Insect Collection

You will be required to collect insects of the various orders and more commonly encountered families from different habitats.

You can start collecting insects during the summer. A description of how to preserve and pin insects is listed below. If you do not have time or the knowledge to pin your insects immediately, they can be preserved as frozen specimens. Keep the specimens frozen in an airtight container such as a Ziploc baggie or Tupperware container. You can then pin them during fall semester. As you catch insects keep track of where they were collected and the date. This information is required for the label that will accompany your pinned specimen (see below).

Collecting material will be checked out to you individually in the first laboratory period. During the laboratory, we will discuss collecting techniques and we will visit a local area to acquaint you with collecting methods. You will be shown how to preserve specimens so that you can best examine the diagnostic characters that will allow you to identify the insect to family. Labeling techniques will be illustrated so that the insects collected can have value as reference specimens. There will be a number of guided collecting trips to local areas to collect specimens. Most of your collecting will need to be done on your own, however. Specialized equipment, such as aquatic nets, may be checked out to you on a short-term basis for this purpose. **It is necessary to remember that the quality of collecting falls off drastically after the first heavy frost; therefore, you really should do most of your collecting before the end of September.** Specific details on the collection will be made in the laboratory.

The first collection will have specimens of 20 different families from ametabolous and hemimetabolous orders.

**Ametabolous** = Collembola - springtails; Thysanura - silverfish; Archaeognatha - bristletails

**Hemimetabolous** = Incomplete metamorphosis = Ephemeroptera - mayflies; Odonata - dragonflies; Blattodea - cockroaches; Mantodea - praying mantids; Isoptera - termites; Dermaptera - earwigs; Plecoptera - stoneflies; Orthoptera - grasshoppers; Phasmatodea - walking sticks; Psocoptera - booklice; Phthiraptera - biting lice; Hemiptera - true bugs and aphids; Thysanoptera - thrips

The second collection will have specimens from 30 different families from the holometabolous orders.

Hemimetabolous - Complete metamorphosis = Megaloptera - dobsonflies; Neuroptera - lacewings; Siphonaptera - fleas; Coleoptera - beetles; Diptera - flies; Lepidoptera - butterflies and moths; Trichoptera - caddisflies; Hymenoptera - bees, ants, and wasps

**The purpose of the insect collection is to:**

- learn to locate and capture specific insects in their habitats;
- learn the correct methods of preserving insects for study or reference;
- use diagnostic characters to identify insects that you encounter;
- help you learn how to use a specimen display to communicate technical information;
- form a reference collection for your future use.
COLLECTION – Preserving and Labeling Instructions

It often is necessary or desirable to capture insects and preserve them for study at a later time. Over the centuries, a number of conventions have evolved that insure the best ways of preserving an insect and recording the information about a captured specimen. In almost all cases, insects are killed by the collector upon capture; less commonly, we collect insects for live studies. There are conventions to which collectors must adhere in preserving insects. If you wish to keep live insects in captivity, ask your laboratory instructor about the best ways to handle the particular species.

PRESERVING and PINNING – Please observe these conventions:

Alcohol Vials: All immatures and soft-bodied adults should be preserved in alcohol. It is best to kill these insects by immersing them in hot water and then transfer them to 70-80% alcohol.

Pins: All hard-bodied adult insects that are large enough so that they will not be damaged or distorted by a #3 insect pin should be pinned. Each insect group has an area of the body through which the pin can be inserted without destroying diagnostic characters. There should be approximately 1 cm of pin above the insect to facilitate handling of the specimen. You will need to purchase a package of pins for your use.

Points: Hard-bodied adult insects that are too small to be pinned are to be preserved by mounting on points. Again, there are conventions that you will need to observe in order to preserve diagnostic characters. Points should be made from the special paper provided in the laboratory.

Spreading: For many insects, such as butterflies, diagnostic characters are best preserved for observation by spreading the wings or legs. Please determine for which groups this will be necessary and the correct methods for each of these groups.

Preserving Insects

Most of the insects that you collect will be hard-bodied adults and will need to be mounted on #3 insect pins (available for purchase either in the laboratory or at the bookstore). Some insects, however, are soft-bodied and need to be preserved in a glass vial with 70% alcohol.

These soft-bodied insects include:

- all immature insects
- whiteflies (Aleyrodidae)
- mayflies (Ephemeroptera)
- termites (Isoptera)
- lice (Phthiraptera)
- aphids (Aphidoidea)
- thrips (Thysanoptera)
- fleas (Siphonaptera)
- book lice (Psocoptera)
- Collembola

Pinning Insects

Adult hard-bodied insects are pinned through the thorax of the body with enough room remaining (0.5 – 1.0 cm) between the insect and head of pin so it is easily handled (usually place pin in the top hole of your pinning block). It should be pinned so that the insect is resting straight, as if lying on a flat surface. All insects are pinned on the right side of the body -- this is universal pinning protocol. Where on the body to insert the pin varies with different insect orders and are explained below. Pinned insects should dry in 2-4 days, depending on the size of the insect.

1. Order Odonata - Dragonflies and Damselflies
   These insects can be pinned one of two ways:
   a. Through the left side of the body with the wings folded (to save room)
   b. Through the right side of the thorax with the wings spread
2. **Order Orthoptera** - Grasshoppers, Katydid, and Crickets  
   Pin through the right side of the pronotum. Wings can either be folded (a) or the right wings can be spread with the left wings folded (b).

![Orthoptera Image]

3. **Hemiptera** - True Bugs  
   Pin through the right side of the scutellum

4. **Homoptera** - Hoppers and Cicadas  
   Pin through right wing

5. **Order Neuroptera** - Antlions, Lacewings, and Dobsonflies  
   Pin through right side of pronotum (see Order Orthoptera)

6. **Order Coleoptera** - Beetles  
   Pin through right elytra (wing)

![Coleoptera Image]

7. **Order Lepidoptera** - Butterflies and Moths  
   Pin through right side of thorax (see Order Odonata) and spread wings according to directions below

8. **Orders Diptera (Flies) and Hymenoptera (Sawflies, Bees, Wasps and Ants)**  
   Pin through right side of thorax

---

**Pinning Small Insects**  
Many insects are too small to pin through the body. These insects should be placed on a ‘point’ which is a triangular piece of card stock. Place the pin through the wide end of the point. With Elmers glue or clear nail polish, attach the right side of the insect to the pointed end. Be careful not to obscure the view of vital identifying characters on the ventral side of the insect. (*I prefer to bend the tip of the point down and glue that to the side of the insect so the ventral side of the insect is completely free [this is a little harder to do, but worth the effort if done correctly]).

---

**Spreading Butterflies and Moths**  
These insects need special care when spreading because of their delicate nature. You have been given a spreading board to assist you. **First,** place the pinned insect in the center of the board and adjust the width of the center space accordingly. **Second,** place two thin strips of paper across each set of wings (a) and secure with pins. **Third,** with a pair of soft forceps, **gently** raise the forewing so the bottom vein is perpendicular to the body of the insect (b) -- readjust strip of paper to accommodate and replace pin as close to the wing as possible without penetrating wing. **Fourth,** gently raise hindwing enough to reduce the notch between the two wings -- again, readjust the strip of paper accordingly. Repeat on
opposite side. Last, support the abdomen of the insect by forming a V with two pins and placing abdomen between the pins.

![Abdomen Support Diagram]

**LABELING**

In order for any biological specimen to have value other than as an object of curiosity, information must be recorded and kept with the specimen. For insects, the minimum information that is expected to accompany a specimen is:
1. locality of capture
2. date of capture
3. collector

One other piece of information, while not always found with specimens, is highly desirable and will be required to accompany any insect specimen in your collection:
4. habitat

All information is to be recorded first on temporary labels. These can be bits of paper from any source, cut or torn, with the above information recorded and placed on the pin or in the vial with the specimen. At the earliest opportunity, permanent labels are to be made and placed with each specimen. Materials to produce these will be supplied by your instructors.

Assessment of the Insect Collection will utilize the following:

**COLLECTION EVALUATION I: Hemimetabolous Insects**

<table>
<thead>
<tr>
<th>Category</th>
<th>Points Possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family requirement (-1 for each family less than 20)</td>
<td>20</td>
</tr>
<tr>
<td>Accuracy (-1 for each misidentification)</td>
<td>15</td>
</tr>
<tr>
<td>Technique of preparation (according to accepted procedures)</td>
<td>15</td>
</tr>
<tr>
<td>Variety (representation of species and modifications within a family)</td>
<td>10</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>60</strong></td>
</tr>
</tbody>
</table>

**COLLECTION EVALUATION II: Holometabolous Insects**

<table>
<thead>
<tr>
<th>Category</th>
<th>Points Possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family requirement (-1 for each family less than 20)</td>
<td>30</td>
</tr>
<tr>
<td>Accuracy (-1 for each misidentification)</td>
<td>20</td>
</tr>
<tr>
<td>Technique of preparation (according to accepted procedures)</td>
<td>20</td>
</tr>
<tr>
<td>Variety (representation of species and modifications within a family)</td>
<td>20</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>90</strong></td>
</tr>
</tbody>
</table>
Example of properly prepared Insect Collection:

Entire box with approximately 30 holometabolous families.

Orders Lepidoptera and Hymenoptera: