

Collecting, Mounting, & Preserving Insects

Equipment

The following list of equipment covers collecting, mounting, and preserving. I try to keep equipment at a minimum and costs down.

1. Sweep net and/or aquatic net
2. Featherweight Forceps
3. Straight point #4 forceps
4. Vials of various sizes for collecting. I've had friend collect pill bottles for me. They work very well.
5. Vials of various sizes for storing, if you're going to collect soft-bodied insects
6. Vials for preserving
7. Field journal
8. Point punch – 6mm rounded edge
9. Paper –100% cotton acid-free cardstock for points and labels
10. Schmitt box or Cornell drawer
11. Unit boxes for the Cornell drawer boxes
12. 3-step pinning block
13. Spreading boards, various sizes (if you're going to work with butterflies, moths, crane flies)
14. Setting needles (for use with the spreading boards)
15. Waxed paper or strips of spreading paper (for use with the spreading boards)
16. Insect pins – I've found #4, and #00 most valuable
17. Clear recloseable bags, 2-gallon size
18. Glue – Elmer's white glue
19. Small camel's hair brushes – moisten the tip and it can help with transferring insect to a vial and cleaning

dust and dirt off the insects.

20. Micron[®] pen .20mm (waterproof, alcohol proof, quick-drying pen)
21. Masking tape for the field
22. Tupperware or other type of container to use as a relaxing chamber
23. Vinegar to act as fungicide for the relaxing chamber (and paper towels)

Other types of Collecting Equipment

1. Aspirator
2. Beating sheet
3. Berlese funnel
4. Flight Intercept Trap
5. Light trap
6. Malaise trap
7. Owen Emergence Trap
8. Pitfall trap

In the Field

Be cognizant of where the sun is in relation to yourself; it helps to not let your shadow pass over the insects you are trying to catch. If using a sweep net, once you have swept up some insects, twist off the net. Most insects will want to fly upward. Using a 2-gallon zip lock bag, you can untwist the net opening and position the bag to let the insects fly up into it. Be sure to separate any predators and large active insects so they do not damage or eat the others. The remaining non-flying insects can be placed into individual vials. Having a cooler handy means you can refrigerate the whole bag and individual vials. In this way, you don't have to kill any that you aren't collecting. When you get home, you can move them to separate vials and place in the freezer or release those that you don't want.

Always take some vials or pill bottles with you when you go into the field – no matter what you're doing.

Data Recording in the Field

Specimens without proper data are useless.

Before moving on to another sweep, make a data label for the bag and each vial. These can be made with masking tape and taped onto the bag or vial. The label should include:

- Bag # or vial #
- Where you are (Name of location if there is one, city, county, state, and GPS coordinates if known)
- Date (written as DD MMM YYYY, 08 Nov 2013)
- How the insect was caught (black light, sweep net, etc)

In your field journal, record the following information. The more info placed on the label, the more valuable the specimen is.

- Bag # or vial #
- What plant which insect was on
- Time of day
- Habitat
- Any other observations about the insect

By numbering and labeling the bags/vials, you won't confuse which insects came from which bags.

Once you are home, you can put each insect into a separate vial and remove any plant material and freeze them or re-refrigerate them. If you decide to freeze them later, put them into another clean, dry vial. This will help to prevent condensation, which can occur with plastic or glass vials.

Mounting Specimens

Frozen insects must be thoroughly thawed or appendages may break off. Insects must be soft enough to pin, either freshly caught and killed or softened in a relaxing box. Allowing them to air dry for a bit will also help to prevent condensation. The larger insects can be spread out to make the legs and other appendages easy to see and photograph.

Relaxing insects before mounting

To relax an insect, I placed 3 sheets of paper towels (or cardboard) moistened with vinegar in the bottom of a large tupperware. Then I place the bugs in their vials on top of the cardboard and put the lid on but not tightly. If I'm working with large collections and have sorted the insects into petri dishes, I place an overturned petri dish on the bottom and set the one with insects on top. I leave them for at least 4 hours. With the vinegar, I've left for the 2 days without worry of fungus.



The cardboard has been wet down with vinegar.



Open the pill bottles of frozen insects and set into container.



I snap 3 sides of the lid on. I keep one side loose so condensation doesn't build up.

After they are relaxed, I take them out of the vials and arrange their legs, antennae, etc. as needed and if needed. To do this, I use a piece of styrofoam that I have covered with a piece of muslin. The styrofoam allows me to use pins to arrange them; the muslin keeps them from "jumping" around because of static electricity. It's best to pin them in a natural arrangement of legs, wings, antennae, before they dry. Long-bodied and long-legged insects can have their legs kept in place by pushing a piece of stiff paper up on the pin beneath them until they are dry.

Any exuviae or puparia should be kept with the adults in a collection and can be mounted on the same pin.

Pointing

Card points are used for mounting very small insects. These insects must be hard-bodied enough to not lose shape when dried.

- Punch a card point – I prefer the 6mm rounded end points
- Push the card point up the pin to the appropriate height for insect mounting, making sure it is not crooked.
- Put a dab of glue on the point and place on the ***right side*** of the insect's thorax or slip between the legs to the underside of the abdomen.
- The points are placed to the ***left side*** of the pins.

Kirk Larsen, via Iowa Insects listserv, sent me this YouTube video of how to point an insect.

<http://www.youtube.com/watch?v=b0qn2uUkrmk&feature=youtu.be>

Spreading

All Lepidoptera are spread. Grasshoppers, dragonflies, and cicadas can have the wings on one or both sides spread.

- Fix paper strips along the side of the spreading boards and pin on one end
- Place the insect on a mounting pin in the proper location
- Pin thru the insect onto the notch of the mounting board so it is not tilted and so that the wings will be flat to the spreading board
- Make sure the insect doesn't move when positioning the wings
- Place paper over the wing, position the wing, and pin the paper
- Position the antennae with pins
- Tuck collection data label under the paper by the specimen
- Note the spreading date on the paper strip to remind you of how long the insect has been on the board
- Allow to dry for at least 1 week or longer. The body should be dry and stiff.

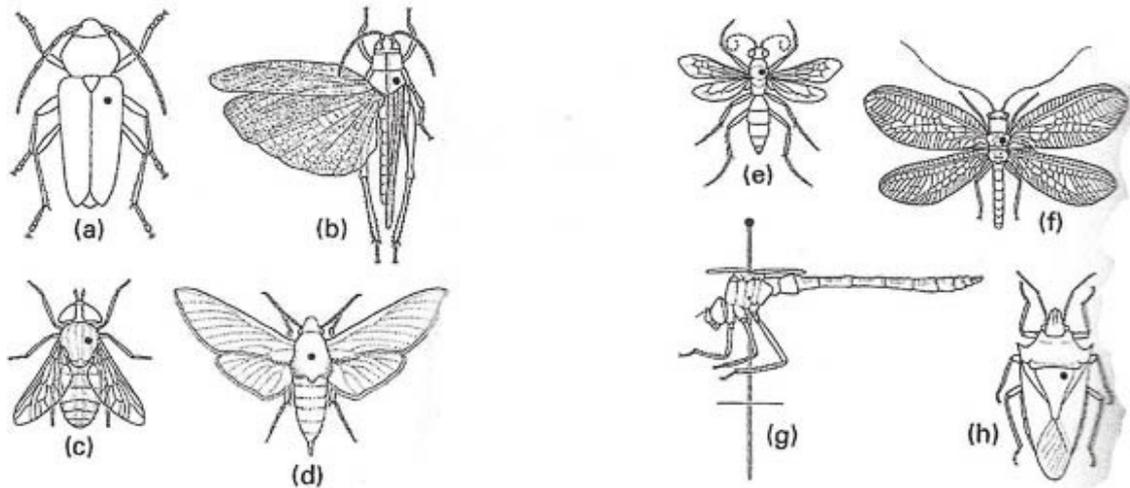
Pinning

Pinning is used for directly pinning medium to large insects and for pinning points that hold the small insects.

Pins range in size from 000 to 7, with 7 being the largest. Pins need to be stainless steel.

- Insects that are at least 5mm are large enough to pin using 0-000.
- Medium to large insects are pinned on sizes 1-3.
- Large specimens (moths, beetles, cicadas) use sizes 4-7.

Use the pinning guide below to pin in the appropriate places



a) Coleoptera, b) Orthoptera, c) Diptera, d) Lepidoptera,
 e) Hymenoptera, f) Neuroptera, g) Odonata, h) Hemiptera
 Gullan, Penny J. and Peter S. Cranston. 2010. *The Insects:
 An Outline on Entomology*. Oxford: Wiley-Blackford.

Carding

This is where specimens are glued to a rectangular card which is then pinned into a Schmitt or Cornell box. Adults should not be carded. Exuviae, pupal cases, and items of this nature are appropriate for carding.

Preserving Specimens

Delicate or soft-bodied species and spiders (eggs, nymphs, larvae, and pupae) should be preserved in 70-80% denatured alcohol. A label should be inserted into the vial and written with alcohol proof ink. Different types of insects and different life cycle stages have their own preservation protocols. This document – Insect order and preserving methods – describes how each needs to be preserved. The taxobox in this document refers to additional information in *The Insects: An Outline of Entomology* by Penny Gullan and Peter Cranston.

Collections should not be in areas where temperature and humidity fluctuate rapidly.

They should be in as dark a place as possible to prevent fading. Periodic deep freezing or “fumigation” may be required. Moth balls packets should be kept in each insect box as well. Periodic checking and refilling of alcohol-filled vials when evaporation has occurred.

Labels

One can have several labels but the minimum is two types of labels that are pinned with each specimen: 1) Locale label and 2) Specimen ID label. I have opted for the 2-label system but I have the flexibility of an optional third label.

The following is the minimum information that is required. I have hyperlinked an example of the locale and specimen labels.

Locale Label – must include the following

- Location in descending order from country, state, county, city, township.
- GPS coordinates and elevation, if known
- Name of location, if there is one assigned to it. EX: Yellowstone National Park
- Date (written as DD MMM YYYY, 08 Nov 2013)
- Collector’s name
- Type of habitat and/or method of collection

Specimen label

- Order, Family
- Genus and species
- Name of the person who made the ID
- BugGuide number, if this was posted on BugGuide

Optional label

This would have interesting information about the insect and could include:

- Plant it was on (always use the botanical name)
- Time of day
- Weather conditions
- The activity of the insect – resting, eating, clustered, individual, mating, etc.

These labels are placed in a specific order and height; pinning blocks make this very simple. The insect is at 1 1/8"; the locale label at $\frac{3}{4}$ "; and the specimen label at $\frac{1}{2}$ ". The font is generally 4pt. There aren't a lot of rules about this unless you are at an institution with a required protocol.

It is important to print these on acid-free cardstock. Sometimes thesis-weight paper will curl up and as specimens get moved around, the labels can twist and turn. This twirling action has been known to damage specimens by clipping off their legs. The cardstock does double duty by reducing the label spinning.

Adding various spacing on the label allows for the pin to be placed without obliterating the information. Another excellent suggestion from Andrew Williams is to include a specimen number on the backside of all the labels for a single specimen. I also include this on the front in the lower right-hand corner and do this because I seldom have the ID for the specimen at the time I'm making the label. Having the number on the front helps me to quickly find this specimen and add the specimen ID label without having to move a number of specimens, risking damage to them. The specimen number correlates to your spreadsheet listing of your specimens. The specimen number will prevent labels from getting mixed up when 2 specimens are examined at the same time.

Specimens in Vials

Specimens in vials have a slightly different method for their labels. The following information is from Dave Ruiter who ID'd caddisflies for me.

If the specimen is in a vial of alcohol, the font size on both of these labels should be **8pt Arial font**. The two labels need to be placed back to back (with the text of each facing outward) and placed **inside** the vial.

I use a piece of heavy bond cotton paper for the label that is longer than the vial circumference. Then grab the end of the label in your forceps and roll the label loosely around the forceps so the roll is a smaller diameter than the vial opening. Stick the label in vial and open the forceps. The label will unwind and "stick" to the vial sides. Don't wrap too tight or it won't unwrap easily. The idea is to curve the label so it matches the curve of the vial. It unwraps easier when the vial is full of preservative.

2 dram vial labels should be 3/8" x 2 3/8" (6mm x 57mm).

Organizing the Labeling Process

I created this process because 1) my microscope isn't in the same location at my computer, 2) I seldom can ID the insect at the time I'm mounting it, and 3) I haven't collected a sufficient number of insect to print off a full page of completed labels. These elements made it difficult for me to ensure that I was getting the correct label on the insect. I knew I needed to create a system that provided accuracy or all my work would be futile.

It has taken me a few years to figure out how to make permanent labels for my insect collection because I began slowly and I do not collect very many each year. I formatted my labels such that one page is 144 labels. When I first began

collecting and mounting I would make temporary labels using plain paper. It was difficult to match up the permanent labels to the temporary ones once I identified the insect with this system. I knew I needed to do something better. Using an example from a friend, I print up the basic information on sheets and cut them to label size. When I mount an insect, I would fill in the date and method of collection with a Micron® pen.



I cut the labels with a rotary cutter and clear guide so they are uniform in size.



Here is an example of a page of locale labels. In the blank spaces, I write the date and collection method.

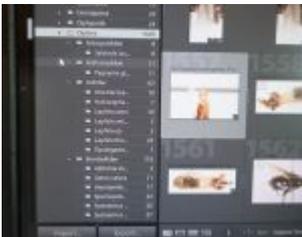
When I collect the insects, I strive to photograph them first, but with the very small ones or very active ones, this sometimes isn't an option. For those I do photograph, I write the photo number of the first photo on the temp label as they go into the freezer. This way, when I'm working with the specimen, I know I have photos already and won't be duplicating my efforts.

As I mount the insects, I keep a ledger. It tracks the specimen number, date, method of attracting the insect, the insect order, the photo number, and a blank column for the ID. I use this ledger to log the names of the insects when I identify them and add that information to a label template. When I am photographing the insects after mounting using a

stacking method, then I note that as well, using the number I create. Since my stacked photos do not have a numbering system such as what the camera applies nor will the date of collection be in the metadata, I create a number. For example, my stacked photos are numbered within each order with my created number, the size of the insect, and the date collected. Within that folder, I name them according to the view of the photos such as lateral, dorsal, face, etc. Once I have this insect identified, I move all the photos into a file labeled for the family/genus/species.



This is a photo of my ledger.



This is screen shot of my Lightroom categories.

It took me a couple of years to figure out this system. It makes my life so much easier and I have confidence that my labels are being applied to the correct insect. The specimen is only as good as its label and the information on it!!