

Student's Guide to Common Green Roof Arthropod Taxa

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This guide is meant for student analysis of green roof samples. It encompasses the most common arthropod orders present on green roofs in New York City but does **not** include all possible taxa. For further identification see Borror and DeLong's *Introduction to the Study of Insects*.

This guide is a dichotomous key split into two sections: winged arthropods and wingless arthropods. To identify your arthropods you will need a microscope or magnifying glass. Start by observing your arthropod then going to the winged or wingless section. Next, read the alternative descriptions provided and decide which best describes your arthropod, then go to the next set of alternatives as directed.

Winged Arthropods

1a) 1 set of wings present. Go to 2. Note: If you see small stumps behind the front wings they are not wings, they are halteres. Halteres look like small knobs. Also, if the specimen has front wings that look hard or leathery and are tucked against the body, there is likely another pair of wings beneath them.

1b) More than 1 set of wings. Go to 3.

2a) Rounded halteres present = **Diptera**

Diverse group with a range of shapes and sizes. Many different species are collected on green roofs – midges, muscoid, hover, and bee flies are very common. Occasionally mayflies (Order Ephemeroptera) will have only two wings. Mayflies do not have halteres and have long thread caudal filament tails. They are uncommon on green roofs unless there is a freshwater source nearby.

2b) Wings membranous and large. Body shaped like a grasshopper with large hind legs = **Orthoptera**. Common on green roofs.

3a) Wings are membranous, not hardened or leathery. Go to 4.

3b) Front wings are hardened or leathery. Go to 5.

4a) Wings are covered in scales, mouth has a coiled proboscis (mouth part), antennae have many segments = **Lepidoptera**. This includes moths and butterflies. Both are common on green roofs.

4b) Wings are not covered in scales, no coiled proboscis. Go to 7.

5a) Long beak, piercing, or cone shaped (Haustellate) mouth part for sucking. = **Hemiptera**. This is the largest and most diverse order including aphids, cicadas, leaf hoppers, true bugs, and more. The best way to identify members of this group is the piercing or beak shaped mouthpart.

5b) Mouthparts are mandibular (chewing). Go to 6.

6a) Abdomen has forceps shaped cerci (pinchers in the back) = **Dermaptera**. Uncommon on most green roofs but can be locally abundant.

6b) Front wings are without veins. Wings usually lay close to the body and meet each other along the back forming a line down the middle. The hind wings beneath the front wings are thinner and have a few veins = **Coleoptera**. Beetles are common on green roofs and may be collected in all trap types.

6c) Looks like a grasshopper = Orthoptera. See 2b.

6d) Not a beetle or grasshopper – may be Mantodea (mantis) or Blattodea (cockroach)

7a) Wings appear long and narrow with fringed hairs. Very small insect (<4mm) with 2-3 segmented tarsi = **Thysanoptera**. Thripes are very common on green roofs and can be collected in large numbers.

7b) Body is bee or wasp like. Hind wings are smaller than front wings. Antennae obvious. Mandibular mouth parts or mandibular mouthparts that form a tongue = **Hymenoptera**. Many bees and wasps are common on green roofs. Not all bees or wasps are pollinators and thus may not look as expected. Parasitoid wasps are common.

7c) Not a bee or wasp. Mouthparts haustellate for sucking = **Hemiptera**. See 5a.

7d) Flying orders other than those described above occur on green roofs but are not as common. If identification is not possible with this key consider the orders Neuroptera, Psocoptera, Isoptera, and Zoroptera.

Wingless Arthropods

1a) Body insect like. Go to 2

1b) Body worm like = larval stage. ID at this stage is possible but not addressed in this guide. Lepidoptera larvae (caterpillars) are the most common larvae collected on green roofs.

1c) 7 pairs of legs, can roll into a small ball = **Isopoda**. Pill bugs are locally abundant on green roofs that have been colonized.

1d) 8 legs = **Arachnida** (Class). Spiders are order **Araneae** and are very common on green roofs. Other arachnids common on green roofs include mites **Acari** (subclass)

1e) Many Legs, 1 leg per segment = class **Chilopoda** (centipedes)

1f) Many legs, 2 legs per segment = class **Diplopoda** (millipedes).

2a) Antennae are absent, very small = **Protura**.

2b) Antennae present and haustellate mouthparts (cone or beak shape). Go to 3.

2c) Antennae present and mouthparts mandibulate. Go to 4.

3a) Antennae are not bristlelike, less than 4mm, antennae 4-9 segmented and about as long as the head and prothorax combined = **Thysanoptera**. Flightless Thysanoptera are not common in large numbers on green roofs but do occur.

3b) Mouthparts are cone shaped = **Hemiptera**. Flightless Hemiptera are diverse and characteristics vary dramatically. Examples include leaf hoppers, stink bugs, aphids, and many more.

4a) Abdomen is constricted at base, antlike = **Hymenoptera**. This can include ants and flightless wasps. Ants are generally absent on green roofs unless the roof has been colonized, then they are locally abundant.

4b) 3 Long threadlike tail filaments = **Thysanura**. Not common.

4c) 2 threadlike filaments, long antennae, forked appendage at end of abdomen = **Diplura**. Easy to be confused with Collembola.

4d) No threadlike filaments, small, short antennae, abdomen with 6 or fewer segments, forked appendage near tail = **Collembola**. Very small and sometimes overlooked by students. Very common and can be collected in large numbers if using pitfall traps.