



Nesodynerus scoriaceus. Photo: Karl Magnacca.

Terrestrial Invertebrates

Bees and wasps
Order Hymenoptera

ORDER INCLUDES:
14 Native Families
42 Native Genera
>800 Native Species
>800 Endemic Species

GENERAL INFORMATION: The order Hymenoptera is large and diverse, and is best known because of the social behavior of ants, bees, and wasps. Hawai‘i’s native Hymenoptera fauna, however, is comprised of non-social bees and wasps and does not include any native ants. The most speciose genus is *Sierola* (Bethylidae) with 278 described and an estimated 400–500 total species. Several species in each of the genera *Hylaeus* (Colletidae), *Ectemnius* (Sphecidae), and *Nesodynerus* (Vespidae), including *H. difficilis*, *H. pubescens*, *E. nesiotus*, *E. polynesianus*, *N. peles*, and *N. scoriaceus*, are common and relatively abundant. However, the status of many other species in these genera, as well as species in the genera *Enicospilus* (Ichneumonidae), *Sclerodermus* (Bethylidae), *Sierola* (Bethylidae), is unknown. As elsewhere, Hawaiian bees and wasps have important ecosystem functions including pollinating native plants and keeping other insects, particularly herbivorous species, in check. The native *Hylaeus*, or yellow-faced bees, are important pollinators for many native plants. Most of the native wasps are arthropod predators or parasites, often specific to particular taxa. For example, species in the family Mymaridae parasitize small insects and insect eggs; species in the family Encyrtidae are parasitoids of mealybugs (Hemiptera); species in the family Figitidae lay their eggs on fly (Diptera) pupae, and species in the families Vespidae and Bethylidae prey on Lepidoptera caterpillars. A large radiation in the family Pteromalidae is largely unstudied, but is believed to parasitize native beetle grubs.

As an example of the diversity of Hawai‘i’s hymenopterans, two genera are briefly outlined. The 64 species in the bee genus *Hylaeus* occur on all the Main Hawaiian Islands (MHI) and Nihoa. They nest in hollow stems, holes in trees, under bark, in crevices, or in burrows in soil. Potential threats include non-native bees (*Ceratina* spp.) found in the native coastal habitats used by *Hylaeus* species and competition with the European honeybee (*Apis mellifera*) for nectar and pollen. Confirmed threats include introduced ants (Formicidae) which compete with *Hylaeus* for nesting sites, and the big-headed ant (*Pheidole megacephala*) and Argentine ant (*Linepithema humile*) which prey on the native bees. Since *Hylaeus* bees pollinate native plants, their loss would be detrimental to the recovery of native plants.

Wasps in the genus *Sierola* are found throughout the Indo-Pacific region, but over 2/3 of the known species are endemic to Hawai‘i. They are small, black wasps found primarily in wet and mesic forests. At present 156 species are known from O‘ahu and 108 from the island of Hawai‘i, with the other islands almost totally unexplored. Hundreds of species remain to be described, and it is not uncommon to find more than ten morphospecies (i.e., species established solely on morphological characteristics) at a single site. These species are difficult to collect, and many

morphospecies are found in very low numbers; this may be an artifact of collection methods or due to their rarity. Similar to other wasps, females find a Lepidoptera larva, sting and paralyze it, and lay an egg on it. Once the egg hatches the larva feeds on the caterpillar.

DISTRIBUTION: Native Hymenoptera are found on all the MHI and Laysan and Nihoa in the Northwestern Hawaiian Islands.

ABUNDANCE: Unknown. A lack of systematic surveys prevents any population estimate. However, the loss of native habitats likely means that species within the order are declining.

LOCATION AND CONDITION OF KEY HABITAT: Hymenopterans occur in most terrestrial habitats.

THREATS:

- Competition with non-native wasps and ants.
- Predation by non-native insects.
- Loss or degradation of habitat, especially the loss of native host plants for bees.

CONSERVATION ACTIONS: The goals of conservation actions are not only to protect current populations and key breeding habitats but also to establish additional populations, thereby reducing the risk of extinction. In addition to common statewide and island conservation actions, specific management directed toward hymenopterans should include the following:

- Conduct surveys to determine the distribution and abundance of known hymenopterans and to document and identify new species.
- Preserve, maintain, and restore habitat for existing populations.

MONITORING: Continue monitoring the status of known populations.

RESEARCH PRIORITIES:

- Conduct systematic and taxonomic assessments of poorly known taxa.
- Work to identify and describe new species to science.
- Conduct studies to document the biology, habitat requirements, and life history of endemic species.
- Refine methods for conducting quantitative surveys.

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