



4-H Study Materials for Entomology Contests

January 2003

VII. Collection and Preservation of Insects

Why Collect Insects

The insect world includes some of the most fascinating creatures ever to exist on earth. In size, they range from microscopic to several inches in length. Many exhibit dazzling, bright color patterns. Some insects are harmful to plants, animals and man, but most insects are beneficial. Some insects, like honey bees, have been cultured by man for many generations.

Insects may be collected as a hobby and for the enjoyment of observing them as a part of nature. They may also be collected for scientific studies. There is no better way to learn about insects than to collect them.

When and Where to Collect Insects

Insects are present in virtually every habitat. The more places a person looks for insects the greater will be the variety collected. Insects may be found flying in the air or buried in the soil. They may be found in the water, on vegetation or under logs, stones and debris.

Insects are most abundant in the spring and summer. However, insects can be collected any day of the year. Some species can be found under bark, in rotting logs or under debris even on the coldest day of the year.

Certain insects, such as moths, are active at night and may best be collected at night. Others, such as dragonflies and most beetles, are active during the day and are therefore collected more easily during the day.

Collecting Equipment

Many insect specimens are lost because proper equipment, such as a net, vial of alcohol or killing jar, is not available at the time the specimen is sighted. The collector should be equipped to take advantage of any opportunity that may be encountered.

Containers. The collector should be equipped with a variety of containers in which to hold specimens collected. Many prize specimens are damaged or ruined because of inadequate containers for holding and transporting. Containers should be large enough to accommodate specimens without cramping or bending them. This requires large containers for dragonflies, butterflies, and other large, delicate insects. Adequate containers should be provided to prevent crowding as well as to isolate rare or delicate specimens. Some of the most available containers collectors use include:

- Cigar boxes

Pill boxes

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Jars

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Test tubes

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Vials

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Medicine Bottles

Sweep net. A sweep net is one of the most important pieces of equipment an insect collector should have. With a sweep net, the collector can capture flying insects and insects found on vegetation. The net may also be used to collect aquatic insects. However, nets designed for collecting aquatic insects are heavier than most sweep nets.

Beating cloth. A beating-cloth or beating umbrella may be placed beneath vegetation. The vegetation is then shaken or beaten with a stick. Insects dislodged from the bush or shrub fall on the beating cloth and can be collected.

Aspirator. An aspirator acts like a miniature vacuum cleaner. It is used to collect small insects.

Light traps. Light traps are used at night and attract a wide variety of night-flying insects. Many varieties of light traps exist. Some collect the specimens alive and others draw the insects into a killing agent, such as alcohol or cyanide.

Bait traps. Bait traps are useful in collecting many beetles and flies. The design of bait traps varies from elaborate devices to a simple tin can buried to soil level and baited with carrion or decaying fruit. The ingenious collector will succeed in constructing a trap to fit his or her needs and desires.

Bait. An effective bait can be made with fresh fruit. Fill half of a 1-gallon container with mashed fruit, such as peaches and/or bananas, and add a cup of sugar. Allow it to stand for about a week, but do not cover it tightly. During this week, add a little more sugar to the mixture each day to continue the fermentation process. Yeast can be added to speed up the process. Before using the bait, add about a cup of brown sugar to the mixture. Apply the bait with a brush to the trunk of trees in the early evening. By nightfall there should be plenty of insects ready to be collected.

Light sheets. A simple white sheet with a bright light source shining on it can be hung outside at night. This is an effective way to attract moths and other nocturnal insects. Blacklights, mercury vapor lights or incandescent lights are all good for attracting insects.

Berlese funnels. An effective trap for collecting Collembola and other small soil insects is the Berlese funnel. This trap can easily be made by placing wire mesh into a funnel. Position the funnel over a jar of alcohol and place a bright light source over the top of the funnel. Add some soil and leaf litter to the funnel, turn on the light and wait 3 to 4 hours. The small insects in the material will try to escape from the light by burrowing down further into the material, past the wire mesh and into the jar of alcohol. Use an eye dropper to remove the insects from the alcohol.

Killing apparatus. Killing jars may be constructed in a number of ways. All consist of a container (usually a jar) with a killing agent. Select a jar that has a tight lid that is easy to open and close. Use a jar that is large enough to hold the insects you will collect. A wide-mouth quart jar is probably the largest size needed, but

smaller jars are more useful.

It is always a good idea to add a paper towel or a few tissues to the jar to absorb moisture that will accumulate in the jar. Some collectors prefer to line the bottom of the jar with plaster of paris about an inch thick. To prepare jars using this technique, mix the plaster of paris with water, pour it into the jar and let it dry before you use it.

The most common killing agent used in killing jars is ethyl acetate (finger nail polish remover). Only a few drops of ethyl acetate are needed in a killing jar because the vapor kills the insects. You may need to add a few drops each day or whenever the insects do not die quickly. As an alternative to killing agents, insects may be killed by placing them in a freezer overnight.

Remember that some insects should be killed and preserved in alcohol. Rubbing alcohol is good to use for this purpose. Vials or small bottles containing alcohol are needed to separate insect specimens for proper maintenance of the collection.

Other equipment. A variety of other equipment and tools will come in handy on any collecting trip. Some of the equipment a collector should have are:



- Forceps or tweezers
- Dissecting needle
- Pocket or hunting knife
- Hand lens
- Notepad and pencil
- Camel's-hair brush
- Vials of preservative
- Eye dropper
- Scissors

Other items that often come in handy are:

- Shoulder bag for equipment

String

- Tape
- Rubber bands
- Glass slides
- Small pieces of cardboard
- Cotton
- Insect pins

Preservation of Insect Specimens

Properly preserved insect specimens will last indefinitely. There are various ways of preserving insects. The proper method is based upon the type of insect to be preserved. Most are mounted dry on pins. Many small specimens are best glued to small cardboard points mounted on pins. Some are preserved in alcohol and others may be mounted on microscope slides. The following list will aid in determining what method should be used for killing and preserving different adult insects.

Kill and preserve in alcohol; mount on slides:

Anoplura (sucking lice)

Collembola (springtails)

Mallophaga (chewing lice)

Siphonaptera (fleas)

Thysanoptera (thrips)

Kill in ethyl acetate; mount on pins:

Blattaria (roaches)

Coleoptera (beetles)

Dermaptera (earwigs)

Diptera (flies): Tiny ones may be killed and preserved in alcohol.

Hemiptera (bugs): Kill in ethyl acetate vapor or alcohol; mount on pins.

Homoptera (aphids, scale insects and whiteflies): Kill and preserve in alcohol. Some may be mounted on slides.

Hymenoptera (bees, wasps, ants, etc.): Small gall wasps and parasites may be killed in alcohol.

Lepidoptera (moths and butterflies)

Mantodea (mantids)

Mecoptera (scorpionflies)

Odonata (dragonflies)

Neuroptera (lacewings, antlions, etc.)

Orthoptera (crickets, grasshoppers)

Phasmida (walkingsticks)

Trichoptera (caddisflies)

Kill and preserve in alcohol:

Ephemeroptera (mayflies)

Isoptera (termites)

Plecoptera (stoneflies)

Psocoptera (booklice)

Thysanura (silverfish)

Larvae of insects should be killed in boiling water and allowed to remain in the water until they float to the top which takes from one to five minutes, according to size, then preserved in alcohol.

Centipedes, millipedes, mites, spiders, ticks and other small arthropods, although they are not insects, are frequently handled by entomologists. All these should be killed and preserved in alcohol. The smaller ones are usually mounted on slides.

Pinned specimens. Properly pinned specimens are valuable and useful. Improper pinning detracts from the looks and value of any specimen.



Common household pins should not be used to pin specimens. Special insect pins should be used. Insect pins may be purchased in various sizes from a number of biological supply houses. Size 2 or 3 **pins** are used for most specimens. Specimens should be mounted squarely, not at an angle. All specimens should be mounted at the same distance from the head of the pin. A pinning block may be used as a spacer to help keep specimens and labels at a uniform height.



Pins are placed in specimens to avoid hiding or damaging appendages or areas used for identification. The standard methods for pinning some of the common insects are:

1. Grasshoppers, katydids, etc.: Pin through the back part of the thorax to the right of the middle line.
2. Stink bugs and other large Hemiptera: Pin through the scutellum to the right of the middle line.
3. Bees, wasps and flies: Pin through the thorax slightly behind the bases of the forewings and to the right of the middle line.
4. Beetles: Pin through the right wing cover near the base.
5. Moths, butterflies, dragonflies and damselflies: Pin through the middle line of the thorax at the thickest point, between and slightly behind the bases of the forewings.
6. Small specimens may be mounted by gluing the specimens to a paper point on a pin.

Relaxing chamber. Many times it is impossible to pin specimens immediately after they have been collected and killed. Most of these specimens dry in an awkward or difficult position to pin. These specimens may be relaxed so that wings or legs may be moved, even months after they have been collected. To accomplish this, the insects have to be placed in a relaxing chamber for a period of time. This allows muscle tissue to absorb enough moisture to make them elastic.

A relaxing chamber is nothing more than a sealed container, such as a large jar, containing sand or a similar media saturated with water. A bit of alcohol may be added to prevent the growth of fungi. A wire screen or small dish is used to prevent the specimen from coming into direct contact with the wet media.

Insects are placed in the container and left until their appendages will move freely. Specimens are then removed, pinned, spread in the desired shape, and allowed to dry. To keep the insects from drying out, they can be placed in the freezer for as many as three days.

Spreading board. Spreading boards are structures used in spreading the wings and legs of insects and to hold them in the desired position until they are dry. They may be made from small pieces of soft pine, cork, balsa wood or styrofoam. Insects are pinned on the board, spread in the desired position and allowed to dry. Small specimens dry in one or two days while larger specimens may take several days.

Preserving in alcohol. Small soft-bodied insects such as aphids and thrips would soon dry out and shrivel or become distorted if not preserved in alcohol. Those insects that should be preserved in alcohol have been listed previously. Many specimens (especially larvae) turn dark when preserved in alcohol. The smaller of these specimens may be prevented from turning black by replacing the alcohol about two to three days after the specimens have been preserved. Killing and leaving large larvae in boiling water for one to five minutes before placing them in alcohol may prevent them from turning dark.

Mounting on microscope slides. Only very small insects such as thrips, lice and aphids are usually mounted on slides. This technique requires special equipment and a certain amount of skill. The specimens are placed on the left-hand side of a microscope slide and a drop of mounting media is added. Then a cover-slip is placed over the media and specimen. After the mounting media dries, the edges of the cover-slip are often sealed to prevent absorption of moisture which may stain the mount. Mounting on slides is an excellent way to preserve and study small soft-bodied insects.

Labeling specimens. A proper label greatly increases the value of a specimen. All specimens, whether pinned, preserved in alcohol, or placed on slides, should be properly labeled.

A label should contain information about the location where the specimen was collected, the date collected and the name of the collector. Labels must be printed in permanent ink, which is non-soluble in water or alcohol.

Pinned specimens should have a proper label attached below the specimen. Specimens preserved in alcohol should have the label inserted into the vial with the specimen, although many specimens have the label attached to the outside of the vial. Specimens mounted on slides should have the label glued to the upper side of the slide and to the right-hand side of the specimen.

