

Exploring the distribution of museum-catalogued Hymenopteran wasps

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INTRODUCTION

The family Braconidae, of the order Hymenoptera (bees, wasps, and ants), contains more than 21,000 parasitoid wasp species. A parasitoid wasp preys upon a living organism for a portion of the parasitoid's life, usually killing it upon maturity. In most braconid species parasitization occurs during the larval stage; adult braconids are free-living nectarivores, in general. They lay eggs directly in or on their preferred host, such as an aphid or a tomato hornworm. Once hatched, the larva will consume its host until pupation, undergo metamorphosis, and emerge from the host as a mature wasp. Braconids, and other parasitoid wasps, are found in most habitats, playing the role of a natural exterminator, allowing healthier ecosystems to persist. Over 1,000 specimens of braconid wasps spanning over 100 years are housed in the University of Michigan Museum of Zoology Insect Collection and were examined as part of this project. Each specimen associates with data such as collection method, coordinates, date, and host organism. These data are not presently available without visiting the museum and handling the specimen. Upon project completion all specimens digitized will be deposited in the museum's database, automatically sharing these data with multiple major biological aggregators.

Research Methods

- Information tags were removed from specimen and placed on slide for digitization
 - Information cards with specimen contain, but are not limited to, coordinates of collection location, host species, and collection method
- Specimens were catalogued in a spreadsheet and images were placed in a Google Drive folder, indicating successful digitization
- Coordinates -- inherently given or derived from given location -- were used to plot Google Earth map displaying all species collected at a single location as one data point
 - E.G. *Agathis perforator* and *Bracon variabilis* in Montcalm County, MI.



Figure 1: Digitization layout for *Agathis perforator* with all given data (Courtesy of the Museum of Zoology, University of Michigan)

RESULTS

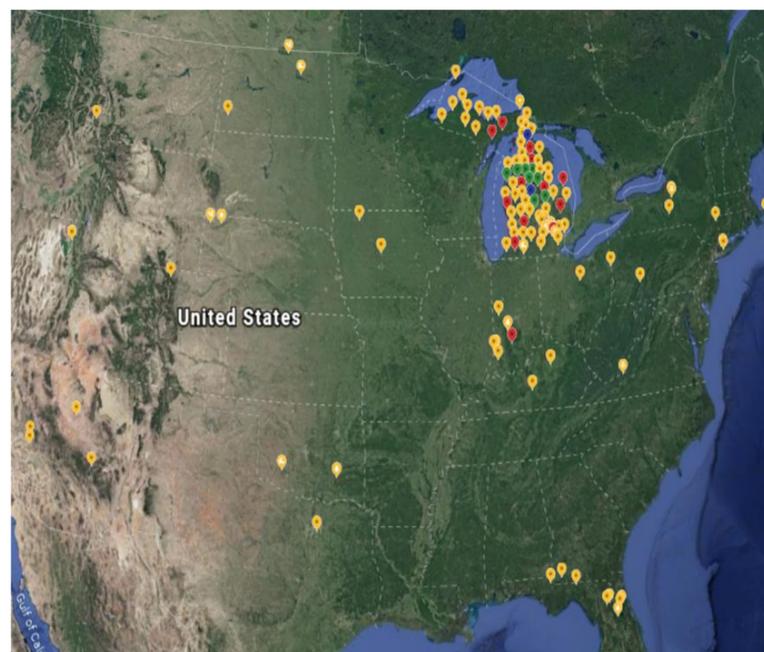


Figure 2: Map of United States Braconidae species

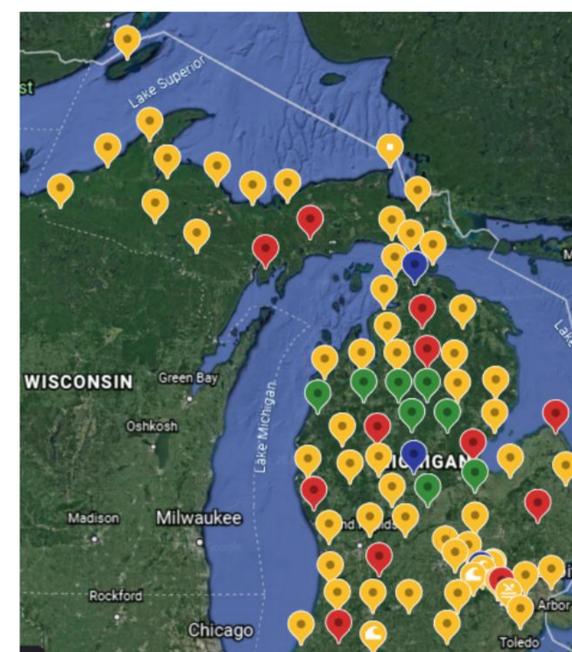


Figure 3: Michigan Braconidae species



Figure 4: Central and South American Braconidae species

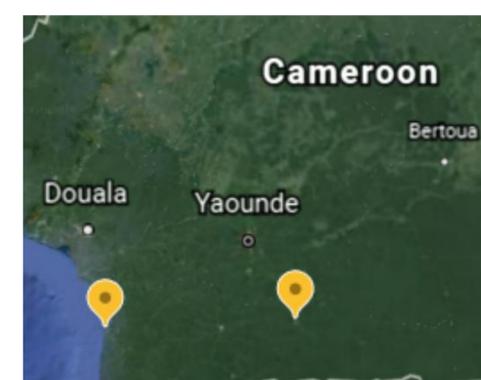


Figure 5: African Braconidae species

Key

Due to an exuberant sampling pool, maps show species diversity for particular areas

- Low species diversity; 1-3 species
- Mild species diversity; 4-6 species
- Moderate species diversity; 7-9 species
- Severe species diversity; 10+ species

Additional Information

- Not pictured: Nanking, China; Matsue, Japan; and Nelson, New Zealand
- Each city contains one species
- This map does not represent the entire collection housed in the museum
- One species may represent multiple museum specimens from a single location

SUMMARY

- The university's museum collection of Hymenopteran wasps alone spans into the thousands: this map takes a glimpse into roughly 500 species of documented Braconidae species from numerous collectors spanning 100 years
- The parasitoid nature of Hymenopteran wasps creates a general exterminator niche; larval stages control pest insect populations; Braconid wasps inhabit the same diverse regions across the globe that their hosts habit
- The majority of specimens from the Museum collection hail from Michigan, possibly due to regional sampling bias: to understand the full breadth of Hymenoptera habitation, further testing is required

ACKNOWLEDGEMENTS

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