The Digitization of Hymenoptera Within the Museum of Zoology

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Introduction

The University of Michigan Museum of Zoology, housed within the Research Museums Center (RMC) has a collection of thousands of Hymenoptera (sawflies, wasps, bees, and ants). Without access to the RMC, these specimens cannot be accessed. This study aims to digitize two Hymenoptera families, Ampulicidae and Sphecidae; two types of solitary wasps that can be found in many locations throughout the world.

This project imaged over 600 specimens from these families to both determine the global distribution of the wasps and digitize the collection so that it may be made available to those outside of the RMC. During the digitization process the location information, date of capture and method of capture are consolidated into a spreadsheet.

This process makes research for others possible by converting once inaccessible physical data into an organized, virtual form. Additionally, this project establishes early stages of study into the historical location and distribution of these types of Hymenopterans, allowing for further research into their populations in the future.

Method

Data Collection:

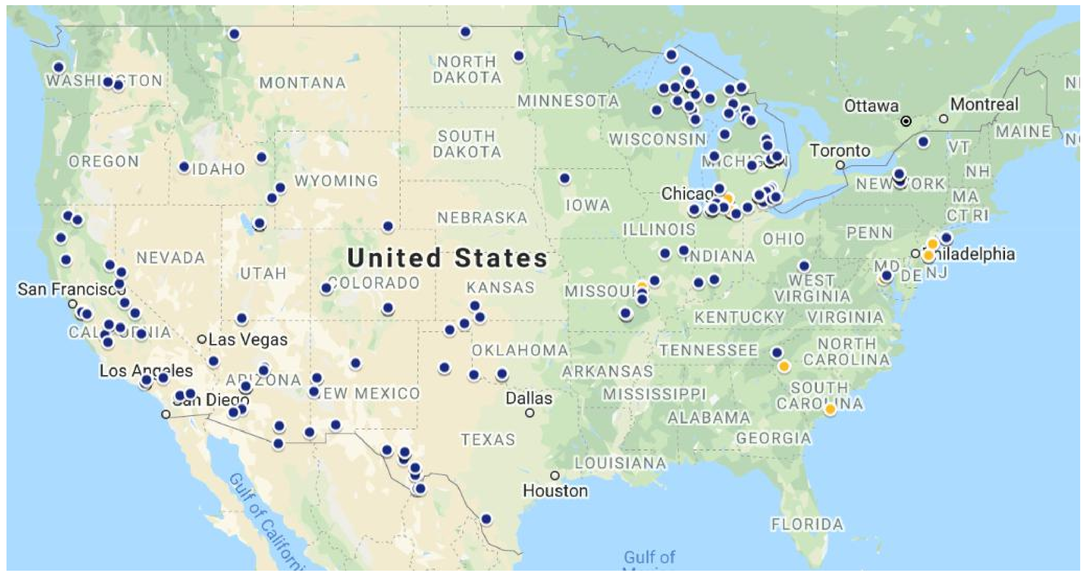
- A hymenopteran specimen is selected from and assigned box.
- The specimen is placed in a display box with its species and location information presented next to it.
- A QR code and corresponding University of Michigan Museum of Zoology Identification (UMMZI) number is assigned to each wasp
- A mounted digital camera or tablet is used to photograph the wasp and QR code.
- The photos are then uploaded to a shared google drive folder where they are renamed with the corresponding UMMZI number.
- The location and identification information is then transcribed into a spreadsheet.

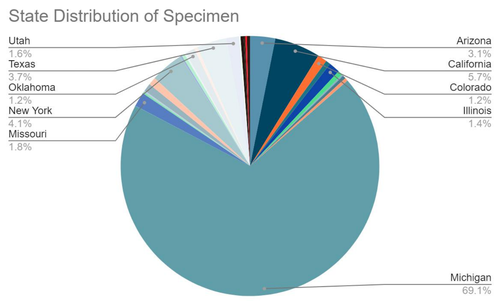
Data Analysis:

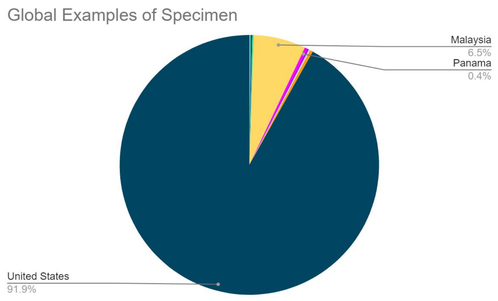
- A coordinate is determined using Google searches and Google Maps for each specimen from the location information
- The coordinates are placed in a custom Google map where the global distribution of the specimens can be displayed.

Results

- Above: An example of the raw specimen data
- Right: A United States distribution map of the data
  - Yellow: Ampulicidae
  - Blue: Sphecidae
  - Full interactive map is found at:
    - https://drive.google.com/open?id=17SK3R3QPo6sVbxXvtKIOUIk-V-QtQ6hQ&usp=sharing
- Below: Composition of the percent of specimens found in certain locations.







Conclusion

In total, 629 Hymenoptera specimens were digitized. The oldest examples were caught in 1909, and the most recent were from 2005. Of these specimens, there were two families, three genera, and 26 species. As shown from the map, a vast majority of these were captured within the united states (508 specimens), 351 of these coming from Michigan. This is likely due to a regional sampling bias. The first of the two families was Ampulicidae; 137 specimens from this family were digitized. The oldest specimen among this group was an unidentified Ampulicidae that was caught on March 9, 1923, in Panama. The remaining specimens were in the Sphecidae family; the oldest specimen of this family was caught in Dickinson county Michigan in July of 1909.

References

"Ampulicidae." *A Dictionary of Zoology*, Oxford University Press, 1 Jan. 2014.
"Sphecidae." *A Dictionary of Zoology*. Ed. Allaby, Michael. : Oxford University Press, 2014. *Oxford Reference*. Date Accessed 18 Dec. 2019.

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