4-H CLUB ENTOMOLOGY LEADERS' MANUAL

Agriculture Handbook No. 106

FEDERAL EXTENSION SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

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A Note to Leaders

This guide has been written for you as a leader of 4–H Club members who are carrying on entomology activities. It was prepared at the request of extension workers and local leaders like yourself all over the country. We hope it will prove helpful and stimulating to you and your 4–H members.

Currently, more than 32,000 boys and girls are enrolled in 4–H Club entomology projects. Many times that number carry out approved entomology practices as a part of other activities. In fact, our entomologists say that there is scarcely any agricultural or home economics field in which insects do not play a part.

The broad objective of this program is to help develop in all 4–H Club boys and girls a greater appreciation of the importance of insects to mankind.

That is a big order—but we believe it can be accomplished with your inspiration and guidance. Your local extension agents, State specialists, and others stand ready to help you. They have other bulletins designed to suit the particular needs of your area. They will also help you and your 4–H Club members plan interesting, helpful programs adapted to your local situation.

The committee of State and Federal extension workers who wrote this manual had one primary goal in mind—helping you to help your 4–H Club members to "make the best better."

May your efforts be crowned with rich success.

C. M. FERGUSON,

Administrator, Federal Extension Service,
United States Department of Agriculture.

Objectives

The purpose of this program is to help the 4–H Club boys and girls achieve the following:

1. Develop leadership and help achieve the broad 4–H objectives of character and effective citizenship.
2. Learn about insect life and the relation of insects to the health, wealth, and happiness of man.
3. Learn to recognize the major insect pests and beneficial insects common to the area where the club member lives.
4. Understand the fundamentals of insect control by carrying on some control practice.
5. Learn about insecticides: the kinds, their specific uses, and safety practices to follow.
6. Support community projects and activities relating to insect control.

Contents

Prepared by a committee composed of M. P. Jones, extension entomologist, and George Foster, formerly associate leader, 4–H and YMW Programs, Federal Extension Service, United States Department of Agriculture, Washington, D. C.; Glen E. Lehker extension entomologist, Purdue University, Lafayette, Ind.; Patricia Ann Kelley, assistant State 4–H Club leader, Pennsylvania State University, University Park, Pa.; and J. O. Rowell, extension entomologist, Virginia Polytechnic Institute, Blacksburg, Va., chairman.

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Opportunities for the Leader

Local leaders have done an excellent job of encouraging 4–H Club members to learn about insects. Club members are informed of the fascination associated with the study of this important group in the animal kingdom. The great variety of insects and the different kinds of life habits they possess afford endless opportunities for exploration into the insect world.

Collecting, preserving, mounting, and assembling insects in collection boxes appeal to children and adults. They will be amazed to know that there are possibly a million kinds of insects which live under a wide range of conditions as to hot and cold, wet and dry, light and dark. Club members will be surprised when you can explain how some insects, like grasshoppers and caterpillars, chew their food with specially developed mouth parts and how some, like mosquitoes and stinkbugs, suck their food through needlelike mouth parts. By careful observation you can locate and point out how insects feed upon other insects. This will afford opportunity to relate how some insects are beneficial and how others are harmful. You can teach them how to control the harmful ones and how to protect the useful ones. You will arouse curiosity when you point out the rows of spots along each side of the body of a large caterpillar or grasshopper, for example. These indicate the openings to the breathing pores. Breathing pores (spiracles) serve the same purpose as your nose.

Figure 1. Leader helps member with insect collection.

Leaders can assist club members in making and displaying collections and mounts of insects showing life stages and damage. They can assist the members also in working up material for use in giving demonstrations. Entomology club members should be encouraged to select an insect and make a study of it. Then at a later

club meeting, some of the members might be called on to give a report of all the interesting things they learned about the insect.

Junior leaders and older club members will delight in helping those younger than themselves to carry out the various activities relating to insects. Leaders can point out to older members some of the many ways that they can assist junior members.

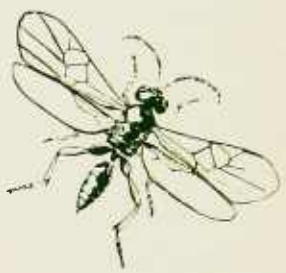
Leaders and members will be pleased to find a rich source of material right in their own homes. Nearly all newspapers, farm and other magazines carry stories about insects. Encyclopedias and science books include references to insects. Bulletins that will give information about most of the important insects common to your area may be obtained from your county extension office. Even color slides and motion pictures are sometimes available.

Local leaders need not be disturbed because they cannot name all the insects collected by their club members. Not even a trained entomologist can do this. Members should continue to collect and learn about many kinds of insects, even though they cannot identify all of them. County agents and State, Federal, and commercial entomologists will find time to assist your club members to identify the insects they collect.

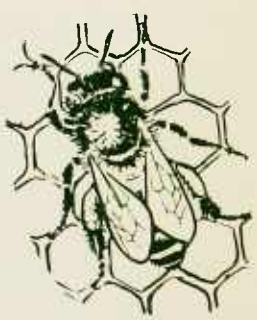
If club leaders can learn to recognize, learn the life habits and the control for a dozen or more common insects, and impart this information to club members, they have made an important contribution. Everyone concerned should realize that an entomology project is not intended primarily to develop entomologists. Rather, the project is part of a plan to help develop a citizenry with a greater appreciation for insects and their importance to man.

Suggested Kit of References for 4-H Club Entomology Leaders

1. State project outlines and record books.
2. Supplemental State entomology publications, such as insect-control bulletins, 4-H procedure guides, and project leaders' manuals, if any.
3. USDA Agriculture Handbook No. 65, 4-H Club Insect Manual (formerly Miscellaneous Publication No. 318).
4. See selected references in this manual for other reference material.



Braconid Wasp



Honeybee

Cabbage Butterfly

Why Study Insects?

There are more kinds of insects in the world than all other animals combined. At present, approximately three-fourths of a million different species of insects are known. Many more species are yet to be found and described. Insects are man's greatest competitor for domination of the earth.

All crops and livestock and the products derived from them are subject to attack by insects. The annual loss from insects amounts to several billion dollars for the United States alone. It is difficult to comprehend the extent of damage and monetary loss occasioned by insects on a world-wide scale. These great losses do not take into account the discomfort and the suffering brought upon the people by direct attacks of insects and by the cost of medical care and labor lost resulting from the diseases spread by them. Insects also kill our animals, destroy our crops and stored products, crumble our buildings, and actually feed on man himself. Certain of the diseases carried only by insects have caused more human deaths than all the wars since the dawn of history. Certain insects transmit important diseases of plants and livestock.

It would be unfair, however, to think of all insects as pests. Most kinds are of no importance. Many are useful to man. Ladybeetles, ground beetles, wasps, and certain flies are beneficial, because they destroy harmful insects. Honeybees, for example, provide us with honey and beeswax. They and other insects are important natural agents of cross-pollination of many kinds of food plants. Some insects are valuable soil builders because they hasten decay of woody plants, improve soil aeration, and improve tilth. The world of insects provides food for birds, fishes, and other forms of animal life. Secretions of several species of insects are used in the manufacture of medical drugs, dyes, and paints. In some countries insects are used as food for man.

The economic aspect should not be the only basis for our study of insects. They are of great significance because of their aesthetic value to man. Many people go through life knowing little about the wonders and beauties of nature and finding little enjoyment in them. We realize a fuller life as we learn more about our natural surroundings. We could profit much by turning to nature's fascinating creatures, the insects, which had their origin many millions of years ago. This is in evidence by insects found in fossils and amber.

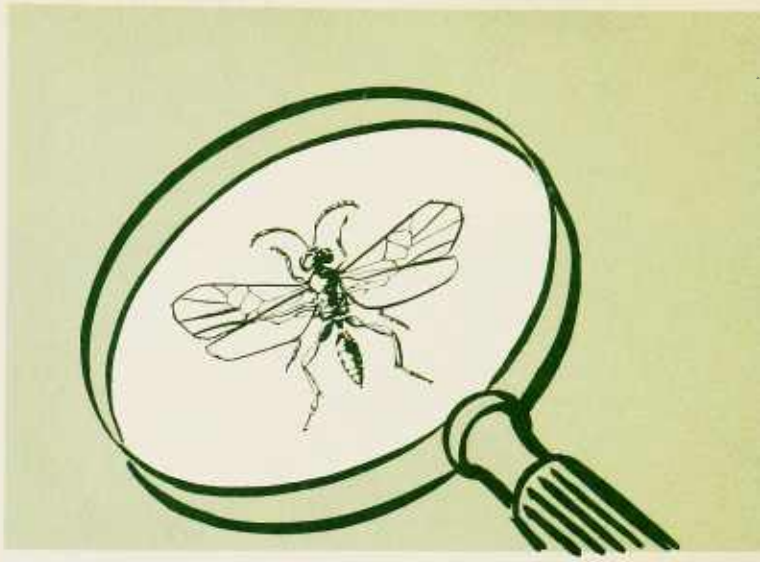
The marvel of insects has been the origin of legends and superstitions down through the ages. Idols were built in the likeness of the sacred (scarab) beetle which was worshiped by the ancient Egyptians. In Biblical times crop destruction by the hordes of locusts (grasshoppers) resulted in famines. Insects, such as the death-watch beetle, have been given common names in keeping with the superstition they created in the minds of the people.

Insects have been the inspiration for designers of airplanes, locomotives, automobiles, children's toys, costume jewelry, wallpaper, draperies, lamp shades, and innumerable other items. Learning about the insects and being able to share this knowledge with others is a source of satisfaction and enjoyment.

What Is an Insect?

All objects upon this earth of ours can be divided into living and nonliving things, such as trees and cows on the one hand and rocks and water on the other. Living things are either plants or animals, and we call these two great groups kingdoms. Insects belong to the animal kingdom.

Everyone knows there are many kinds of animals. We need but close our eyes to think of everything from fishing worms to elephants. As a leader of an entomology club, you yourself will want to know just where insects fit into this teeming mass of animal life. Animals, like many other things, are classified simply by dividing them first into large groups having similar characteristics, and then by subdividing each group into smaller and smaller groups until there are no longer any differences in structure upon which further divisions can be made.



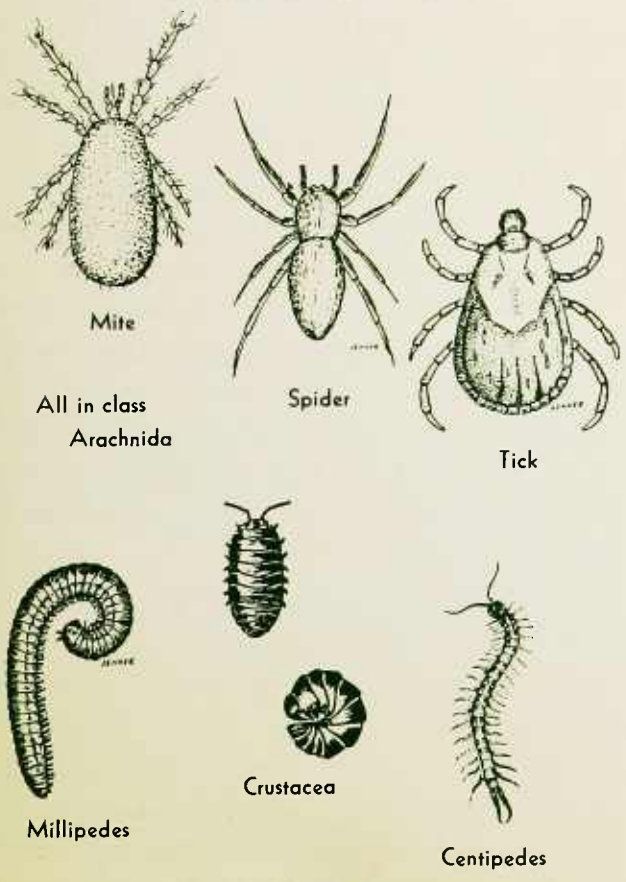
Insects are members of the largest group (arthropods) in the animal kingdom. This group contains not only insects, but also spiders, mites, ticks, scorpions, daddy-long-legs, centipedes, millipedes, sowbugs, crabs, crayfish, and lobsters. All these animals are grouped together because they have outside skeletons, segmental bodies, and jointed appendages. Grasshoppers and crayfish are somewhat alike in structure.

To further divide the large group (arthropods), the next step is to separate the insects from their many relatives. The arthropods are divided into many classes. The insects belong to one of these classes. Insects differ from all other arthropods by having 3 body regions (head, thorax, and abdomen), 3 pairs of legs, and usually 2 pairs of wings in the adult stage.

On this page are some of the animals that may be mistaken for insects. They belong to other classes and are insects' closest relatives. The mites, spiders, and ticks all have 2 body regions and 4 pairs of legs. Centipedes have 1 pair of legs on each body segment; the millipedes have 2 pairs on each body segment; whereas the crustacea have a total of from 5 to 7 pairs.

Most people refer to insects by a common name. The common name may apply to an insect species like the housefly, or to a group of insects, such as grasshoppers, for example. Even though common names are very important, they vary widely from one locality to another. For these reasons, scientific names are necessary, especially for entomologists.

Some Relatives of Insects



Guideposts for 4-H Club Leader

A Tribute to the Local Leader

You plant and more gardens flourish
Than ever your hands can tend;
You call, and more socks are mended
Than your needles could ever mend.
You lead, and there follows after
A power that you cannot know;
For the ones you teach shall climb out of reach,
When the seeds you are planting grow.

Your Place in the 4–H Club Entomology Program

You are a 4–H Club local volunteer leader. There are few undertakings more challenging. Whether your members are taking entomology along with other projects or specializing in this area alone, the horizons are unlimited. As is true with all phases of 4–H Club work, this program is under the general direction of your county extension agents. Therefore, the functioning of your local 4–H Club program should be in keeping with the general policies and procedures guiding the county extension program.

As the leader, you are the key person in your local 4–H Club. The success or failure of your entomology program depends a lot on your interest and initiative, but the whole load should not rest on your shoulders. Your job is to help your club members plan and carry out a program based on their needs, interests, and abilities. That is a big job, of course. The best leaders, however, are those who recognize their strengths and weaknesses—and do something about them. This manual properly used can help you to become a better entomology leader.

More Leaders May Be Needed, Too

When we properly "team up" young, inquiring minds and the exciting, varied field of entomology, the growth potential is practically limitless. So, we see the need for more leaders and assistant leaders.

Where can we get additional leaders for our entomology program?

a. *Look about your area* for other adults who might serve as leaders. Local beekeepers, teachers, insecticide dealers, and garden supply dealers are "naturals." Actually any interested parent or other adult who is willing to take special leadership training and give some time can be helpful.

b. *Older 4–H entomology members or former entomology members* may serve as junior leaders for younger 4–H'ers.

c. *College students in entomology or biology* may be interested and willing to help during the summer months.

Successful expansion of your entomology program consists of seeing opportunities for helping our young people and providing leadership to show the way.

Helps Available

No 4–H Club leader need go his way alone. There are many sources of help in connection with your entomology program. Your local extension agents can provide you with literature, training aids, and other assistance as needed. They have all the resources of your State land-

grant college and the United States Department of Agriculture at their disposal. In addition many friends of 4–H in commercial concerns and other organizations can provide help in your entomology work through your extension agents. Trained entomologists are frequently located in the community. These include entomologists in local colleges, at branch experiment stations, with pest-control operators, and the field representatives of insecticide companies.

Magazines, newspapers, radio, and television are sources of information.

Your greatest asset is your own ingenuity. You are not expected to know it all. Help is available if you seek it.

How To Organize To Get the Job Done

The 4–H Club entomology program can be adapted to many types of club organization. You will want to consider the pattern being followed in your county and State. The problems apparent in your community may call for special attention. The following suggestions are to give you a picture of different ways of doing the job. You and the extension agents may want to consider these in your planning:

a. *The community 4–H Club* is one in which members enroll in a variety of projects. This necessitates giving project instruction along a number of lines during the year. Therefore, the time devoted to one project in regular meetings may be limited.

Figure 2. Entomology project members and their leader.

However, many such clubs have special leaders for the different projects. For example, a leader working with the members enrolled in entomology may hold special training meetings. Often members of other clubs nearby with a special interest in entomology are involved on a community, district, or even a county basis.

b. *Entomology project 4–H Clubs* are organized much the same as the community club except that all members are enrolled in the entomology project.

c. *Countywide project groups.*—Members expressing interest in entomology, for example, come together in a central area in the county. Regular meetings are held with programs built around entomology. The number of meetings held during the year varies from place to place and from monthly to quarterly. This approach may be used to supplement either of the local club approaches discussed earlier.

There are other ways of organizing your entomology program for greater effectiveness. Some examples include:

d. *Programs designed for different age groups* enable you to gear the program and teaching methods to the special interests of each group. (See p. 8 for suggestions).

e. *Relating entomology to other 4–H Club projects and activities.*—The entomology project is designed to fit in with and supplement other projects and activities. The construction of insect collecting equipment and display boxes can be used toward the requirements of handicraft or other projects. 4–H members enrolled in the garden project need to know how to identify the common garden insects and how to control them.

Members who have projects in dairying and livestock know the importance of controlling flies, lice, cattle grubs, and other insects that attack farm animals. Many insects also need to be controlled

in connection with the production of forage and grain crops to feed these animals.

The insects we find in and around our homes are of particular importance. Many, such as termites, attack the foundations of our homes. Others chew holes in our clothing, carpets, and furniture. Insects get into our stored food and make it worthless. The housefly and the mosquito not only disturb our rest and relaxation, but carry organisms which cause diseases of human beings.

Flowers, lawns, and ornamental plants are attacked by many insects and related pests. Members enrolled in the home grounds projects also need to know how to control these pests by sanitation, removing breeding areas, or by the use of insecticides.

There are many other projects which entomology can round out and help.

The Youth You Lead

The first objective of our entomology program is to help boys and girls develop leadership, character, and effective citizenship. This increases the importance of the entomology program. It improves people as well as their environment.

Like other good 4–H leaders, you no doubt want to understand boys and girls better. Why do they behave as they do, and why is one so different in behavior from another? Boys and girls themselves do not usually understand the physical and mental changes going on within them. Even as adults, we seldom know why we "tick" the way we do. Gradually, however, scientists and parents are learning more and more about the similarities and differences in behavior of children of the same age. If you acquire this kind of understanding, it will help you adjust your entomology activities to the needs of young people, as they work to become happy, successful adults.

Research suggests some general principles that help us understand youth better. Each person moves through common stages of growing up. He goes through the same growth sequences as other persons—but not always at the same age. Each one tackles the growing-up jobs at his own time in his own way. Therefore, we should remember that a knowledge of these general sequences is simply background information, to be adapted to fit the many individual differences in the boys and girls with whom we work. Otherwise we may tend to make all club members fit a preconceived idea of what all 10-year-olds or 15-year-olds are said to be like.

How Can We Apply Some of These Facts?

a. *Working with 10- to 13-Year-Olds.*

With this age group you have the problem of setting a pace that will enable members to do efficient work without strain.

Since the interest span of younger members is brief, try to guide them to select short-term projects. Some examples:

- Undertake the control of one kind of insect:
  - Control grubs on one cow.
  - Dust poultry for lice.
  - Store family blankets properly to prevent clothes-moth damage.
- Spray shrubs around home for control of pests.
- Collect and mount 10 insects.

You can plan many club activities in which all members may take part. Some examples:

- Make simple equipment for use in entomology project—collecting net, collecting box (cigar box), insect killing jar.
- Take field trip to observe and collect insects.
- Ask each member to give a simple method demonstration on some phase of entomology.
- Take a tour to members' homes to view each other's projects.
- Assist with community fly-control program or other insect-control programs.

Figure 3. Public demonstration (Virginia).

Remembering that these youngsters are still in the "play stage," encourage them to make a game out of learning. Members may—

Answer rollcall by naming an insect.

See who can collect the most insects in a given period of time.

Have an identification contest of a few common insects.

Have a contest on answering elementary questions about insects.

b. *Working With Teen-Agers*

In dealing with older 4–H members, remember their new independence of thought and their desire to express themselves. Ask them to help with the planning of an entomology program that will meet their needs and desires.

Recognize their improved abilities and energies by encouraging them to undertake more difficult projects. Some examples:

Conduct a life history study of at least one insect: Housefly, ladybeetle, cabbage butterfly, or a pantry pest.

Collect and mount a specified number of insects of economic importance.

Conduct surveys:

Time of first appearance of some important insect.

Determine extent of damage by an insect pest.

Carry out approved entomology practice in connection with at least one other 4–H project or activity.

Encourage their growing creative ability by suggesting that members:

Arrange their insect collections in an appealing manner in relation to color and balance.

Take part in group projects, such as organizing and conducting fly, mosquito, and rodent control as an overall community health program.

Exhibit products of the entomology project—collections, mounts of life history, control projects—at local fairs, at 4–H events, and in local store and bank windows.

Encourage club members to develop good judgment.

Entomology provides an opportunity to exercise wise choices. They might:

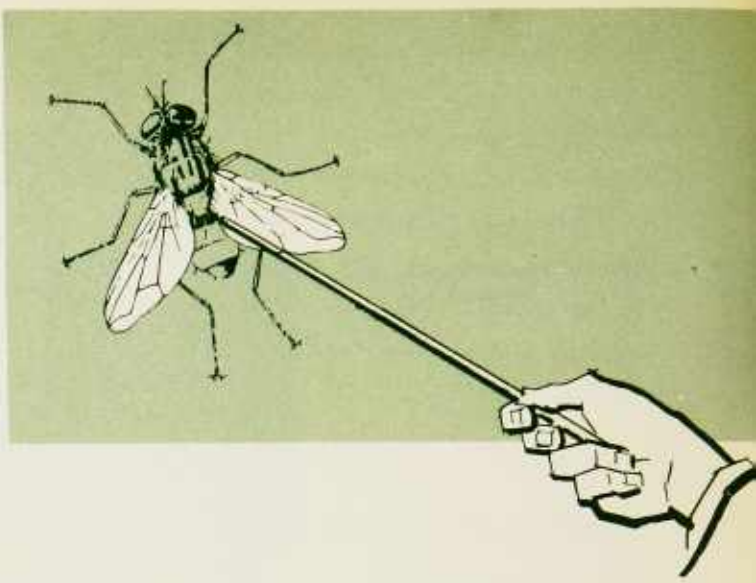
Determine the population of designated insects by actual count or "sweeping" to tell when to apply insecticides.

Conduct a public demonstration on entomology.

Apply an insecticide and adjust sprayers.

Employ safety aspects in storing, handling, and using insecticides.

Teaching Methods and Aids



"If the student doesn't learn, the teacher doesn't teach." The progress that 4–H members make in the entomology project depends largely on the teaching methods you employ. Many methods are used in connection with the 4–H entomology project. Descriptions of some of the most commonly used methods and teaching aids follow.

Demonstrations

A demonstration is simply showing and telling how to do something. Have you ever shown anyone how to milk a cow, how to set out a plant, how to start an automobile? If you have, then you have given a demonstration. A demonstration is showing by doing. Why demonstrate? Demonstration develops the ability to impart knowledge to others. It helps the club member to develop poise, initiative, and originality. Demonstration is also the best known technique for sharing with others what we have learned.

a. *Individual demonstrations* should be a part of every club meeting. Each club member should have an opportunity to show and tell how to do some phase of the subject being studied.

b. *Team demonstrations* should be used to handle the subjects that are too difficult for an individual to handle. Clubs should select their best individual and team demonstrations and have these repeated later at achievement banquets, county fairs, parents' night programs, meetings of civic clubs, and other such occasions.

In selecting the subject for the demonstration, cover only one main theme or idea. Select subjects that apply to entomology problems in your community or county. Examples of themes that might be used are: Roach control, ant control, or garden insect control. The opportunity for individual demonstrations is virtually unlimited. The following is an example which may offer suggestions for other individual demonstrations:

EXAMPLE:

Subject:	**CONTROL CLOTHES MOTHS IN WOOLEN CLOTHES**
Equipment:	**Woolen suit on hanger, clothesbrush, plastic clothesbag, insect-tight storage box or drawer, PDB crystals, mothballs, old newspaper, EQ-53.**
Introduction:	**Clothes moths present in most areas.** **Damage can be severe.** **Loss in money, time, etc.** **Clean and protected clothes not likely to be damaged.**
Methods and materials to be used:	**How to control clothes moths—sunning, brushing, tight storage, mothballs, PDB crystals, EQ-53, or 5-percent DDT oil spray.** **Show how to use these.**
Summary:	**Clothes moths do not like clean woolens, sunlight, or chemicals. Therefore, keep woolens clean, treat with EQ-53 or other materials and store in insect-tight containers.**

For information on team demonstrations, see pages 61 to 63, Agriculture Handbook No. 65, 4–H Club Insect Manual.

Discussions

Club discussions are a means of crystallizing thought on a subject. There are several types of discussion which might be used, depending upon the size of the group, opportunity for advance preparation, and other factors. One of the most popular is the agree-disagree questions which relate directly to some of the problems in your community. Put them on the board or on sep-

arate sheets of paper. Your list may include such statements or questions, for example, as:

a. *Entomology* has a bearing on most 4–H Club projects.
b. *Entomology* is the study of insects, spiders, and centipedes.
c. *Do our entomology problems* have an effect on our city neighbors and if so, how?
d. *Are there insect problems* with livestock in this community?
e. *Is the health of our people* affected by insects?
f. *Are there beneficial insects?* If so, list them, and tell why.
g. *Many others.*

Games

Games add much spice to the entomology project, and those used in other activities can often be adapted for this use.

Contests

Contests are games, and the following may serve as a sample: (The correct answers are given to guide leaders.)

CONTEST QUIZ—MAKE AS MANY MARKS (X) AS NECESSARY TO ANSWER QUESTION

a. *Cricket:* If you were a Jiminy cricket singing at Grand Ole Opry, you would sing with: your mouth ( ); your sides ( ); rubbing spurs on legs on wing edge (X).

b. *Chigger:* If you were a chigger (redbug) on your 4–H Club agent, you would make him swell up by: sticking your beak in him (X); kicking him ( ); stinging him ( ).

c. *Wood tick:* A tick lays its eggs on: an animal ( ); ground (X); bush ( ).

d. *Spider:* Large garden spiders found in cottonfields: eat each other ( ); eat cotton bolls ( ); eat insects (X).

e. *Mud dauber:* I am a "Mud Dobber"; I use my house to: store honey ( ); store spiders (X); to hide in when it rains ( ); rear young (X).

f. *Ant:* If a man can lift 2 times his own weight, an "ant" can lift 10 times (X); 20 times ( ); 100 times ( ); 200 times ( ) his weight.

g. *Flea:* I am a flea. When I hatched from an egg I was: on Fido ( ); in the dirt under the house (X).

h. *Termite:* The termite that does all the damage has eyes like: an eagle ( ); an ant ( ); a fly ( ); no eyes (X).

i. *Dragonfly:* Eats mosquitos (X); doctors snakes ( ); eats tadpoles ( ).

j. *Mosquito:* I am a mosquito. I want to give you spring fever and chills. When I bite you, I stand on my head (X); lie down ( ); sit down ( ).

k. *June bug:* A "June bug" (May beetle) spends: 3 months ( ); 6 months ( ); 1 year (X); 3 years (X); 6 years ( ) in the ground as a "grub worm."

l. *Tadpole:* I am a tadpole. I turn into: a fish ( ); a snake ( ); mud puppy ( ); frog (X).

m. *Snake:* If you met a snake in the woods, he might: sting you with his tail ( ); grab his tail and roll away ( ); run and hide (X); bite you (X).

n. *Honeybee:* I am a honeybee. To collect a pound of honey, I would have to travel a distance equal to: ½ time (X); 1½ times ( ); 3 times ( ); 6 times ( ) around the world.

Playlets

Playlets may be used to make the entomology project interesting. Your State project book may include some representative playlets. Two such playlets are available from the extension entomologist, Federal Extension Service, United States Department of Agriculture, Washington 25, D. C. They are listed among the selected references in this manual.

Tours and Field Trips

Visit 4–H Club projects where successful insect-control measures have been followed. It would also be well to visit some projects where no control methods have been used to see the contrast between poor and good practices.

A field trip may be taken alone or with others who are not necessarily club members. However, if it is to count as a field or observing trip, the club member should go primarily to study some phase of entomology.

Collecting trips may be made to gardens, orchards, fields, ponds, streams, or nearby parks.

Visit areas where there are large infestations of destructive insects. Have the members count

Figure 4. Members discussing rearing jars and display cases.

numbers of insects per square foot, on each branch, or have them estimate the damage or the potential damage.

Organize contests in the field between members, teams, or clubs. Have the teams collect a number of items, such as one aquatic insect, one gall, one sample of bark beetle damage, one termite, one ant, one fly. The team that collects all the items first and labels them correctly wins.

Try to have club members prepare a report of the field trip as soon as possible after the trip is made or before the next meeting.

Visit the local library and have club members look at insect books. There are a great number of books on insects. Some libraries have 200 or more.

Collections

Collections are a valuable part of the project. They help acquaint members with the names of insects and provide excellent exhibit material. Collections usually consist of the adult forms of insects. However, the larval forms may be included after being properly preserved in 70 percent alcohol and sealed in a vial. Adult forms are usually mounted on regular insect pins. Common straight pins are not recommended, but they may suffice temporarily for beginners. Cigar boxes are suitable for beginners, but older club members will prefer larger display boxes with glass tops. A collection box with outside dimensions of 24 by 18 inches and 3 inches deep is often used. Your State project book may have other suggestions about kinds of boxes and also about the number and kinds of insects to collect.

Exhibits

Exhibits give members an opportunity to show their accomplishments and to keep the public informed about their work. The exhibits may be displayed at fairs, in store windows, at school, in community houses, and in other places.

Models, collections, photographs, and samples of insect-damaged plants and similar items are all excellent aids for successful exhibits.

Life History Studies

For this part of the entomology project or activity, select one or several insects common in the community. Observe the changes in the form, structure, and habits of the insects as they pass through their various life stages. Younger members will be fascinated by watching a moth emerge from a cocoon. Older 4–H members, with more experience and training in entomology, might be interested in watching insects lay eggs, watching the eggs hatch into tiny larvae or nymphs, then noting the changes in color and form as the insect grows to the adult stage. Notes can be made on all observations including the number of days spent in the various stages, kind of food, if any, taken in each stage, number of

eggs laid by the adult, and where the winter is spent.

It will be desirable to select insects that can be caged for study and that have short life cycles, so that the work can be completed during one season. Examples of insects to use are houseflies, blowflies, cabbage butterflies, Mexican bean beetles (where they occur), squash bugs (Northern States), and Harlequin bugs (Southern States). Your county extension agent can suggest other insects that have short life cycles and are suitable for use in life history studies.

Insect Control Studies

This phase of the 4–H Club entomology project has to do with individual or group activities on the farm, in the home, and in the community. Studies can be conducted on hundreds of different insect projects. Among excellent examples are: Spraying or dusting cattle for lice or tick control; treating poultry for lice control; spraying or dusting a particular field or garden crop for insect control; construction of a flytrap; spraying a barn, garbage rack, or poultry house for fly control; construction of insect-tight storage boxes for prevention of clothes moth damage to woolen blankets or furs; fumigation to control stored-grain insects; and many more.

Control studies consist also of complete insect-control programs carried out seasonally as a part of other 4–H Club projects, such as vegetable gardening, baby beef production, home beautification, and poultry production.

Surveys

Surveys may serve several functions. The simplest way is for members to examine some plant to see how many kinds of insects are feeding on it, then make a record of what they find. Surveys may be made in the spring of the year to determine when a given insect pest first appears on a crop.

Surveys may be conducted by making sample counts of the insect on a given number of plants or a specified number of feet in a row crop. The "sweeping method" of surveying is usually made on crops such as alfalfa and peas. The number of insects, such as plant lice or plant bugs, caught in a collecting net during the sweeping is used for timing the application of the insecticide. The method used for making the survey will differ from one area to another, depending on the kind of insect involved and the crop. State project outlines should be consulted for definite instructions on making a survey in your area.

Films and Slides

Movie films on entomology are distributed by your State extension service and by several commercial organizations. County extension workers can help you obtain appropriate films and slides.

Figure 5. Collections, mounted specimens of damage, and killing jars.

Subject-Matter Suggestions for 4-H Club Meetings

The following outlines for club meetings are merely suggestions of a possible method of presenting the entomology project to your club. Your meeting to organize your club will be in advance of the meetings outlined below. These suggestions do not include the business or recreational phases of the meetings. They are in no way intended to conflict with or replace procedures recommended in your State or county. They are supplementary only.

1st Meeting

1. Open the meeting with a discussion of the topic, Why Study Insects? (See p. 4 of this manual.)
2. Relate this to the entomology project.
3. Pass out appropriate project materials to club members.
4. Discuss the requirements of the project with the members.
5. Have a brief discussion on how entomology fits in with other projects.
6. Instruct members to assemble the materials needed to make an insect killing jar. Have them bring these materials to the next meeting. (See Agr. Handb. 65, p. 8.) If possible, have each member bring a live insect to the next meeting.

2d Meeting

1. Open the meeting with a demonstration on how to make an insect killing jar. Explain why carbon tetrachloride is the safest material for use when killing insects.
2. Have members make their own killing jar and kill the insect they brought with them.
3. Discuss the topic, What Is an Insect? (See p. 5 of this manual.) Tell how insects differ from other living creatures.
4. Show members the parts of an insect and have them identify these parts on the insect they brought with them.
5. Instruct members to bring to the next meeting the materials needed to construct an insect spreading board.
6. Show a film on insects.

3d Meeting

1. Open the meeting with an entomology roll-call topic.
2. Demonstrate how to make an insect spreading board. Have the members construct their spreading boards.
3. Show how to spread the wings of a butterfly. If live butterflies cannot be found at this time of the year, a model can be constructed and used for demonstration.
4. Show a film on insects.
5. Instruct members to bring materials for making an insect net and an insect collection box. (See Agr. Handb. 65, p. 7, or your State 4–H entomology project book.)

4th Meeting

1. Open the meeting with a short discussion on how insects affect man. (See p. 4 in this manual.)
2. Construct the insect collecting net. Demonstrate how to use the insect net. Demonstrate how to remove insects from the net.
3. Construct or procure the insect collection box.
4. Discuss the topic Where To Look for Insects. (See p. 11 of this manual.)

5. Instruct members to collect 4 or 5 insects and bring them to the next meeting.

5th Meeting

1. Open meeting with a rollcall topic on Where To Look for Insects.

2. Have members report on their experiences in collecting.

3. Demonstrate how to pin the various groups of insects. (See Agr. Handb. 65 p. 8.) You may want to repeat the demonstration on how to spread the wings of a butterfly. Pass out the insect pins and have the members pin the insects they collected.

4. Demonstrate how to use the insect label and how to adjust the height of the insect and the label on the insect pin. (See Agr. Handb. 65, p. 9.)

5. Show how to arrange the insects in the insect collection box.

6. Discuss possible plans to procure additional help to identify insects with which you are not familiar. (See p. 6 of this manual.)

7. Discuss plans for exhibiting insect collections.

8. Ask members to choose one insect and be prepared to give a report on its life history at the next meeting.

6th Meeting

1. Open meeting with a rollcall topic. Member answers by giving name of an insect, preferably one of which he has studied the life history and control.

2. Have selected members give a report on the life history of an insect.

3. Review important points to remember in life history studies.

4. Divide your members into four groups, and assign each group to look up as much information as possible on one of the following topics:

Four ways insects are protected by nature:

a. *Mimicry*—one insect resembles another which is less tasty to its enemies.

b. *Pugnacity*—bees protect their hive by stinging their enemies.

c. *Playing dead*—certain insects pretend death whenever disturbed.

d. *Protective coloration and form*—blending into their surroundings.

This information may be obtained from encyclopedias or magazines or from actual live specimens.

7th Meeting

1. Open meeting with a rollcall topic naming a part of an insect.

2. Have a demonstration by a club member or a team on control methods for one or more common insects.

3. Consider the major points in insect sect control in a discussion with the members. (See this manual, p. 4.)

4. Distribute and note highlights on Opportunities in Professional Entomology. (See selected references in this manual.)

Keeping Records

Use the State or local record forms. If none are available in your State, suggestions for a record form may be found in Agriculture Handbook No. 65, pages 41, 50, 51, and 52.

Awards

Other local groups may make contributions to support the entomology project; however, the Hercules Powder Co. sponsors the following awards to individual members:

County — A maximum of four gold-filled medals of honor will be awarded to top-ranking members.

State — An all-expense trip to the National 4–H Club Congress to be held in Chicago.

National — Six $400 college scholarships will be presented to a "blue award group" of State winners, preferably to consist of 1 from each of the 4 Extension regions and 2 at large. The allotment shall depend upon the quality of records.

Informing the Public

Enlist the cooperation of newspaper and magazine publishers and radio and television outlets.—You should use many means to share the story of activities. This will increase enthusiasm for the program, sell it to the public, and generally expand its effectiveness.

Suggestions.—See your local newspaper editor and explain your entomology program to him. Keep him informed of progress.

Visit the nearest radio station. Arrange program time. Several of your discussion topics will make interesting radio interviews. Invite the radio editor out to one of your meetings to make a recording of one of your discussions.

Participation in radio and television shows is excellent training in public speaking for members. Your county extension agent might have a program on which you and your club members can appear.

Notify newspapers and radio stations of all special events, such as tours, demonstrations, contests, recognitions, and ceremonies.

Here are some of the subjects that will make good news stories:

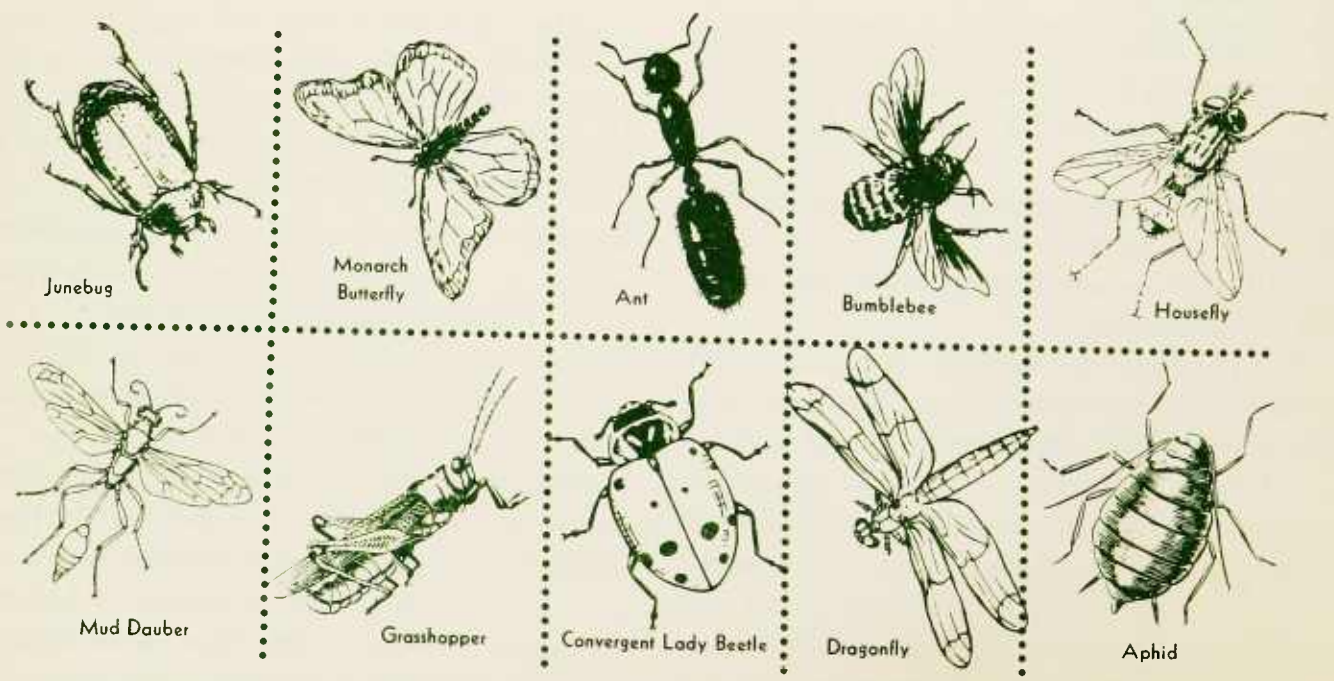
What the club is doing.
What individual members are doing.
Tours and field trips.
Campaigns.
Meetings featuring outside speakers.
Winners in the county, State, and National awards program.

Don't overlook television. Use simple demonstrations, such as those descriped on page 10 of this manual.

A newspaperman will appreciate your reporter's giving him the essential facts about any events to be announced. These facts are the familiar five W's of any news story—when, where, what, who, and why. This means when and where the event is to be held; what it is about; who will take part; and why it is being held.

Farm magazines are always glad to have good how-to-do-it stories. The National 4–H Club News wants to have reports of club activities, too.

And remember, as in other areas, that your 4–H public information programs must be in keeping with the overall county programs under the direction of your extension agents.



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Evaluating the Results of Your Work

Your duties at the end of the year are many. There are record books to be completed and forwarded to the county extension office. You help arrange for winners to attend district and State events. You assist in planning exhibits for fairs. You help arrange for transportation to these events. This is the time, too, when you evaluate the results of the entomology program. Some of the measures of your success are these:

Number of members who participated in the program.

Number of members who completed their objectives.

Number of members who plan to enroll next year.

Response of the community to the entomology program.

Interest of parents in the program.

Of course, evaluation of results is a never-ending process if the program is to grow.

Rewards You Receive.—You have given much of your time and thought and energy to the 4–H program. What are your rewards? Not money, surely. Yet the satisfactions of 4–H leadership are many:

The fun of service to boys and girls.

Opportunities to meet people and attend events.

Personal growth.

Inner satisfaction.

Service to community, county, and State.

Public recognition.

Leaders testify that they often "take away more than they bring." They agree with the late Dr. C. B. Smith that their most enduring satisfaction in life is to devote to others the talents with which they are blessed. "That which you do for yourself dies with you; that which you do for others lives long after you are gone."

The Time of Your Satisfaction.—Perhaps your time of greatest satisfaction is when members trained by you have reaped the reward of their work. The member's rewards are several:

He may have been instrumental in the adoption of new entomology practices on his home farm.

He may have influenced neighbors to adopt new practices.

He may have earned an office in his club.

He may have received well-merited publicity in press and radio.

His activities may have been publicly acknowledged in the county achievement programs.

He may have achieved the crowning glories of trips to the National Camp, the National Club Congress, or the State Roundup.

He may have won other county, State, or even National honors.

These are the hours when the leader feels the satisfaction of a teacher whose students have justified the teacher's fondest hopes. He knows that his hours spent with boys and girls have helped build citizenship and character.

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