

Exercise 1: Collecting and Curating Insects

Why a Collection?

There are several reasons to make an insect collection. First, it will help you gain an appreciation for the diversity of insects. Second, it will help you learn about their habitats and ecology. Third, the process will teach you to collect, identify, and properly store and label these organisms.

Introduction

You should consider investing in an amateur insect collector's kit, which will cost you about \$25 – 35. You will at least need to purchase an insect box, which will cost you about \$10.00. The kit contains a box, a small net, pinning equipment, and labels. I will supply those latter materials, although I have a limited supply of nets, and you may want to have the materials to continue collecting after the course is over. For whatever you order, including the field guide (I also have a limited supply of those to loan out), you can pay me and I will order them so that we may get a bulk discount.

In addition to the information in this chapter, I will reprint an insect collection guide, published by BioQuip, for you. I will have copies of this on reserve in the laboratory, along with other taxonomic references. Various insect identification keys will also be available in the teaching laboratory. One of your best sources to get to the correct order will be Tripplehorn and Johnson (2005). In fact, because of the disagreements on arthropod taxonomy, especially at the family level and below, I want us to use a common text to standardize our labeling. Therefore, use Tripplehorn and Johnson (2005). Even if you use a different source to identify a specimen, check Tripplehorn and Johnson (2005) to verify the name. This agrees with the Peterson Field Guide for the most part, but not always. This text will be available any time you're in the laboratory, and I have a second copy in my office if you'd like to borrow it (the copy in the laboratory **MUST** remain in the laboratory).

I will incorporate your collections, if you decide not to keep them, into the Davidson College Entomology Collection, so it's important to do a professional job of presenting your specimens. This will involve properly preserving or pinning them, providing accurate information on capture locality, and properly identifying the specimens. Of course, you'll want to do a good job on these tasks anyway, since much of your grade will depend on your pinning and identification skills.

Your Insect Collection

1. Your insect collection should contain at least fifty (**50**) different species of insects (and other animals from superclass Hexapoda). Often, entomologists will collect arachnids with their hexapods. You may add spiders and their kin to your collection if you wish, subject to the rules below (and the additional rule that, no matter how many non-hexapod orders you collect, you still need 14 orders of insects (see #2)).
2. There should be representatives of at least fifteen (**15**) orders and thirty (**30**) families. Fourteen of these orders and 27 families **must** be insects.
3. All specimens should be keyed out to the **family level**.
4. At **least five (5) specimens** should be keyed out to the species level.

5. Note on non-hexapod arthropods: These need be identified to Class (millipedes and centipedes) or Order (arachnids and crustaceans) at least. If you collect three spiders and identify them to Order (Araneae), it counts as three specimens and one order. The extra specimens may not help you if you have over 50 species of insects, unless you identify them to the family, and they belong to different families. You can then use these as three of your 30 required families. After that, more non-hexapod arthropods will not count for you (see #2).
6. The collection is worth 150 points. **Both proper identification and proper preservation are required to get full credit for any specimen.** Specimens must be preserved correctly. For instance, pinned caterpillars will get a zero regardless of whether they're correctly identified, because you don't pin caterpillars. *Poorly* preserved but correctly identified specimens will have half of their point value deducted. Incorrectly identified specimens will receive no credit, even if they're preserved perfectly. If you get the order correct but the family wrong, you'll receive partial credit. If you get the family right but the order wrong, you will receive no credit.
7. Follow instructions and conventions in the BioQuip handout for mounting, preserving, & labeling your specimens.
8. Type up a reference **table** (using Excel or Word) tallying up your specimens in the different families and orders, and identify which specimens have been keyed to the species level. Each ID should indicate your taxonomic source and the choices you made in the dichotomous key to get your result (cite the source and the couplet statements you used to make your identification). In addition, include information on locality and collector in the table –it will be easier for me to read here than on your labels, but it should also appear on your labels.
9. Finally, if you wish to have your collection returned, please indicate; otherwise I will add your specimens to the Davidson College Entomology Collection. We will also construct a display from our collections of Davidson College insects in one of the display cases on the first floor of Watson.

Some Suggestions for Where to Collect Insects

1. Use a sweep net to sweep over grasses in a field.
2. Spread a cloth or plastic sheet under a bush or shrub and beat or shake the plant vigorously.
3. Look under rocks, stones, logs, bark, and leaf litter.
4. Watch and wait patiently for butterflies and other large flying insects to alight on flowers, plants, or near water, and then drop a net over them.
5. Examine outdoor lights at night.
6. Bait insects by placing a small amount of crushed banana or peach and molasses in a large mason jar. Put a funnel in the jar so that insects will go in, but cannot easily fly out.

Killing Insects

In order to preserve the insects in a permanent collection, you must kill the insect without damaging it. I have a limited number of killing jars available for loan, but if you buy a collection kit you will have your own. The preferred poison we will use is ethyl acetate. The jar itself will either have plaster of paris in the bottom or cotton covered with several pieces of blotting paper. The cotton or plaster absorbs the poison and prevents the insects from

becoming drenched in the liquid ethyl acetate or trapped in cotton. **Do not inhale** the poison. When your kill jar loses its effectiveness you will need to recharge it; there will be a supply available in the laboratory hood. Keeping the lid tightly on the jar, and not leaving it open while collecting will increase the time during which your kill jar is effective. Several kill jars of different sizes may be the most effective way of collecting many insects in one trip. Large, hard-bodied insects may take some time to die, especially if the jar keeps opening and closing. While they are alive they may damage small, fragile insects that are put into the same jar.

Transferring insects from a net to a kill jar takes some practice, skill, and caution. Work the open jar into the net and place it over the insect as it clings to the net. Then work the lid onto the jar and over the net; as the insect slows down it can be removed from the net and moved into the bottom of the jar. The lid can then be placed on the jar while both are still in the net. Remove the insect from the jar after it is dead and place it in between layers of paper toweling, in small vials, or in glassine envelopes to prevent damage until you have a chance to pin them.

Kill soft-bodied adults and most larvae by dropping them into 75% ethanol solution. This will also serve as the preservative for these specimens. After they are dead, remove them and place them into a vial with a fresh batch of 75% ethanol for long term preservation.

Preservation

Follow the directions in your text (Ch. 17), the BioQuip brochure, and other sources I've made available to you. All non-hexapods and soft-bodied insects should be preserved in vials of 70-75% ethyl alcohol (EtOH) or isopropyl alcohol, with the identification labels inside. You should use permanent ink pen or, preferably, pencil to label specimens. These vials should be kept separate from any pinned specimens. Small adults should be glued with super glue to small triangular points, which are then pinned, large adults are pinned directly, generally in the right side of the middle thoracic segment.

Relaxing

Dried insects are often difficult to pin and they also become fragile. Legs and wings are easily broken at this point. Your best bet is to not let your specimens dry out in the first place. We will have a relaxing fluid available, which will soften the insects when exposed to it. In a mason jar, add a layer of sand and saturate it with the relaxing fluid. Cover the sand with a piece of paper towel or blotting paper. Place the insect in the jar and leave it for 1-3 days. Then remove it and immediately pin and spread it.

Displaying

Hard-bodied insects will be displayed in an insect box. Follow the instructions in the BioQuip brochure for pinning insects. Butterfly spreading boards, pinning blocks, pins, and other materials will be available in the laboratory. Soft-bodied insects and larvae should be in labeled vials and displayed in a tray, which will be available in the laboratory. Directions for labeling vials will also be found in the BioQuip brochure.

Specimens in your box must be displayed in a logical fashion. Specimens should be grouped by order, and then by family within order – use a logical scheme that corresponds to your typed table, so that your instructor can follow your scheme easily! Heading each group of

specimens in an order should be a label tag with the order name, pinned to the bottom of the box. Pinned specimens should have two tags, one with collection locality and date information, the other one with taxonomic information. The taxonomic tag should include *all* levels to which you've identified the specimen; for instance, if you identify a bee to genus, you should have: Order Hymenoptera, Family Apidae, Genus *Apis*.

Be aware that dead insects are attractive food items to certain other, living insects, such as dermestid beetles and ants. Don't leave your collection outside, and be careful about keeping it at home. You may keep your collection in the laboratory, and I'll provide fumigants to help keep out any nasty critters.

Literature Cited

- Triplehorn CA and Johnson NF (2005) Borror and DeLong's Introduction to the Study of Insects (7th edn). Thomson Brooks/Cole, Belmont, CA
- Anonymous (1991) INSECTS; How to Study, Collect, Preserve and Identify Them. Purdue University Cooperative Extension Service, Purdue, IN