Introduction to Entomology:

Collection and Observation of Insects

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Activity Name: Intro to Entomology (for grades 4-8)

Ages: 9-14

Activity Energy: Low, Medium

Length of time: 2 days (2 hours each day)

Number of Participants: 1 – 30

Indoor/Outdoor: Both

Concept: This lesson is an introduction to insects and entomology. Students make their own insect traps, leave them out overnight and examine their catch the following day. A PowerPoint is also available to assist with discussion and to introduce Entomology to students using local examples. *See the other files associated with this resource.*

Materials Required: Materials for making traps (recycled where possible!): bottles, bowls, old sheets, wooden dowels, tape, scissors. Bait to attract insects will vary depending on species, but can include: meat, fruit, or even a small light.

Introduction: Insects are the most numerous and diverse class of animal, comprising approximately 73% of all animal species with more than 1 million different species described to science and an estimated 2-3 million additional species yet to be described (Gullan and Cranston, 1994). Because of their diversity, insects are ideal for studying concepts of evolution such as fitness and adaptation. In this lesson, students will learn basic insect biology, see some examples of local insects, and reflect on the adaptations that help these animals to survive in their environment.

Methods:

Day 1 (2 hours): Students build their own insect traps to be placed outside overnight. They can come up with their own design, or use the designs found at the links below. We recommend using non-lethal traps so that insects remain alive. This allows for observation of insect behaviour, and teaches students that all life is valuable and to be treated with respect.

Baited traps: Place a piece of bait into a plastic yogurt or similar container, and bury the container so the top is at ground level. You can try using an assortment of different types of bait such as rotting bananas, fresh leaves, bits of ground beef, or anything else you can find. If you use bait high in protein such as meat make sure you take steps to prevent non-insect animals such as birds, rodents, and racoons from stealing your bait. Chicken-wire can be used effectively to make a protective 'hat' for your trap that will keep out unwanted animals while allowing the insects to fall in.

Bottle Traps: Follow the instructions in the diagram below.

Beat Sheet: If the overnight traps are unsuccessful, the class can construct a 'beat sheet' for collecting insects. Take two broom handles and lay them in an 'X'. Tape them together where they cross using some duct tape. Lay a small sheet on top of your X and attach the corners of the sheet to the ends of the broom handles. Hold the beat sheet under a shrub or tree while shaking the branches. Insects will fall into the sheet where they can be observed. You can also use an upside down umbrella or a bucket.

Day 2 (2 hours): Deliver an introductory lesson on insect biology. A PowerPoint has been created for your convenience, *see the other files associated with this resource*. Examine the species caught in the traps using hand lenses/microscopes if available. Discuss whether the species are insects or not. Get the students to identify three examples of insect adaptations that increase the fitness of an individual. Discuss the different ways in which fitness can be increased (e.g., defence from predators, ability to acquire food, ability to reproduce and care for young). Point out the connection between the forms and functions of the insects you see, and how that form/function arises in species through evolution in response to survival challenges within the environment. A good example to use is camouflage: for instance an insect that spends most of its time on green leaves will likely have different colouration than a ground-dwelling insect. Why is this an adaptation to survival?

Tips for Teachers:

- This lesson must be done at a time of year when most insects are out and about (May-October)
- If for some reason live insect observation is not suitable for your situation, another option is to obtain insect specimens (the Royal BC Museum may be able to lend out their collections)
- Once you have captured your insects, you may want to perform some experiments; check out our lesson on Insect Behaviour

Background facts and information:

- There are thought to be about 1 million described species of insect. Uncertainty about the specific number is due to the possibility of 'new' species being described more than once through a failure to recognize the extent of diversity within a species (Gullan and Cranston, 1994). It is thought there are between 3-4 million species of insect that have not been described, primarily in the equatorial regions of the planet.
- Number of insects in some of the bigger orders: Beetles (Coleoptera) > 300,000 species, Wasps, ants, and bees (Hymenoptera) = 250,000, Flies (Diptera) = 175,000, Butterflies and Moths (Lepidoptera) = 175,000, True Bugs (Hemiptera) = 175,000. No other orders exceed 20,000 species (Gullan and Cranston, 1994). In comparison, there are about 8,000 species of bird known to science.
- See the notes within the PowerPoint for more facts and information.

Possible Extensions:

There are many different lessons that would go well with this intro.

- For older students, using dichotomous keys to identify insects
- Discuss the role of insects in ecosystems (decomposers, predators, prey, etc.)
- Students could also choose a particular insect to do a research project/presentation on
- While building the traps, students could write an instruction manual or draw up blueprints

Literature Cited:

Campbell, N., & Reece, J. (2005). *Biology (7th ed.).* San Francisco: Pearson, Benjamin Cummings.

P.J. Gullan and P.S. Cranston (1994) *Insects: An Outline of Entomology*, *2nd edition.* Blackwell Science