4-H Entomology Record and Report

For 20___

Name: _____ Project Leader: _____

Address: _____

_____

Age: _____ Years in Project (including this year): _____

Why Use This Form for Recordkeeping?

This form will help you keep a record of your work in your 4-H entomology project. Keeping your records up-to-date will greatly simplify the task of applying for various 4-H awards. Instructions for using this form are given at the start of each section. There is more information on project specifications in the 4-H entomology series manuals.

Section 1: Collection and Field Notes

Use this section to record your field observations and the results of your collecting expeditions. This section will accurately preserve this data for specimen labeling at a more convenient time. You can also use this section to record your special collections of immature insects, economic insects, and noninsect arthropods.

Sample Number	Date	Location	Habitat	Weather Conditions	Collecting Device	Collector
1	V-19-86	Haslett, MI	backyard	night, 65 F	blacklight	Dunn, Deso
2A	V-24-86	Lansing, MI	woodlot	sunny & hot	(none)	Dunn
2B	V-22/24-86	(same as above)			pitfalls	Dunn

Collection and Field Notes (continued)

Sample Number	Date	Location	Habitat	Weather Conditions	Collecting Device	Collector

(Insert additional pages if needed.)

Section 2A: Special Entomology Projects

Use this section to record the results of your special projects, such as wing laminations or plastic embedments.

Date	Description of Item
VI-13-86	lamination: wings from Monarch butterfly
VI-28-86	plastic embedment: three species of ground beetles

(Insert additional pages if needed.)

Section 2B: Special Beekeeping Projects

Use this section to record the number of honey plants collected and pressed during the season.

Date	Location	Habitat (woods, field, etc.)	Plant Name

(Insert additional pages if needed.)

Section 3: Entomological Studies

Use this section to record the tangible items from your entomological studies (illustrations, articles, photographs, displays, and oral presentations/demonstrations).

Date	Description of Item
VII-12-86	Article in Y.E.S. Quarterly (entomology journal), Summer '86 issue
VIII-3-86	Talk and demonstration given to elementary school students

(Insert additional pages if needed.)

Section 4: Entomology Experiments

Use this section to describe, in your own words, one of your experiments pertaining to living insects. Use a copy of this form to record the results of other experiments you have conducted, including insects you have reared.

1. Purpose of Experiment (What did you hope to accomplish?)

2. Background Study (What information did you gather about this problem? What references did you use?)

3. Hypothesis (What is your trial answer?)

4. Experimental Methods (Describe how you set up and conducted your experiment. Include the results and discuss whether you satisfied your hypothesis.)

5. Revision of Hypothesis (If you need to, state your revised hypothesis and suggest additional experiments you may want or need to do.)

Section 5: Beekeeping Records

Use this section to record the purchase and sale of your beekeeping materials.

Purchases

Date	Item	Source	Cost
VI-1-86	5 hive bodies	Busy Bee Supply Co.	$33.00
VI-5-86	1 queen excluder	Busy Bee Supply Co.	$ 3.75
		Total Expenditures:	$

Sales

Date	Item	Purchaser	Amount
		Total Income:	$
		Profit/Loss (Income – Expense = Profit):	$

Issued in furtherance of Cooperative Extension work, acts of May 8, and June 30, 1914, in cooperation with the U.S. Department of Agriculture. W J. Moline, Director. Cooperative Extension Service. Michigan State University. E. Lansing. MI 48824.

1P-1R-2M-8:86-UP RLM

Price: 40 cents

0-16431

4-H ENTOMOLOGY PROJECT SCORE CARD

4-H 743d-W
2/22

Years 1-6 – Insects (1 to 2 boxes)

Name (Last, First):_____ Level/Division/Class: _____

County: _____Club: _____

Placing: _____ Merit/Honor _____ Blue _____ Red _____White _____ Participation

Year	# of Insects	# of boxes	Information Card	Required # of Orders	Order ID	Family ID
1	10	1	401A	0	0	0
2	20	1	401B	0	5	0
3	30	1	401C	0	15	0
4	40	2	401D	6	All	0
5	50	2	401E	8	All	10
6	60	2	401F	10	All	30

Identify all insects by common name

Orders

Anoplura
Coleoptera
Collembola
Dermaptera
Dictyoptera
Diplura
Diptera
Ephemeroptera
Hemiptera
Homoptera
Hymenoptera
Isoptera
Lepidoptera
Mallophaga
Mecoptera
Megaloptera
Neuroptera
Odonata
Orthoptera
Plecoptera
Psocoptera
Siphonaptera
Thysanoptera
Thysanura
Trichoptera
Zoraptera

INSECT COLLECTION	Possible Points	Your Score
Orders correctly identified	15	_____
Identification	25	_____
Assigned to correct order		
Degree of correct family identification		
Accuracy of common names		
Pinning and Spreading	25	_____
Condition of specimens		
Proper wing spreading		
Pinned correctly		
Uniform heights on pins		
Insects level and straight		
Position of legs, etc.		
Labels	15	_____
Neat and accurate		
Uniform height – not twisted		
Proper size		
Complete information		
Arrangement in boxes	10	_____
Variety of insects		
No duplication		
Grouping and spacing		
Background		
ID 401 A-F.....	10	N/A
TOTAL	~~100~~ 90	_____

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Advanced Collecting Techniques

The key to becoming an effective insect collector is to keep one important idea in mind at all times: to collect a diversity of insects, you must know when, where, and how to check the many insect habitats in the world around you.

This sounds complicated, but it really isn't because all insect habitats can be placed into one of the following five habitat types: (1) aquatic, (2) terrestrial, (3) plant-associated and arboreal, (4) animal-associated, and (5) aerial.

Each one of the special techniques or skills described in this manual is more or less suited to one (or two) of these habitat types, and each produces uniquely different results. Therefore, try a variety of these techniques and skills if you want to diversify and enlarge your collection.

AQUATIC INSECTS

A variety of techniques can be used to extract insects from their watery habitats. Some of the most widely used techniques include dip netting, treading, emergence trapping, and aquatic light trapping.

Dip nets. The easiest way to make your own dip net is to obtain a large mesh kitchen strainer and attach it to a suitable pole (an old broom handle works nicely) with automotive hose clamps (fig. 1). In addition, a shallow white plastic pan or bucket is needed when sorting through the contents of the dip nets. Forceps and an eyedropper are very helpful for picking out specimens and placing them in a vial of preservative (see page 15 for more information on preservatives).

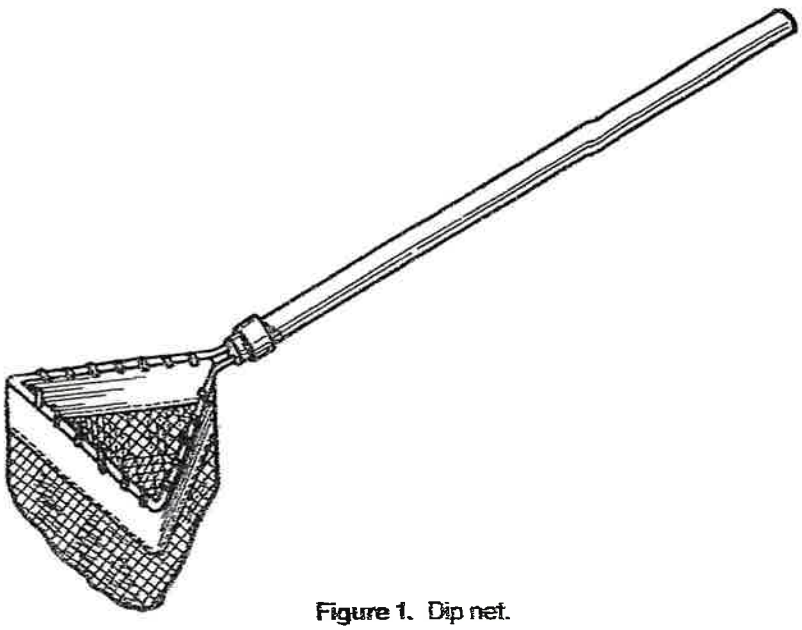

Figure 1. Dip net.

The technique for using the dip net is simple. Select an aquatic habitat with an abundance of plant life. Move the dip net through the vegetation to dislodge and capture the specimens. Be sure that the rim always faces the direction of travel! After several passes, empty the entire contents into the white pan. Add a little water if necessary. Most insects will begin to move about in the shallow water, but some will have to be removed from the vegetative debris in the pan. Swishing the plant material back and forth in the water will usually accomplish this. Now you are ready to pick out any desirable specimens and put them in a vial with preservative.

Treading. This technique requires only a few pieces of equipment, a pair of rubber waders (or old boots), and collecting bottles. **Do not tread with your bare feet!** In addition to the waders and bottles, a short-handled dip net, a white pan, forceps, and an eyedropper will be very helpful.

The treading technique is quite simple and easily mastered in a short time. First select an appropriate habitat. Freshwater marshes, shallow ponds, wet meadows,

bogs, and woodland pools are especially productive.

Start in an area where there is emergent vegetation and where the water is between 2 inches and 1 foot deep. Begin thoroughly stomping (treading) a small area (2 feet by 2 feet) of vegetation into the water with your feet. Continue this process for several minutes and then step back and watch the area. Various insects will begin to come to the surface of the water in the treaded area. Some only pop to the surface momentarily, so be ready with your dip net (kitchen strainer). This activity will generally last for several minutes before subsiding.

Sometimes the murkey water makes it difficult to see some insect specimens, and this is where your white pan (or small pail) comes in handy. Dipping water out of the treaded area will often enable you to collect hard-to-see specimens. After the activity has subsided, move to another spot and repeat the process. Your results will vary according to the type of habitat, vegetation, water depth, and season, so be sure to try this technique in a variety of situations.

Emergence traps. This type of trap is suspended over aquatic plants to capture adult aquatic insects after they emerge from the water.

There is no specific design for emergence traps. Most are constructed of a wood frame covered with nylon mesh (window screen material). The trap may be square, triangular, or cone-shaped (fig. 2), and should be equipped with a trapdoor or opening at the top to facilitate specimen removal. (In this regard, "peaked" traps work best.) The trap may be designed so it is held above the water by floats or stilts, or by suspending it from an overhanging tree branch.

Select any aquatic habitat where there is abundant vegetation and where the water is not too deep. Freshwater marshes and the edges of ponds and slow-moving streams are ideal and will generally be most productive.

Aquatic light trap. These traps are used to attract and capture nocturnal aquatic insects below the surface of the water. Use a ¾- to 1-inch-thick board to form a plug at one end of the trap (fig. 3). At the other end of the trap, form a funnel from window screen material. Drill two 1½-inch holes in the end board and form screen tubes to insert in these holes. Obtain either an airtight jar and suitably sized flashlight or a special waterproof flashlight to place in the trap. If you use the jar and flashlight, use molding clay or putty to hold the flashlight in place. Sometimes you will need to use a stone or other weight to keep the trap underwater.

When retrieving the trap, keep the board end down and the trapped insects will collect in the screen tubes. Next, remove the wood plug and empty the screen tubes, placing your specimens in a suitable preservative.

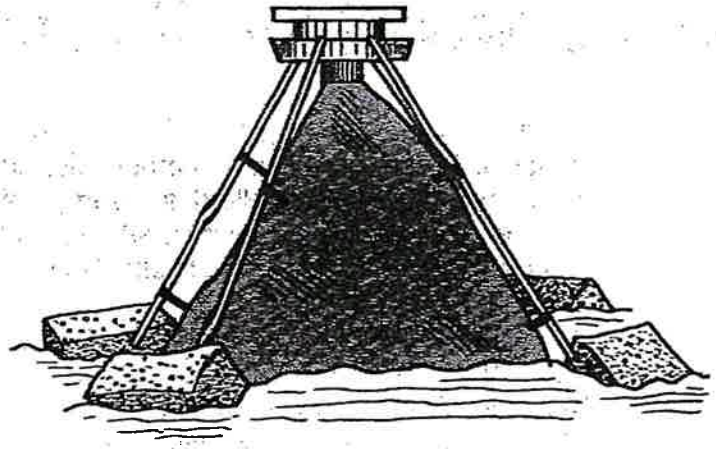

Figure 2. Emergence trap (cone-shaped/aquatic).

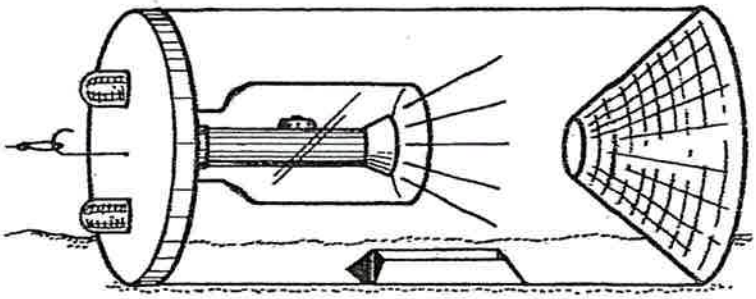

Figure 3. Aquatic light trap.

TERRESTRIAL INSECTS

A large number of insects live near the ground, burrowing in the soil or moving among the soil humus and leaf litter. Thousands of insects may be in the soil at your very feet! However, because they live in a hidden world and often only come out at night, they remain undetected by many collectors. Thus it becomes necessary to use a variety of traps and techniques to collect these insects.

Pitfall traps. Pitfall trapping is a simple technique that can be modified to suit any collector's needs. The basic pitfall trap is nothing more than a container (glass, plastic, or metal) buried in the soil with the rim flush with ground level. Pitfall traps range in diameter from 1 inch to 6 feet, but 4 to 8 inches is the most practical size.

The most efficient pitfall trap is one that employs two containers (fig. 4). One container is buried in the ground for the entire duration of the trapping operation. The other cup is designed to fit inside the outer container and remains removable. This greatly simplifies the job of specimen removal. Other "accessories" which can be used with pitfall traps are covers, barriers, baits, and preservatives. Each of these items can vastly improve the performance of a plain pitfall trap.

Pitfall trap covers can be constructed of any readily available flat objects such as shingles, pieces of boards, or stones. The cover sits up on several small stones so that there is about a half inch of space between the cover and the ground. Placing a large rock on top of this cover is one way to keep skunks, raccoons, and rodents from digging up your traps.

A barrier can be used to increase the effectiveness of a pitfall trap. A barrier is simply a 4-inch-high by 3-foot-long fence that is placed between two pitfall cups. Wandering insects are intercepted by the fence and directed into a cup at either end of the trap. Barriers are most easily made from strips of Plexiglas, wood, or aluminum (garden edging).

A greater variety of insects can be taken in pitfall traps if baits are used. Each type of bait will produce different results. Many types of natural and artificial baits can be used. The bait used by lepidopterists (people who study butterflies and moths) works well. It consists of sugar, molasses, mashed overripe fruit, and beer. Or try mixing active dry yeast with molasses, sugar, and water. Both of these baits work best if given some time to ferment before they are used.

Animal refuse also attracts a wide variety of insects. Fish, beef lung, raw hamburger, chicken bones, and other meat scraps work well. As with any bait, the smellier it is, the better! Animal dung also can be used. When using dung as a bait, it is best to use it in a liquid state by mixing the dung with liberal amounts of water. This procedure keeps the dung from drying out and thereby losing its attractancy. More importantly, it keeps the trapped insects from burrowing into the dung, making them difficult to extract. With the liquified dung, all you need do is skim the insects off the surface with a strainer.

The use of preservatives in pitfall traps allows a greater interval between trap checks. Live traps (that is, those without preservatives) must be checked on a daily basis to prevent loss of specimens due to predation, cannibalism, escape, and decomposition. On the other hand, traps filled with preservative only need to be checked on a weekly basis. This becomes particu-

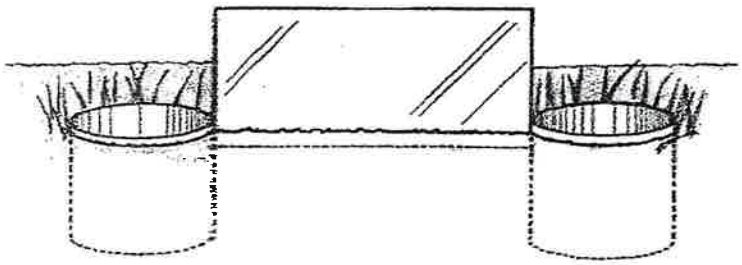

Figure 4. Pitfall trap (double-cup/barrier).

larly important if you have large numbers of traps, or if the traps are set up in distant locations.

While it has been shown that some preservatives act as attractants and others act as repellents, this should not cause any concern to the general collector. The best all-around pitfall trap preservative is ethylene glycol, and this material is readily available in the form of automotive antifreeze/coolant. Purchase the cheapest brand you can find and dilute it with water. During periods of little rain, or if your traps are covered, use a 50/50 mixture of ethylene glycol and water. If you anticipate frequent rains, use more of the ethylene glycol — the rain will gradually dilute the solution.

When you check your traps, take along a mesh strainer to remove the specimens. If the solution is overly diluted with rainwater, discard the solution; if it is not, add only a small amount of fresh solution. Try to keep the container one-quarter full.

Pan traps. Pan traps are used in the same manner as pitfall traps. The only difference is the type of trap container. The typical pan trap is made from a disposable aluminum pie or cake pan. It is installed in the same fashion as a pitfall cup and can be supplied with baits or preservatives.

Hidden insect extractions. Many insects are hidden in organic materials such as leaf litter, rotten wood, beach drift, flood debris, and soil. Several techniques and simple pieces of equipment can be used to easily collect specimens from these materials.

One of the most widely used devices for extracting hidden insects is the **Berlese funnel.** The basic components of a Berlese funnel are a light (60 or 75 watts), a plastic or metal funnel, a mesh screen, and a sample container. You can construct your own Berlese funnel by studying figure 5.

The first step is to obtain a habitat sample. Rake up small amounts of leaf litter (the layers closest to the ground contain the most insects), rotten wood, beach drift, or flood debris, and place it in plastic bags for transport to your home.

To operate the funnel, carefully place small amounts of the habitat sample on the mesh screen in the funnel and then turn on

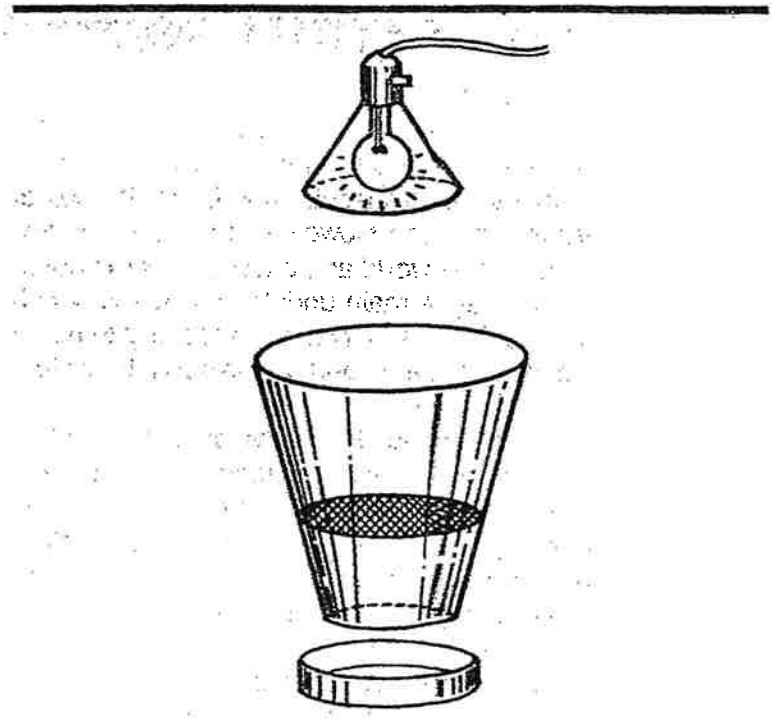

Figure 5. Berlese funnel.

the lightbulb. The light will begin to heat the sample, forcing the specimens deeper into the sample until they fall through the screen and into your collection jar. Your jar, of course, should be filled with a preservative such as alcohol. The extraction process generally requires several hours.

Many hidden insects can also be extracted by **sifting.** Collect a habitat sample just as if you are going to use a Berlese funnel. Instead of using the funnel, however, spread a large white sheet on the ground and dump your sample onto the center. Have your killing jar, forceps, and aspirator (see next section) handy as insects should begin to move about on the sheet. After the activity has subsided, spread the sample out in a larger, shallower circular pattern. Gather up any specimens. Repeat this process several times, or until the activity ceases.

You can also separate insect specimens from organic debris by using the **flotation method.** Obtain an old wash tub, pail, or similar large container and fill it halfway with water. Obtain your samples of organic debris, and then place small amounts (several handfuls at a time) into the water. All of the heavy debris will sink to the bottom while the lighter insects and debris will float to the