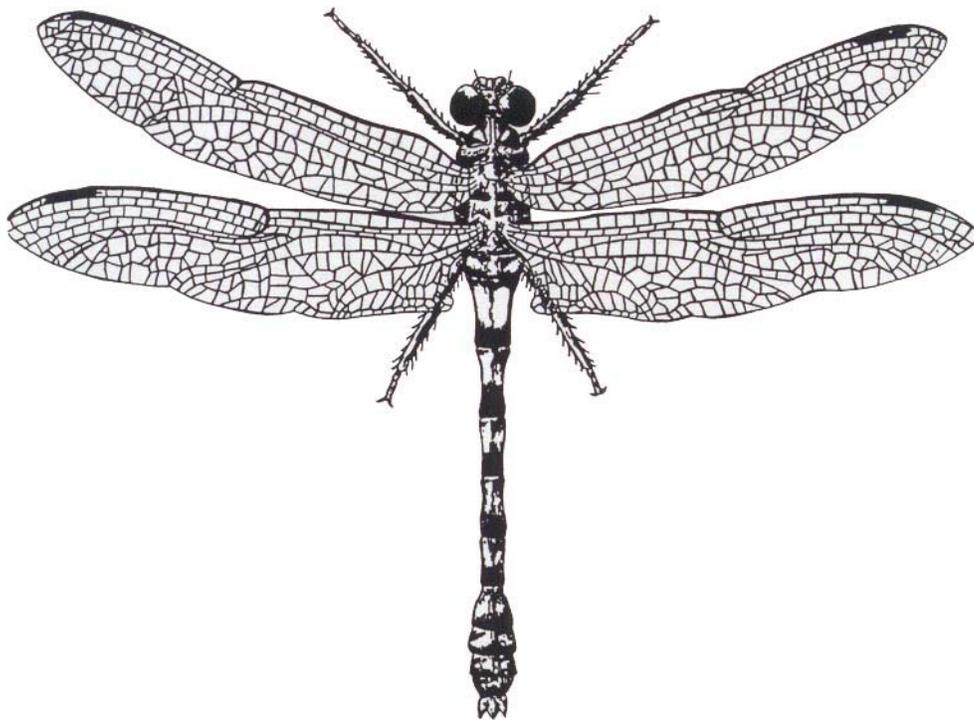


Preparing Insect Specimens for Exhibit

For 4-H Entomology Projects



Excerpted from the Insect Information Manual a University of Idaho Extension publication prepared by Robert L. Stoltz, Hugh W. Homan, UI Extension Entomologists, and with Mary Jean Craig, Extension Associate, 4-H/Youth, University of Idaho State 4-H Office.

This publication provides 4-H members with specific directions for mounting, identifying, and exhibiting their Entomology displays. A list of potential sources for entomological supplies are listed at the end of this publication, but should not be construed as the only sources nor is it an endorsement of these companies.

Preparation of Insect Specimens

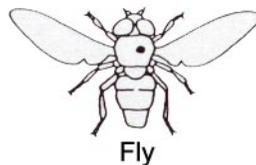
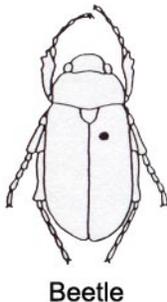
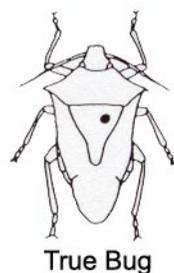
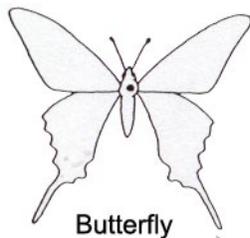
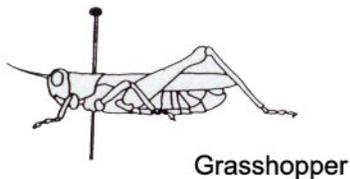
Insects can be killed in a killing jar or by putting them in a freezer for an hour. If live insects are not killed right away, large ones should be kept singly in separate containers to keep the larger insects from destroying the smaller ones.

Insects should be spread and pinned as soon after killing as possible. If you will not be able to pin your insects within a few hours after collecting and killing, put them in the freezer in a small container such as a film canister. Put some tissue in the container with the insects. Before you pin the insects, let them thaw out for 10-20 minutes so they are soft and pliable.

How to Pin Insects

Pinning Insects

Insects should be pinned in a uniform manner using pins made especially for this purpose. Obtain insect pins from your county agent, hobby stores or biological supply houses. Check with your local leader. Do not use common straight pins since they will rust and soon ruin what may be valuable specimens. Pins come in several sizes; No. 2's and No. 3's are recommended for 4-H use.



Mount insects when they are still fresh because once dried out they become brittle and easily broken. Any insect that is large enough to be supported by a pin, without breaking or otherwise being distorted, may be pinned directly through a definite part of the body from top to bottom. The place of insertion depends upon the type of insect (see illustration below left).

The following rules have been set up for pinning different types of insects so the pin may be placed firmly through the heavier parts of the body:

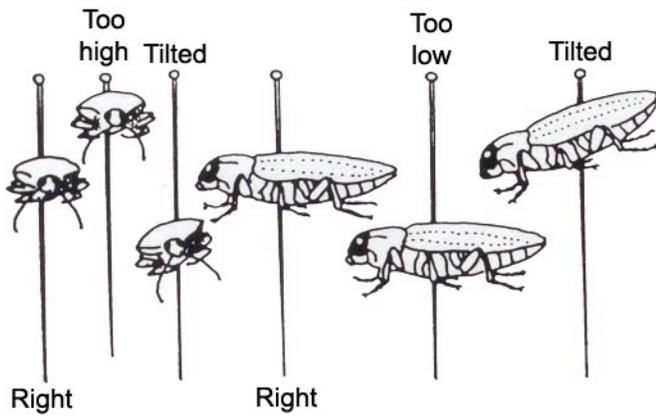
1. Bees, wasps, flies, etc. - Pin through the thorax between bases of fore wings and just right of the center line.
2. True bugs - Pin through the scutellum, which is the triangular area between the bases of the wings.
3. Grasshoppers, crickets, etc. - Pin through the prothorax or "saddle" just to the right of the center line.
4. Beetles - Pin through the fore part of the right wing cover near the center line.
5. Butterflies, moths, dragonflies, etc. - Pin through the center of thorax between the bases of fore wings.

In the absence of specific information, pin insects through the thorax just to the right of center.

One-half inch of the pin should project above the insect for easier handling of the specimen. Use a pinning block to measure this distance. All insects should be at same height on the pins, that is, about 1/2 inch of pin should be visible above the insect.

The insect should be horizontal on the pin at right angles to the pin itself. It should not be tilted from side to side. The pinning block is a valuable aide in getting the insect in good position on the pin.

Soft-bodied insects may tend to droop on the pin. Legs and wings and antennae may be in disorder. Straighten these body parts in a way that permits future study. If the insect needs this attention, move the legs, etc. with forceps or a pin. To counteract body or wing droop, add a heavy paper support under the pinned insect and leave it there until the insect hardens.

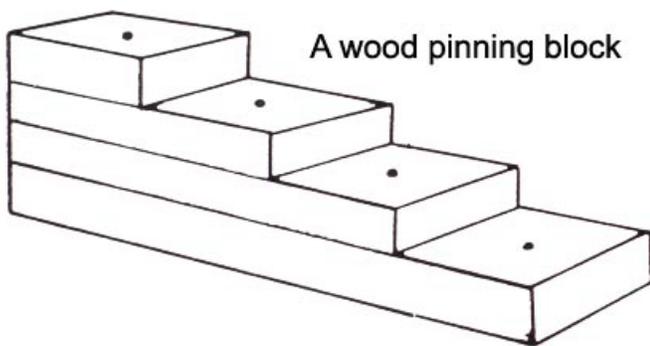


NOTE: The insects and labels do not have to be exactly at each level of the pinning block. Uniformity and neatness, however, are the main goals of the block.

Pinning Block

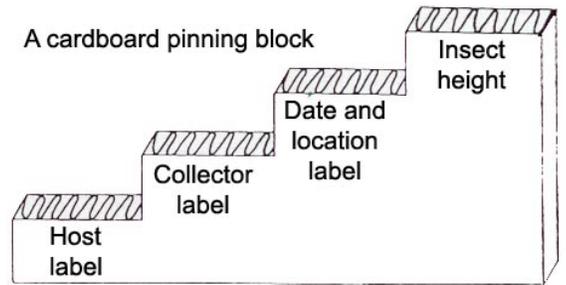
Your collection will look neater if insects and labels on all the pins are at the same height. A mounting block or pinning block will be helpful. To make one, the following materials are needed:

1. 4 pieces of soft wood or Styrofoam ¼ inch thick; 1 inch wide; 1, 2, 3 and 4 inches long; or a piece of cardboard 4 inches long and 1 inch high.
2. Small carpenter's drill or small nail (not needed for Styrofoam).
3. Glue, for gluing small pieces of wood together.
4. Cutter for cardboard.



How to Make a Pinning Block

With a drill or nail, make a small hole in the center of each step as shown in the above drawing. The hole needs to be only slightly larger than the diameter of an insect pin – 1/16 inch drill bit or 4d nail.

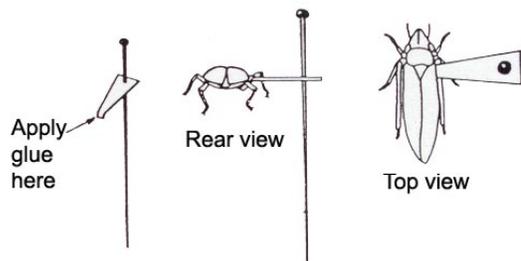


Pinning blocks may also be cut from a single piece of cardboard. Steps can be cut to achieve the same heights as the wood or Styrofoam blocks.

How to Card Point Small Insects

Some insects are too small to use the regular pinning procedure. Pinning small insects destroys too much of the insect body symmetry to allow proper identification. Thus, cardboard points are used.

1. Select heavy paper, such as filing cards, for cutting out card points. This is a card point. 
2. Cut the points in the shape shown. The points should be about 3/8 inch long. An easy way to make points is to cut a strip of paper 3/8 inch wide, then cut at angles with a single edged razor blade or scissors.
3. Put a pin through the base of the card point and punch it up on the pin to about ½ inch from the top of the pin. Use a pinning block to get uniform heights of the points.
4. With a pair of tweezers, bend the tip of the card point down, as show in the sketch below.
5. Put a tiny drip of glue on the bent tip of the card point and press it gently to the underneath right side of the insect. Clear fingernail polish or any clear drying glue may be used. Be sure the insect is "square with the world" and not at an angle. This takes practice.

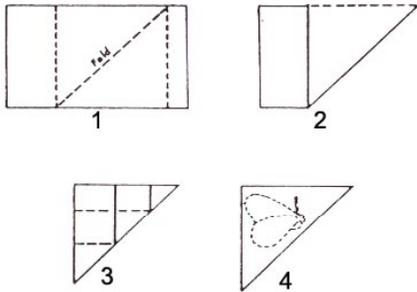


NOTE: In the illustration above, note the right side of the insect is glued to the point. In the collection, card pointed insects should be mounted with the point on the left side of the pin. As with all regularly pinned specimens, the head of the card pointed insect should point toward the top of the display case.

Soft-bodied insects such as aphids, springtails, silverfish and mayflies should not be pinned at all. They should be put in small vials of alcohol. These vials can be displayed in collection boxes if firmly held in place with pins, glue, or wire fasteners.

Preparing Insects

Butterflies and moths may be “papered” for storage during collecting trips before spreading. The steps in making a paper triangle are illustrated. These papered specimens must be thoroughly relaxed before spreading is attempted.



Insect Spreading Board

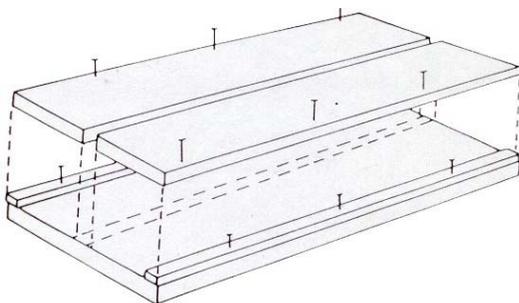
Lepidoptera (butterflies and moths) must be properly mounted to look their best in an insect collection. The spreading board will enable you to prepare your Lepidoptera when they are freshly killed, or relaxed, so their wings will remain in the desired position when dry. The groove is wider at one end than the other so you can put small Lepidoptera at one end and large ones at the other.

Materials Needed

1. 1 piece of 3/8-inch or 1/2-inch fiber insulating board or balsa wood 5 1/2 x 12 inches.
2. 2 pieces of 3/4-inch by 2 5/8-inch soft-wood 12 inches long (called 1 x 3s).
3. 5 small shingle nails and 4 3/4-inch brads.
4. 2 1/4-inch wood or cardboard strips x 12 inches.

Tools Needed

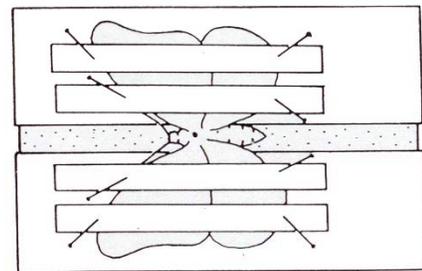
1. Hammer
2. Saw
3. Knife



Spreading Butterflies

Your butterfly must be freshly killed or well relaxed so it won't be so stiff that it breaks when you put it on your spreading board.

Pin the insect through the thorax and place it in the groove on the board. Place a strip of paper 1/8-inch wide over the wing and pin down one end. Slowly pull the wing into position, using the point of a pin to push against the veins in the wing. The back edge of the front wing should be at right angles to the insect's body and the rear wing should be brought up so its front edge just underlaps the front wing. When the wing is in the correct position, push the strip down on the board and pin. If you have kept the strip of paper tight enough, the wing will remain in place. Repeat on the other side and the insect will look like the illustration.



Butterfly properly spread

The addition of a wide piece of paper will keep the wing flat until it dries. An ordinary butterfly will dry in a couple of days in the heat of the summer.

Riker Mounts

Riker mounts are a type of display made of heavy cardboard with a transparent top. Insects placed inside rest on a layer of cotton that fills the box and holds the specimens snugly in place. Life histories of large butterflies or moths make attractive Riker mounts. Host plant material, insects and labels can be arranged in life-like poses.

Riker mounts may be purchased from biological supply houses, but they are easy to make.

How to Make a Riker Mount

Select boxes of adequate size to hold your display. Many gift boxes such as shirt, necktie or candy boxes are excellent for this use. The box should not be more than 2 inches deep. Cut deeper boxes to that depth.

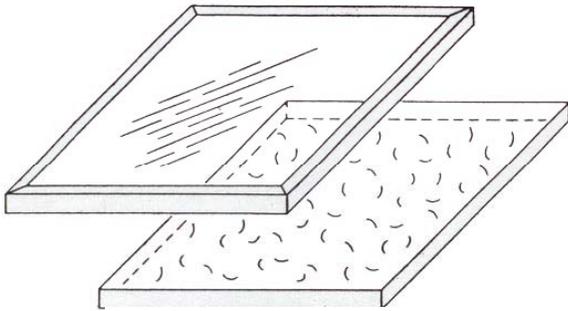
Step 1. Carefully cut out the interior portion of the box lid leaving about 1/2-inch margin.

Step 2 Cut glass or heavy-gauge transparent acetate to size and tape or otherwise fasten to the inside of the lid.

Step 3 Fill the bottom of the box with a layer of cotton.

Arrange previously prepared display material and labels in desired position on the cotton. Add a mothball under the cotton in the corners to protect the display.

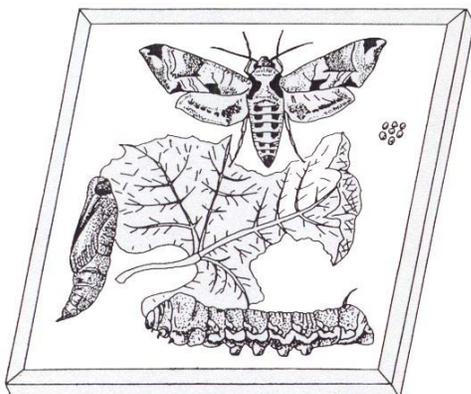
Bind the box together, top and bottom, with plastic tape.



Life History Study and Mount

In Unit 3 you are required to study the life history (life cycle) of one insect. After your study you will make a life history mount showing the different stages of growth of the insect. You may choose any insect from which you can find all stages of growth. For example, you might show the egg, larva, pupa and adult of the tent caterpillar, or the egg, nymph and adult squash bug. Other suggestions are blow flies, house flies, ants, crickets, cockroaches, lady beetles, Colorado potato beetles or grasshoppers.

When you have found the insect you wish to study, place the infested material on which it is found in a suitable cage. Be sure there is an adequate food supply in the cage, i.e. an alfalfa plant infested with aphid will provide food for lady beetles and their larva, or a potato plant will serve as food for a Colorado potato beetle. A cage may be prepared using a window screen, cheese cloth, or similar material to completely surround the infested plant. Attach the screen to the ground and close all openings to prevent insects from escaping. You may wish to transplant the infested plant to a flower pot or bucket, or surround the plant with screen.



Make daily observations and record the insect's habits and changes that take place in the insect(s) or the host. A place is provided in the Unit 3 record book to record certain important dates – you may wish to add others. These records will be useful when you write about your observations.

Your life history mount should include all stages of the insect's development. Use a Riker-type mount which you have made or purchase a Riker mount. The box may be a cardboard or wooden box approximately 8 inches long, 6 inches wide, and 2 inches deep with a transparent top. The usefulness of your mount will be greater if it includes an example of the insect injury. Small vials are excellent for exhibiting the egg, larva and pupa stages of growth. Vials may be available from your dentist, county agent or district entomologist.

Labeling Insects

After your insects are pinned or on card points, they need to be labeled. Each pinned insect will have at least two, and may have up to three, labels. The 4-H record books include labels on the last pages.

The FIRST LABEL under the insect will have the following information on it:

Place: Include the county, state and nearest town.

Date: Month, day and year, using the last two digits of the year. Use roman numerals for the month and regular numbers for day and years.

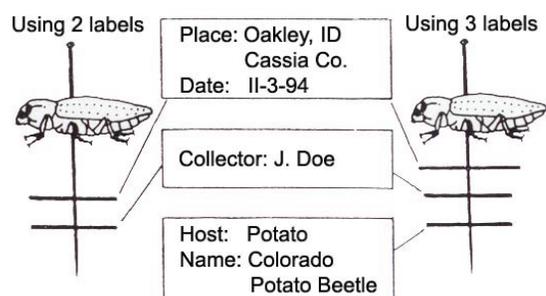
**Place: Oakley, ID
Cassia Co.
Date: II-3-94**

The SECOND LABEL on the pin will contain the name of the collector. Only the first initial and last name are necessary.

Collector: J. Doe

The THIRD LABEL which may be needed in Units 4 and 5 is the host and/or common name label. This label will tell from what plant, animal, crop, trap or bait the insect was collected.

Place all labels so that they can be read from front to the rear of insect. All labels should be uniform in size and position on the pin. This is how they should look:



Alcohol Labels and Specimens

Specimens preserved in alcohol also will need to be labeled with the same information as pinned specimens. One large label is all that is needed with alcohol mounts. The label should be cut from notecard paper. The label information should be written on the paper with a hard lead pencil or India ink. Most other inks will run or fade out in the alcohol. Place the label in a vial so it can be read without moving the vial. In other words, the label should be parallel with the order label. The label should be prepared as follows:

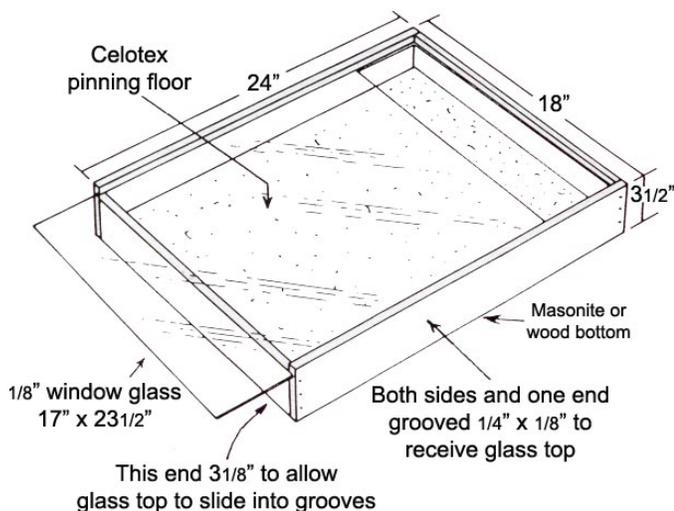
Oakley, ID II-3-94
Cassia Co.
J. Doe, Coll.
Potato (optional)
Common name (optional)

Very fragile insects such as craneflies, mosquitoes, aphids, immature insects, etc. are better preserved in alcohol. All arthropods other than insects should be preserved in alcohol. Rubbing alcohol may be used for this purpose. Use only vials with leak proof lids.

Preparing the Collection for Display and Exhibit

After your insects have been properly preserved, pinned and labeled, they are ready to be arranged in a display for exhibit.

Insect collections are displayed in boxes. These boxes can be simple cigar boxes or more elaborate glass top wood display cases. You must have a suitable pinning bottom in the display box. Celotex, soft fiberboard or similar material is suggested. The box should be deep enough to hold the pinning floor material and pinned insects when the lid or cover is in place. The cover may be glass or other see through material. The glass top display case suggested below should be adequate for several years' collections.



Glass Top Display Case

Materials needed for a glass top display case, 18 x 24 inches:

1. 1 piece of masonite or hardboard for bottom – 18 x 24 inches.
2. 2 side pieces of pine – $\frac{3}{4}$ x 3 $\frac{1}{2}$ x 24 inches
3. 1 end piece of pine $\frac{3}{4}$ x 3 $\frac{1}{2}$ x 16 $\frac{1}{2}$
4. 1 end piece of pine 34 x 3 $\frac{1}{8}$ x 16 $\frac{1}{2}$ inches
5. 1 piece of Celotex or similar soft fiberboard for pinning floor – 16 $\frac{1}{2}$ x 22 $\frac{1}{2}$ inches.
6. 1 piece of window glass 1/8-inch thick – 17 x 23 $\frac{1}{2}$ inches.

Arranging Collections

Your collection should start from the upper left hand corner of the box as you want to view the specimens. Specimens should be placed in a straight line from top to bottom. If you display several specimens per order or family, you may arrange them in lines from left to right below each order or family name. The following example will illustrate proper arrangement:

Order name	Order name
X	Family name
Order name	CC
YYYYY	CC
Order name	Family name
ZZ	D
ZZ	Family name
Order name	EEE
A	
Order name	
B	

Each letter represents one pinned specimen or alcohol vial.

The collection should be displayed so as to fill the entire box while being as orderly and neat as possible.

There is a definite sequence which more advanced collections (Units 3, 4 and 5) will follow when placing various Orders in your collection. The sequence of Orders should be as follows:

- | | | |
|------------------|------------------|------------------|
| 1. Thysanura | 9. Psocoptera | 17. Mecoptera |
| 2. Collembola | 10. Mallophaga | 18. Neuroptera |
| 3. Ephemeroptera | 11. Anoplura | 19. Trichoptera |
| 4. Odonata | 12. Thysanoptera | 20. Lepidoptera |
| 5. Orthoptera | 13. Hemiptera | 21. Diptera |
| 6. Isoptera | 14. Homoptera | 22. Siphonaptera |
| 7. Dermaptera | 15. Coleoptera | 23. Hymenoptera |
| 8. Plecoptera | 16. Strepsiptera | |

For example, you collected insects from the Orders Coleoptera, Hymenoptera, Odonata, Dermaptera and Hemiptera. In the collection they would appear as follows:

Odonata	Hemiptera
X	XXX
X	Coleoptera
Dermaptera	X
X	X
	Hymenoptera
	X

Always display all insects of the same order together in the box.

Order labels are provided at the end of the project record books.

When arthropods other than insects are displayed, they should be placed after the last Order of insects.

Alcohol Specimen

Alcohol specimens may be placed in the collection like a pinned specimen. The vial should be tightly capped, laid on its side so the label is readable, and the vial secured with insect pins.

Another alternative is to place a label on a pin and put it in the collection where the vial should be placed. The vials may then be labeled and presented in a separate container. Vials are easily presented by placing them upright in a board with holes drilled to fit the vials.

For example, a pin with the label "alcohol vial 1" can be placed in the collection. The vial can then have the number 1 on its lid, side or in the alcohol. The vial can then be located by this number and the insect inspected.

Preserving Soft-Bodied Insects

Although the exoskeleton (outer skeleton) of most adult insects is hard, some species are soft-bodied. In such species, the exoskeleton is thin and pliable.

As discussed earlier, insects of this type are aphids, lice, springtails, silverfish, termites, thrips and isolated forms in other insect orders. Generally, all of the immature insects are soft-bodied. Soft-bodied insects cannot be pinned or pointed because in drying they will shrivel up or even decompose. They must be preserved in another way.

Liquid

The most common way to preserve soft-bodied insects is by placing them in 70% alcohol. A drawback to this method is that the original color may be lost or may change. To at least partially overcome color change, follow one of these procedures:

First you can kill the insects in boiling water and then transfer them to vials of 70% alcohol, or they may be killed in K.A.A. Make this by mixing 1 part kerosene, 2 parts acetic acid and 10 parts 70% alcohol. Acetic acid (a mild, harmless acid) may be obtained at drugstores or photographic stores.

After sitting in K.A.A. for 2 to 5 days (less time for small insects) the insect can be transferred to 70% alcohol vials.

Did you know that:

Less than 3% of all insects are considered harmful.

About 1/3 of the biomass of the Amazon Jungle is ants.

There are 120 references to insects in the Bible.

As of 1989, 4500 postage stamps have been issued representing more than 1800 species of insects.

The smallest insect is a beetle less than 1/100 inch long and the largest is a stick insect that is 10 inches long with a 10 inch wing span.

There are over 1.5 million kinds of insects on earth.

If a pair of houseflies bred on April 1 and all of their offspring lived, by the end of August the earth would be covered 47 feet deep in flies.



Sources of Information

Many sources of help are available for members interested in this project. Here are a few:

Resource People

4-H leader
County Extension Educator
University of Idaho Extension Entomologists

Resource Books

Golden Press Nature Series

- Insects
- Insect Pests
- Butterflies and Moths
- Spiders and Their Kin

Peterson Field Guide – Insects (Borer and White)

- How to know the insects
- How to know immature insects
- How to know spiders
- How to know butterflies
- How to know grasshoppers

Biological Supply Houses

American Biological Supply Co.
288 B-1 East Green St.
Westminister, MD 21157
(352-377-3299)

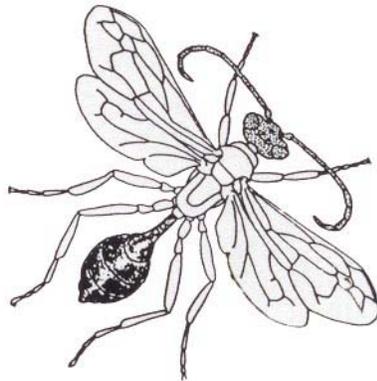
BioQuip Products
17803 LaSalle Ave.
Gardena, California 90248
(310-324-0620), www.bioquip.com

Carolina Biological Supply Company
2700 York Rd.
Burlington, North Carolina 27215
(800-334-5551), www.carolina.com

Wards Natural Science Establishment
P.O. Box 92912
Rochester, New York 14692
(800-962-2660), www.wardsci.com

Nasco West
P.O. Box 3837
Modesto, California 95352-3837
(800-558-9595), www.enasco.com/prod/home

Young Entomologists' Society, Inc.
6907 W. Grand River Ave.
Lansing, Michigan 48906-9131
(517-886-0630)



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