Describing Hymenopteran diversity on the OSU Lima campus

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Introduction

• Estimates for the number of species on Earth vary from 2 million to 1 trillion.1
• Despite the overall uncertainty, estimates for the number of insects have stabilized around 6 million species.2,3
• Recent work suggests Hymenoptera (Fig. 1) is the largest insect order.4
• Although the bees are perhaps the most well-recognized members of the order, parasitic wasps are highly diverse and likely outnumber other insect orders.5

A B C

Figure 1. The order Hymenoptera is strikingly diverse, containing four major subgroups: sawflies (A), bees (B), ants (C), and wasps (D). Ant photograph courtesy of Pawel Bieniewski.7

Materials & Methods

• Insects were collected in a malaise trap at a farm plot at The OSU Lima campus.
• Hymenopteran insects were sorted from the bulk collection using a key to identify insect orders.8
• Depending on the insect’s size, specimens were either pinned or pointed.
• Specimens were imaged using either a Leica S9i microscope with a digital camera attached or a Canon EOS Rebel T5 DSLR camera.

A B C

Figure 2. The Leica S9i microscope used for sorting and identification. It also contains an integrated imaging system which allows photography of small organisms.

Results

A taste of variation: Some Hymenopterans found at the farm

A B C

Figure 3. Example specimens from three of the major types of Hymenopterans collected from the farm site. A. An ant collected from the farm. Ants are eusocial organisms that live in colonial groups. Although our trap typically collects flighted insects, ants and other wingless organisms occasionally will crawl up and into the collection vessel. B. A parasitic wasp collected from the farm. Although not what most people imagine when they hear the word “wasp” these organisms actually make up the vast majority of Hymenoptera, and likely of insects. This individual is a female, which we can tell from her large egg-laying organ (denoted with a red arrow). C. A yellowjacket (Vespula sp.) collected from the farm. Yellowjackets and other colonial wasps are likely the most familiar wasps to the average person.

Similar but different: A story of two parasitic wasps

A B C

Figure 4. Although similar at first glance, the parasitic wasps to the right are of different species. The individual in panel A is smaller with more orange coloration on her thorax and abdomen. The individual in panel B is larger and has more black coloration on the thorax and abdomen. The two species are also likely to attack different host insects, a factor we can investigate further after confirming their species designations.

A reoccurring challenge: Flies mimicking wasps

A B C

Figure 5. An obstacle faced while sorting through Hymenopteran specimens has been distinguishing between wasps and flies. Many insects, including flies, mimic the body structure, body colors and wing coloration of the widely-feared stinging bees and wasps. A. The fly mimics the coloration of a wasp, which is particularly noticeable on the wings. B. The fly mimics the constricted body structure seen in many hymenopterans. C. The fly mimics the coloration and banding stripes seen in many species of bees and wasps.

Future Work

• The next step in this project is to begin keying the parasitic wasps seen in Figure 4 to confirm their species identification.
• Following the identification of the two species, we will work to identify additional parasitic wasps that have similar appearances and body colors at the farm site.
• Once a list is compiled, we will research the ecology of each species, such as the range of host insects they attack, and known predators of each.
• This knowledge will help us determine if mimicry is used to benefit the parasitic wasp or if it is by mere coincidence that they mimic one another.

Citations

8. Purdue University Extension - Entomology. A Pictorial Key to the Order of Adult Insects. 8pp.

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