

Missouri 4-H Entomology

Supplementary Guide to Insect Collecting



Adapted from Kentucky 4-H Entomology Guide

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Missouri 4~H Entomology

Guide to Insect Collecting and State Fair Projects

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Objectives:

The objectives of 4-H Entomology Insect Collecting Activities are to:

- Discover the value of making an insect collection.
- Learn how to collect, identify, label, and display insect specimens.
- Complement 4-H Entomology Units 1 – 3.



Making an Insect Collection

Making a collection is the best way to learn about what insects look like, where they live, and what they do. A collection also helps you tell other people what you have learned about insects and serves as an example to help others identify insects around their home and garden.

Where to Find Insects

Insects can be found almost anywhere, including:

- In the air.
- On a wide variety of vegetation, both day and night.
- Around street lights, porch lights, and study lamps.
- In woodpiles, especially in spring and early summer.
- In the soil.
- In fresh or decaying fruit.
- On domestic animals (e.g. fleas and lice).
- Along the edges of rivers, streams, lakes, or ponds and in the water.
- In buildings: windows, flour bins, cereal packages, closets, or boxes where clothing and old papers are stored.



How to Collect Insects

As you can see, insects live in all kinds of places. Some are a real challenge to capture, while others can be picked up by hand and put directly into a collecting jar. If you think an insect may bite or sting, gently tap it into your jar with a twig or use tweezers to pick it up.

You will need an insect net to catch fast-moving insects. An insect net can be used in a variety of ways. You can use it to scoop insects out of the air as they fly past, or you can sweep the net through weeds and flowers to catch whatever is hidden within. Some insects "play possum" when disturbed. To catch them, hold your net under plants and shake the insects off into the net.

Be very careful when catching stinging or biting insects. Try this technique: sweep the insect into the net and, with a quick jerk, force it to the bottom of the bag. Then grasp one hand around the bag just above the captured insect. Put the end of the bag with the insect into your collecting jar. Place the jar lid over the mouth of the jar as tightly as you can, and wait until the insect becomes still. Then take the end of the bag out of the collecting jar, quickly remove the stunned insect, and put it back into the collecting jar.



Collecting moths and butterflies without damaging them requires special care. To keep these insects from escaping after being netted, whip the net so the insect goes to the bottom of the bag. Keep the insect trapped in the bag by giving the net a flip so the bag bottom rests across the loop. Then pinch the thorax of the insect while it is still in the net. This will stun the moth or butterfly and keep it from beating the scales off its wings when it is put in the collecting jar.

Making a Killing Jar

You will need to kill the live insects you capture before putting them into your collection. The killing method should be quick and as painless as possible. Also, the killing method should not ruin the insect's appearance. A killing jar that can be carried with you is handy for doing this.

Any clear, wide-mouthed, plastic jar with a tight screw-cap lid can be used to make a killing jar. A pint-size jar (a peanut butter jar works well) is easy to carry and will be big enough to hold large insects. You can make larger or smaller killing jars to suit yourself.

After selecting a jar, cut discs of blotter or newspaper to fit snugly into the bottom of the jar. A stack of discs $\frac{1}{2}$ inch high is enough.

When you want to use the killing jar, pour fingernail polish remover or rubbing alcohol onto the paper discs. Pour off any fluid that is not absorbed by the paper. Then put a few narrow strips of tissue paper in the jar. The tissue paper helps absorb moisture and gives the insects a place to hide. When insects are hiding, they do not thrash around and damage themselves so much.

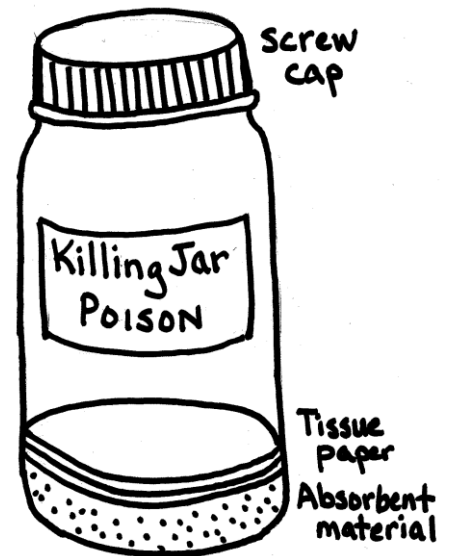
Killing jars containing cyanide, carbon tetrachloride, gasoline, or ether are too dangerous to be used safely. Even though fingernail polish remover is relatively safe, the killing jar should be labeled KILLING JAR – POISON.

After any insect is killed, DO NOT leave it out in the open for very long, or it will become too brittle to mount on an insect pin. It is best to pin insects on the same day that they are captured. If this isn't possible, store insects in a freezer until you are ready to pin them. But do not leave the insects in the freezer for more than a month; this will also cause them to become brittle.

Freezing Insects

Another way to kill insects is to freeze them. If you want to freeze your insects, start by placing the insects in small containers as you collect them. Many things can function as a container, including baby-food jars, old spice bottles, and even zip-lock bags. It is a good idea to carry both large and small containers. Preferably, put only one insect in each container, so that the insects will not harm one another. When you are finished collecting, put the containers in the freezer for at least 3 hours. The insects can then be removed and are ready for pinning after a few minutes.

This method is less messy and cheaper than using a killing jar. The only drawback, other than waiting overnight for the insects to freeze, is that you often have to carry several small containers while you collect instead of just one killing jar.



Pinning Your Insects

After you have finished collecting for the day, it is wise to go ahead and prepare the specimens to put in your collection. This means putting them on insect pins. Don't wait until the next day, because the insects may become dry and brittle, and parts of the insect may break off when you try to pin them.

You can begin pinning the insects after they have been in the killing jar for about 20 minutes. If you take them out of the killing jar too soon they may revive after you have pinned them.

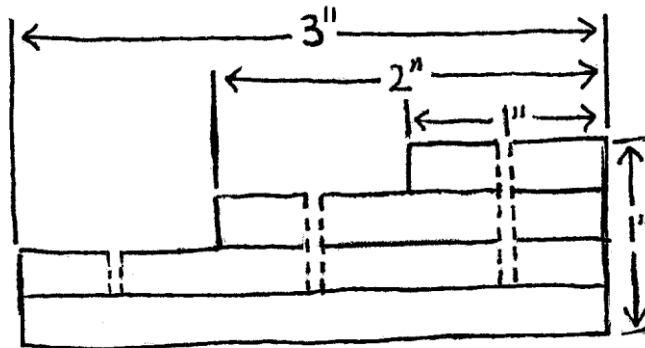
Use special insect pins that can be bought through Extension Publications, 2800 Maguire Blvd, Columbia MO, 65211, (573)882-7216. Gently run the pin through the thorax of the insect a little to the right of the midline of the body. The illustrations on pages 4 and 5 show examples of the correct spot to insert the pin. Leave about $\frac{1}{4}$ inch of the pin visible above the specimen. This will be enough of a handle to pick up the specimen without touching the insect. There will be enough room on the pin below the insect to add labels. Work carefully and try to get the insect level on the pin so it is not tipped from front to back or from side to side. Use a pinning block to help pin the insects and labels at the desired levels. Pinning blocks can be purchased from a supply store, or you can make your own using the instructions below.

How to Make and Use a Pinning Block

A display collection will look better if the insects and labels on the pins are at a uniform height. A pinning block is used as a gauge to position insects and labels at uniform heights on the insect pins.

How to Make:

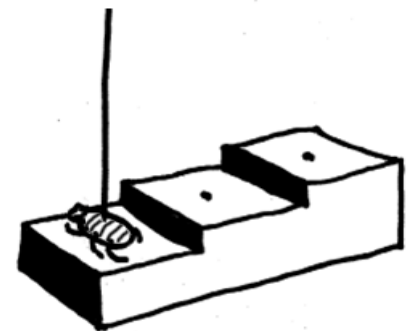
1. Make the block from strips of wood 1 inch wide by $\frac{1}{4}$ inch thick.
2. Cut a 3-inch, a 2-inch and a 1-inch long piece from your wood strip, and glue them together in step fashion as shown below.
3. Next, drill three small holes as shown all the way through the block. You can use a small sized finishing nail for the drill bit.
4. Then glue another 3 inch strip to the bottom of the block to cover the bottom of the drilled holes.



How to Use:

To use the pinning block, put the head of the pin bearing a freshly pinned insect into the shallowest hole of the pinning block. Push on the pin until its head is at the bottom of the hole. This will force the insect into a position $\frac{1}{4}$ inch down on the pin. If the back of the insect is not resting on the block, that means the insect is too low. (Remember, the insect pin is upside down in the hole.) Push the insect downward on the pin until the insect's back is in contact with the block.

To position labels on the pin, put the label on the pin. Then put the point of the pin in either of the other two holes. Use the same hole for all the insects in your display collection. You can later change your mind about positioning labels, but not about positioning insects after they have dried on the pin.

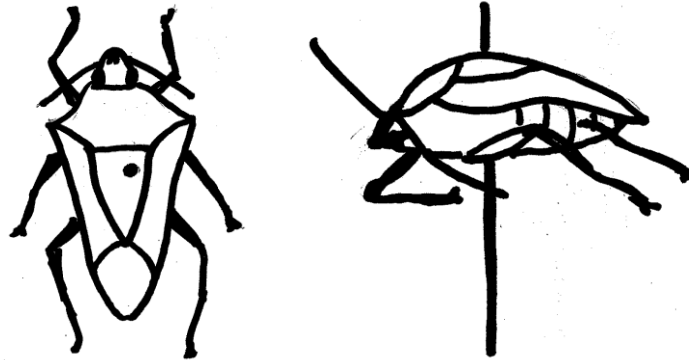


Examples of correct pinning methods for common insects:

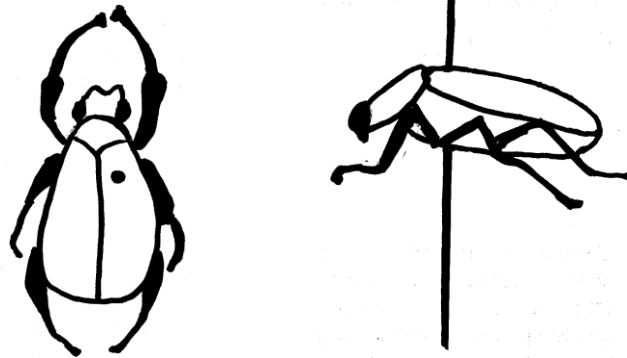
1. Pin bees, wasps, flies, dragonflies and other insects with similar wings through the thorax between the bases of the wings.



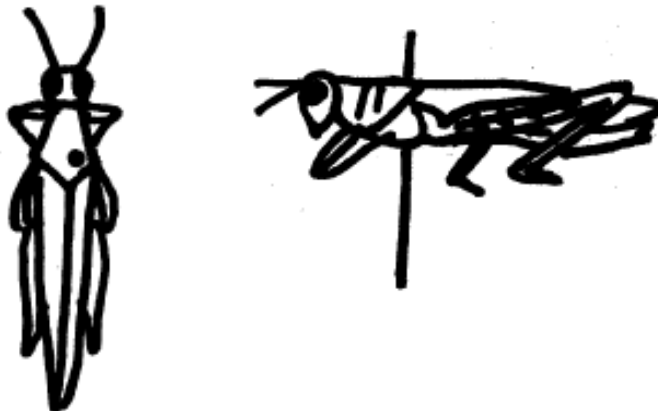
2. Pin true bugs through the right corner of the “scutellum.” The scutellum is a triangular area with the point of the triangle pointing to the rear. In stink bugs the scutellum is large, but in other bugs it may be quite small.



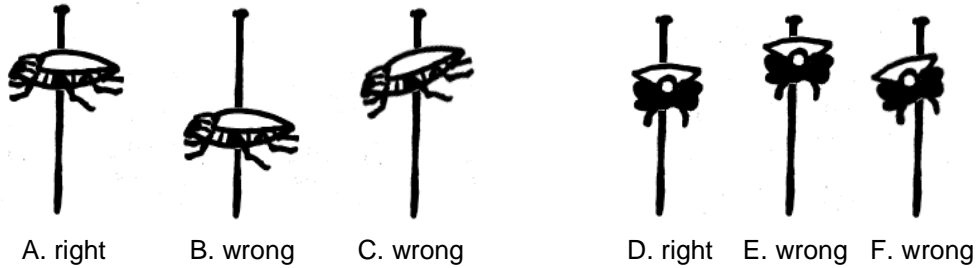
3. Pin beetles to the right of the center line so that the pin emerges from the underside of the insect between the middle and hind legs of the right side. Do not pin so far back that the pin comes through the abdomen.



4. Pin grasshoppers so that the pin emerges between the middle and hind legs of the right side. Insert the pin near the right hind margin of the “pronotum.” The pronotum is the saddle-shaped structure of the thorax just behind the head.



The illustrations below show some correctly and incorrectly pinned insects.



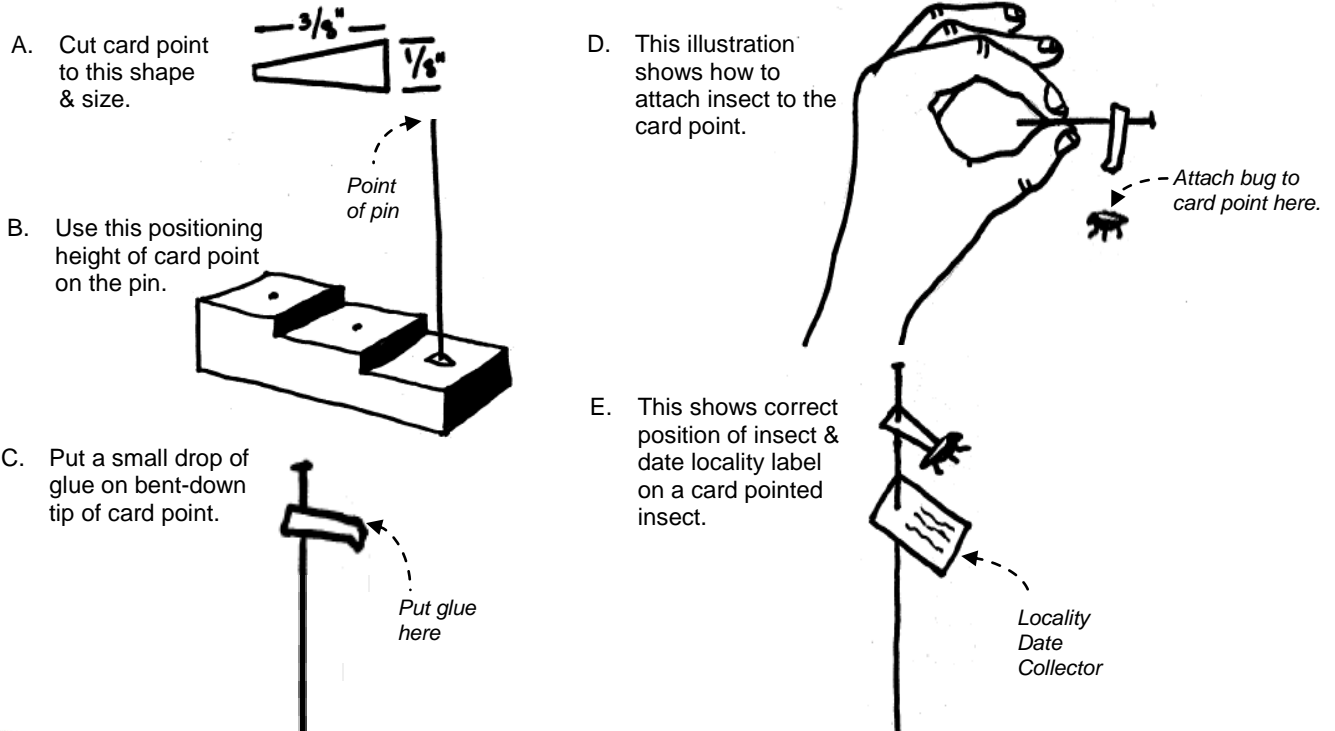
Illustrations of right and wrong methods of pinning:

- | | |
|---|---|
| A. correct height & position for specimen | D. correct height & position for specimen |
| B. insect too low on the pin | E. insect too high on the pin |
| C. insect tilted on the pin | F. insect tilted on the pin |

How to Card Point Small Insects

Small, delicate insects may be impossible to pin in the conventional way with standard sized insect pins. You can solve this problem by using the card point pinning technique explained below. Prepare several card points on pins in advance so they are ready when you want to mount a small insect.

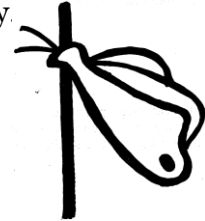
1. Select some heavy paper, such as a file card, and cut triangular card points to the dimensions as shown in Figure A.
2. Put an insect pin through the base of the card point. Use a pinning block as shown in Figure B to position the card point on the pin.
3. With a pair of tweezers, bend down the tip of the card point as shown in Figure C.
4. Put a tiny drop of glue on the bent down tip of the card point, and touch the glue drop to the right side of the insect as shown in Figure D. Do not use so much glue that the insect becomes totally embedded in it. When you lift up the pin, the insect should be level and topside up as shown in Figure E.



Pinning and Spreading Butterflies and Moths

Moths and butterflies look better and are easier to identify if their wings are spread properly. Once the insect is pinned through the body, position the wings as shown with a spreading board (this can be purchased from a supply store, or you can make your own by following the directions on page 7) or with two blocks of Styrofoam™, each twice as long as the butterfly or moth and about the same height as the insect on the pin, placed on either side of the insect. The wings should be gently pulled into place with an insect pin placed behind a large wing vein. The back margins of the front wings should be perpendicular to the insect's body, with just a slight notch between the front and back wings. Narrow strips of paper placed over the wings will hold the wings in place (the strips of paper should be pinned to the spreading board as well). Depending on the moisture in the air, it may take up to a week for the wings to completely dry in place.

1. Put an insect pin through the center of the thorax of a freshly killed butterfly



2. Push the pin straight down in the center of the slot of your pinning board until the outstretched wings are just level with the surface of the pinning board.



3. Insert an insect pin lightly in each front wing near the front margin and just behind one of the heavy wing veins. Move the front wings forward gently until the hind margins of the front wings are in a straight line, at right angles to the body.



4. With a pin placed behind a heavy vein in the hind wing, move each hind wing forward until the gap between the front wing and hind wing is closed to just a notch, as shown on the right side of the illustration below.



5. Cut narrow strips of thick wax paper and lay them over the wings. Pin them in place as shown. Remove the other pins that are through the wings. The pins holding the paper strips in place should not go through the wings but should be close to them to keep enough pressure on the wings to prevent their slipping out of place. If the abdomen tends to sag, it can be propped up with pins until it dries. You can also use pins to keep the antennae in place while the specimen dries. Depending on the moisture in the air, the specimen should remain on the board from up to eight days.



How to Make a Spreading Board

If you do not have a spreading board, you can easily make one according to the following directions. There are also other styles of spreading boards other than those listed here.

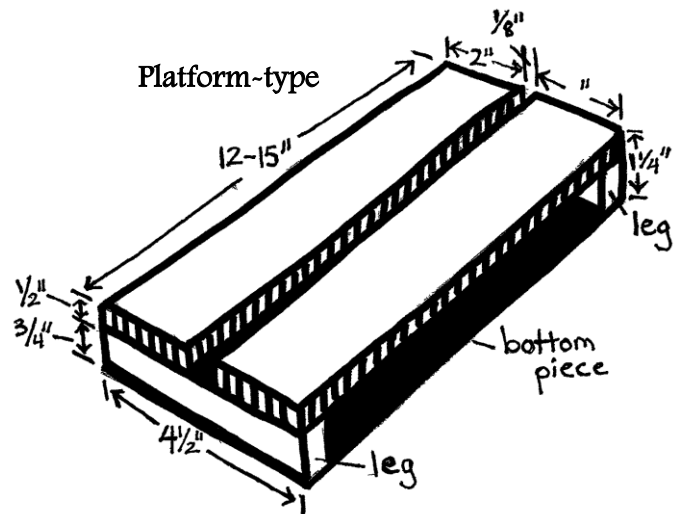
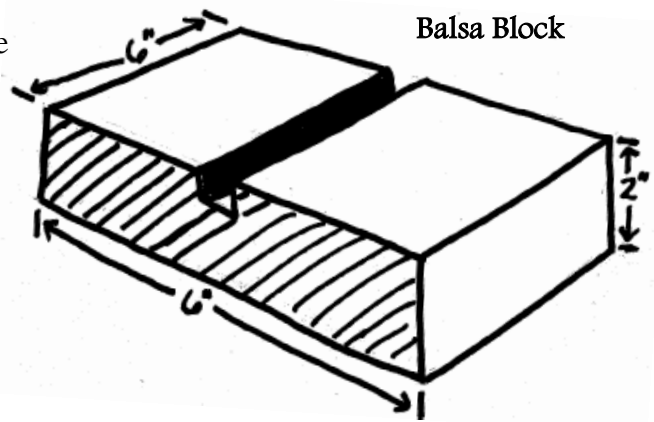
Balsa block spreading board – This is merely a block of balsa wood 6 x 6 x 2 inches with a slot cut in one face of the block. The slot should be $\frac{1}{2}$ to 1 inch deep and just a little wider than the body of the insect whose wings you want to spread.

Platform-type spreading board – This board is a little harder to make, but it does not require so much balsa wood. Also you can taper the width of the slot to do the job of an adjustable purchased board. When spreading an insect, you just pick the proper place along the slot that best fits your insect.

The exact length and width of the board is a matter of choice, but 12 to 15 inches long by about 4 inches wide is a convenient size. However, the distance from the top of the board to the top of the bottom piece should be $1\frac{1}{4}$ inches or more. If you make this dimension too short, the bottom piece will stop the insect pin and hold the insect above the spreading surface of the board.

To assemble the board, place the top pieces on the legs so the width of the slot between the top pieces is $\frac{1}{8}$ inch at one end and $\frac{1}{2}$ inch at the other end. Nail the top pieces in place, and then turn the board over so the legs are up.

Glue a length of balsa wood strip about 2 inches wide and $\frac{1}{4}$ inch thick over the slot. The balsa strip should be long enough to cover the entire length of the slot. Then nail on the bottom piece. The bottom piece makes the board sturdier and protects the pins that poke through the balsa strip when there are insects on the board.



Labeling Your Insects

After you have pinned an insect, make out a date-locality-collector label to put with the insect. Blank index cards without lines can be used for insect labels. The example below shows you how the labels are to be filled out. If the insect was not collected in Missouri, use the back of a printed label to record the date-locality-collector information.

Fayette	Co.	COMMON NAME
MO 21 Jun	19	
Coll. John Doe		
		<i>Ladybird Beetle</i>

Use a fine-pointed pen, called a crow quill pen, and India ink to fill in the labels. Ball-point pens and pencils are too coarse or smeary to do a neat job, but a micro-point roller ball pen is acceptable.

It is usually a good idea to fill in a label while it is still attached to the label sheet. If you cut the label out first, it is harder to hold in place while you write on it because it is so small.

After you have completed a label and cut it out, attach it to the pinned insect. Line the label up so it is parallel to the insect's body and can be read from the left side of the insect. Lining up the date-locality-collector label in this way better protects the insect from damage and also takes up less space. It will also allow the "Common Name" label to be read more easily when it is put on the pin.



Identifying Your Insects

Identifying insects can be a real challenge, but it is also fun. There are several ways to figure out what kind of insect you have:

- Matching your insects with pictures in books. A good book is **Handbook of the Insect World** by Hercules Powder Company, which is out of print but can be purchased from a number of online booksellers. There are also many excellent field guides available at book stores and on the Internet that can help with identification. Some are listed below:
 - Borror, D.J. and R.E. White. A Field Guide to the Insects. Boston: Houghton Mifflin Co.**
 - Covell, C.V. Peterson Field Guide to Eastern Moths. Boston: Houghton Mifflin Co.**
 - Dunkle, S.W. Dragonflies of the Florida Peninsula, Bermuda, and the Bahamas. Gainesville, FL: Scientific Publishers.**
 - Farrand, J., Jr. The Audubon Society Pocket Guide to Familiar Insects and Spiders. New York: Knopf.**
 - Feltwell, J. Butterflies of North America. New York: Smithmark Publishers.**
 - Klots, A.B. A Field Guide to Butterflies. Boston: Houghton Mifflin Co.**
 - Milne, L. and M. Milne. Audubon Society Pocket Guide to North American Insects and Spiders. New York: Knopf.**
 - Walton, R.K. The Audubon Society Pocket Guide to Familiar Butterflies of North America. New York: Knopf.**
 - White, R.E. Peterson Field Guide to Beetles. Boston: Houghton Mifflin Co.**
- If you can't find a picture to match an insect you have, you can use a key to identify it. An insect "key" is a step-by-step system which leads you to the proper identification of an insect. The **Key to the Orders of Insects**, available on the Missouri 4-H Projects webpage, will help you identify orders of insects and also has descriptions of the insect orders to supplement the information in the key.

Check the Missouri 4-H Projects webpage for additional resources in identifying insects.

Getting More Variety in Your Collection

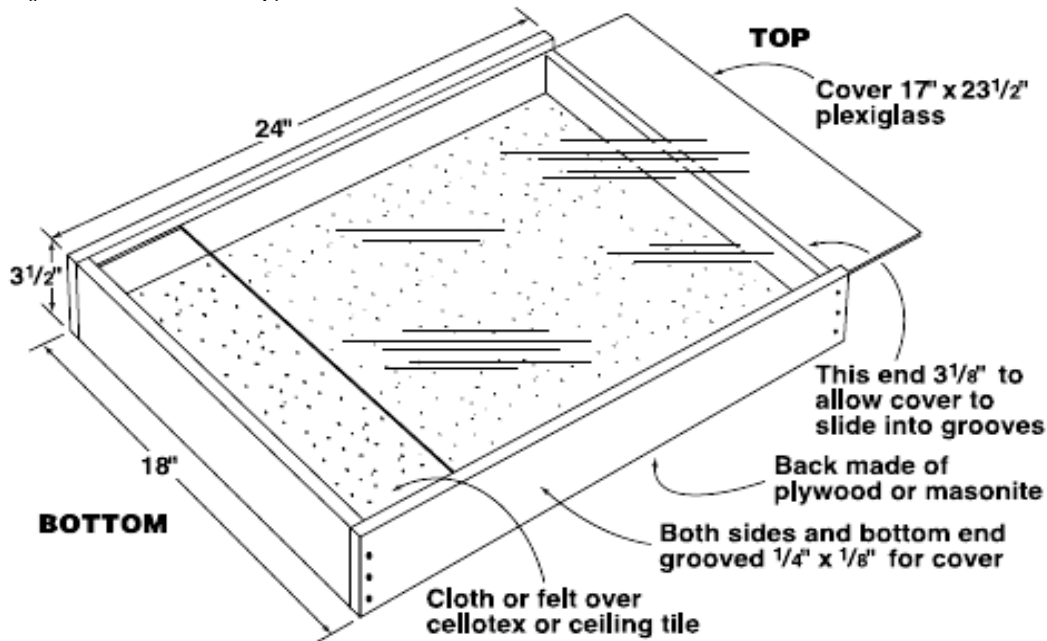
If you collect in only a few different places during the day and use the same collecting techniques, it may be hard to find enough variety of the insects you want for your collection. Many types of insects that cannot be found during the day are attracted to lights at night. Some insects will come to lights early in the evening, and others may come very late. The color of the light also affects the attraction of insects. A black light (ultraviolet) is more attractive to a greater variety of insects than lights of other types. You can also devise traps to collect insects when you are not at the light.



Storing and Displaying Your Collection

After you have pinned and labeled your insects, keep them in a safe place (such as a cigar box, covered shoe box, or insect box from a hobby store) where they will not get broken or eaten by carpet beetles. Placing moth balls in the insect boxes will also help repel carpet beetles.

If you enter your collection in the display competition at fairs, you will have to use a regulation 18" x 24" x 3 1/2" inch display box with a Plexiglas cover.



DISPLAY CASE

18 X 24 inches

Materials List:

1. Bottom 1/4" X 18" X 24" plywood or 1/8" x 24" tempered masonite
2. Two side pieces of pine 3/4" x 3 1/2" x 24" groove to accept cover 1/4" x 1/8"

3. One end piece of pine 3/4" x 3 1/2" x 16 1/2" groove to accept cover 1/4" x 1/8"
4. One end piece of pine 3/4" x 3 1/8" x 16 1/2"
5. One cellotex or ceiling tile 1/2" x 16 1/2" x 22 1/2." Cover bottom so pins will stick.

6. One piece of cloth or felt to cover bottom, about 18" x 24"
7. One plexiglass for cover 1/8" or more x 17" x 23 1/2"

Collecting and Displaying

1. All exhibits are to be in standard size boxes: 18" x 24" and not more than 3 1/2" thick with a plexiglass cover and cellotex-type false pinning bottoms. The reason for this very specific sized box is because it will fit into the state fair display racks. While there is a limit on those selected from the county to exhibit at state fair it's a good idea to be prepared by having the right size box for the time you may, rather "will" be selected.
2. Specimens are to be arranged so the box can be exhibited horizontally. (Inside tip to understand the rationale for this. The racks at state fair are displayed horizontally.)
3. Identification labels should be used. Follow instructions for pinning and labeling included in this curriculum supplement.
4. Use insect pins for pinning insects.
5. Include a "collection catalog" in an envelope attached to the back of the display box. The catalog should list each insect, its order and common name. Ideally space should be left next to each listing for judge's comments. Boxes selected to advance to the state fair will not be re-judged. State Fair exhibits are a showcase of Missouri 4-H project work.



Ideas for Exhibits and Project Goals to shoot for:

Trying to come up with ideas to exhibit at the fair can be frustrating. The following are some ideas/goals you can consider. Keep in mind you could exhibit other things you have made for the project like, killing jars, spreader boards, pinning blocks, collection nets, etc. The following ideas (goals) are for those who want to collect, label and exhibit insects!

As a goal, the first-year project would start with one box but could be up to 2 boxes. Try to collect a minimum of 25 insects from at least four orders. It would be wonderful if you could collect 50 insects but that is up to each member and the project leader to decide. Identification beyond the order is not necessary, but correct “common names” should be included. Be sure to include a date-locality label as it may be hard to remember specifics about each insect as the number in your collection grows.

As a goal for your second-year of 4-H insect collections, see if you can add eight orders to your display and try to collect 50 insects! If you get really excited collecting it's ok to have 2 boxes and 100 insects. Ideally one-half of the insects should include common names. If you have a lot of insects, it is best to choose only the best specimens to make a nice-looking, uncluttered display.

It's getting tougher now. In your third-year of 4-H insect collections challenge yourself to include 2 boxes with a minimum of 10 orders and 100 insects! If you collect 150 insects, more power to you. Test your skills by including common names on all.

It should be clear that the pattern in the project has increasing complexity every year. Congratulations, you are here for the long haul. In your fourth-year of 4-H insect collections shoot for 2 boxes with a minimum of 12 orders and 150 to 250 insects. Expand your knowledge by adding a third box which focuses on a pest insect. Consider adding in the pest display box an example of the insect damage, the stage of the insect causing the damage, and any other stages of the insect that are important for diagnosing the problem. You can also include information in the display which tells how the insect is managed. All insects must include common names. The more complexity you add to your project work the more you'll learn. Or, said in another way, you get out what you put in.

Hats off to you fifth-year 4-H entomology members. This year your projects may consist of any display which pertains to experiences beyond those of previous projects. Examples include special collections of native or exotic insects, an in-depth study of one insect or small group of insects, or a collection of immature insects. Charts, photographs, models, or other visual aids may be used. You are encouraged to write a short (less than 200 words) statement regarding the theme of their fifth-year display. Fifth-year projects may be repeated for successive years, but it must be different each year.

Tips for Improving Your Display Collection

The information below will help you “make the best better” in preparing your display.

1. Insects should be arranged in the box so that the short sides of the box are the right and left. Insects must be in vertical columns with the head of each insect toward the front (top) of the box.
2. Insects on card points should be pointed in the same direction as the other insects, with the card point jutting to the left from the pin.
3. All insects of the same order should be grouped together into one series, but they may continue into more than one column. In other words, insects in the same order should not be scattered in the box and separated from each other by insects of other orders.
4. The largest insect of an order should be placed first in that order series; the rest should be placed according to decreasing size.
5. Common names should be more precise than the common name of the order. For instance, “beetles” is the common name for Order Coleoptera, so when identifying a beetle you should try to identify what kind it is, such as Colorado potato beetle.



6. See that the order labels lie flat on the bottom of the box in front of the first insect in the order series. Labels should be held in place with two common straight pins. If the series continues into the next column, label the continued column also. If an order series ends in the middle of a column, you may start the next order series right after it.
7. A "date-locality" label should be on the pin of each specimen. The pin should go through the center of the label. The label should be aligned parallel to the insect's body so it can be read from the left side of the collection. Keep the labels at a uniform height on the pins.
8. If the wing length of moths or butterflies is one inch or more, the wings should be spread.
9. The "common name" labels rest on the bottom of the box and are held in place by the specimen pins. The pin should go through the right side of the label, causing the label to jut to the left from the pin. If the insect is large and blocks the view of the common name label, the label may be placed on a separate pin close after the insect. Every insect should have a common name label whether anything is written on it or not.
10. Every insect in the collection should be different, either a different species or a different form of the same species. (Males and females of the same species often look slightly different, so you can use a male and a female as different insects.)
11. Damaged or poorly pinned insects detract from the appearance of your collection. Replace such specimens if you can. However, if a damaged insect is your only representative of that order, then you should include it in your display collection. (Insider tip: you only have one chance to make a good first impression. Always strive do you best and look your best in both project work and everyday life.)
12. When entering your display at your county fair, consider attaching a collection catalog to the display box. The catalog will make it easier for the judge to make constructive comments.
13. A more diverse insect collection will be more rewarding for you and more fun to share with others.

Good luck, and remember... *have fun!*

