide additional context for pseudoscorpion evolution and paleogeography.

Project Specifics

1. This project will be a collection of interactive visualizations that will focus on different areas of data from the same database.
2. Data was collected from Paleobiology Database (PBDB), World Spider Catalog (Dunlop *et al.* 2020), Pseudoscorpions of the World (Harvey 2012). PBDB contributes 418 rows across five datasets, WSC provides 86 row, and the POW has 908 rows, a total of 1,412 rows of raw data provided in CSV file format. The Global Biodiversity Information Facility is another option that we are investigating. Data from GBIF and PBDB can either be downloaded as CSV files or accessed via API depending on the data needed and the intended use
3. Data transformation methodology
 - 3.1. To clean the data, we will use Python Pandas in Jupyter Notebook.
 - 3.2. The use of Postgres will create a SQL database to form relationships between datasets taken from multiple sources.
 - 3.3. SQLAlchemy will export the cleaned data.
 - 3.4. Python Flask will pull the data from the database to use in the visualizations. Google Map Platform API or MapBox API will allow for the presentation of interactive locality information. Additionally, we may use the GBIF API to make for a smoother transition of locality data into our interactive map.
 - 3.5. Javascript and leaflet will create visualizations
 - 3.6. HTML and CSS will construct the platform to publish the project in an online format.
4. The JS Library is to be determined but possible options include:
 - 4.1. Popper.js: <https://popper.js.org/>
Help make tooltips to bring up a text box while hovering over an image.
 - 4.2. List.js: <https://listjs.com/>
Allows for easier sorting and filtering features in the code.
 - 4.3. Darkmode.js: <https://darkmodejs.learn.uno/>
Provides a dark mode option to enhance the usability
5. Visualizations
In addition to the informative landing page, a page will be dedicated to the past, present, and future work and the following visualizations will be incorporated

- 5.1. Locality map modeled after the map below from Harms & Dunlop (2017), but instead of numbers, we will incorporate interactive markers with two layers. The first will provide additional locality information and the other will present details about the fossil specimens found at each marker when hovered over or clicked on.



Figure 1. Global map showing the localities of the fossil deposits. 1, Gilboa; 2, Lebanese amber; 3, Archingey amber; 4, Ákava amber; 5, Burmese amber; 6, New Jersey amber; 7, Canadian amber; 8, Fushun (Chinese) amber; 9, Parisian amber; 10, Baltic amber; 11, Rovno amber; 12, Romanian amber; 13, Bitterfeld amber; 14, Aix-en-Provence; 15, Dominican amber; 16, Chiapas (Mexican) amber; 17, Kauri (New Zealand) amber; 18, East African copal; 19, Madagascan copal; 20, Colombian copal.

- 5.2. Past Work and Status pseudoscorpion research by looking at publication records, similar to the graph (below) in Selden & Ren (2017), but specific to pseudoscorpions and including two groupings: extant and fossil.

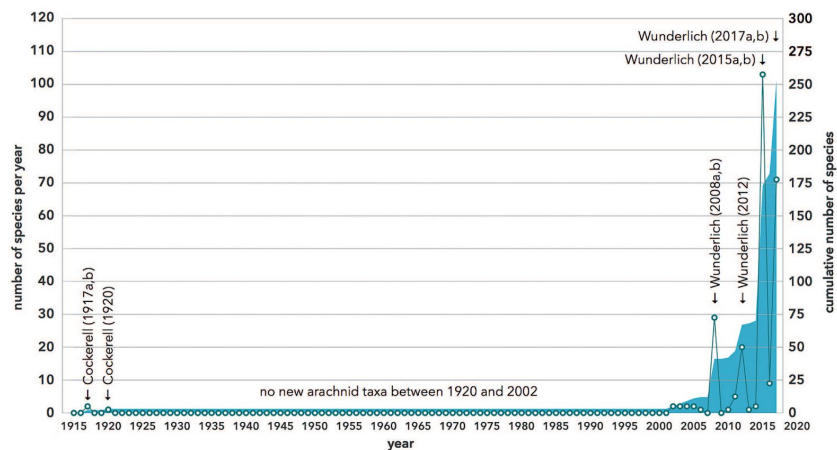


Figure 1.—Graph showing number of fossil arachnid species described from Burmese amber each year from 1917 to the present day (●), and cumulative curve (color). Landmark papers indicated. Data mainly from Dunlop et al. (2017), updated.

- 5.3. List of current described Mesozoic pseudoscorpions presented at images/icons and will supply additional information when hovered over.

Project Organization

1. Member Roles

- a. Mindy Ketchum: Data Cleaning
- b. Brittney Oleniacz: Data and Content Manager
- c. Adrian Strecker: HTML and CSS Designer

2. Proposed Timeline

The following timeline is just an overview and is subject to change. It does not include the work that will occur outside of the class period to make the listed benchmarks.

- a. November 11, 2020
 - i. Introduction to Pseudoscorpions
 - ii. Brainstorming and starting proposal
 - iii. Work out database ERD
- b. November 14, 2020
 - i. Complete and Submit Proposal
 - ii. Brainstorm and discuss potential visualization
 - iii. Start looking into JS libraries
- c. November 16, 2020
 - i. Outline of Website with sketches
 - ii. Complete data cleaning and “export”
 - iii. Finish SQL database by adding data to the database
- d. November 18, 2020
 - i. Create visualizations
- e. November 21, 2020
 - i. Complete website
 - ii. Finish adding content
 - iii. Prepare Presentation
- f. November 30, 2020
 - i. Presentations

Works Cited

- Dunlop, J. A., Penney, D. & Jekel, D. 2020. A summary list of fossil spiders and their relatives. In World Spider Catalog. Natural History Museum Bern, online at <http://wsc.nmbe.ch>, version 20.5 <https://wsc.nmbe.ch/resources/fossils/Fossils20.5.pdf>
- GBIF.org (14 November 2020) GBIF Occurrence Downland. <https://www.gbif.org/>
- Harms, D., & J.A. Dunlop. 2017. The fossil history of pseudoscorpions (Arachnida: Pseudoscorpiones). *Fossil Record*, **20**: 215-238.
- Harvey, M.S. 2013. Pseudoscorpions of the World, version 3.0. Western Australian Museum, Perth. <http://museum.wa.gov.au/catalogues-beta/pseudoscorpions>
- Selden, P. & D. Ren. 2017. A Review of Burmese amber Arachnids. *Journal of Arachnology*, **45**: 324-343.

