Luvabug Learning

the child scientist at play

an activity guide for teachers

Entomology as child's play

Maybe children are in love with bugs because most bugs live down low where the children are, sharing space with them.

Bugs are little. Most don't bite or sting. Most seem rather unafraid and therefore friendly, though very, very busy doing what they're doing with an air of mystifying purpose and preoccupation. They don't seem to mind much when a child's eye gets close. Often they will crawl onto an offered finger. Sometimes they will do some wondrous and astounding thing.

Many bugs — unlike robins, squirrels, and rabbits — are not difficult to catch. They can be put in jars where the captives duly captivate. Given what they need inside the jar, some insects will demonstrate obligingly the utterly amazing cycle of their lives.

Insects are the most abundant of all the animals. Is there an outdoor place where there are none in summer? All children have a chance have a chance to know them and to love them. As the seasons move from spring to summer and on to fall, there are new bugs to play with and to study. There seems to be no end to insects, except when winter shuts them down — a moving lesson in itself.

Are entomologists just grown-ups who never lost their love for bugs?

"Luvabug Learning" is designed to help creative teachers make the most of children's high regard for insects. The essentials of good science — posing questions, running tests, observing, and concluding —exist quite naturally within all children. Engage the eager minds of child scientists with their common love of bugs, add a little guidance, and the children will retain respect for science and their love of nature — and of insects — throughout their lives.

The child scientists will be at play for life.

…designed to help creative teachers make the most of children's high regard for insects.

Serendipity Sessions

Children (like all the higher animals) are built to learn by opportunities that come by chance. When curiosity — motivator of both scientists and children — jibes with serendipitous occasion, attention rivets; learning is easy and lots of fun.

We offer here no complex science lessons to prepare and give. Rather we want to show teachers how to be alert and ready for the moment when an insect strays across a child's path. These things can be done most anywhere the bugs — which is most everywhere.

All children in a class need not be present for each occasion — peer-sharing will take care of that. While interest is sill high, an insect can be brought into the classroom for all to run new tests that can answer questions asked.

Here the teacher does not **teach** a lesson, but facilitates the learning — perhaps also asking questions that can be answered by the child scientists so hard to play.

The insects and the kids take center stage.

IOWA STATE UNIVERSITY
Extension and Outreach

PM 1516 December 1992

Serendipity Sessions

Insect Serendipity material adapted by permission from Douglas Fleury, Caterpillar Catalyst, Inc.

Beetles. Every fifth living thing is one.

(Coleptera = coal-ee-*op*-tera) – an order

Beetles on their backs. Roll over, Beetle!

Can the observation be repeated? How do different beetles do it differently? Data sheets, graphs, and statistics CAN make sense.

Premise
They don't like it. They make every effort to turn back over on their feet as quickly as they can. *Why the panic?*

Each beetle uses its body parts (its equipment) and movements (its techniques) to get back on its feet. *How do they do it? Do they always do it the same? Do different beetle species do it differently? Can their speed at turning over be predicted?*

Needs
• any big live beetle on its back

Set up
Some beetles can be found when they fall off jostled plants, or they may be found inside the classroom window in the morning, or they may come toward a flashlight in the night.

Activity
If at any time during a beetle encounter the beetle is on its back, focus the students' attention by asking them to watch what the beetle does next. After the beetle turns over, ask the children to report what they saw. If the beetle moved too fast, roll it over on its back and let them watch again.

You may be able to inject this demonstration into any situation in which there is a larger beetle present. Before the beetle is on its back ask some "what if" questions to elicit student predictions and hypotheses.

Variations
Compare the strategies or time it takes for representatives of different beetle species to get back on their feet.

Studies
Use several beetles of the same species to see if the observations can be repeated. Compare different species in a genus or genera in a family. If the beetles are too fast, try videotaping them. Have the investigators design their own data sheets, graphs, and statistics; describe in art, prose, or poetry the efforts of a beetle on its back. Magnification may be necessary if smaller beetles are studied.

Chirping beetles — Cerambycidae (long-horned wood borers)

(Cerambycidae = "ser-am-*biss*-us-dee" — a family

Premise
Long-horns, who have wonderfully long antennae, are fairly common from early summer until first frost. As grubs they can do some damage to plants by feeding in their stems. If you've ever picked up an adult long-horn, you may have noticed that it squeaked or chirped depending on how big it was. Most of the members of this family make noises. In the fall, several species can be found on the flowers of goldenrod.

These beetles have chewed their way out of solid wood, so be careful of the mandibles. Once you recognize your first long-horn, you will find more members of this large beetle family.

Needs
• any long-horned beetle
• scrap of stiff paper or a credit card

Set up
In order to hear this beetle well (and safely), you must take care not to put its jaws so close to your ear that you get bitten. One easy way to do this is to put the beetle on something flat, such as a credit card. The card touches your ear before the beetle does and acts like a resonator.

Activity
See how many different long-horns you can find. Compare their sounds. If you find two colored the same but of different size, you may have a male and a female. Check to see if there is any difference in sound.

Studies
The squeaks of different cerambycidae are of different pitches and quality of sound. The sounds record nicely and would make a fun collection. There are computer programs that will digitize the sound and graph the sound pattern.

Beetles as work horses — harnessing a superbug

Premise
Most insects are able to move things greater than their own weight. Beetles' heavy exoskeleton has permitted children everywhere to tether them for flying exhibitions. It is also possible to hook them up so they can pull a weight.

Needs
- surface with traction (such as a towel or sandpaper)
- any large beetle one or more inches long
- a piece of sewing thread and a paper clip
- weights to pull

Set Up
Tie a harness around a part of the beetle s body, but NOT in the groove between the head and thorax, or between the thorax and abdomen or the beetle will cut itself in two when it pulls. Many beetles have handy horns on their heads or spines on the sides of their thorax to tie the harness to.

Beetles have well-developed claws on the ends of their feet. They will need a surface the claws can cling to — felt, cloth, or sandpaper will do. Open the paper clip into an "S" shape. Tie the free end of the thread to loop in the "S." Place washers or small fishing weights (one at a time) onto the other loop of the "S" as the beetle pulls.

Studies
You can improvise a balance to measure how the beetle's weight compares to the weight it has pulled. Tape three pencils in a bundle to make a fulcrum that will hold a ruler as a balance beam. Put the beetle at one end (it's tricky to keep the beetle from crawling off, but teamwork will prevail).

Put the weights the beetle pulled at the other end of the balance. For more accurate measurements, borrow a beam balance.

Running tests. Measuring. Keeping track.

Beetles, beetles, everywhere! What makes a bug a beetle?

Premise
Because every fifth living thing is a beetle, most insects children find will be beetles. If children can say that an insect is not a beetle, they have taken a giant step in insect identifications.

Needs
- any insect over ¼-inch long

Set up
Look at pictures first. A most striking feature of a beetle is its wing covers, called elytra (pronounced eel-eye-tra). One is called an elytron. They are hard or leathery, and usually meet in the center, forming a straight line down the beetle's back. They do not have veins. When a beetle takes off, it must first faise its elytra, then stretch out its flying wings, which are folded up beneath. (Both ladybugs and fireflies do this sequence slow enough to see with ease.)

The flying wings are attached to the thorax. At the point where they meet, there is a shield-shaped or triangular plate called the scutellum. If your insect doesn't have wing covers check out the scutellum to see if the covers are very short.

Beetles all have chewing mouth parts. If your beetle is very small, these may be hard to see with magnification. Beetles have a wonderful variety of antenna forms. Their length, composition and arrangement give important clues to identifying beetle families.

Activity
Gather different beetles to compare, and then draw pictures. Try writing a description of what a beetle looks like so a Martian could use it to identify one.

Studies
Make a perpetual journal of beetle families found in a certain area, such as the school grounds. Develop an identification guide for common beetles found by the students.

Observing closely. Describing similarities and differences.

World's largest insect trap — your school building

Premise
Scientists use insect behavior to devise traps so that seldom-seen insects can be collected for study. Some of these traps are as simple as a piece of cardboard on the ground under which insects will hide and be caught. Some are tricky. A piece of clear glass across an opening on a trail will be bumped into by many insects, who will then fall into a trap below.

Your school building incorporates these and several other devices that trap insects. Technically your school is one of the biggest insect traps there is.

Needs
One school with big windows.

Set up
Insects will come into the school building for many reasons. At the beginning of the school year, clean off your window stills. Then you will have an idea of the variety of insects that come into the school, get trapped and die at your windows — usually of dehydration.

Activity
This activity can be as simple as checking each day to see what has been caught by the windows. To make this more scientific, put each week's "catch" into a baby food jar filled with rubbing alcohol cut to 35 percent (70 percent strength rubbing alcohol diluted half and half with distilled water). A paper label with the location, date, and how collected written in pencil will give enough data to make the specimens usable in formal studies.

Variations
If one class on each side of the building does this, you can tell which is a better collecting area. Certain building features may favor some rooms, such as those near outside doors or near inside or outside night lights.

Studies
Insects that have dried out are very crunchy. They can be picked up with a watercolor brush wet with alcohol and transferred to the jar. The orders or families of the insects caught can be tabulated each week. Temperature and weather conditions should be entered in a journal. One study could try to record as many different orders or families of insects as possible. Another might show how insect populations change as the season changes. These studies can be done each year to generate a master log for insects coming into the school.

References

— for young people

Hutchins, Ross E. 1972. *Insects in Armor — A Beetle Book.* Parent's Magazine Press, New York. 64 pp.

Lavine, Sigmund A. 1962. *Wonders of the Beetle World.* Dodd, Mead & Company, New York. 62 pp.

Oda, Hidetoma. 1986. *Beetles.* Raintree Publishers, Milwaukee. 32 pp.

Patent, Dorothy and P. Schroeder. 1978. *Beetles and How They Live.* Holiday House, New York. 159 pp.

Penny, Malcom. 1986. *Discovering Beetles.* The Bookwright Press, New York. 48 pp.

Rood, Ronald. 1972. *Bees, Bugs, and Beetles.* Scholastic Book Service, New York. 64 pp.

Watts, Barry. 1989. *Beetles.* Franklin Watts, London. 29 pp.

— for teachers

Dunn, Gary A. 1990. *Buggy Books: A Guide to Juvenile and Popular Books on Insects and their Relatives.* Young Entomologists' Society, Inc., Lansing. 120 pp.

Hapai, Marlen Nachbar and Leon H. Buton. 1990. *BugPlay: Activities with Insects for Young Children.* Addison-Wesley Publishing Co., Reading, MA. 283 pp.

Kalmus, H. 1960. *One Hundred and One Simple Experiments with Insects.* Doubleday & Co., Garden City. 194 pp.

Prepared by Dennis Melchert, Iowa State University Extension communications, Doublas Fleury, Caterpillar Catalyst, Inc., and Wendy Wintersteen, ISU Extension entomologist.

... and justice for all
The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue SW, Washington, DC 20250-9410, or call 800-795-3272 (voice) or 202-720-6382 (TDD). USDA is an equal opportunity provider and employer.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Cathann A. Kress, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.