



Entomology Leaders Guide

Welcome to the world of bugs! Entomology, also known as the study of Insects, is a branch of science that has proved to be instrumental in understanding the natural world happening around us. This project aims to teach members how to properly catch, study and identify some of the smallest animals in our ecosystems so that they too can gain respect and understanding of these little critters!

Project Completion Requirements

Project Items & Record Pages

- Complete at least five (5) project topics or activities
- Create at least two tangible items that will be on display at Achievement Day
- All activities/project meeting topics must be documented on the record page provided.
- Member Guide must be at the **CLUB** Achievement Day with **ALL** pages completed.
- NOTE:** Although the group may do activities together, project members are expected to document & display their own project/activity items at Achievement Day.

Exhibition Requirements

Members are strongly encouraged to participate in the 4-H Classes at PEI Fairs & Exhibitions

- Members may choose **ONE** tangible project item to send on the Exhibition Circuit.
- Group members **do not** have to send the same items.
- Chosen item must be approved by the 4-H Specialist at the Club Achievement Day

4-H Year Completion

In order to complete the 4-H year members are required to:

- Complete the **PCR's (Project Completion Requirements)** as outlined above
- Complete a **Communication** Project
- Complete a **Community Service** Activity
- Complete an **Agriculture Awareness** Activity

The Project Leader's Job

To begin, thank you for volunteering your time to be a 4-H project leader! We appreciate your time and willingness to teach today's youth a new skill and share your knowledge.

Becoming a project leader can feel overwhelming at first, but we hope that this page will make your "job" clear and offer some tips to help you be successful.

Responsibilities

1. Become a screened leader

You may have already completed this step, but it is a very important one. The best place to go is to the 4-H PEI website and visit this page: <https://www.pei4h.ca/4-h-leaders>, to see if you have completed all the necessary requirements. Project meetings cannot begin until you have received a "conditional letter" from the Provincial 4-H Office.

NOTE: As of July 2019 a new policy has been implemented by 4-H Canada that each project group be accompanied by two screened leaders. *Insert more information about what National has to say about this policy and why they think it is important for this policy to be in place.*

2. Set Project Meeting Dates

The amount and length of project meetings is determined by you, the project leader. That being said, you are responsible for covering **five** activities or topics (see project activity ideas pages) with the group. You may decide that you'd like to have five meetings - covering one topic per meeting, or you may decide to spend two 5 hour sessions with your group and cover multiple topics or activities in one meeting. This will also depend on the project you are leading. For instance, if you are leading a quilting project, then the member will be focused on one large item with multiple steps and skills involved. However, a rabbit project may require multiple meetings (and even locations) to cover different activities and topics. Meetings can begin anytime after November 15th.

Whatever the case, we highly recommend that Project Leaders **set dates in advance of members signing up for the project**. This method will ensure the members know what they are signing up for, or enable them to make a decision to not sign up if they cannot commit to the dates listed. We also hope that this will avoid a lot frustration for you, because working around multiple schedules is almost impossible!

3. Choose Topics and Activities

You may choose to work on this step before setting dates for project meetings. Some topics and activities may be able to be covered in one project meeting, while others may need their own meeting. Regardless, we ask that you document your project meetings and topics covered on the next page so that the 4-H Specialist can refer to this information at Achievement Day if necessary.

4. Materials & Supplies

While you are responsible for determining what materials and supplies are needed, you **are not** responsible for covering these costs. Options to consider:

A. 4-H Canada has a FCC 4-H Club Fund that all leaders are welcome to apply to. These grants are valued at \$500 each. Applications are accepted August through to the end of October.

B. Asking for supplies. Depending on what project you are leading, just putting a call out for the supplies you need to friends, family, etc. may be successful

C. Determine an estimate total for the materials and supplies needed and set a "project fee" that all members will pay to help cover the additional costs

5. 4-H Year Completion and Project Completion Requirements

The project leader **is not** responsible for 4-H Year Completion (these components will be completed at the Club level) though each member **must** complete these components. Project leaders should focus on the Project Completion Requirements, found on the front cover of this guide. These are the items that the 4-H Specialist will expect to see on display at the Club's Achievement Day (typically scheduled for June-July).

6. Club Meetings & Events

Project leaders are not expected to attend monthly club meetings, but are more than welcome to attend if they'd like to know what is going on at the Club, Provincial or National level of 4-H. Similarly, Club events and activities are open to project leaders, but it is not necessary to attend. Project leaders are encouraged to attend Achievement Day. This is an event that wraps up the Club's 4-H year and a celebration of member success.

The Project Leader's Plan

After reviewing the Project Completion Requirements list on the front of this guide, review the Project Activity Ideas page/s. You can also pull ideas from past experiences, books, social media, online or you can plan to join a tool, attend an event or book a guest speaker. The sky is the limit! Regardless of what activities or topics you decide upon, you should choose five in total. It might be a good idea to ask the 4-H members in your project group what they envision before making a concrete plan. In some cases, the project group members may depict what activities or topics based on what project item they have in mind.

Topics and Activities

1. _____

Supplies needed:

_____	_____
_____	_____
_____	_____

2. _____

Supplies needed:

_____	_____
_____	_____
_____	_____

3. _____

Supplies needed:

_____	_____
_____	_____
_____	_____

4. _____

Supplies needed:

_____	_____
_____	_____
_____	_____

5. _____

Supplies needed:

_____	_____
_____	_____
_____	_____

Entomology

Around our feet exists a tiny world we can sometimes find hard to understand, or even notice. This world seems so different from ours but, in reality, in many ways it is very much the same. There can be rulers governing societies, and parents caring for young ones as they learn how to survive. There are friendships, battles and chances to learn from mistakes. Of course in this world, everything happens much faster. A single season in our world can be the length of a lifetime, or many generations of lifetimes, in this tiny world. A great many things happen very quickly, and so may be easy to miss. This project manual was created to help you (yes you!) learn how to pay closer attention to the creatures that inhabit this miniature world, and to begin to understand how much this world is truly a part of our own.

- Retrieved From Entomology Reference Guide (4-h Saskatchewan)

Planning Your Project

- **Review & Select** the activities which you want to learn more about based on your division level - *possible topic choices are included on the next page!* Leaders and/or members are also invited to research and create their own project activity.
- **Discuss** with your project leader the project activity outlines as explained in the guide. The Leader Resource (*available at the 4-H PEI Office*) does include more detailed instructions for some project activities.
- **Identify** your goals & time-line for completing chosen project activities



Requirements For this Project:

1. Magnifying glass or eye Glass
2. Clean glass or plastic jars of different sizes with wholes that have been punched into the lids (by an adult)
3. A butterfly net
4. A lined, durable notebook that will be used for field work!



Supplies & Materials

Supplies and materials will be needed for this project. Project leaders are not expected to cover the cost of these items. The leader can decide if they would like to set a fee for the project or if they would like to divide up the total cost of materials and divide amongst the project members. 4-H Canada also offers annual FCC Club Grants. Applications typically go live in August and are due at the end of October. These grants are an excellent way for project leaders to get some extra funding for materials.

Remember...

The multiple intelligence theory teaches us that people learn in at least 8 different ways. All individuals will be stronger in some ways of “intelligence” and weaker in others. It follows that the more ways we teach, the more members we will reach. Teaching projects using a broad blend of writing, reading, hands on work, artwork, self evaluation, discussion, and so on, will help increase the learning potential of all members.

Projects are designed to teach many skills. However, the 4-H member is always more important than the subject matter. Stress cooperation in the activities where possible to develop teamwork and cooperation skills. These are valuable skills that will assist them in a number of settings. Ensure the work is completed in a manner that members feel good about themselves and their efforts. This can be done by assigning appropriate tasks or roles based on member’s individual abilities. Modeling and expecting supportive behaviour (i.e. no “put-downs”) amongst members, or by other adults, also contributes to a positive experience.

Project Activity Ideas

Introduction to a Miniature World

- **Start Your Field Book!**
- Get your introduction to the world of insects, and how to properly study and identify new species!

Be Bug Smart

- Learn the importance of staying safe while studying insects and understand which ones need to be observed with caution

Species Diversity:

- **Practicing with a Dichotomous Key**
- How to Identify insects using a simple “Key”

“ Franken-Bugs”:

- Different insects have beneficial adaptations to help them live in their environment! Create your own “ultimate bug”!

Underground Burrowers and Litter Dwelling Insects

- Learn about the world beneath our feet! Insects have adaptations and unique methods of living underground!

Labeling Project for Underground Burrowers and Litter Dwelling Insects

- These labeling practices will help you when sketching and drawing new species and habitats for your field notebook!

How to Build a Simple Pit fall Trap

- How to catch terrestrial insect like beetles or ants safely!

Insects in Flight

- **Catching Insects Using Nets**
- Learn how to use a butterfly net to capture butterflies, moths, dragonflies or damselflies and carefully examine them.

Learning about Metamorphosis

- Watch your own butterfly change and grow through the amazing process of metamorphosis!

Building and Aquatic Trap

- How to safely capture and study insects from still water habitats, like lakes or wetlands!

Worlds Collide– Coexisting with Insects

- Insects living in every habitat and eco-system imaginable-including your back yard! Learn about the roles insects play in urban areas!

Building a Food Chain

- Learn the important roles different kinds of insects play as predators or prey

New Format. New activities. New ideas.

- In its first year of the new project format, the 4-H staff welcome any feedback, questions or concerns about the Blacksmith Project. Please do not hesitate to get in touch. Further instructions are provided in the Leader Guide.
- If you have an idea or topic in mind for a project activity that relates to blacksmithing, be sure to talk to your project leader! The new project format allows you to review, discuss and select activities that interest you and your fellow 4-H project members. If you don't see something that you are interested in, suggest a new idea! Have fun with it!

Introduction to a Miniature World - Starting Your Field Notebook

This Activity will show members how to correctly identify and sort a variety of common insects and will introduce them to some of the scientific language of the world of bugs! The two best ways of identifying insects apart from other small critters are the presence of six legs and two pairs of wings. Six legged animals are referred to as **“hexapods”**. Insects are also identified by their hard outer-bodies, this is referred to as their **“exoskeleton”**. So when doing their research on bugs, members should be looking for six legs, two pairs of wings and possibly a hardened outer body! An example of this would be a butterfly (six legs & two pairs of wings) versus a Spider (eight legs & no wings). With this new information we can determine that a butterfly is an insect, while a spider is not!

Requirements- Members: <ol style="list-style-type: none">1. A lined, durable notebook that will be used for field work!2. Pen or Pencil / Ruler	Requirements—Leaders: <ol style="list-style-type: none">1. Pictures of various insects
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Now that we know some basic terms—how will we record all our information on the insects and bugs we find as we go along? We must start our **Field Notebook**:

Things to Include in your field notebook:

1. Your name on the inside of the book cover AND the date on the top of each new page! That way you can look back on when and where you found bug and begin to recognize migration or habitat patterns!
2. Any new word you hear or learn about, especially the scientific terms that will be bolded in the new activities! It will be easier to remember them this way!
3. Drawings of new insects you find! Between your project meetings, if you see an insect that you are interested in, try to draw it with specific details! If you cannot draw it, then write them down! That way at your next meeting the leader can help you identify the insect!

How to Draw an Insect:

1. First, you must find the beetle you want to draw. If this is your first attempt at drawing a beetle, it might be easier to find a picture of a beetle, as it's always much harder to draw something that's moving around.
2. Start by drawing the body (is the beetle rounded or more square?).
3. Once you have drawn the body, the head can follow (Does it stick out past the body? Does the beetle appear to have a 'neck' or is the head difficult to tell apart from the body?) Don't worry about adding in details just yet. We'll add in the other parts first.
4. A beetle's body wouldn't go very far without its legs, so these should be drawn in next. Remember that beetles have six legs. When you're just beginning to draw beetles, just try to draw the basic shape of the legs (Are they very rounded? Or square? Do they have large claws at the end of their legs or are they blunt?)
5. Now that our beetle has a body, a head and legs on which to move about, it needs a way of finding out where it's going.
6. The final step is to draw in the antennae (Are these short or long? What shape are they? Like a thread or do they branch off into different pieces?) Once you get better at drawing beetles, you can include details like how many segments the antennae are made of, or how many segments the legs have. But don't worry about that until you've mastered the basics!

Be Bug Smart

Requirements:

1. Field Notebook
2. Online Access, or printed pictures of "Most Wanted" Insects.

Instructions:

1. Insects have many ways of defending themselves from predators, including stinging or biting. The more you know about biting or stinging insects in your area before going out and exploring, the less likely you will be to have an unfortunate encounter with an insect who thinks you are a predator and has no choice but to defend itself.
2. Find images and make your own descriptions of what you think are the top five most common biting or stinging insects in your area. Be prepared to present your findings in a creative way to your club. Consider treating these insects as if they are on a 'Most Wanted' fugitive list. They are armed and dangerous, and should only be observed from a distance. Include in your presentation what you think would be the safest way to observe these insects (e.g. From what distance is it safe to observe them?)



Species Diversity - How to Classify Insects

To understand the **species diversity** surrounding us in the insect world, we have to properly use the terminology of Entomology. Firstly, insects have their own scientific names, however for the purpose of this project we will use the common name we all are familiar with (butterfly, beetle etc.). Secondly, each species can belong to an **Order**. An order is a broad group that can be made up of many types of species. For example, all beetles belong to the same order, but if you found any **aquatic** beetle (a beetle that lives in the water), it would surely belong to a different species than a beetle you found in a **terrestrial** (land) environment.

What are the Seven Insect Orders:

1. Beetles (Order : *Coleptera*)
2. Bees, Wasps and Ants (Order: *Hymenoptera*)
3. Butterflies and Moths (Order: *Lepidoptera*)
4. Dragonflies and Damselflies (Order: *Ephemeroptera*)
5. Flies (Order : *Diptera*)
6. True Bugs (Order: *Hemiptera*)
7. Grasshoppers (Order: *Orthoptera*)

Identifying insects and keeping track of where you found them will help you recognize the insect diversity in a particular area. You may start to notice, or perhaps you have already, that different kinds of insect populations are associated with different kinds of habitats. For example, you will find different insect communities underground than you would in water, flying around in the air or among flowers

It can be easy to tell different groups of insects apart; you can easily tell the difference between a butterfly and a beetle, right? Sometimes however, it can be quite tricky.

- To tell the difference between insects that look similar, and identify what they are, those who study insects (called **entomologists**) use a *key*. This is not the kind of key you use for a lock. An entomologist's key is a written series of steps, based on visible features of the insect, that help you identify what sort of insect specimen you have found.
- Each step is composed of two parts. Read both of the components of each step carefully. Then examine your specimen to see which category it fits into. **Your specimen must only fit into one category**, so choose the **best** fit.
- Step one asks the collector (that's you!) to identify how many legs the insect specimen has. If you count six legs, you would follow the instructions in the brackets and move forward to step two. You would continue reading the subsequent steps, repeating the process of understanding each of the steps and looking for the characteristics in question on your specimen. If your specimen has more or less than six legs, as represented in option b), your specimen is not classified as an insect at all, and therefore could not be identified using a key specified for insects.
 - (Note: there are keys for spiders, and other noninsect creatures as well, but our focus in this project is on insects.)
 - On the next page is an outlined "Key Activity" you can use to help key insects to one of the seven orders we have already introduced.

Practicing with a Dichotomous Key

Instructions

1. Find an insect specimen and place it in an area where it can be easily observed. If it is a live specimen, a clear container with holes punched in the lid by your club leader should provide a clear viewing area.
2. Observe the features of the insect specimen paying close attention to the number of limbs, colour, size, presence or absence of wings, etc.
3. Follow the instructions provided in the key to identify the specimen to order level, making note of any other insects in that order (i.e. if your specimen is an ant, remember that bees and wasps also belong to this same group). Remember to write down the steps you take in the key in your field notebook. This way if you accidentally make a mistake, (This is okay. You will get better with practice.) you can work backwards and see where that mistake was made.
4. Make sure to be recording the new Species and Order names in your field book for future reference!
5. Have your club leader check your final guess to see if you are correct.



What You Need:

1. Your field notebook
2. Either a real bug or various pictures of common insects to your area



Key to Seven Insect Orders	
1.	a) Your specimen has six legs. (Go to Step Two.) b) Your specimen has more or less than six legs. (Your specimen is not an insect.)
2.	a) Your specimen has two sets of large, spread out wings. (Go to Step Three.) b) Your specimen has very small wings, wings that are folded or hardened, or no wings at all. (Go to Step Four.)
3.	a) Your specimen's wings are coloured with either bright or dull colors. (Your specimen is a Butterfly or Moth.) b) Your specimen's wings are mostly clear, or if they are coloured, the body is very long and slender. (Your specimen is a Dragonfly or Damselfly.)
4.	a) Your specimen has its wings folded across its back, and they form an "X" pattern, as they cross each other. (Your specimen is a True Bug.) b) Your specimen does not have wings folded in an "X" across its back, or it has no wings at all. (Go to Step Five.)
5.	a) Your specimen has a set of hardened front wings hiding the bottom pair of wings. (Your specimen is a Beetle.) b) Your specimen does not have a hardened set of front wings, or if the front wings appear hardened, it has very large hind legs used for jumping, or it has no wings at all. (Go to Step Six.)
6.	a) Your specimen has tough front wings that are folded on its back, with large hind legs used for umping. (Your specimen is a Grasshopper.) b) Your specimen has only spread, membranous (thin and see-through) wings, or it has no wings at all. (Go to Step Seven.)
7.	a) Your specimen has only one obvious pair of wings. (Your specimen is a Fly.) b) Your specimen has two pairs of clear wings, often with a colourful body (e.g. yellow and black) or it has no wings at all, often with a black or dark coloured body. (Your specimen is a Bee, Wasp or Ant.)

“Franken-Bugs”

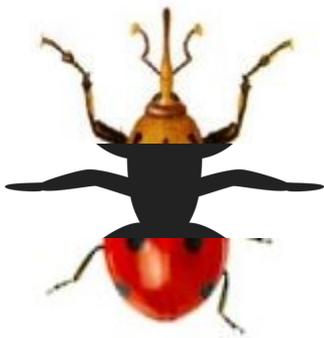
Instructions

1. Use magazines and/or websites to find pictures of all different kinds of insects.
2. Cut or print them out and spread them on the floor in front of you. Look at your collection, paying special attention to any unique parts (large wings, small legs, oddly shaped bodies or whatever catches your eye).
3. Start selecting the parts of certain insects you like best – only picking one part from each insect. Pick what you think would be the best head, the strongest body, the most useful wings (if you want wings), unique antennae, legs and any other feature you want to be part of your “Franken-bug”.
4. Once you have the parts of your perfect insect, start gluing them all together either on a sheet of construction paper or in your field notebook.
5. Once you’ve built your very own unique creation, write out a short description of why you chose the parts of insects that you did to build your new creature. You can even give it a name.
6. Don’t forget to show off your amazing new creature to your fellow club members.

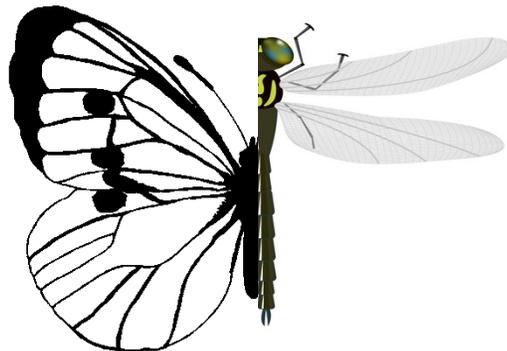
What you will need

1. A collection of pictures from magazines or
2. websites of different insects
3. Scissors
4. Construction paper (or you can use your field notebook)
5. A glue stick

Example 1:



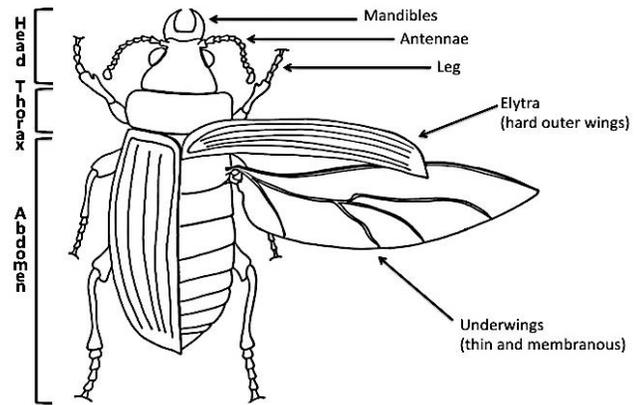
Example 2:



Underground Burrowers and Litter Dwelling Insects

Below is a generalized Beetle diagram. This is an outline to identify the parts of a general beetle that could also be found on many other species of insect.

1. **Mandibles:** pointed mouth parts, usually found at the front of their head. Used to catch prey and forage for food.
2. **Antennae:** Found behind the mandibles, and are used for location and communication. They are feelers that identify the environment for the insect, and when they are used to touch another insect become a form of communication. Some have a number of little antennal segments (*antennomeres*) which can help with identification.
3. **Thorax:** joins the head of the beetle with the rest of its body, located directly behind the head. Where the first pair of legs are usually found.
4. **Abdomen:** the body of the insect
5. **Elytra:** The outer set of wings, used for defense and protection of the underwings. Usually hard, and are a part of the *exoskeleton*.
6. **Underwings:** The wings under the *Elytra*, these are thin and fragile, most commonly used for flight. Though not always as some beetles have a fused Underwing that acts as a second layer of defense.



FOR MORE INFORMATION AND FURTHER RESOURCES ON THESE TOPICS A PDF REFERENCE GUIDE CAN BE MADE AVAILABLE FOR LEADERS OR FOLLOW THIS LINK: <https://www.4-h-learns.org/resources/entomology-reference-book2015cansk>

Another common insect found on the ground would be the Ant! Similar body structure to a beetle, except and Ant does not have wings. They do, however, have a very complex hierarchical social structure, which can be shown in the diagram below of a basic Ant colony. To make this social structure work, Ants are born into difference roles!

1. **Workers:** small, infertile female ants are the ones that find food and bring it back to the colony and place it in **Food Storage**. Those are the ones you find in a garden or on the sidewalk.
2. **Soldiers:** Infertile female that are larger, they can defend the colony from predators due to their powerful jaws.

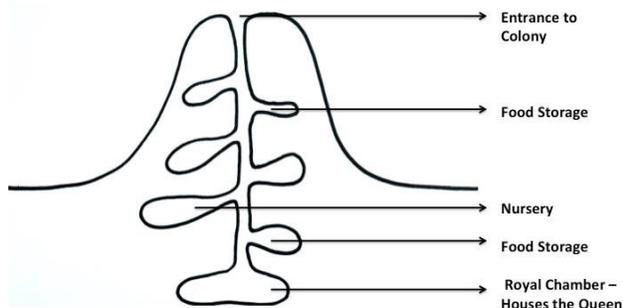


Figure 2. Basic structure of an ant colony. Notice how there may be more than one food storage chamber, depending on the size of the colony. There may also be more than one nursery or entrance to the colony, but only one royal chamber.

3. **Drones:** Fertile male ants develop wings and fly to meet princess ants, and possibly even make new colonies.
4. **Princesses:** Fertile female Ants with wings. With drones, they can move to a new area and make a new colony, under which they would become a Queen. They are found in the **Nursery**.
5. **Queen:** Queens lose their wings after being a princess as all their foods is taken to their **Royal Chamber** at the bottom of the Ant colony. They can live up to 30 years!

Underground Burrowers and Litter Dwelling Insects

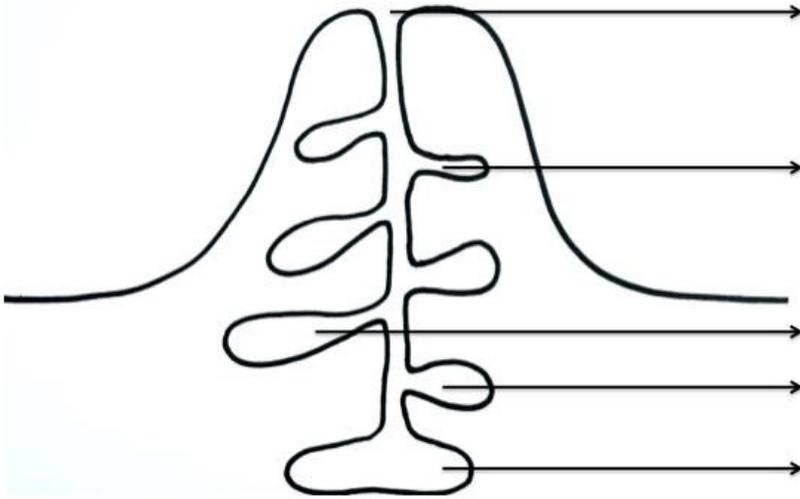
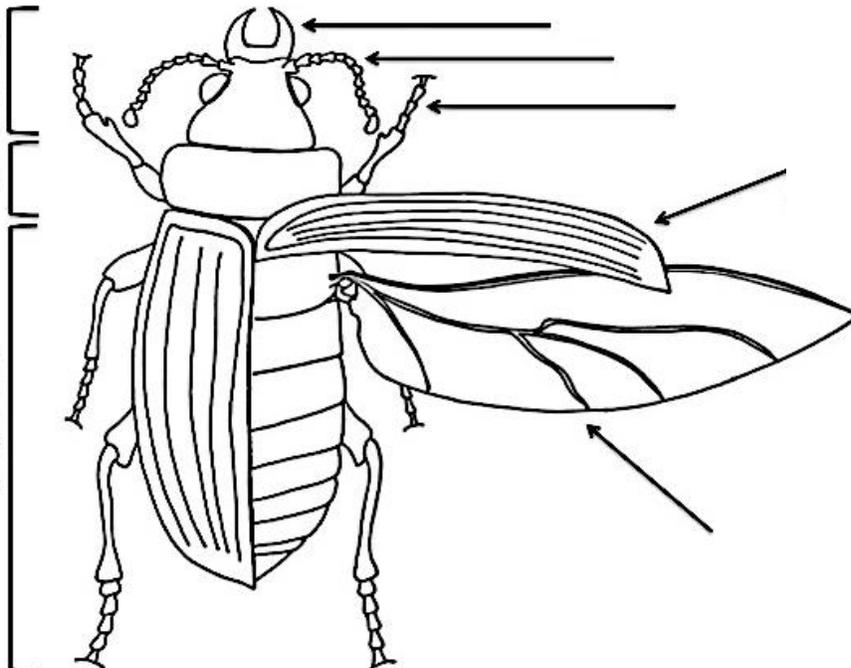


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How to Build a Simple Pit-Fall Trap



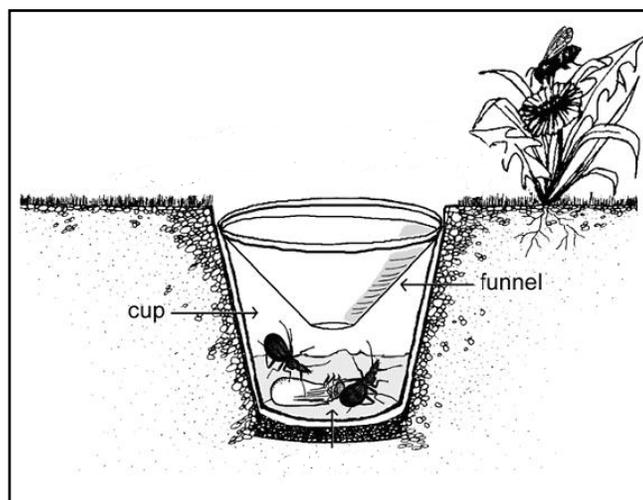
What you need

1. A plastic container like a plastic cup or jar
2. A trowel
3. A plastic funnel or a flexible material shaped into a funnel
4. Some dog food, cat food, sugar or honey to use as bait
5. Your field notebook



Instructions

1. First, check the weather forecast and ensure there will be no rainfall within the next three days. This will help you trap living specimens – you don't want to drown any insects.
2. Next, take your plastic container and funnel and find an area outside that you have easy access to but won't be disturbed by other people. Your own backyard is usually the best place to start.
3. Use your trowel to dig a hole in the ground about the same shape and depth as your plastic cup. Try digging in a shady, quiet spot.
4. Place your plastic cup into the hole and pat the soil down around it so that the top of the container is flush with the land around it. It's very important that the lip of the plastic container should not rise above the level of the land.
5. Once you are satisfied, bait your trap with dog or cat food if you are looking for ground beetles, or honey or another sweet bait if you are looking for ants. Only a little bit of bait is necessary (four or five pieces of cat or dog kibble, or half a teaspoon of sugar or honey).
6. Finally, place the funnel on top of the trap. The funnel should also be flush with the surrounding land. The trap works by enticing insects with the smell of food, and as they come to investigate, they slide down the funnel into the container below ground, unable to escape until the trap is checked.
7. It's important to write in your field notebook where you set your trap so you don't forget!
8. Around the 24-hour mark, return to your trap and carefully check to see if anything has fallen in. If not, the trap can be reset (bait renewed and checked again in another 24 hours). If there is an insect present, carefully remove the jar or cup, keeping the funnel overtop to prevent the insect from escaping.
9. Congratulations! You now have a ground dwelling specimen to identify, describe and draw in your field notebook. Make sure to release the specimen where you found it once you have finished describing it. Never keep a living specimen longer than an hour as this may stress it out.



Insects In Flight

Dragonflies And Damselflies: these insects have incredible range of motion due to their four wings. These particular wings are a very thin extension of the *exoskeleton*. Their strength comes from the thin network of lines that run across the surface of the wing called **venation**. The venation allows for the thin wing to have the strength to travel in many habitats in search of food, and to move very quickly in any direction. Despite their similarities, there are a few differences that help Entomologists to differentiate between the two:

1. Dragonfly: has a thick, strong and usually shortened body with wider wings. The eyes are set close together on its head, and may even touch at the center. The wings never fold atop the body.
2. Damselfly: has a long slender body that is delicate. The wings are very long, but have the ability to fold over the body when not in flight. Its eyes are usually spread very widely apart on the head.



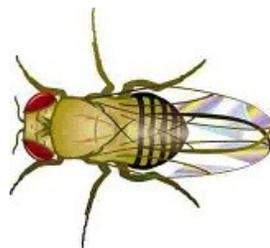
Butterflies and Moths: when thinking on these insects, not much would come to mind that makes them similar when in fact they are apart of the same overall group. Their larger, more delicate wings are due to their need for slower flight, as they feed on nectar instead of other animal. The reason behind their oftentimes beautifully patterned wings is to protect them during flight, as they do not have the speed to get away from a predator. The spots on their wings are called **eyespots**, and are used to confuse predators into thinking the insect is a larger animal. The differences between these two are really only found in their sleeping habits and coloring.

1. Butterflies are “day workers” and are pollinating during the day, moving between flower to flower. They have bright coloured wings to blend into the foliage and to confuse predators.
2. Moths : are the “night workers”, and find nectar in the flowers that bloom at dusk or night, their colours and patterning often more dull so that they can blend into the night.



Flies and Wasps: The largest and most diverse Order of insects would be **Diptera**, which covers all flies, from mosquitoes to fruit flies. A common survival technique found in many flies is the mimicking of the colouring of a wasp or bee to scare off predators. The black and yellow colouring discourages any predator from getting too close, for fear of being stung. The only difference is found in their wings as all flies have only two wings, while bees and wasps have four. One thing these two groups do have in common though, is a wide variety of eating habits. Wasps are **omnivorous**, meaning they eat both plant material and meat.

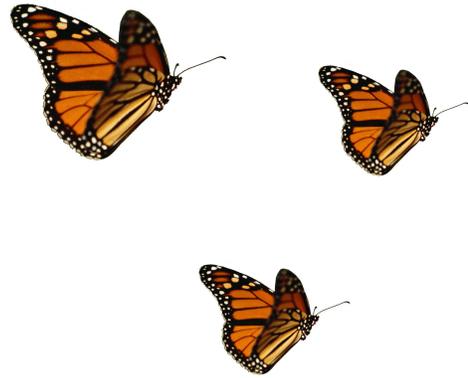
A very important thing to keep in mind when watching these insects is that some do have stingers as an anti-predator survival technique and so it is important to use caution and give them their space! However, if you do not bother them, they will not bother you so if one does fly around you, stand still and quite and swatting at it will only anger or scare it.



Catching Insects Using Nets

What you will need

1. A lightweight butterfly net with at least a diameter of 12 inches
2. Your field notebook
3. A pencil
4. A ruler
5. A clear and clean container with a lid that has had small air holes punched into it



Instructions

1. Under the supervision of your club leader or another adult, go outside on a warm sunny day and find a spot where there are a lot of flowers. A meadow or garden will do (ensure you have permission to be there). Catching flying insects can be frustrating as many of them move very quickly. Remember to be patient. Don't focus all of your energy on catching insects – remember to observe them and your surroundings too. Also, be gentle when trying to catch them. Don't hurt surrounding plants, and definitely don't hurt the insects you are trying to capture. Use long, broad sweeps of the net to capture your specimens. It's almost always futile to chase after insects you are trying to capture because they can most certainly fly faster than you can run. Rather, wait in one spot for an insect to land near you then try your best to gently capture it with your net.
2. If you happen to catch a specimen in your net, ask your club leader or an adult to help you move it into your clear container. Gently set the net overtop of the container and coax the insect into the jar, always remembering that insects are extremely fragile. Once the insect is in the jar, replace the lid quickly, and enjoy observing what you have caught.
3. Make notes in your field notebook about insect type, colour and size (try using your ruler to measure the length of the body, or length of the wings and record your measurements).
4. Once you have made your observations, remember to release your insect; never keep an insect captive longer than one hour.

Learning about Metamorphosis

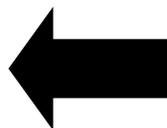
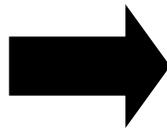
What you will need:

1. Pencil crayons or markers
2. Your Entomology Project Reference Book
3. A copy of the diagram on the following page

Instructions:

1. Congratulations, you have just discovered a new species of butterfly. As an entomologist, your job is to record this new insect's life cycle (drawn below).
2. Start by appropriately labeling each step of the butterfly life cycle and at the very end, colour in your adult butterfly including any and all unique colours, shapes or patterns that are present on its wings or body.
3. Make sure you think about the purpose of the colours of your butterfly (e.g. bright wings to scare off predators or dark wings to hide).
4. Share your new butterfly with your club.

METEMORPHOSIS - The Life Cycle of Butterflies



Building an Aquatic trap (1/2)

What you will need

- A metre long pole (preferably plastic)
- A clear jar
- A plastic funnel
- Thin and flexible wire
- Duct tape
- Four metal S-hooks
- Two elastic bands
- Flagging tape
- Small net or sieve
- A plastic pail (ice cream buckets work well)
- Your field notebook

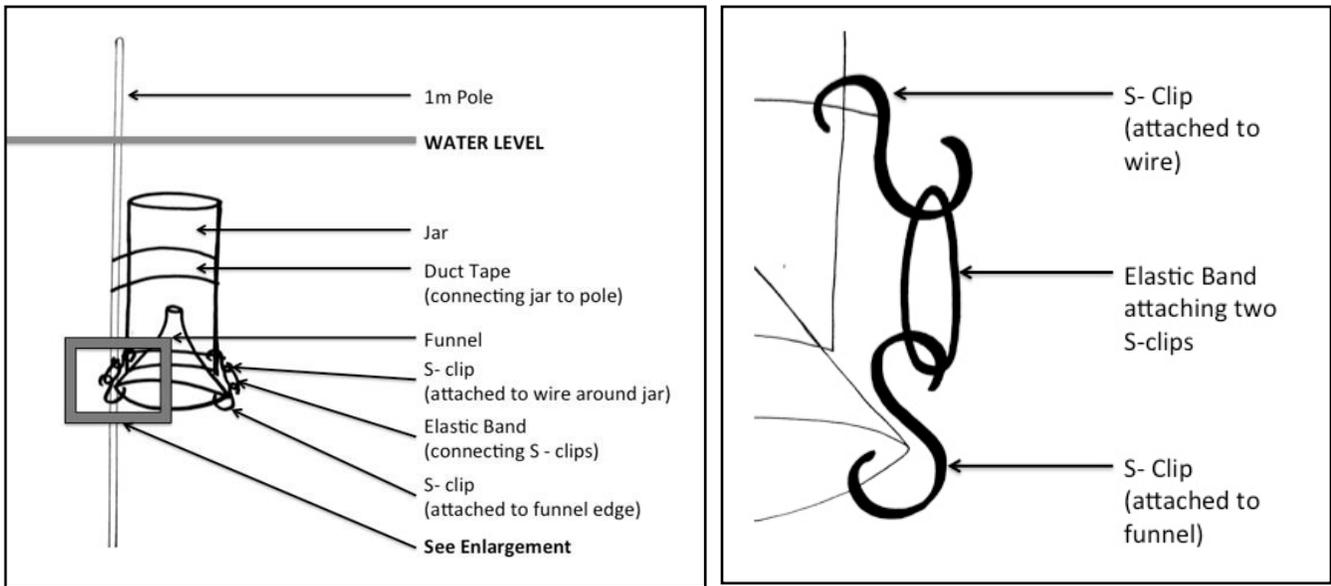
Instructions

Are there nearby still water areas you suspect might be rich in insect life? Take note of these areas and their depth. Make sure they have an approachable shore and a fairly shallow bottom (no more than half a metre – you don't want to go for a swim while setting your traps). Once you have a location picked out, you can begin building your aquatic insect trap.

Building your trap

1. Start by loosely wrapping some wire around the mouth of your jar. Wrap the wire around at least four times, ensuring it's tight enough to not fall off the lip of the jar, but loose enough that two metal S-hooks will be able to fit between the lip of the jar and the edge of the wire (you will be hanging the S-hooks from the wire later on). Leave the two ends of the wire free and dangling at least four inches down either side of the jar. Once this is done, tape the loose ends of the wire down with duct tape. This will help keep the wire in place.
2. Next, tie two S-hooks to each of the elastic bands. The S-hooks should be on either end of the elastic band. Then, hook one S-hook from each elastic band to the wire around the lip of the jar, and the other S-hook around the lip of the funnel, which should sit with the funnel pointing downwards into the jar.
3. Finally, either duct tape your jar to the metre-long pole or use both wire and duct tape to tie your trap to the pole (you can fiddle with the two combinations and try to set your jar either horizontally or vertically on the pole). Note: your trap will be sitting with the open end of the funnel pointing towards the ground, and the bottom of the jar facing upwards. Ensure that your trap is placed about the middle of your pole so that the whole trap will be submerged when it is placed in the body of water.
4. Now you're ready to put your trap in the water. Go out to your chosen body of water and gently fill the trap with water before pushing the pole into the muddy bottom. Your trap should stand up on its own near the edge of the wetland (where you can easily reach it) with the jar suspended just above the sediment.

Building an Aquatic trap (2/2)



Checking your trap:

After 24 hours your trap will be ready to be checked. Bring a small net or sieve and a shallow pail.

1. First, add some water to your pail and leave it on shore.
2. Then, gently remove the trap from the water, first by removing the pole from the muddy bottom and rotating the trap in the water slightly before lifting it up from the water.
3. Bring the trap onto land and drain it into your sieve or net.
4. Now quickly but gently empty the contents of your net or sieve into your bucket.
5. Observe any moving life forms. Can you observe any insects? Any non-insects?
6. Be sure to write down descriptions of the creatures you find, and draw them if you can, in your field notebook. Identify them using your insect guide or a website and be ready to share your findings with your club.

****Always make sure you gently release your specimens back into the wetland where you found them once you have finished studying them.****

Worlds Collide – Coexisting with Insects

Urban Insects:

The urban landscape, places like cities or towns, is full of adapted insects species. However, in places of large human population, many of these come to be seen as pests or dangers to health. Flies for example, they eat rotting meat or animal waste and due to this can spread harmful bacteria around between humans. This has caused them to gain a reputation as spreaders of disease. While this is part of the picture, and it is always important to keep your food clear from insects such as this, they also play a vital role in the urban ecosystem. Flies, mosquitoes and other insects are a large part of aviators diets. Without them in the urban landscape, no birds would stay either. Another example would be Bee's or Wasps. They are feared in gardens and parks, and yet they are the main contributor to pollination of the greenery we see around towns.



Pollinators:

Insects hold many roles in food production. They are both instrumental in the growing of food and a pest to many farmers. This is due to the large number of species of insects that all have a unique affect on the environment surrounding them. One of the largest ways they effect agriculture, is due to pollination. **Pollinators** are animals that serve to move pollen from one flower to another. Pollen is involved in the fertilization of some plants, resulting in the production of a fruit from that flower, When insects acts as a pollinator they are helping all kinds of crops to produce more food, enough to feed the human population.



Curious Case of the Cockroach:

One of the most infamous **invasive species** around would be the cockroach. They are “non-native” species that have come to Canada, and have been able to find a space for themselves in new ecosystems. This is in part due to their hairy legs. Their legs are covered in minute hairs that are extremely sensitive to vibration on the ground from predators, meaning they are very good at hiding. They are also famous for their ability to rapidly reproduce and survive in a multitude of climates. They are another example of how there is a balance between the insect and human world, because this ability to migrate into new areas is aided by human migration patterns as well. It is though that most cockroaches in Canada originated from European cockroaches that were stowaways on ships and transports during times of Settlement by the Europeans.



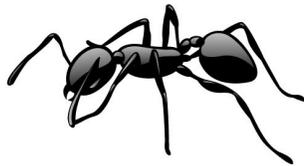
Building a Food Chain

What you will need

1. Multiple small pieces of paper (enough that each member of the club has a piece)
2. A hat or container to put them in.

Instructions

1. Label each piece of paper with one of the following:
 - Flower
 - Ant
 - Mosquito
 - Butterfly
 - Predacious beetle
 - Dragonfly
 - Bird
2. Each member of the club begins by picking a piece of paper at random out of the hat or container. The piece of paper determines what animal each club member is.
3. Now, the group has to place themselves into a food chain. Begin by discussing what role each animal plays in an ecosystem, and place predators near one end and plants and grazers at the other.
4. Once the chain is formed, each member must announce his or her role in the food chain.
5. This game can also be treated as a race. The club can be divided into two teams, and whichever team builds their food chain correctly the fastest, wins. To add a further challenge, a 'wild' card can be put into circulation. Whoever picks this card must make up his or her own link in the food chain (e.g. honeybee).



4-H Judging

Judging is an important skill that you will use in 4-H and beyond. As a 4-H member, judging will help you develop important assessment skills, and with practice, you will learn to carefully **observe, evaluate, make decisions, communicate with confidence.**

Is Judging a requirement for THIS project?

Judging is not a requirement for **ALL** 4-H PEI projects, but you are encouraged participate in the practice whenever possible.

- When Judging is a requirement, it will be listed in the PCR's (Project Completion Requirements) on the front page of this member booklet. Members will need to fill out the score card below showing that the activity has been completed. The judging activity will be arranged by your project leader!
- When Judging is not a requirement, members and leaders may use the information and scorecard below for practice and learning. The skills learned from 4-H judging are used in everyday life situations, so it is always a useful skill to build!

Score Card for Judging				
I place this class of:	_____	in the order of	_____	_____
	<small>(Description - specify type of animals or items)</small>		<small>(1st)</small>	<small>(2nd)</small>
			<small>(3rd)</small>	<small>(4th)</small>
I place _____ over _____ because:				
Reasons:	_____			

I place _____ over _____ because:				
Reasons:	_____			

I place _____ over _____ because:				
Reasons:	_____			

I place _____ at the bottom of this class because:				
Reasons:	_____			

For these reasons, I place this class of:	_____	in the order of	_____	_____
			<small>(1st)</small>	<small>(2nd)</small>
			<small>(3rd)</small>	<small>(4th)</small>

4-H MEMBER OPPORTUNITY - Provincial 4-H Judging Competition (Annual Event)

This event is open to all members, ages 9-21, and offers a great opportunity to learn more about judging in a competitive atmosphere (Three age categories & cash prizes awarded to top members for their judging abilities). Senior members (17-21) also compete for the chance to join the **Maritime 4-H Judging Team** to compete at **Agribition** (Regina, SK) in November.



- **4-H Canada Learns** is a resource tool providing information on 4-H projects from different provinces. Check out www.4-h-learns.org/resources - keyword "judging" for resource documents that will help with developing and building your judging skills!
- **4-H PEI** is able to provide information to members and leaders on both livestock and non-livestock judging practices. Check with your 4-H Specialist for more information **AND** be sure to check out the 4-H PEI Judging Resource page at www.pei4h.ca/4-h-judging-resources

Member Reflection

As a 4-H member, you are encouraged to “Learn to Do by Doing” through hands-on activities. Keeping a record of your 4-H activities with this **Member Reflection** will provide helpful insight for you, your leader and the 4-H Specialist as to skills you have learned and projects you have completed throughout the 4-H year!



Skill Based Project: You are encouraged to work on skill development and completion of project requirements (with guidance from the project leader) throughout the 4-H year. Not every activity will have a tangible item (for display), but you are asked to share the activities and learnings in which you participate below...

Project Activity: _____

What I did: _____

What I learned: _____

What I liked: _____

Project Activity: _____

What I did: _____

What I learned: _____

What I liked: _____

Project Activity: _____

What I did: _____

What I learned: _____

What I liked: _____

Project Activity: _____

What I did: _____

What I learned: _____

What I liked: _____

Project Activity: _____

What I did: _____

What I learned: _____

What I liked: _____

(feel free to use more space if necessary!)

LEADER COMMENTS (optional): Leader observations can be helpful to you in future years with this and other 4-H projects. Be sure to ask your project leader if they would like to reflect on your 4-H year.

I am most impressed by... _____

I believe that you have learned... _____

In the future I encourage you to... _____

4-H Year Completion Checklist

In addition to completing a Skill Based 4-H project, members are also required to participate in Communications, at least **ONE** Ag. Awareness Activity and **ONE** Community Service Activity in order to complete the 4-H year.

Use the space provided to reflect on what you have learned through participation in these activities.

If this information has already been completed in another booklet, please indicate where it can be found:

My Communications Activity

- Speech
 Demonstration (Single)
 Demonstration (Team)
 Alternate Communications: _____

What I learned: _____

What I can work on: _____

Agriculture Awareness Activity

What did you do to complete this activity this year? (Either on your own or with your 4-H Club)

What area of Agriculture would you like to explore in the future?

Community Service Activity

What did you do to complete this activity this year? (Either on your own or with your 4-H Club)

What will you do in the future to give back to your community?

4-H PEI - Staff Comments (Optional)

Completion Requirements		Completion Notes
Skill Based Project		
Communications		
Ag. Awareness Activity		
Community Service Activity		