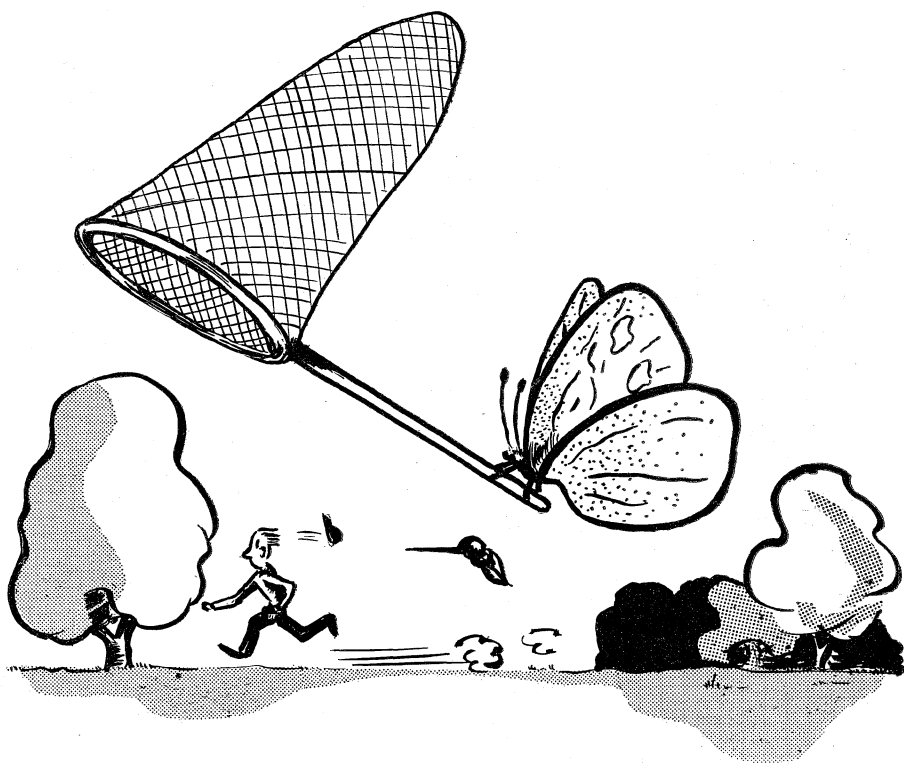


# 4-H CLUB INSECT MANUAL

Circular 333



**EXTENSION SERVICE**

Oklahoma A. & M. College, Stillwater

Shawnee Brown, Director

# 4-H Club Insect Manual

C. F. STILES  
*Extension Entomologist*

## INTRODUCTION

Insects damage or destroy many million dollars worth of crops in Oklahoma each year. The boll weevil alone reduces the cotton crop from 50 to two hundred thousand bales of cotton. The Hessian fly, chinch bug, cutworm and grain weevils damage cereal crops (wheat, corn, barley and rye).

Grain sorghums and hay furnish food for thousands of hungry caterpillars and grasshoppers. Garden and truck crops are also damaged or destroyed by dozens of different insects. Flies, gnats and mosquitoes attack livestock, and, if not controlled, often cause great losses.

Man is attacked by several different kinds of flies and mosquitoes. Some of these pests carry deadly diseases, such as malaria and sleeping sickness. The house fly carries the bacteria on its feet that causes typhoid.

By knowing the habits and life histories of these insect pests, we may fight them more successfully. All boys and girls who enroll in the 4-H Insect Club should learn how to control insect pests.

All insects are not harmful; some are useful. Among the common useful ones are the honey bee, the bumble bee and the lady beetle. Boys and girls who are interested in beekeeping may enroll in the 4-H Bee Club.

## OBJECT

1. Learn to identify insects.
2. Make insect collections.
3. Raise insects from eggs to the adult stage.
4. Learn the principles of insect control.
5. Demonstrate control methods by team demonstrations.
6. Organize communities for insect control.

## FIRST YEAR REQUIREMENTS

General rules for membership in all 4-H Clubs will apply to the 4-H Insect Club.

1. Answer roll call with name of some insect.
2. Collect 35, or more, harmful or useful insects. Mount these insects on pins (standard insect pins preferred). Place name card on pin, giving common name of all. (See Fig. No. 11) Pin in a cigar box or boxes according to instructions given in this manual.
3. Fill out the blank form in manual on the life history, habits and control of one injurious insect collected.
4. Carry on an insect control demonstration of some kind either for yourself or for one of your neighbors.
5. Keep a report of all work done.
6. Submit report on blank furnished by your county agent at the end of the season.
7. Exhibit at your community, county and state fair, 25 of the insects which you have collected, named and pinned neatly in a cigar box prepared according to directions.
8. Boxes should be covered with cellophane to keep out dust and dirt.

## SECOND YEAR REQUIREMENTS

1. Answer club roll call with the name of some useful insect. Use the name of a different insect at each club meeting.
2. Collect 75, or more, useful or harmful insects. Mount on insect pins. Place name card on pin. (See Fig. 11) Pin in the standard 4-H box. See Handicraft Plan No. W-7 for instructions for making the standard 4-H insect display box. Give common names of all.
3. Raise one insect from egg to adult. Keep notes on number of days required to complete each stage of development.
4. Fill in the insect record sheet (page 15) on life history, habits and control of one of the harmful insects collected.
5. Conduct at least two control demonstrations during the year.
6. Keep accurate records of all work done.

7. Turn in a report on blank furnished by your county agent at the end of the season.
8. Fair exhibit shall consist of 40 insect specimens pinned in the standard 4-H insect box. All boxes must be covered with glass to protect the insects and keep out dust.

### **THIRD YEAR REQUIREMENTS**

1. Answer roll call with common or scientific name of some insect. Use name of different insect each time the roll is called.
2. Collect 125, or more, useful or harmful insects. Mount on insect pins. Place name card on pin. (See Fig. No. 11) Pin in standard 4-H insect box. Give scientific names of five common insects.
3. Raise at least three different kinds of insects from egg to adult. Keep a full set of notes on all stages of the insects' development.
4. Conduct three insect control demonstrations. Make notes on success or failure of the demonstration and list gain or loss in dollars and cents, where possible.
5. Keep accurate records of all work done during the year and submit them with your year's report to your county agent.
6. Fair exhibit shall consist of 75 insect specimens mounted on insect pins and exhibited in standard 4-H insect box. All specimens must be labeled according to instructions on page 11. Give the scientific name, in addition to the common name, of five insects.

### **FOURTH YEAR REQUIREMENTS**

The requirements are the same for the third and fourth years with the following exceptions:

1. Collect 150 or more useful or harmful insects and mount them according to instructions given for the third year.
2. The fair exhibit shall consist of 100 insect specimens, of which 10 must be beneficial and 25 harmful. Scientific names of 5 insects must be given.

### **WHY STUDY INSECTS?**

The study of insects is called Entomology. Insects have been present on earth for many million years. There are more than 800,000 different kinds of insects known at the present time. The fast trans-

portation of today makes it possible for insects to be carried from one part of the world to another in a few days. Fifty years ago it took weeks or even months for them to travel the same distance. This rapid method of travel makes it much easier for an insect in any stage to be transported to a new home and become established there.

When this country was first settled, fruits and vegetables ripened with very little insect damage. Today, it is almost impossible to get perfect fruits and vegetables without insect control.

### What Is An Insect?

An insect is a small animal which

1. Has six legs.
2. Has two feelers (antennae).
3. Has three body regions. The head is the part which holds the eyes, mouth parts and antennae or feelers. The thorax is the middle part and the legs and wings are attached to it. The abdomen is the part behind the thorax.
4. Breathes through the small openings in its body wall, called spiracles. The breathing openings, or spiracles, are found in the abdomen and thorax, and are connected to tubes which carry the air to all parts of the body.

### How Insects Grow

Some insects hatch out of the egg into a form which resembles that of the adult. Others hatch out into a form which does not resemble the adult in any way. For example, a maggot hatches from a fly egg. After feeding for several days, the maggot, or larva, goes into a resting stage from which the adult fly emerges. This series of changes is called metamorphosis.

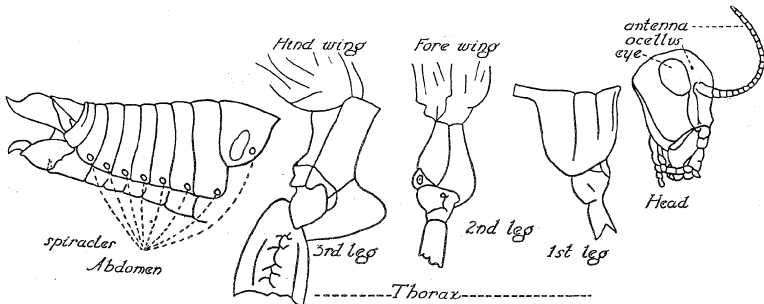


Fig. 1.—Outline of body of grasshopper as seen from the side, dissected to show the three body regions and parts of body referred to in this manual.

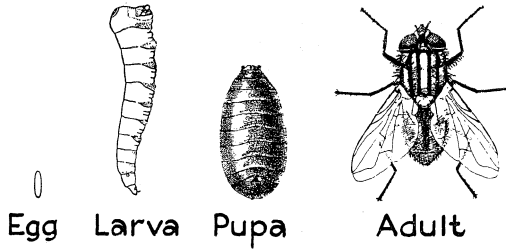


Fig. 2.—Life cycle of the house fly. All house flies pass through these stages in their development. (Complete Metamorphosis.)

### Swallowtail Butterfly

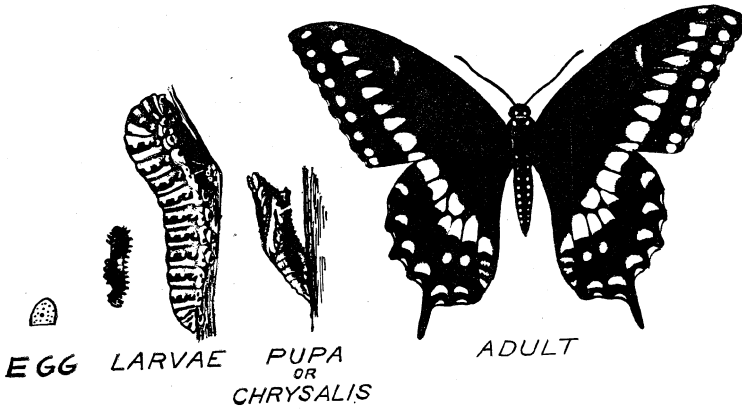


Fig. 3.—Life cycle of butterfly. Young does not resemble the adult.

### Colorado Potato Beetle

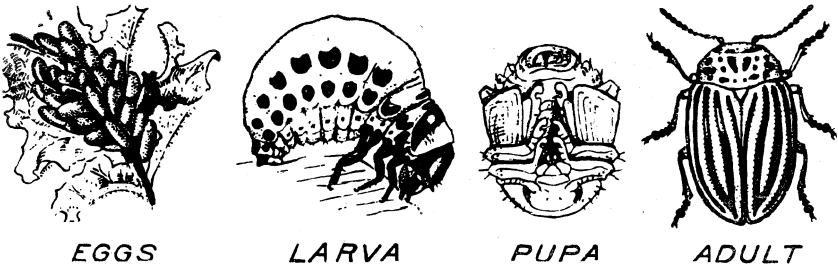


Fig. 4.—Life cycle of the Colorado potato beetle. Young does not resemble the adult.

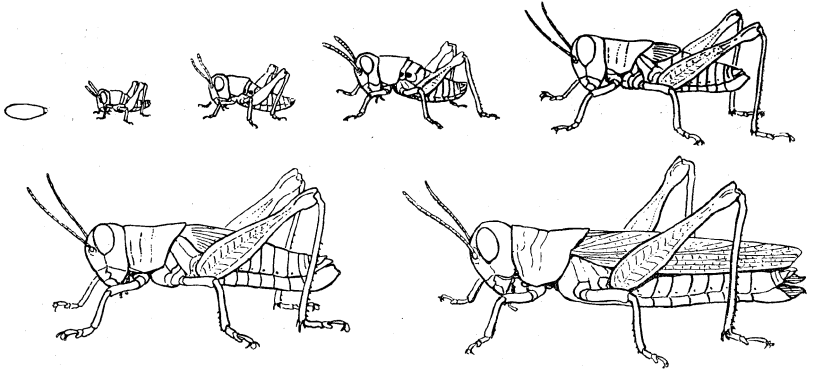


Fig. 5.—Life cycle of the grasshopper. Egg hatches into tiny grasshopper which sheds its skin as it grows. The young grasshopper resembles the adult. (Incomplete Metamorphosis.)

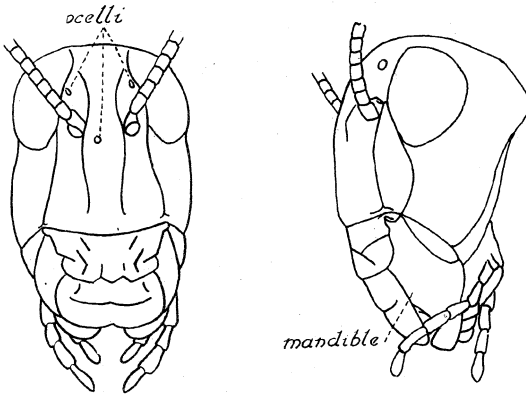


Fig. 6.—Front and side view of grasshopper's head. This insect has the chewing type of mouth parts.

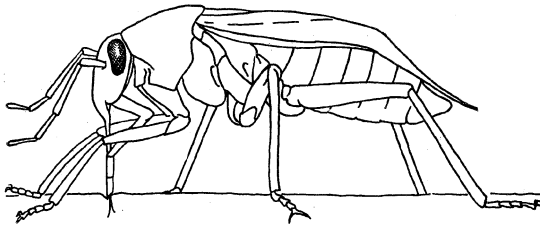


Fig. 7.—Insect with sucking type of mouth parts. One of the true bugs.

Examples of insects having incomplete metamorphosis are the grasshopper, chinch bug and squash bug. Examples of insects having complete metamorphosis are the house fly, butterfly, and potato beetle.

Insects shed their skins from time to time during the growing stage. The new skin forms under the old and when the shedding occurs the new soft skin enlarges to allow the growth of the insect. This shedding is called moulting. (Example: Grasshopper.)

### **Insect Control**

In insect control, insects are classed according to their manner of feeding. There are three groups: Those with biting or chewing mouth parts, those with sucking mouth parts, and those with lapping mouth parts.

The mouth parts of the grasshopper are good examples of chewing mouth parts.

The mouth parts of one of the sucking insects are shown in Fig. 7. A good example of this kind of insect is the squash bug.

### **HOW TO KILL INSECTS FOR STUDY**

The proper method of killing and pinning (mounting) and arranging insects is important. It adds much to the appearance and usefulness of the collection.

Insects may be killed in many ways. One of the best methods of killing them is the use of a bottle or jar containing some type of poisonous gas. Perhaps cyanide is the best, but since this material is so very poisonous to man, it is not recommended for use by novices. For beginners, it is suggested that they use a killing jar or bottle made by moistening a piece of absorbent cotton with either lighter fluid, gasoline, chloroform, or carbon tetrachloride, and placing it in the bottom of a wide-mouth jar. Cut a cardboard circle so that it will fit tightly in the jar. Push this down over the absorbent cotton. Killing jars made in this manner will last approximately one day and must then be recharged. The jar should be closed tightly at all times when not in immediate use. Keep it away from an open flame.

For the more advanced 4-H members to make a cyanide jar, it is suggested that they place one-fourth to one-half inch of sodium or potassium cyanide in the bottom of a jar, then cover this with a syrupy plaster of paris or patching plaster. Allow to dry in the open with the lid off before using. To prevent damage to the insects by moisture and jarring, place strips of toilet tissue or similar material in the jar.



**CAUTION:** When collecting, care is necessary to avoid damaging the insects. Butterflies should not be placed in the jar with other insects.

### Pinning Insects

Insects should be mounted on insect pins which are long, slender and rust proof. If insect pins are not available, needles or slender pins of any kind may be used. Do not use the short common pins unless absolutely necessary as they are too short and your insect specimens will be damaged in handling. In mounting grasshoppers the pin should be passed through the base of the thorax (the part of the body which carries the legs) just to the right of the middle line. This is illustrated in Fig. 8. The back of the insect should be three-eighths of an inch from the head of the pin.

True bugs such as squash bugs and stink bugs are mounted by passing the pin through the right side of the scutellum, the triangular

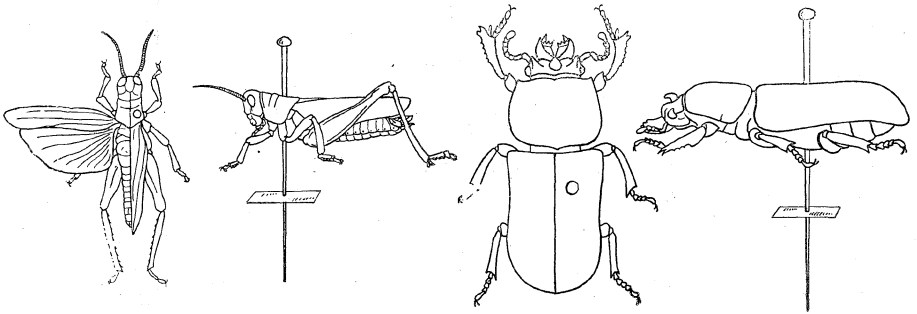


Fig. 8.—Method of pinning grasshoppers (one wing is usually spread) is shown on the left. At the right is the method of pinning beetles. The small circles on the grasshopper and the beetle show where the pin should be inserted.

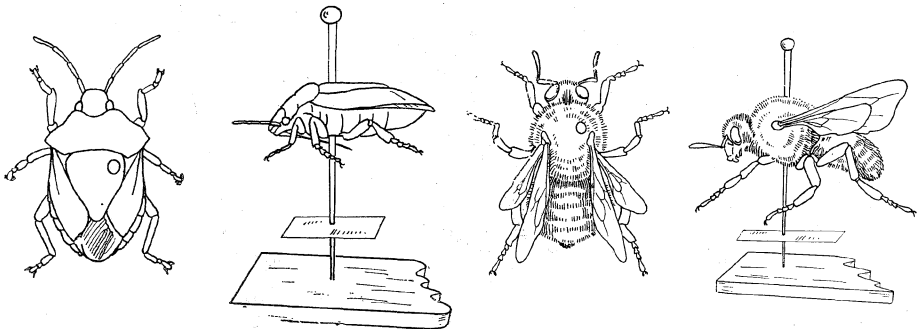


Fig. 9.—Method of pinning true bugs (left); and the correct method of pinning bees, wasps, hornets and other closely related insects (right).

portion of the thorax between the wings slightly to the right of the middle line. This is shown in Fig. 9. In other insects the pin should be placed as shown by the small circles in Fig. 8.

A large number of the insects are grouped under one large division called beetles. Many of these will be found in each insect club member's collection. In mounting beetles the pin is placed through the right wing cover just back of where it is attached to the thorax and a little to the right of the middle line. This is illustrated in Fig. 8.

Bees, wasps and ants will also form a large part of the club member's collection. Many of the useful insects belong to this group. These insects are mounted by placing the pin through the right side of the thorax a little to the front and left of where the wings are attached. (See Fig. 9.)

Extreme care should be taken in mounting butterflies and moths. If the wings are drooped or broken, the specimen will be worthless. A spreading board is necessary in securing good specimens of butterflies, moths, dragon flies and other large winged insects.

**Spreading Board:** The spreading board is made by using two 12-inch strips of some soft wood. Linden, white pine or yellow poplar are satisfactory. These two strips are then nailed to two small boards. A space large enough for the insect's body should be left between the

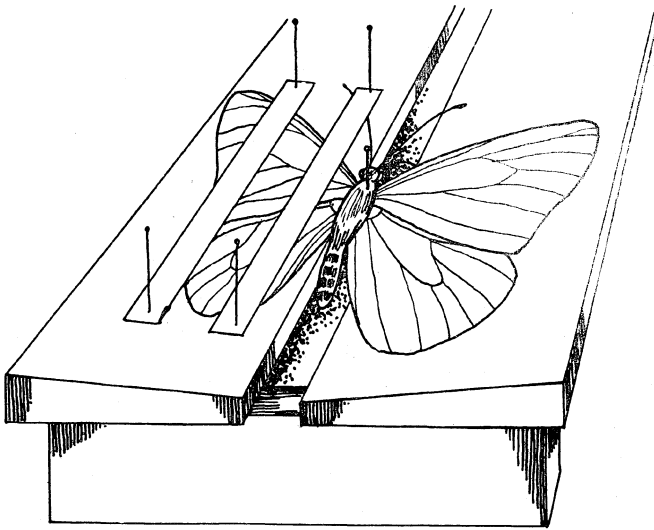


Fig. 10.—Butterfly pinned on spreading board with one wing and antennae properly spread.

strips. A strip of cork or balsam is fastened to the underside to cover the groove between them.

The pins are then passed through the insect and inserted into this soft wood with the body in the groove. (See Fig. 10.)

Then stretch the wings out on the boards and pull them forward. This can be done by inserting a pin near the front of the wings. The wings should be pulled out far enough so that the rear of the front wing will be about at right angles to the body. Then pull the hind wings forward until they are in a natural position. The wings should be held in place with strips of paper which are pinned down tightly at each end.

The specimen should remain on the spreading board for several days so that the wings will stay spread. Care should be taken in placing the strips across the wings in order not to rub the scales from the wings of butterflies and moths.

Fig. 10 shows a butterfly in place drying on a spreading board. Also see Handicraft Plan No. W-13.

### Labels

A small neat label should be attached to the pin holding the insect. The label should be one inch long and one-half inch wide and made from white heavy paper or cardboard. A correct label is shown in Fig. 11. The name of the insect, where it was collected, the date it

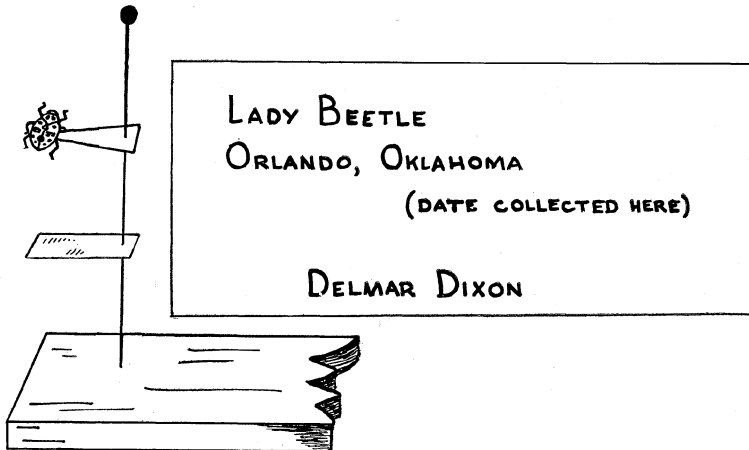


Fig. 11.—Method of mounting small insects (left); and the type of label that should be used (enlargement at right). Your label should be 1 inch long and  $\frac{1}{2}$  inch wide.

was collected and the name of the collector should appear on each label.

### **Collection Box**

A cigar box makes an ideal collection box for first year members. However, before it is ready to be used, a club member must fit a piece of corrugated pasteboard into the bottom of the box. This makes it possible to insert the pins securely. The corrugated pasteboard should be glued to the bottom of the box to prevent spilling of the insects should the box be upset. The pasteboard and the sides of the box should be covered with clean, white paper to give the box a neat finish. The insects should be placed in the box in straight rows. The different orders of insects should be grouped together. For instance, all beetles should be in one group. Two or more moth balls should be fastened in the insect boxes at all times. Unless this is done, small beetles called dermestids will feed upon the insects and soon cause them to fall to pieces. A good method of keeping the moth balls from rolling around in the box is to fasten them to a head of a pin. To do this, heat the pin and then insert it while hot into the moth ball. Then place the pins in the corners of the box with the insects. Your collection box must be kept dry and protected from dust and mice. Pinned insects are easily broken and should be handled carefully. All insects must be placed at a uniform level on the pins.

### **Why the Scientific Name for an Insect**

The scientific name for an insect is necessary to an entomological worker and pest control operator. Oftentimes an insect is known by several different common names. The corn earworm is known in some sections of the country as the tomato fruit worm. In other sections, especially the South, it is known as the cotton bollworm. An insect has only one scientific name. The scientific name of the corn earworm is *Heliothis armigera*. When this name is used, all entomological workers know to which insect we refer.

### **INSECTS FOUND IN OKLAHOMA**

The following are names of insects found in Oklahoma and they may be of some value to the club members in naming their insect specimens. This list is far from complete, but it contains some of the most important ones.

**COTTON:** Boll weevil, cotton leafworm, bollworm, cotton flea-hopper, grasshoppers, and sharp shooters.

**WHEAT:** Hessian fly, wheat strawworm, wheat-head armyworm, false wireworm, grasshopper, and chinch bug.

**CORN:** Chinch bug, cutworm, white grubs, southern corn root-worm, corn bill bug, wireworm, corn earworm, stalk borer, and grasshopper.

**ALFALFA AND CLOVER:** Army and variegated cutworm, clover leaf weevil, green clover worm, alfalfa webworm, pea aphid and grasshopper.

**GARDEN:** Bean leaf beetle, striped cucumber beetle, 12-spotted cucumber beetle, squash bug, potato beetle, blister beetle, tomato horn worm, tomato fruit worm, cabbage butterfly, cabbage looper, harlequin bug, and turnip louse.

**ORCHARD:** Flatheaded apple tree borer, roundheaded apple tree borer, San Jose scale, cankerworm, tent caterpillars, codling moth, apple curculio, plum curculio, peach tree borer, shot-hole borer, green June beetle, grape leafhopper, strawberry leaf roller, and woolly apple aphid.

**STORED GRAIN AND GRAIN PRODUCTS:** Granary weevil, meal worm, cadelle, confused flour beetle, Indian-meal moth, pea weevil, rice weevil, bean weevil and Angoumois grain moth.

**SHADE TREES:** Poplar borers, locust borer, maple borer, elm borer, bagworms, Catalpa sphinx, walnut datana, cankerworms and shot-hole borer.

**LIVESTOCK AND POULTRY:** Cattle grubs, horse bots, biting flies, horse flies, screwworm flies, biting and sucking lice, poultry lice, fleas, ticks and mites. The last are not true insects.

**HOUSEHOLD INSECTS:** House fly, roaches bedbugs, fleas, mosquitoes, ants, clothes moths, carpet beetles (dermestids), cigarette beetles, book lice, and silverfish.

**USEFUL INSECTS:** Honey bee, lady beetles, lacewing fly, ground beetles, tachina flies and ichneumon wasps.

**WOOD EATING INSECTS:** Termites and powder post beetles.

### **INSECT NET**

The insect net is necessary in collecting the rapid flying insects. The net consists of a bag made of any thin, stout material attached to a handle from two to three feet in length. The bag should become slightly smaller at the bottom. The common size is one foot in diameter

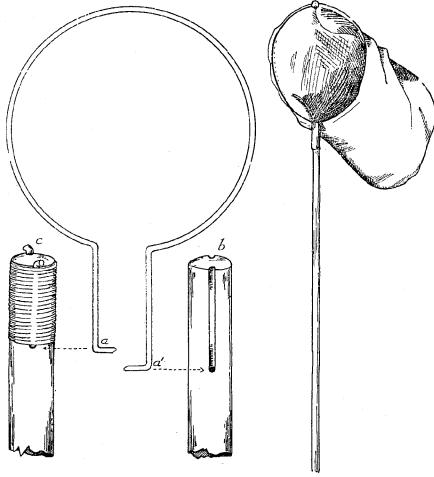


Fig. 12.—At left are parts of an insect net showing homemade ring and upper end of handle. To fasten ring to stick, insert a —a' in groove shown by dotted line, then wrap with fine wire or stout string. At right is a completed insect net.

and two feet deep. The edges should be double hemmed so that they will not wear out. Should the bag be made of light material, it must be sewed to a band of strong muslin at the top. This band should be double and open at each end so that the wire ring can be inserted. This part can be laced up with a string and the ends of the string tied to the handle. This will keep the net from slipping around on the ring. The parts and the completed net are shown in Fig. 12. Also see Handicraft Plan No. W-21.

## INSECT RECORD SHEET

1. Common name of insect \_\_\_\_\_
- II. Description:
1. Size (indicate by mark) \_\_\_\_\_
  2. Color \_\_\_\_\_
  3. Mouth parts:      Chewing \_\_\_\_\_; sucking \_\_\_\_\_; lapping \_\_\_\_\_
  4. Number of wings \_\_\_\_\_
- III. Where does insect live:    Air \_\_\_\_\_; soil \_\_\_\_\_; water \_\_\_\_\_; in host \_\_\_\_\_
- IV. On what does insect feed:

Item	Leaves	Blossoms	Fruits	Branches	Main Stems	Roots
Flowers						
Shrubs						
Orchard Trees						
Other Trees						
Hay Crops						
Grains						
Vegetable Crops						
Other Crops						

Wood \_\_\_\_\_; wood products \_\_\_\_\_; woolens \_\_\_\_\_; furs \_\_\_\_\_

Fabrics \_\_\_\_\_; food materials \_\_\_\_\_; stored products \_\_\_\_\_

Man \_\_\_\_\_; animals \_\_\_\_\_; other insects \_\_\_\_\_

Tiny plants or animals in water \_\_\_\_\_

V. Habits:

1. How does it spend the winter:
  - Egg \_\_\_\_\_; larva \_\_\_\_\_; nymph \_\_\_\_\_; pupa \_\_\_\_\_; adult \_\_\_\_\_
2. Where does it spend the winter? \_\_\_\_\_
3. Kind of life cycle:
  - a. Complete (four stages) \_\_\_\_\_
  - b. Incomplete (less than four) \_\_\_\_\_

VI. Economic importance:

1. Pest \_\_\_\_\_
2. Beneficial \_\_\_\_\_
3. Questionable \_\_\_\_\_

VII. Control for pest:

1. Insecticides \_\_\_\_\_
2. Sanitation \_\_\_\_\_
3. Cultural Practices \_\_\_\_\_

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