

HOW TO MAKE AN INSECT COLLECTION



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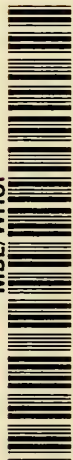
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HOW TO MAKE AN INSECT COLLECTION

Containing suggestions and hints designed to aid the beginning and less advanced collector. This booklet is based on the experience and methods developed during years of collecting insects by members of Ward's Entomological staff.



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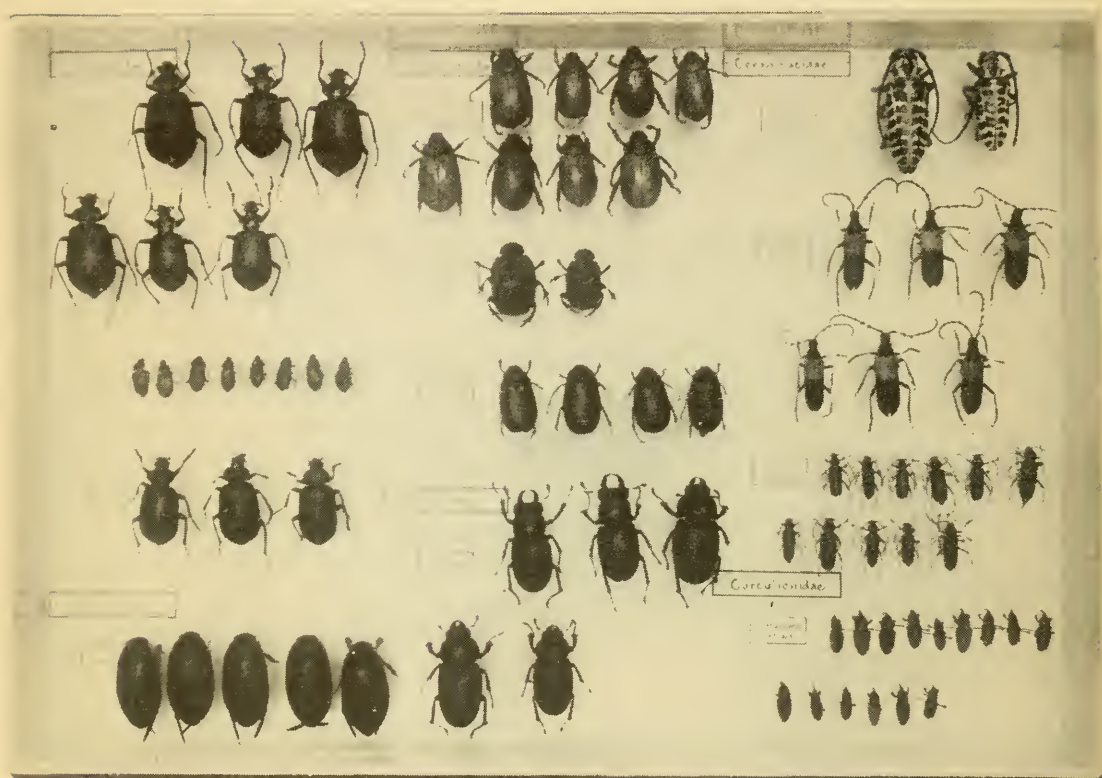


Fig. 1. A scientific collection of insects.

Note: This booklet is designed to replace *Directions for Collecting and Preserving Insects* by Dr. A. B. Klots which is now out of print. The current publication is a co-operative affair written by members of Ward's own staff. The preliminary work was done by Mr. Richard L. Post before he left Ward's to resume his graduate studies at Oregon State College. It is intended primarily to give instruction in entomological technique and methods to the less experienced collector. We do not desire to be dogmatic in our presentation and our readers are urged to remember these are suggested methods only since each individual will develop his own special variations and technique as he becomes more experienced.

Why Collect Insects?

If a hostile race of men attacked this country every year, doing damage to nullify the labor of a million workers, if they

injured and destroyed our crops, infected us and our domestic animals with fatal diseases and even attacked our homes, extraordinary measures would be taken to ward off these attacks. Yet this is what insects do to us, often without our realizing the extent of their depredations.

It is true that the harm done by some insects is somewhat offset by the good other insects do in supplying man with products he can use, by pollenizing flowers and by helping to keep in check man's insect foes, but this is not sufficient to over-balance the harm done. About 75% of all known living species of animals are insects, in fact about 650,000 different species have been described. In view of the size and importance of this group and the incalculable



Fig. 2. Equipment needed for collecting insects.

losses incurred from its depredations, it would seem imperative to know as much as possible about them. The first step in this direction would be to form a collection, at the same time attempting to learn as much as possible about the immature stages and the insects themselves.

A job worth doing at all is worth doing well, and a scientific collection of insects cannot be obtained unless certain fundamental methods are followed. We have prepared these instructions so that any person without previous experience can start this most fascinating and instructive of occupations.

Supplies and Equipment Needed

One cannot take pictures without film and camera nor can he collect and prepare insects without a few necessary items of equipment (Fig. 2). These can be home-made but the average person will find it more satisfactory to purchase them. They

need not be expensive, in fact, it costs surprisingly little to do really creditable work.

Essential Items. The following are the essential items you will need:

1. Collecting net light in weight but of strong, durable construction with a bag of good quality, lock-stitch netting.
2. Killing jar with cyanide, properly made for maximum efficiency and safety. The 16-ounce size is probably best for most types of specimens.
3. Insect pins of double japanned steel wire with especially sharp points and beads that will not come off. Sizes 1, 2 and 3 are most widely used.
4. A spreading board with adjustable groove can be used with a wide variety of specimens. Spreading boards should be carefully constructed to work with ease and a minimum of difficulty.
5. Insect storage boxes constructed to be as air tight and pest-proof as possible will give adequate protection for a carefully made insect collection.
6. A permanent field note book of a size that may be conveniently carried in the pocket or collecting bag is essential for the noting of necessary collecting data.

7. A camel's hair brush will be found useful when handling minute specimens.

8. A few small jars and vials containing 75% alcohol are necessary for preserving many types of insects.

9. A supply of folded paper triangles, glazed paper or cellophane envelopes should be carried to use when collecting butterflies or large specimens that will later be pinned.

10. A well made forceps with slender points and a length of 4" or 5" will be very useful for handling some of the specimens you will collect.

Accessory Items. A few additional items are desirable if really serious work is to be done or when the beginner is collecting several orders of insects.

1. Two extra cyanide killing jars. A small 4-ounce jar for small delicate insects and a large quart jar to be used exclusively for butterflies and moths.

2. An unbreakable celluloid killing tube with cork.

3. Sweeping or Beating net.

4. Metal box with layers of cellucotton for storing insects until they can be relaxed and mounted.

Where to Look for Insects

Insects can be found almost "everywhere," in fact it is hard to find a place where they cannot be collected. The beginning collector will not see as many insects as one who is more advanced, but as he progresses he will be able to find them in some stage of their development at all times almost everywhere. He will see them in the grasses of fields and meadows; in woods, under leaves and in the soil of the forest floor; in flowers, in rotten wood, under bark; beneath stones or boards, in slow and swift streams or in lakes and ponds and at lights. Insect hunting is one sport from which the collector always returns with game. Definite instructions as to where to collect insects are futile and we can only say "seek and ye shall find."

Land Collecting

The Aerial Insect Net. The most essential item of insect collecting equipment is the net. An aerial net should be designed to give the maximum strength, rigidity and durability without sacrificing the light weight so important to the collector. The necessary parts of an insect net (a) are the handle (b), a ferrule (c) for attaching (d) the hook or ring, and a bag (e) hung from the ring. See Fig. 3.

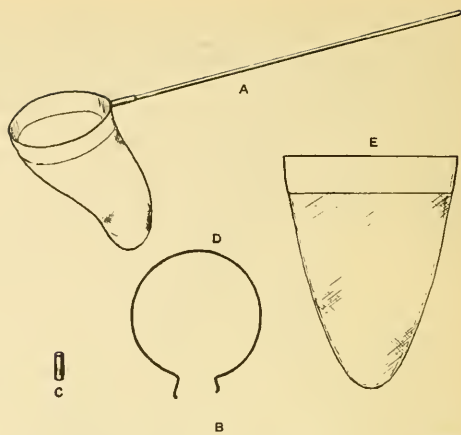


Fig. 3. Parts of an insect net. A. The assembled net. B. The handle. C. The ferrule. D. The ring. E. The bag.

Flowers, herbs, and boughs should be swept with a sidewise motion, giving the net a half turn on the back stroke so that the vegetation always passes across the face of the open bag (See Fig 4). This will get more insects than an upward or downward sweep and at the same time will do less damage to the plant. If care is taken the same patch of flowers or plants may be visited several times.

Do not chase insects on the wing as they will become alarmed and not return. If a flower visiting kind is disturbed and flies away, wait patiently with net ready for a few minutes and it will likely return. Sweeping can be done with the ordinary aerial net but it is better to use a more sturdily constructed one having a scrim bag with a canvas top. A very useful net for sweeping is shown in Fig. 5.

The Sweeping Net. Sweeping is by far the most productive method of collecting insects as far as numbers are concerned. By sweeping the net over vegetation (in sweeping the net is used like a broom), especially when the latter is in flower or fruit, one can secure many specimens that can be obtained in no other way.

When sweeping, only a few strokes should be made before emptying the net as otherwise many specimens will be damaged by shaking them about with the debris. When one stops swinging the net the end of the bag containing the mass of debris should be swung over the outside of the ring (See Fig. 11a), effectively locking the insects in and preventing their escape.



Fig. 4. A. Sweeping across flowers.



Fig. 4. B. Sweeping in grass and low vegetation.

Some insects fly up into the end of the net when captured, others drop down and try to escape by crawling under the edge of the net ring. With experience the collector will soon learn what to expect of the captured insects. (See Fig. 11 illustrating removal of insects from the net.)



Fig. 5. Sweeping net.

The Care of Nets. All insect nets are easily ripped and should be kept away from barbed wire and thorny trees. Keep the nets dry; moisture rots the fabric making it more easily torn and in addition ruins all insects caught in the net when it is wet.

Other types of collecting equipment such as beating nets, aspirators, traps, etc., are described later in this manual.

Aquatic Collecting

The early stages of many groups of insects as well as adults of others live in the water. Special collecting equipment and different methods must be employed for collecting these forms. The beginning collector should devote as much attention to water insects as he does to land collecting.



Fig. 6. Aquatic net.

The Aquatic Net. Water insects may be collected by a heavy dip net swept thru the water at various levels and thru the mud and débris at the bottom. The frame must be strong to withstand this severe use and one of coppered steel spring wire $\frac{1}{8}$ " in diameter has proven most effective. The diameter of the net ring should be 10 or 12 inches. It is preferable that the end of the handle and ferrule should be

made of brass so that no water can reach the wood and thus cause binding and swelling. The rigid frame is easily removed by pushing back the ferrule. (Fig. 6.)

The bag should be made from extra heavy scrim with a canvas top. Grommets or slits should be placed on the canvas rim so that the water will drain quickly from the top portion when the net is removed from the water.

The net bag need not be deep, as aquatic insects are usually quite helpless out of their natural environment. A broadly rounded net bag 18" deep is the proper depth for a frame 12" in diameter. All aquatic insects can be picked up with forceps and dropped into the vials or jars of 75% alcohol. If you use your fingers to pick out aquatic insects be sure to watch out for species which bite. Data labels written in pencil should always be placed in each vial.

All-Purpose Net. For collectors who will wish to look for specimens in a variety of habitats, an all-purpose net such as that illustrated here (Fig. 7) will be ideal. It may be obtained with a selection of three bags having zippers for easy removal and quick changing. These are aerial, sweeping and aquatic respectively. The handle is tapered so that the weight is more adequately distributed and balanced, furthermore, the tapered handle prevents binding when used in aquatic collecting and the ferrule is easily adjusted at all times.



Fig. 7. All purpose net.

Scraper Net. The scraper net is the most practical piece of equipment ever devised for digging and scraping the bottom of ponds and streams. Material can be dragged up and piled on the bank where the collector merely waits for the specimens to disentangle themselves and then be captured as they crawl away. The Scraper Net illustrated here (Fig. 8) was designed by Dr. J. G. Needham. It is built to withstand the toughest kinds of usage with a frame and reinforcement of heavy galvanized iron and the sides and bottom of $\frac{1}{8}$ " mesh galvanized wire screening. The ferrule is provided with a thumb screw so that any size handle may be used.



Fig. 8. Scraper net.

Apron Net. The Apron Net (Fig. 9), also designed by Dr. Needham, is especially constructed for collecting in water weeds. It is covered with a coarse-mesh top which keeps out debris and aquatic plants but allows aquatic insects to enter. The back portion of the top is hinged and covered with a finer meshed screen to prevent escape of insects as the net is pushed thru the water. The pointed nose permits pushing the net thru dense growth of aquatic plants. The cover is easily flipped back and the captured insects can be selected with forceps or fingers and dropped into 75% alcohol.

Seine. A seine made of fine strong wire netting and fastened along its edges to two wooden handles is a light useful piece of collecting apparatus. A good seine may be made from the adjustable window screens that may be purchased at any hardware or ten-cent store. Pull the two halves of the screen apart, knock off the wooden strip forming the side, leaving the two short strips at the ends to serve as handles



Fig. 9. Apron net.

for your seine. In collecting insects from fast flowing streams the seine is held against the current with the top slanting down stream and its bottom tight to the floor of the stream. If stones are lifted or disturbed or the bottom violently dug up by an assistant, insects will be carried by the current directly into the seine where the specimens may be picked off.

Tangles and Hooks. By using a handle with a hook on the end or a piece of barbed wire one can pull out dense masses of Chara and other weeds from ponds and ditches. An ordinary potato hook is excellent for this purpose. After pulling the aquatic plants to the shore, spread them out on the bank and many water insects can be collected as they crawl out.

Where to Look for Aquatic Insects. In shallow water, stones and logs should be turned over and leaf tufts pulled apart.

Searching beneath boards and other cover near the margins of ponds and streams reveal many ground beetles and semi-aquatic forms.

Look for insects floating to shore on the windward side of a pond or lake after a warm night. Also follow the shore line of lakes and ponds and examine the debris early in the morning before the gulls and crows do their entomological collecting.

Killing Insects

The Cyanide Killing Jar. The best killing bottles are charged with potassium or sodium cyanide. These compounds give off deadly fumes sufficient to kill most insects in a short time. The cyanide jar (pint size) is made by covering a $\frac{3}{8}$ " layer of cyanide in the bottom of the jar with a blotter cut to fit the inside diameter. A $\frac{1}{2}$ " layer of sawdust is added and covered with another piece of stiff blotting paper. A thin layer, about $\frac{3}{16}$ ", of plaster of paris is poured on top and allowed to set with the cover off (See Fig. 10.) Other size jars should have these layers in proportion but smaller jars will require thinner layers.

A freshly made bottle should be allowed to set several days before using, and unless one is used to handling chemicals or poisons the killing bottle should be purchased as the making of these bottles by amateurs is very dangerous.

Important! Cyanide bottles should be labeled "Poison," kept tightly corked, and placed where children cannot reach them. To prevent breakage several layers of adhesive tape can be applied to the bottle, covering the bottom and extending an inch or two up the side. If the bottle should break, pour water over the cyanide and the poison will soon be dissipated. A cracked jar should be buried, first making sure to smash the jar with a spade before covering it with earth. Remember, both the cyanide gas and the solid are poison—don't breathe the gas and wash your hands carefully after handling the solid.

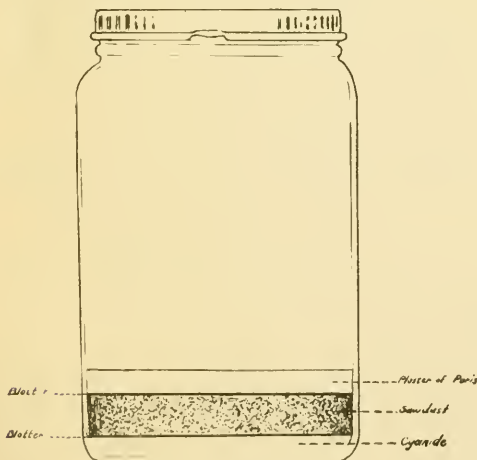


Fig. 10. Killing jar.

Use of Cyanide Killing Jar. There are, of course, many ways to remove captive insects from the net bag for transference to the killing jar. As previously recommended, when enough specimens are in the net, swing the end of the bag over the loop or ring in order to prevent their escape (See Fig. 11a). The bag may then be laid on the ground and specimens removed by slipping the hand under the rim as in Fig. 11b, or the entire catch killed at once as in 11d. Sometimes with large specimens one will want to use the method shown in Fig. 11c. Another approved method for removing insects is to hold the net in an upright position, end of the handle on the ground. Hold the net in position by crossing a leg over the handle and remove specimens by running the jar or killing tube into the net bag. (See Fig. 13 for the proper method of using a killing tube.)

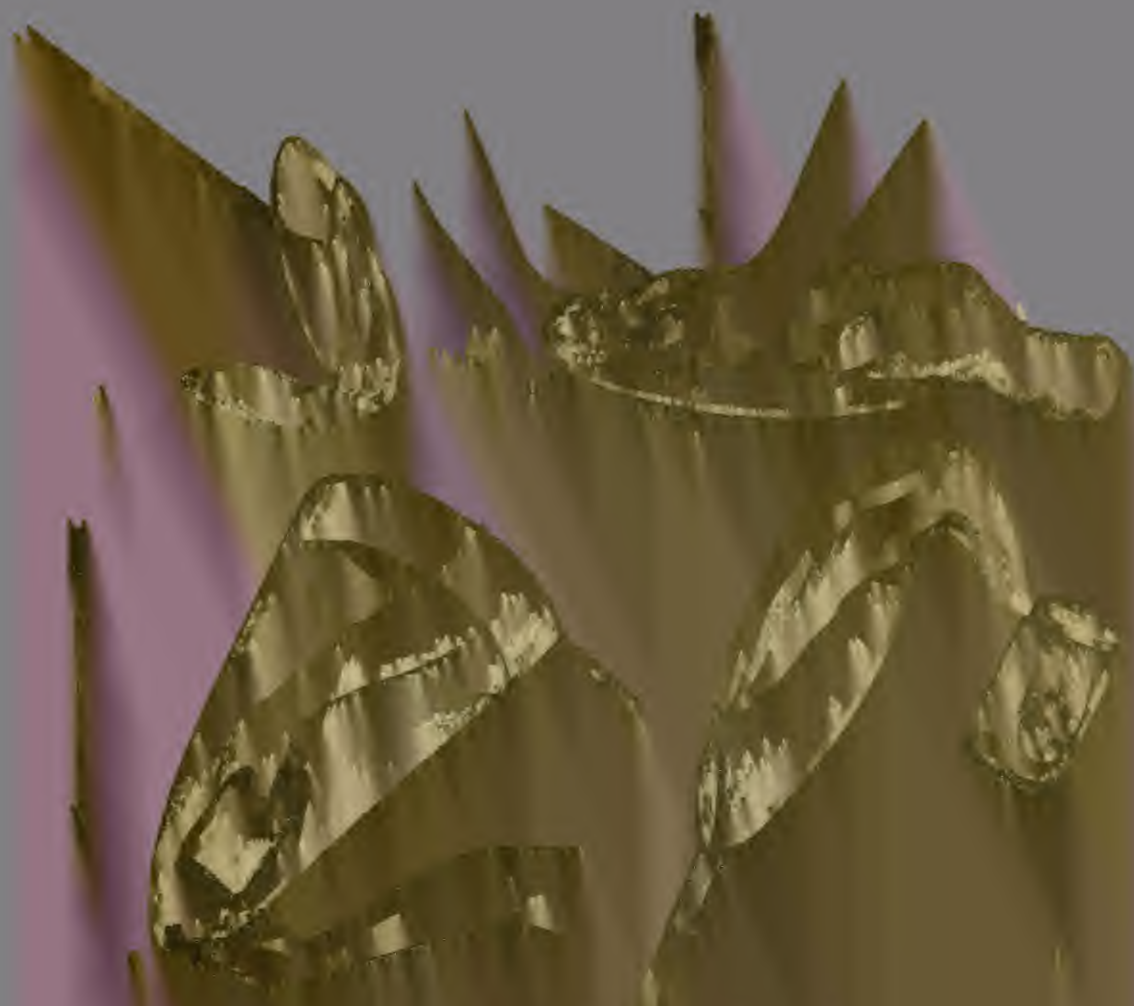
The specimens should not be left in the killing bottle longer than 3 to 8 hours because insects become brittle and some colors fade after exposure to the fumes for a greater length of time. Thirty minutes exposure to cyanide will kill all but the toughest forms. Snout beetles require several hours.

It is necessary to keep the inside of the bottle dry to prevent the killed specimens from becoming discolored. This may be avoided by shredding some paper toweling or filter paper and placing a few pieces in the killing bottle. Moisture will not only be readily absorbed but specimens will also be kept from shaking about by the toweling. It should be replaced when it has become overly moist. When collecting butterflies, moths and other delicate winged insects, place a layer of soft cotton in the bottom of the jar instead of paper toweling.

To revive an old killing bottle that has become weak, drill a hole thru the plaster with a darning needle or piece of wire and add a few drops of vinegar or other dilute acid.

Collectors of delicate moths and butterflies frequently put a few drops of ether or chloroform in their killing jars before starting out. This is done to quiet the insects at once because the cyanide fumes kill slowly.

Butterflies often batter themselves when placed in the killing jar. They may be stunned by pinching the thorax between



DIAMOND CUTTING

THE FIRST OF THESE IS THE BRILLIANT CUT. This is the most common cut, and is the one which is most highly valued. It is a cut which is designed to reflect as much light as possible, and to do this it is cut in a way which gives it a high degree of symmetry. The brilliant cut is the one which is most highly valued, and it is the one which is most commonly used for jewelry.

THE SECOND OF THESE IS THE ROUND CUT. This is a cut which is designed to reflect as much light as possible, and to do this it is cut in a way which gives it a high degree of symmetry. The round cut is the one which is most highly valued, and it is the one which is most commonly used for jewelry.

THE THIRD OF THESE IS THE OVAL CUT. This is a cut which is designed to reflect as much light as possible, and to do this it is cut in a way which gives it a high degree of symmetry. The oval cut is the one which is most highly valued, and it is the one which is most commonly used for jewelry.

THE FOURTH OF THESE IS THE EMERALD CUT. This is a cut which is designed to reflect as much light as possible, and to do this it is cut in a way which gives it a high degree of symmetry. The emerald cut is the one which is most highly valued, and it is the one which is most commonly used for jewelry.

THE FIFTH OF THESE IS THE PADPARDSCHAH CUT. This is a cut which is designed to reflect as much light as possible, and to do this it is cut in a way which gives it a high degree of symmetry. The padparschah cut is the one which is most highly valued, and it is the one which is most commonly used for jewelry.

THE SIXTH OF THESE IS THE HEART CUT. This is a cut which is designed to reflect as much light as possible, and to do this it is cut in a way which gives it a high degree of symmetry. The heart cut is the one which is most highly valued, and it is the one which is most commonly used for jewelry.

THE SEVENTH OF THESE IS THE PEAR CUT. This is a cut which is designed to reflect as much light as possible, and to do this it is cut in a way which gives it a high degree of symmetry. The pear cut is the one which is most highly valued, and it is the one which is most commonly used for jewelry.

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