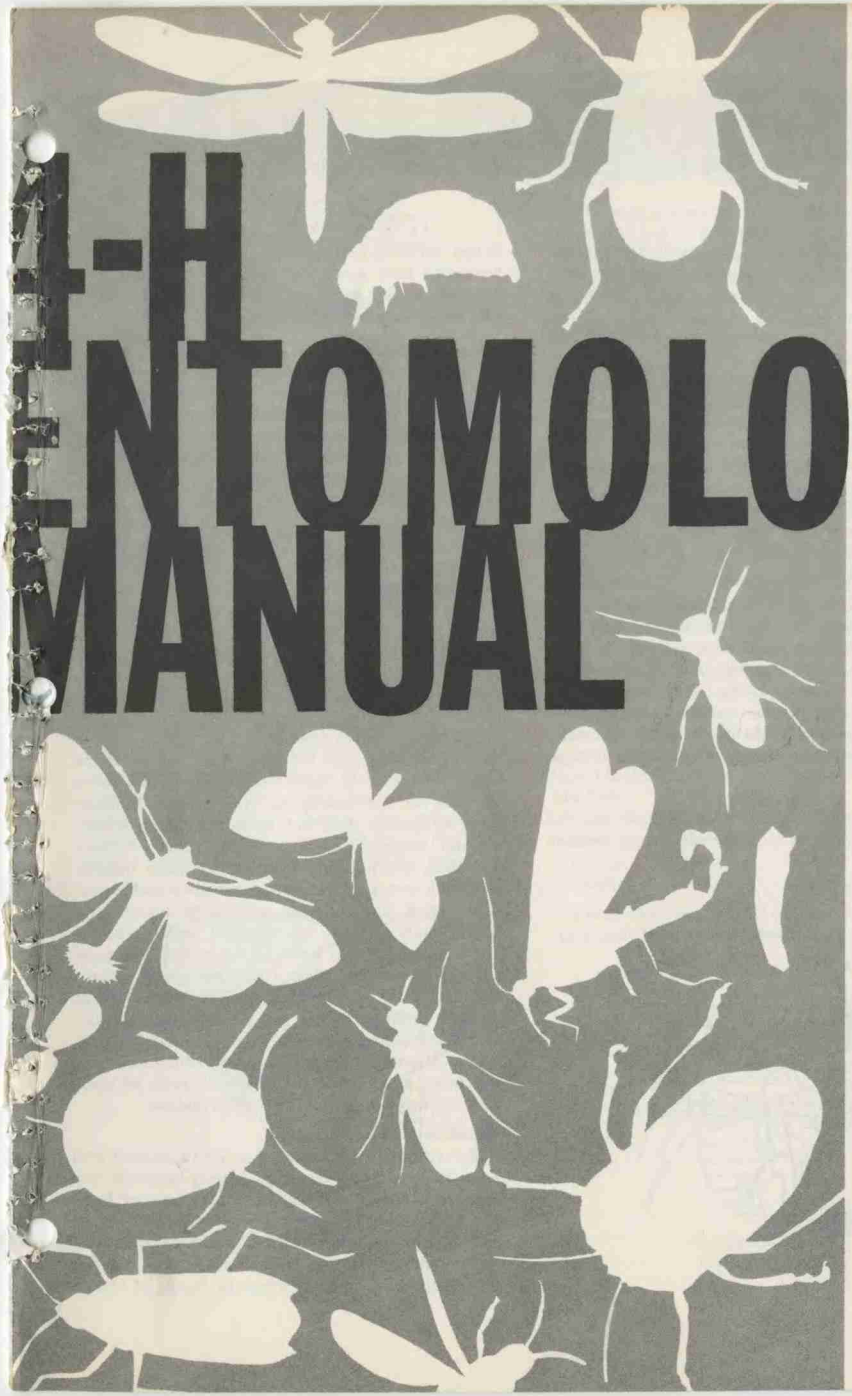
4-H ENTOMOLOGY MANUAL



4-H ENTOMOLOGY MANUAL

Before going any place one must know directions, but first we must know where we are. Once we are "oriented" we can find our way—if we have good directions.

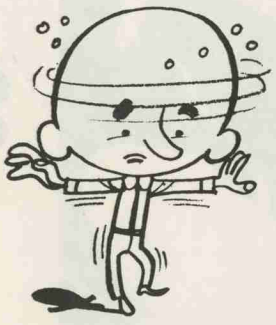
This manual gives you directions, but, first let's see where we are.

Today we classify everything as being either animal, mineral, or vegetable. We won't bother here with minerals, or vegetables—only animals. Dogs, tadpoles, worms, and insects are animals. Let's get oriented by looking at some of these.

We sometimes think of dogs and wolves as being nearly alike. Each has four legs, two ears, two eyes, a nose, a fur coat, and a bushy tail, but they are different in other ways, so we must class them differently.

Even among dogs there are great differences. In fact, some dogs look more like wolves than they do like the tiny toy specimens that fit in your pocket. Still they are dogs. Because of differences, it is necessary to break down the classification of dogs into breeds, such as pointers, setters, and collies. Some people might group them according to use, calling them watch dogs, hunting dogs, pets, etc.

There are many four-footed animals besides dogs and each is put in a certain group because it has different features. Of course, some animals have two feet, some six, some eight, and a few have many, like the thousand-legged worms. Each has its own classification.



"Where Am I?"

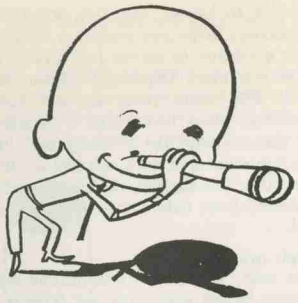
Where Do Insects Fit In?

Four-fifths of all animals are insects and some men spend their lives studying them. These fellows are called entomologists. They study what insects look like, how they live, and how to control them. You, too, can be an entomologist, let us say a part-time entomologist—an amateur—by being able to recognize a house fly, a honey bee, a moth, a butterfly, a grasshopper, a hornworm, a weevil, an ant, a termite, etc. This is insect recognition. You can recognize insects even before they become adults, perhaps, while they are still maggots, caterpillars, nymphs, or larvae. You may be able to tell what they will become by looking at their eggs. Of course, you can find out how long it takes for eggs to hatch, how long nymphs or larvae feed, and on what. This is your study of life history. Control is based on recognition and life history.

We control honey bees to get them to work for us. We build houses for them and put on extra boxes where they store honey. We don't build shelters for the wasps, the lady beetles, bumblebees, or dragon flies, but these and many others are our friends, too. We control tobacco, cotton, livestock, and household insects by using insecticides, fly swatters, or screen windows and doors. If we knew enough about our helpful insects and had enough of them we wouldn't need to worry about many of the harmful ones. For instance, certain wasps feed their young on tobacco hornworms. If we had enough of these wasps, our control problem would be solved. You already know that certain insects do not bother tobacco, cotton, livestock, stored food, or clothing. You are becoming an amateur entomologist. Now let's see how we can use some of this information.

An Oriented Entomologist

An entomologist looks at a small animal and says it is not an insect—a daddy-long-legs for instance—it has no wings and four pair of legs! No self-respecting insect uses more than three pair of legs to get around on. So, the entomologist decides first: has this animal three pair of legs? Then has it two pair of wings or traces of them?



"I'm Getting Oriented"

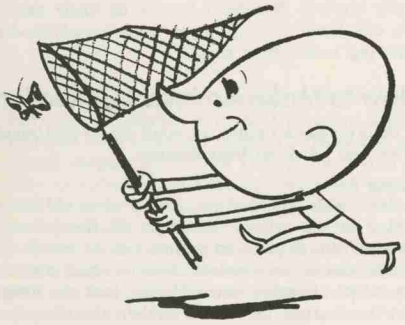
What about an ant? Well, they show traces of wings and at times some have wings, too. Bed bugs? Your fathers and mothers perhaps sang:

The butterfly flies on wings of gold,
The fire-fly on wings of flame,
The bed bug has no wings at all,
But it gets there just the same!

Quite true, the bed bug has no wings—only wing buds, so with its three pair of legs we must classify it as an insect.

There is something else we must consider, too, that is the body. A typical insect's body is composed of three parts: head, thorax, and abdomen. You can see them distinctly in an ant.

Well, to come back to the insect's body, first let us point out that the skeleton of the insect's body is made up of the head, which bears the eyes, antennae (feelers), mouth parts, and brain; the thorax, which carries the tools for travel (legs and wings) and is full of muscles to make them go; the abdomen, which always contains most of the digestive and all of the reproductive system. You can see the parts we have talked about in a typical insect, but most insects are not typical. Because of the lives they live, many identifying structures are changed and may at first confuse you. But you soon learn to recognize these modifications.



"I'm Oriented"

The legs and wings of insects are different, too. That is a sort of foolish thing to say, because you already know that. A grasshopper, for instance, can jump great distances through grass, but a honey bee does not jump. On the other hand, a grasshopper cannot fly leisurely or for very long distances without alighting, but a honey bee can hover in front of a flower, or when loaded with pollen, take off on a non-stop flight in a bee-line for home miles away. It all depends on the kind of life the insect lives.

Groups or Orders of Insects

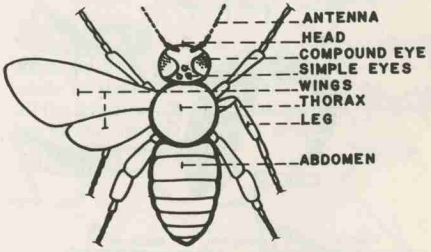
Your first step in classifying or grouping insects is careful examination of them. By studying the shape and type of wings, you can put them into different groups that we call *orders*. That is as far as we expect you to go, but if you want to explore further, you can do it by considering the size and shape of the insect, by examining its legs, if they are beetles, or wings if they are flies.

There are many other things to consider such as coloring, spots, where found and when, etc.

In breaking down into smaller groups, you may use characters like segments of legs, veins in wings, sections and kinds of mouthparts and even hair placement. Your final breakdown would look like this:

Order	e.g.	Hymenoptera
Family	e.g.	Apidae
Genus	e.g.	Apis
Species	e.g.	mellifera

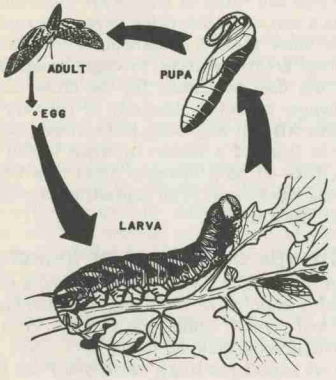
From this you would get the scientific name *Apis mellifera*, our common honey bee.



A Typical Insect

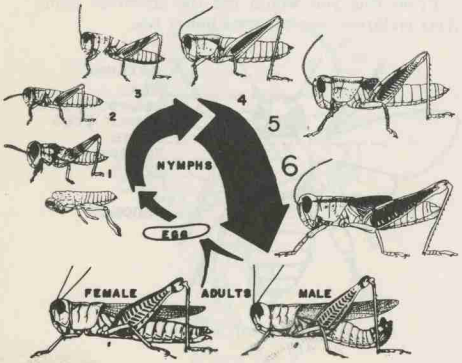
How Insects Grow

Before you learn the orders you must master one more word, a big one—metamorphosis. Simply, it means development or change (the way in which the insect grows up) and metamorphoses (the plural form) are either complete or incomplete.



An example of complete metamorphosis is the tomato hornworm. On plant leaves you can see eggs and larvae (caterpillars). The pupae (so-called change-over or resting stage) are found in the soil near plants. The adult moths are not often seen, since they fly at night.

A grasshopper is an example of incomplete metamorphosis: first the egg, then little wingless hoppers eating their heads off to become bigger hoppers, which they do step by step, molting several times and coming out each time bigger and able to eat more than before. Finally they are full grown hoppers with wings.



What a lot to learn! Yes, but understanding some entomology helps you become a better farmer, a better gardener, or maybe just a more intelligent citizen—a more important person in your community. The insect (they are not just bugs any more) may chew leaves like a tomato hornworm or make honey like a honey bee, or suck blood like a mosquito, or spin silk like a silkworm, or feed on other insects like a ladybird beetle. The way an insect lives determines if it is harmful or helpful.

Most Insects are Beneficial

You see, many of the over one million different insect species in the world are our friends. More than half of them are helpful in some way. We have over 15,000 species in North Carolina, but probably fewer than 300 are pests or cause us any harm. So, by learning about them we can help our friends, the beneficial insects, while at the same time learning how to control the injurious ones.

If it wasn't for our beneficial insects which pollinate our crops, we would be reduced to living on cereals and nuts. No more beef steaks! The direct products of these insects such as honey and beeswax, shellac, and certain dyes annually sell for more than 125 million dollars in the United States alone. Except for warfare between insects—one kind killing and feeding on the other—mankind might not be able to keep this earth to himself for more than 5 or 10 years. Insects are terrifically prolific (they multiply very fast). For instance, starting with one pair of aphids, in 10 generations their offspring would weigh more than the 500 million humans living in China. The offspring of one pair of houseflies in one season would cover the United States 4½ feet deep. Obviously many factors are acting to keep our injurious insects under control. Beneficial insects do their share. We can learn to help them—and ourselves—by knowing more about them.

How to Make An Insect Collection

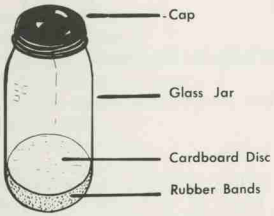
Before you can study an adult insect you must catch and kill it without damage.

Killing Jar

Get a wide mouthed jar, cut up some old inner tubing or use rubber bands to fill the jar one quarter full. A piece of sponge rubber cut to fit the jar can be used instead. Pour in about a quarter cupful of carbon tetrachloride (ask the druggist for "carbon tet"). The rubber absorbs some of the liquid and you can pour off the rest. Fit a piece of cardboard filled with little holes into the jar on top of the rubber to keep it in place. Screw

on a tight fitting cap and your jar is now ready for use.

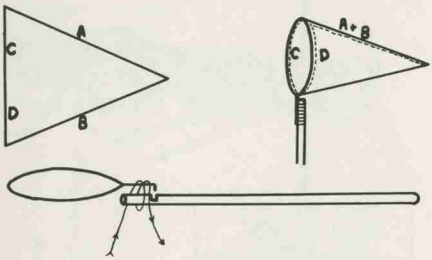
Make a couple of extra jars—you may need them. You can knock an insect into a jar, or pick one up and drop it in. Other insects move so rapidly you have to chase them with a net.



Killing Jar

Insect Net

The insect net is composed of three parts: cloth bag, wire hoop, and handle. The bag is made from a triangular piece of cloth (ABCD). Use a bag at least twice as long as the diameter of the hoop so that when you flip the net over it keeps the insects confined.



Cheese cloth, curtain material or tobacco plant bed cloth is suitable. Sew the triangular piece of material with sides AB together. The bag is now funnel shaped. Either sew the open end onto the wire or make a tunnel through which to run the wire hoop. In some cases you can use a heavier cloth band around the "mouth" of the net.

Use wire long enough to keep the entire opening of the bag rigid and also reach down the handle so it can be securely attached. Some coat hangers may be satisfactory for this, but most are not rigid enough. You can make a handle 2½ to 3 feet long from an old broom or mop. Attach hoop to handle by grooves and wires or clamps.

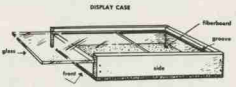
Insect Pins

Pins designed for pinning insects are available and should be used where possible. As a rule, number 2 or 3 pins are most suitable for general collections. Insects, such as mosquitoes, are very small and fragile and must be put on points. These points are triangles cut from heavy paper or thin cardboard. Then the pin is inserted through the wide end and the insect glued to the point.

Some soft bodied insects, such as aphids and the larvae (caterpillars and grubs) of others cannot be pinned. Preserve these in 70% alcohol.

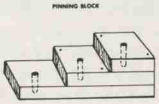
Storage Boxes

A good storage box is necessary, since dead insects are subject to attack by other insects and mice. Cigar boxes are very good for temporary storage. Cut a piece of cardboard or some other soft material which pins will stick into. Place it into the bottom of the cigar box and then cover with a sheet of white paper. The recommended size is a case that will take a glass cover 18 x 24 inches (standard sized glass). Therefore, the case should be approximately 18½ x 24½ x 3 inches. For those desiring to make their own box, either at home or as a shop work project at school, write to Agricultural Engineering Extension, N. C. State College, Raleigh, N. C. and ask for Insect Display Case plan No. 2532.



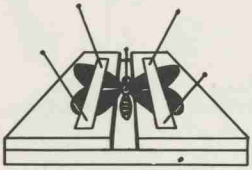
Pinning Block

The appearance of your insect collection can be improved by using a pinning block. This block is made in steps which allows the worker to keep all the insects the same height on the pin and also get all the labels at the same level.



Spreading Board

Some insects, especially moths and butterflies, should have their wings properly spread to reveal their true beauty. Take two boards separated by a space of about ½ inch, place a soft material in the bottom of the ½ inch slot into which to pin. Place the insect body in this "trough", then work wings into position and pin down with strips of paper. The paper strips prevent damage to insect wings by the pins. Pull front wings up until hind margins are at right angles to the body, then pull front margin of each hind wing up to it and pin in place. Under good drying conditions insects can be removed from the spreading board in 4 or 5 days and the wings will remain in place.



Spreading Board

Repellents for Stored Insects

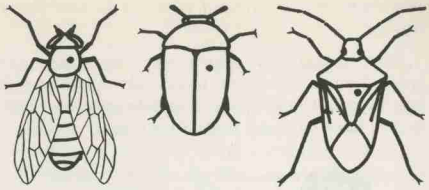
Certain pests attack pinned insects. Even in good storage boxes it is necessary to add an insect repellent such as paradichlorobenzene or naphthalene. These can be easily used in the crystalline form. For display collections use moth balls. Heat the head of a common household pin and insert into a moth ball, this melts the naphthalene and when it rehardens, sticks solidly. Place these moth ball-headed pins neatly into the corners of the insect box.

Relaxing Jar

If insects become hardened before they are pinned, relax them by putting them in a saucer or shallow dish placed on moist sand within a larger closed container. If left too long molds may develop. Avoid having to use a relaxing jar except for very valuable insects.

Pinning Insects

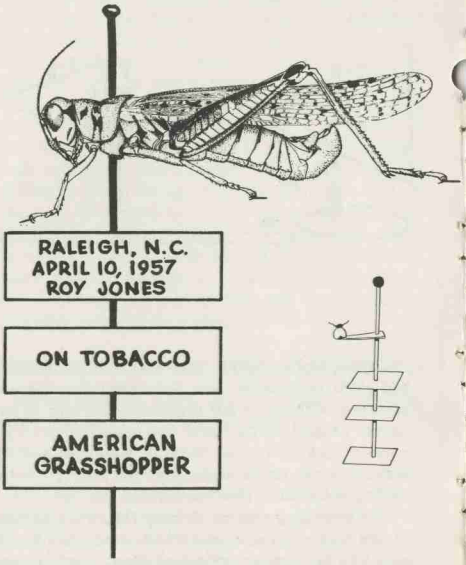
Each group of insects has its own characteristics as to shape and body balance, making it necessary to learn how to pin the various orders of insects. For example, most insects are pinned just to the right of the center line of the thorax. The thorax is heavily muscled because of wings and legs. This makes it the strongest section of the insect and the best place to pin. Beetles are pinned through the right wing cover. Pin insects so that they are horizontal. Pins should extend about ¼ inch above the insect.



Where To Pin Insects

Identification Labels

There is a proper arrangement for putting information on labels on each insect. These labels are arranged one above the other on the pin. For 4-H Entomology collections only the first or top label is required. They carry the following information:



(a) (b)

Labels

(a) Showing information on each label.
(b) Showing proper arrangement on pin.

Orders

There are many orders of insects but here are those most common in N. C.

GRASSHOPPERS, ETC.—ORDER ORTHOPTERA
(Straight Wings)

Order Characteristics

WINGS—Two Pair—
Top Pair—Leathery, Straight and Held Roof-Like When At Rest
Bottom Pair—Membranous and Folded

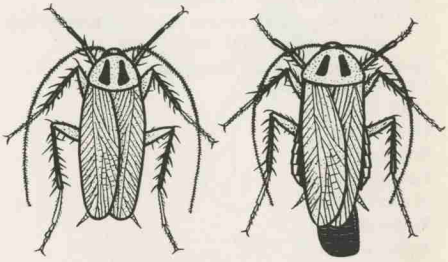
MOUTHPARTS—
Adult—Chewing
Nymph—Chewing

METAMORPHOSIS—Incomplete

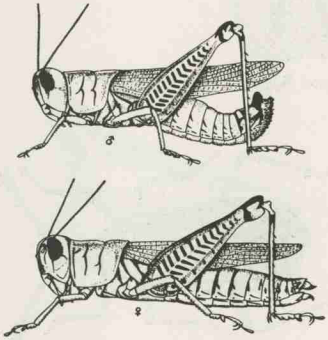
COMMENTS—There are about 250 species in our state. Many of these are very destructive.

Some Other Common Orthopterons

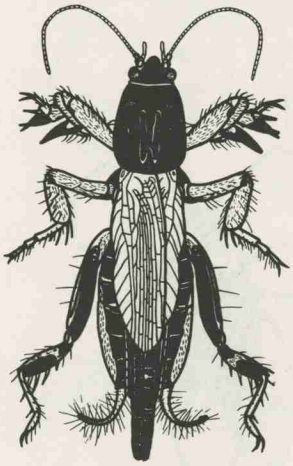
Long-horned grasshoppers
Katydids
Cone-headed grasshoppers
Cave and camel crickets
Field crickets
House crickets
Tree crickets
American cockroach
Oriental cockroach
Brown-banded cockroach
Walking sticks
Praying mantes



German Cockroaches



Grasshoppers



Mole Cricket

TRUE BUGS—ORDER HEMIPTERA
(Half Wings)

Order Characteristics

WINGS—Two Pair—
Top Pair—Half Leathery and Half Membranous
Bottom Pair—All Membranous

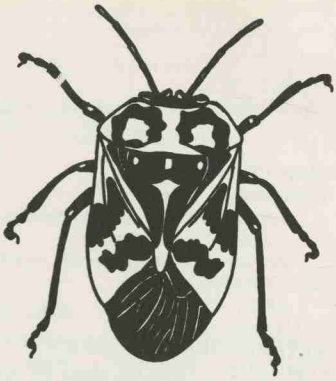
MOUTHPARTS—
Adult—Piercing-Sucking
Nymph—Piercing-Sucking

METAMORPHOSIS—Incomplete

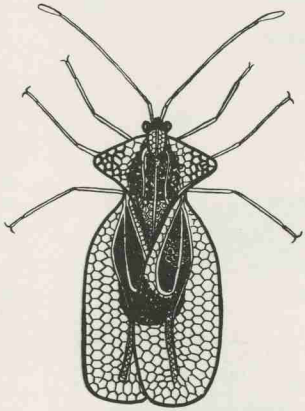
COMMENTS—Of all insects only members of this order may be rightly called bugs.

Some Other Common True Bugs

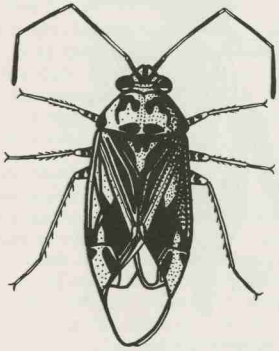
Four-lined plant bug
Stink bug
Chinch bug
Bed bugs
Leaf-footed bugs
Water boatmen
Water striders
Back-swimmers
Flat bugs
Stilt bugs
Box elder bug
Ambush bug
Damsel Bugs
Assassin bugs
Giant water bugs



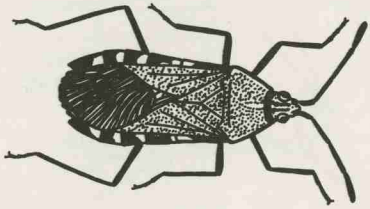
Harlequin Bug



Lace Bug



Tarnished Plant Bug



Squash Bug

APHIDS (Plant Lice) ETC.—ORDER HOMOPTERA

(Like Wings)

Order Characteristics

WINGS—Two Pair—

Top Pair—Same Texture Throughout

Bottom Pair—Membranous

MOUTHPARTS—

Adult—Piercing-Sucking

Nymph—Piercing-Sucking

METAMORPHOSIS—Incomplete

COMMENTS—Many members of this order secrete a sugar-containing solution called "honeydew".

Some Other Common Bugs

Buffalo tree hopper

Spittle bugs

Lantern flies

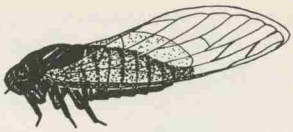
Jumping plant lice

Scale insects

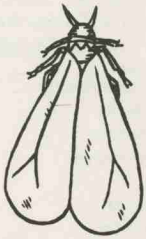
Woolly aphids

Grape phylloxera

Mealy bugs

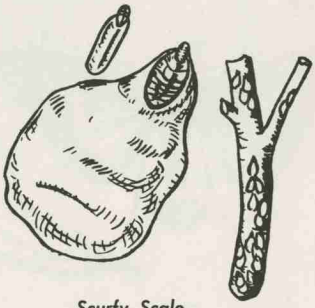


Cicada

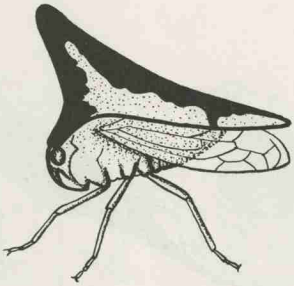


White Fly

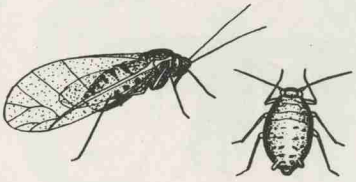
Leaf Hopper



Scurfy Scale



Tree Hopper



Aphids or Plant Lice

MOTHS, BUTTERFLIES AND SKIPPERS—ORDER LEPIDOPTERA

(Scale Wings)

Order Characteristics

WINGS—Two Pair—Both Covered With Scales

MOUTHPARTS—

Adult—Siphoning (Sucking type)

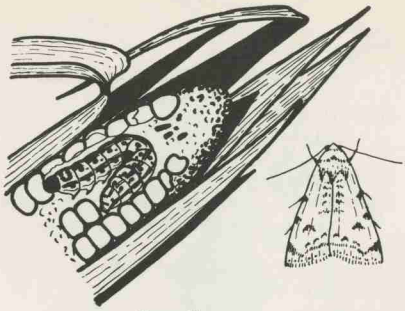
Larva (Caterpillar)—Chewing

METAMORPHOSIS—Complete

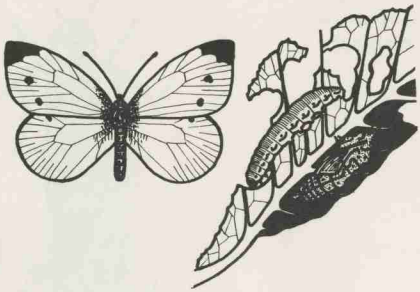
COMMENTS—Color is carried in scales. Scales are easily rubbed off. There are over 1200 different moths and butterflies in North Carolina.

Some Other Common Moths, Butterflies, and Skippers

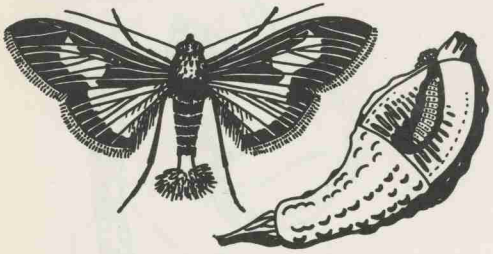
Mourning cloak butterfly
Monarch butterfly
Sulphur butterflies
Silver spotted skipper
Hairstreaks
Viceroy butterfly
Tobacco budworm



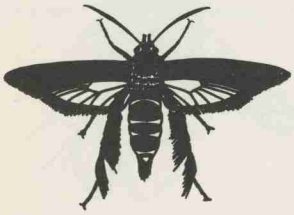
Corn Earworm



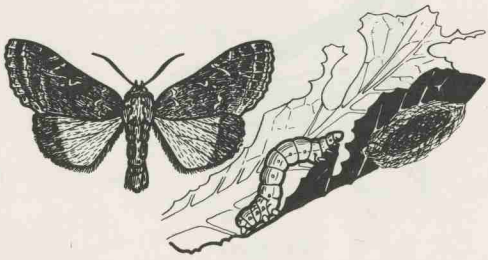
Cabbage Butterfly



Pickleworm



Squash Vine Borer



Cabbage Looper

BEETLES—ORDER COLEOPTERA
(Sheath Wings)

Order Characteristics

WINGS—Two Pair—
Top Pair—Shell-Like
Bottom Pair—Membranous

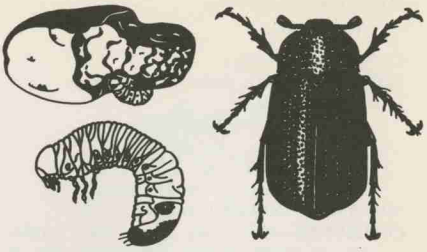
MOUTHPARTS—
Adult—Chewing
Larva (Grub, etc.)—Chewing

METAMORPHOSIS—Complete

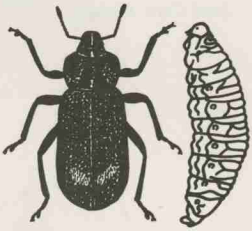
COMMENTS—This is our largest order having over 3000 different species in the state.

Some Other Common Beetles

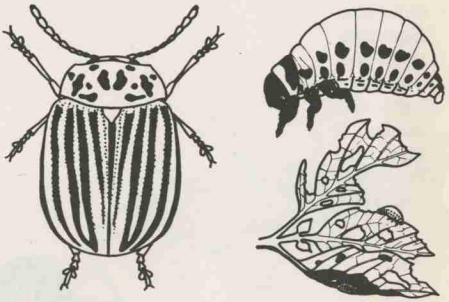
Striped cucumber beetle
Spotted cucumber beetle
White-fringed bettle
Blister beetles
Bark beetles
Ladybird beetles
Carrion beetles
Ground beetles
Long-horned beetles
Rice weevil



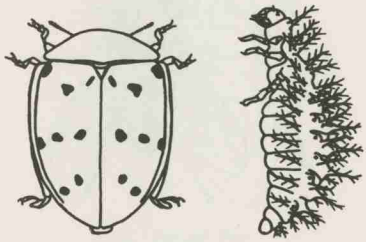
White Grub



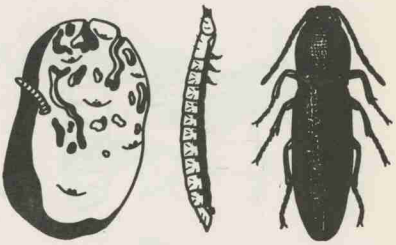
Vegetable Weevil



Colorado Potato Beetle



Mexican Bean Beetle



Wireworm

FLIES—ORDER DIPTERA
(Two Wings)

Order Characteristics

WINGS—One Pair Only—Membranous

MOUTHPARTS—

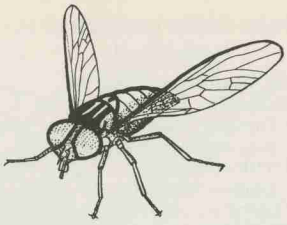
Adult—Piercing-Sucking (Mosquito)
Sponging (Housefly)
Larva (Maggot)—Mouth Hooks

METAMORPHOSIS—Complete

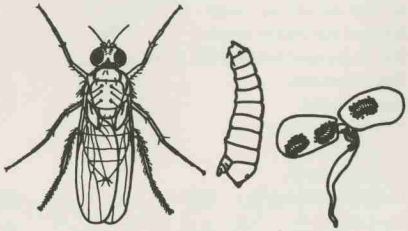
COMMENTS—There are about 2000 species of flies in North Carolina. Characteristics of the order are quite variable.

Some Other Common Flies

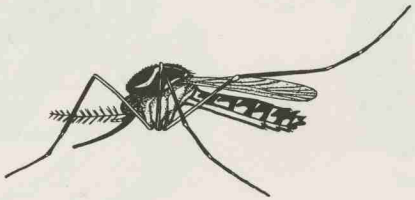
Soldier flies
Crane flies
Fungus gnats
March flies
Midges
Gall gnats
Black flies
Horse flies
Deer flies
Stable flies
Bot flies
Blow flies
Flesh flies
Louse-like flies



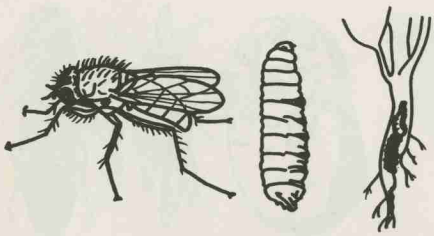
Syrphus Fly



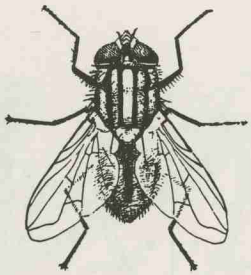
Seed-Corn Maggot



Mosquito



Cabbage Maggot



House Fly

BEES, WASPS, AND ANTS—ORDER HYMENOPTERA

(Membrane Wings)

Order Characteristics

WINGS—Two Pair—Both Membranous

MOUTHPARTS—

Adult—Chewing-Lapping

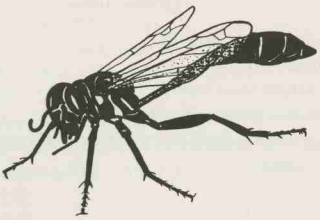
Larva—Mostly Chewing

METAMORPHOSIS—Complete

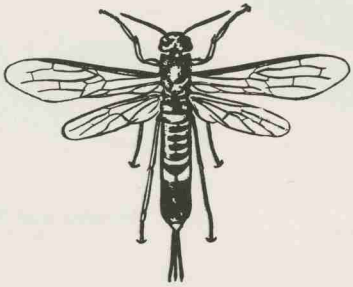
COMMENTS—Many of our most useful insects are in this large order of over 1800 species.

Some Other Common Hymenopterons

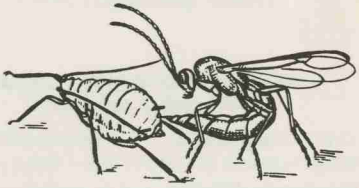
Carpenter ants
Sweet-loving ants
Grease-loving ants
Social wasps
Hornets
Ichneumon flies
Braconid flies
Sawflies
Cynipid wasps
Chalcid flies
Cuckoo wasps
Velvet ants
Bumble bees
Leaf-cutter bees



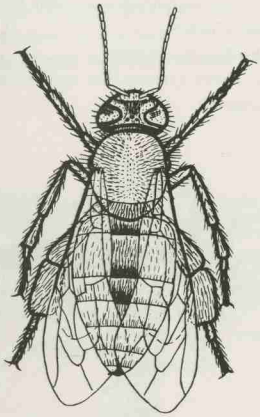
Solitary Wasp



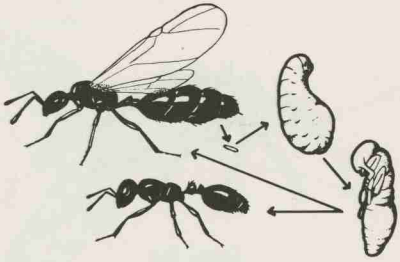
Horntail



Wasp Stinging Aphid



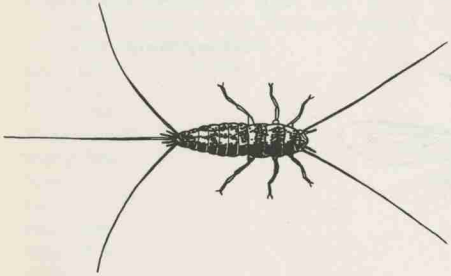
Honey Bee



Ants

BRISTLE TAILS-ORDER THYSANURA
(Bristle Tails)

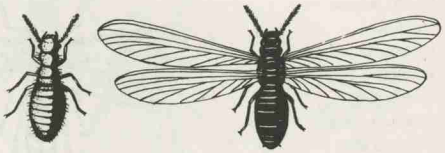
Order Characteristics
Wings—Absent
Mouthparts—Chewing
Metamorphosis—Incomplete
Comments—Body carrot shaped and covered with scales.



Firebrat (Silverfish are Similar)

TERMITES—ORDER ISOPTERA
(Equal Wings)

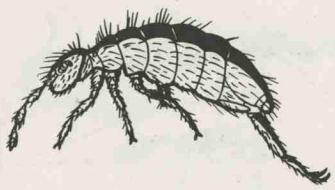
Order Characteristics
Wings—2 pair —approximately equal size in kings and queens at mating time. Absent in workers.
Mouthparts—Chewing
Metamorphosis—Incomplete
Comments—These are social insects in which castes are king, queen, worker and soldier.



Wingless and Winged Termites

SPRINGTAILS, ETC.—ORDER COLLEMBOLA
(Glue Bar)

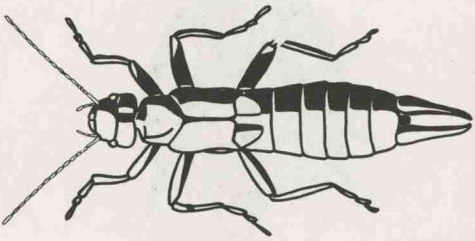
Order Characteristics
Wings—Absent
Mouthparts—Chewing
Metamorphosis—Incomplete
Comments—Frequently associated with cess pools and damp soil. Spring-like process on end of abdomen.



Spring Tail

EARWIGS—ORDER DERMAPTERA
(Skin Wings)

Order Characteristics
Wings—2 pair —
Top pair very short and leathery.
Bottom pair membraneous. Some wingless.
Mouthparts—Chewing
Metamorphosis—Incomplete
Comments—Cerci (forcep-like structures) on tip of abdomen.



Earwig

PSOCIDS—ORDER PSOCOPTERA
(Muscle Wings)

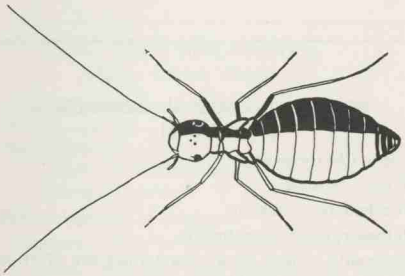
Order Characteristics

Wings—Some wingless, others with 2 pair of membraneous wings, folded roof-like when at rest.

Mouthparts—Chewing

Metamorphosis—Incomplete

Comments—Booklice feed only on fungi, etc.



Book Louse

DRAGON FLIES, ETC.—ORDER ODONATA
(Toothed)

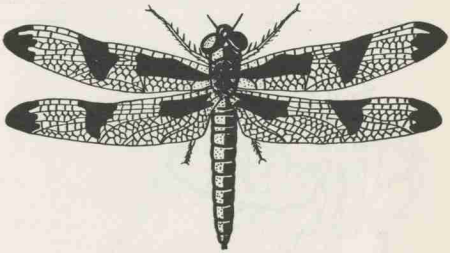
Order Characteristics

Wings—2 pair —both pair long, narrow and net veined. Some with color markings.

Mouthparts—Chewing

Metamorphosis—Incomplete

Comments—The nymphs live in water and many have a scoop-like lower lip.



Dragon Fly

THRIPS—ORDER THYSANOPTERA
(Fringe Wings)

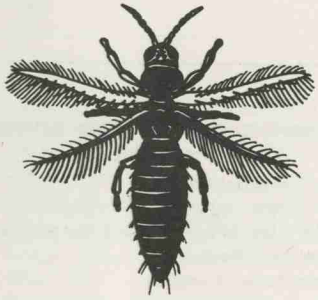
Order Characteristics

Wings—2 pair —long and narrow with fringe of hair on both edges.

Mouthparts—Rasping-Sucking

Metamorphosis—Incomplete

Comments—Small louse-like insects



Thrips

MAYFLIES—ORDER EPHEMEROPTERA
(Lasting but a Day; Wings)

Order Characteristics

Wings—2 pair —net veined. Top pair much larger than bottom or hind pair. Held at a vertical angle to body when at rest.

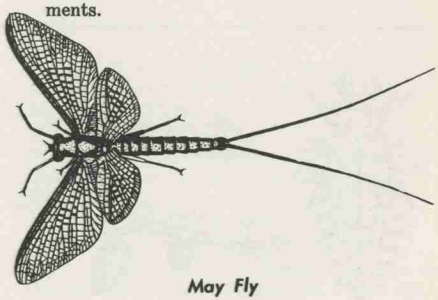
Mouthparts—

Adults—Degenerate

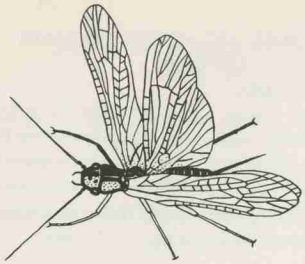
Naiads (Nymphs)—Chewing

Metamorphosis—Incomplete

Comments—The adults live about 24 hours. The young live in water. Adults have long tail filaments.



May Fly



STONEFLIES—ORDER PLECOPTERA
(Plaited Wings)

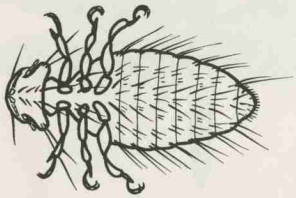
Order Characteristics

Wings—2 pair—top pair narrow and net veined. Bottom pair broad and folded like a fan.

Mouthparts—Chewing

Metamorphosis—Incomplete

Comments—Wings when at rest overlap like pages in a book.



BITING LICE—ORDER MALLOPHAGA
(Wool-eating)

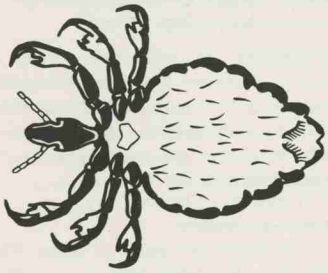
Order Characteristics

Wings—Absent

Mouthparts—Chewing

Metamorphosis—Incomplete

Comments—These broad-headed lice are often referred to as bird lice.



SUCKING LICE—ORDER ANOPLURA
(Unarmed Tail)

Order Characteristics

Wings—Absent

Mouthparts—Piercing-sucking

Metamorphosis—Incomplete

Comments—Narrow-headed lice that prefer mammals such as cows and hogs. Have pincer-like claws

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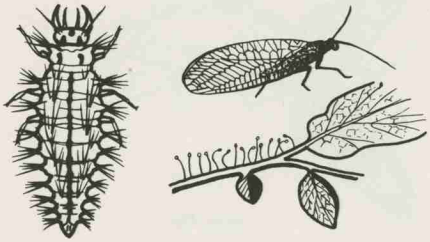


NERVE-WINGED INSECTS—ORDER NEUROPTERA
(Nerve Wings)

Order Characteristics

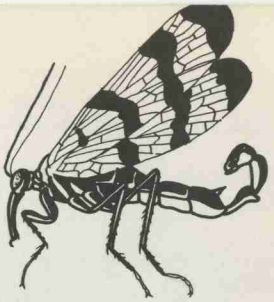
Wings—2 pair—large leaf-like with many fine net-like veins. Wings held roof-like when at rest.

Mouthparts—Chewing

Metamorphosis—Complete

Comments—Many of these insects are predaceous, that is, they feed on other insects.

SCORPION FLIES—ORDER MECOPTERA
(Long Wings)



Order Characteristics

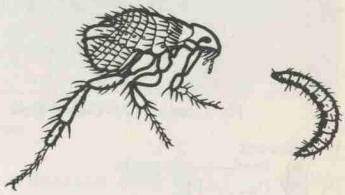
Wings—2 pair—both pair fairly long with many veins.

Mouthparts—Chewing

Metamorphosis—Complete

Comments—The chewing mouthparts are at the end of the long trunk-shaped head.

FLEAS—ORDER SIPHONAPTERA
(Tube; without Wings)



Order Characteristics

Wings—Absent

Mouthparts—

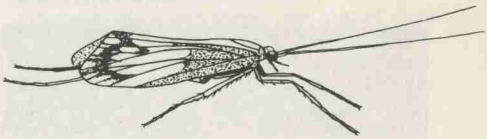
Adult—Piercing-Sucking

Larva—Chewing

Metamorphosis—Complete

Comments—Body laterally compressed (flattened) Hind legs long and suitable for jumping. Many spines on the body.

CADDIS FLIES—ORDER TRICHOPTERA
(Hair Wings)



Order Characteristics

Wings—2 pair—all membraneous, covered with short hairs. Held roof-like when at rest. Bottom wings are broader and shorter than the top pair.

Mouthparts—Chewing

Metamorphosis—Complete

Comments—Larvae live in water. Adults are very numerous near water. Have long slender antennae.

Reference Material

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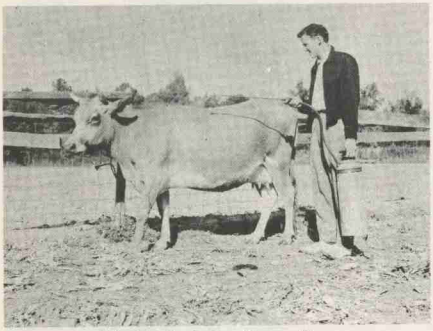
Insect Control

The number of projects that one could do on insect control is unlimited. Just a few are listed.



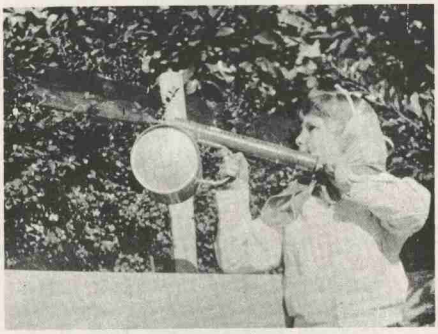
Fly Control On Dairy Cow

No Cabbage Loopers Yet!

1. **Livestock**
   - (a) Beef—Cattle grub
   - (b) Dairy—Fly
   - (c) Sheep—Sheep tick
   - (d) Hogs—Hog louse
   - (e) Dogs—Flea
   - (f) Poultry—Poultry lice
   - (g) Cats—Flea

3. **Fruits and Vegetables**
   - (a) Apples—Codling moth
   - (b) Peaches—Peach tree borer
   - (c) Strawberries—Strawberry weevil
   - (d) Beans—Mexican bean beetle
   - (e) Potatoes—Wireworm
   - (f) Cabbage—Cabbage looper

Good Boll Weevil Control



Controlling Scale Insects

2. **Field Crops**
   - (a) Tobacco—Plant bed insects
   - (b) Cotton—Boll weevil
   - (c) Corn—Billbug
   - (d) Milo—Corn earworm
   - (e) Small Grains—Aphid or greenbug
   - (f) Pasture Pests—fall armyworm

4. **Ornamental Flowers, Shrubs & Trees**
   - (a) Evergreens—bagworm
   - (b) Asters—Tarnished plant bug
   - (c) Euonymous—Euonymous scale
   - (d) African Violets—Aphid

5. Household and Health
   (a) Clothing—clothes moths
   (b) Pantry Pests—Confused flour beetle
   (c) Disease Carriers—housefly
   (d) Annoyance Pests—mosquito
6. Structural Pests
   (a) Termite
   (b) Powder Post Beetle
7. Stored Grain Pests
   (a) Rice Weevil
   (b) Bean Weevil
8. Other
   (a) Beekeeping
   (b) Biological control

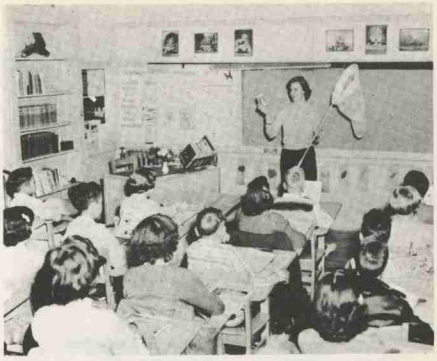
Plan Your Project

Any control undertaken, must be planned so you can determine if treatment was worthwhile. Therefore, it is always necessary to leave a row of plants or an animal untreated so that you can check to see what would happen if no treatment were carried out. Usually, the best way to determine differences is to count the number of insects or note the extent of damage in the treated as compared with the untreated.

In conducting entomological work, do not overlook the evaluation of cultural practices, of insect barriers such as screens, of sanitation practices, etc. for there are many ways to control insects other than by chemicals alone.

Where to Get Help

1. Local Leaders
2. County or Home Agents
3. State College Specialists



Learning By Teaching

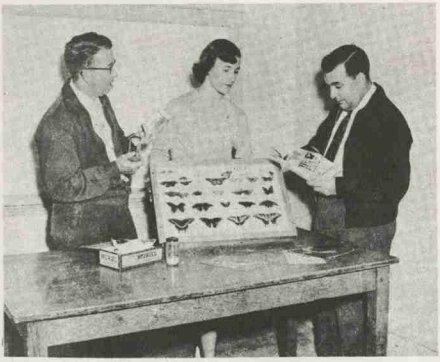
4. County Health Units
5. Libraries

Records

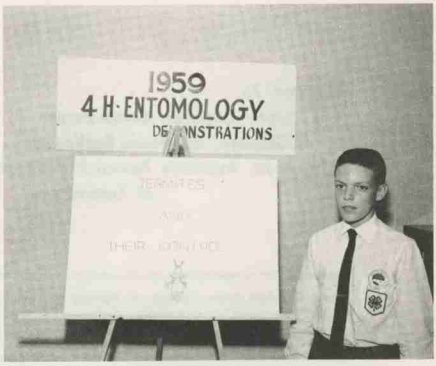
There are thousands doing the 4-H Entomology Project work in North Carolina. Do a good job of your record book. It is the only evidence we have to judge you. The more projects you complete the stronger your record will be. Collection and study is only one phase, each additional control project will count, this includes beekeeping.

DEMONSTRATIONS

Demonstrations supplement the project work in Entomology and Beekeeping. Everything contributes to your record such as talks and demonstrations before groups, preparation of insect displays, etc.



Planning Projects



Share Your Knowledge By Demonstrating

Conversational Insects

I long to interview the little insects
And get the drift of what they're driving at:
To chat with Wasps and Crickets
In bushes, trees, and thickets
And understand the language of the Gnat.
I crave to get an earful from a Locust —
To say, 'I understand you' to a Flea;
To say, 'Quite so' to Chinch Bugs
And 'That's correct' to Inch Bugs
And 'Go ahead. I get you' to a Bee.
I want to have a Weevil say, 'I'll see you,
Come up and get a statement sharp at two:'
To have flies say, 'Now listen'!
And 'Get me right on this'n'—
And hear them all deny the interview.
To talk of this and that to Caterpillars;
To hear the gassings of the Brown-tail moth;
To hear Hookworms and Jiggers
Explain the facts and figures —

I'd like to hear two Beetles plight their troth;
I'd like to comprehend the talk of Skeeters;
To reason with them and to understand.
I'd rather have them bore me
Than have them come and gore me—
I'd like to call their conversation grand.
I'd like to grasp the chatter of the Roaches
And understand them as they sit and think!
'Twould be, I feel, informing
And mentally quite warming
To sit and gossip with them in the sink.
I'd love to hear a Cabbage Worm broadcasting
A message on the busy radio;
No matter what he'd say, sir,
He'd not be anyway, sir,
More deadly than some speakers that I know.

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North Carolina State College of Agriculture and Engineering of the University of North Carolina and the U. S. Department of Agriculture, Cooperating. N. C. Agricultural Extension Service D. S. Weaver, Director. State College Station, Raleigh. Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914.

OCTOBER, 1961 (Rep.) CLUB SERIES NO. 100