

Let's Do Science

Grade Two

Small Crawling and Flying Animals



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and Flying Animals

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Small Crawling and Flying Animals

Before You Begin

Children are naturally curious about, and fascinated by, small crawling and flying animals. This is a hands-on unit that encourages observation of these important members of the animal kingdom. Students learn about the structure and life habits of animals by discovering where these diminutive creatures live, what they eat and are eaten by, and how they are uniquely suited to their particular environment.

Topic E: Small Crawling and Flying Animals

(Suggested time: 6 weeks or ongoing)

If you are approaching this topic as a year-long study, small animals should be obtained in the fall and cared for and observed over the school year. Pet stores or scientific supply companies may supply the animals you want. For a study over a six-week period, May and June are good times to observe small animals in a park or conservation area. Small animals can be borrowed from students or other classrooms for this short period. Any small animals borrowed from the outdoors must be returned to their original location after a short time.

Prepare for this unit by collecting or making temporary containers in which to keep small animals (for example, insects and their larvae, earthworms or spiders). If you are interested in keeping any small crawling and flying animals for the school year, you will need to supply permanent homes for the animals. These can be made using clear containers that have lids with holes, which allow air to pass through but are secure enough to prevent the animals from escaping. Fine netting secured over the openings works well. Correct living conditions, including habitat and food supply, must be maintained. **If you plan to hatch larvae, place an order with a scientific supply company in advance to ensure the larvae arrive at the desired time. Consider any allergies students might have to these animals.**

Note: See “Care of Living Things in Live Animal Studies” in the Introduction to grade 2 on page 21.

Background Information

This unit deals with the enormous variety of small-scale animal life we encounter in our local environment. In addition to introducing conventional ways of sorting these animals into distinct categories, emphasis is placed on the importance of these diminutive life forms in the grand ecological picture.

All animals, large and small, are either *vertebrates* (animals with backbones) or *invertebrates* (animals without backbones). Vertebrates include fish, amphibians, reptiles, birds and mammals. For the most part, vertebrates all have a skeleton consisting of a skull with hinged jaws, a backbone and two pairs of (usually jointed) limbs. This internal support structure allows vertebrates to grow much larger than most invertebrates. Conversely, the lack of an internal support structure dictates that most invertebrates are small. The individuals of one large group of invertebrates, the arthropods (see below), have a soft body covered by a hard protective outer shell called an *exoskeleton*. Although smaller, invertebrates greatly outnumber vertebrates in sheer numbers. More than 90% of animals are invertebrates!

In fact, well over one million different species of invertebrates have been discovered and classified to date. Since these represent the greatest number of small crawling and flying animals encountered outdoors, let's look at the major categories into which we can sort invertebrates. With the exception of the exclusively marine *Echinodermata* (starfish, sea urchins and sea cucumbers), examples from each of these categories can be found in Alberta ecosystems.

Flatworms and Roundworms

As the name suggests, flatworms have flat bodies. They range from a fraction of a millimetre in length (for example, the *Polycelis* flatworms found in the lakes and streams of Alberta) to over 15 metres (such as the parasitic tapeworms that live within the internal organs of many vertebrates, including man). Some roundworms are parasitic too, such as the trichina worms that make their homes in the muscles of pigs and rats. (If pork is not thoroughly cooked, these worms can survive in the human digestive tract and plant themselves in the musculature of people, crippling and sometimes killing their host). Roundworms (also called *nematodes*) have bodies that are long, slender, smooth, cylindrical, and pointed at both ends. Many harmless species can be found in the soil and in ponds and streams.

Segmented Worms

These animals differ from flatworms and roundworms in that their bodies are divided into segments, or rings. Although you can find species of segmented worms in the ocean and in fresh water, the species we are most familiar with is the earthworm found in soil. Earthworms literally eat

their way through the soil, digesting dead plant and animal matter and excreting this rich material at the surface. By loosening and mixing the soil, earthworms perform an essential task. Almost every segment of an earthworm is equipped with tiny bristles, or *setae*. These hold one part of the body in place while the remainder extends during the crawling motion. The earthworm breathes through its skin, which must always be moist, but not submerged. After a heavy rain it is not uncommon to find earthworms that have fled to the surface to avoid drowning. If they do not return to the soil before their skin dries out, they die. Leeches (bloodsuckers), many species of which thrive in water, are another example of a segmented worm.

Mollusks

These are animals with soft, fleshy bodies. Most mollusk species (but not all) incorporate an external or internal hard shell.

- Clams, oysters and scallops are mollusks with two-part, hinged shells held together by strong muscles.
- Snails and slugs are good examples of single-shelled mollusks. They live in both salt and fresh water and on land. Snails carry their shells on their backs and can withdraw into them for protection. Their eyes are at the end of two protrusions on top of their head. Snails have a single foot which secretes a slime along which the foot slowly moves. On dry land, this leaves a tell-tale shiny trail. The tongue of a snail has rows of sharp teeth and can scrape small plants off stones or off the sides of aquaria (a very useful trait). This tongue can also cut larger plants into pieces, and even drill holes in the shells of other animals. Slugs are much like snails, except the shells of slugs are small, thin plates. These animals live in damp places—under leaves, logs and stones.
- Squid, cuttlefish and octopuses are mollusks with no shells or shells within their bodies. The internal shell of the cuttlefish is sold as the cuttlebone that is provided as a dietary supplement to cage-birds.

Arthropods

The enormous number of animals that belong to this group have jointed legs, external skeletons (exoskeletons) and several body parts (usually a head, thorax and abdomen). Arthropods can be divided into four major sub-groups.

- Crustaceans are primarily aquatic animals with hard shells, such as crayfish, lobsters, crabs and shrimp. Here in Alberta we have freshwater shrimp, tiny versions of the familiar marine variety. These are active year round, thriving under as much as a metre of ice in winter.
- Centipedes and millipedes are worm-like animals that have long, segmented bodies with many legs. (“Centipede” means 100 feet and “millipede” means 1,000 feet.) They don’t actually have this many feet.

Centipedes have flatter bodies than millipedes, one pair of legs per body segment and are carnivores. Millipedes have rounder bodies, two pairs of legs per body segment and are herbivores.

- Arachnids include spiders, scorpions, mites, ticks and daddy-longlegs among their ranks. They are distinguished by the fact they have eight walking legs, two body parts (the head and thorax are joined), no wings and no antennae. Note: these eight-legged arthropods are *not* insects as they are commonly, but incorrectly, termed.
- Insects alone account for nearly 83% of all known animal life. As varied as the close to one million species of this group are, they all have six walking legs, three distinct body parts (a head, a thorax and an abdomen), antennae, breathing holes along the sides of their bodies called spiracles, and the adults have wings. Insects hatch from eggs and undergo changes in form as they grow into adults. This process of change is known as *metamorphosis*. Some insects, such as grasshoppers, pass through three stages: egg, nymph and adult. Their appearance does not change greatly from the nymph to the adult stage, so they are said to undergo an incomplete metamorphosis. Others, such as butterflies, moths, flies and beetles, pass through a complete metamorphosis of four stages: egg, larva, pupa and adult. The final adult form is quite different from the preceding three forms. For example, caterpillars change to butterflies or moths, grubs become beetles and maggots transform into flies.

Due to their small size and large numbers, small crawling and flying animals (vertebrates and invertebrates alike) are sometimes taken for being unimportant pests. Although mosquitoes, ticks and snails carry parasites that cause disease in humans, and scorpions, spiders and snakes can deliver deadly bites or stings, small animals are beneficial because they fill essential ecological roles (niches). For example, without small crawling and flying animals, flowers would go unpollinated, many large animals would starve and plant and animal waste would quickly pile up to unmanageable proportions. For a fuller understanding of the primary consumer, secondary consumer and decomposer roles that small animals play, see the discussion of food chains and food webs in the grade 5 unit Wetland Ecosystems.

As mentioned above, small animals are both consumers and are consumed. They make ready prey for larger animals. Many species have evolved highly successful defensive adaptations in response to the vulnerability that comes with diminutive size. Just try to catch a fleet-footed mouse or a burrowing Richardson's ground squirrel (gopher), pick up a horned lizard, come near a flighty grasshopper, or simply detect a moth against the bark of a tree! Your attempts will likely be foiled in every instance.

Elementary Science Program of Studies

General and Specific Learner Expectations

In general, small animal species can evolve survival adaptations more quickly than larger animals due to their tendency to produce large numbers of young and due to the quick turn around time between successive generations. In fact, it is this propensity to adapt to new environments with relative ease that has brought about their success.

The following general and specific learner expectations have been taken directly from the 1996 Elementary Science Program of Studies. The specific learner expectations (SLEs) are referred to by number in the second column of the activities table.

General Learner Expectation

Students will be able to:

Describe the general structure and life habits of small crawling and flying animals: for example, insects, spiders, worms, slugs and apply this knowledge in interpreting local species that have been observed.

Specific Learner Expectations

Students will be able to:

1. Recognize that there are many different kinds of small crawling and flying animals, and identify a range of examples that are found locally.
2. Compare and contrast small animals that are found in the local environment. These animals should include at least three invertebrates, i.e., animals such as insects, spiders, centipedes, slugs and worms.
3. Recognize that small animals, like humans, have homes where they meet their basic needs of air, food, water, shelter and space; and describe any special characteristics that help the animal survive in its particular home.
4. Identify each animal's role within the food chain. To meet this expectation, students should be able to identify the animals as plant eaters, animal eaters or decomposers, and identify other animals that may use them as a food source.
5. Describe the relationships of these animals to other living and non-living things in their habitat, and to people.
6. Identify and give examples of ways that small animals avoid predators, including camouflage, taking cover in burrows, use of keen senses and flight.
7. Describe conditions for the care of an example small animal, and demonstrate responsible care in maintaining the animal for a few days or weeks.

Cross-curricular Connections

Children's Alternative Frameworks

8. Identify ways in which animals are considered helpful or harmful to humans and to the environment.

Social Studies

- After observing soil communities and doing activities from the *Looking for a Home* unit in *Innovations, Level 2*, learn about the local community.

Language Arts

- Write stories about places to which they might like to migrate and give reasons for their choices or write the story from an animal's perspective.
- Research a favourite animal and write a report or make an oral presentation on where it lives and why this is a good habitat for the animal.

Mathematics

- Explore symmetry, measurement, geometric shapes and patterns using animals.

Art

- Create an imaginary small animal (by combining real animals or coming up with something completely new), keeping the needs and characteristics of the animal in mind.

Common alternative frameworks children bring to this unit include:

- small crawling and flying animals are bad and annoying;
- all small animals (including spiders and earthworms) are bugs; and
- apart from bumblebees, small animals have no useful roles.

Activities

Classroom teachers have identified the following activities that address the Specific Learner Expectations (SLEs) in the Program of Studies. The list is not prescriptive and teachers may select activities that are most appropriate for their students.

Activities have been listed under two headings: Key Activities and Extension Activities. Key activities are supported by authorized resources and identify “powerful and practical” means for achieving learner expectations. Extension activities represent alternative ways of achieving or supporting learner expectations.

Key Activities

Key Activity	SLE	Print Resources	Essential Materials	Comments
Finding and describing the homes (habitats) of small animals, and the animals that live in them	1, 2, 3	<p><i>Innovations in Science, Level 2, Looking for a Home (Who Lives Where?)</i>, p. 5</p> <p><i>Explorations in Science, Level 2, Creatures and Crawlers (Free Exploration)</i>, p. 6</p> <p><i>Explorations in Science, Level 2, Creatures and Crawlers (Getting to Know You)</i>, p. 10</p> <p><i>Explorations in Science, Level 2, Creatures and Crawlers (All Sorts of Creatures)</i>, p. 11</p> <p><i>Explorations in Science, Level 2, In the Field (Look and See)</i>, p. 18</p>	<p>chart paper, Bristol board, glue, string or thread, cardboard, paper, clear containers with punctured lids, spoons, magnifying lenses or micro boxes</p> <p>a variety of magnifying devices, recording sheets</p>	Initial observations of small animals can be made in the schoolyard and local parks. Later when children have learned about an animal’s habitat they may prepare a classroom environment for the short-term care of the animal. All animals should be treated with care and returned to their original homes.
Observing and comparing two closely related organisms	1, 2	<p><i>Explorations in Science, Level 2, Creatures and Crawlers (A Closer Look)</i>, p. 12</p>	magnifying glasses or bug boxes, jars of creatures	Encourage students to make lists of similarities as well as differences.
Observing a small study plot and describing the different kinds of animals that live in it	1, 2	<p><i>Innovations in Science, Level 2, Looking for a Home (A Closer Look)</i>, p. 17</p> <p><i>Explorations in Science, Level 2, In the Field (Staking a Site)</i>, p. 10</p> <p><i>Explorations in Science, Level 2, Creatures and Crawlers (In Our Hoops)</i>, p. 13</p>	<p>hula hoops (or string and Popsicle sticks), magnifying glasses or micro-boxes, clipboards, large sheets of paper, mural paper</p>	

Key Activity	SLE	Print Resources	Essential Materials	Comments
Observing and studying animal movement	2	<p><i>Critters</i> (Allen et al.) (<i>Now You See Them, Now You Don't</i>), p. 57</p> <p><i>Explorations in Science, Level 2, Creatures and Crawlers (Trailing Creatures)</i>, p. 22</p> <p><i>Explorations in Science, Level 2, Creatures and Crawlers (Ready, Set, Go)</i>, p. 23</p>	containers of small crawling and flying animals (i.e., earthworms, mealworms, etc.), magnifying glasses, watch or clock	Children can work in groups, recording their observations in journals that can be used for monitoring progress and understanding.
Observing and studying soil organisms	1, 2, 3	<p><i>Explorations in Science, Level 2, Creatures and Crawlers (Who Lives Down Under?)</i>, p. 14</p> <p><i>Innovations in Science, Level 4, Down Under (Soil Makers)</i>, p. 23</p>	<p>spoons, pails, large sheets of paper, magnifying lenses</p> <p>rotten log sample, magnifying glasses, knitting needles, resource books on decomposers</p>	
Preparing temporary homes for animals in the classroom	3, 4, 6	<p><i>Explorations in Science, Level 2, Creatures and Crawlers (Make Yourself a Home)</i>, p. 16</p> <p><i>Innovations in Science, Level 2, Looking for a Home (Building a World)</i>, p. 21</p> <p><i>Explorations in Science, Level 2, In the Field (Classroom Laboratory)</i>, p. 19</p> <p><i>Critters</i> (Allen et al.) (<i>Home on the Range</i>), p. 4</p>	<p>containers, materials and objects from the small crawling and flying animals' immediate environment</p> <p>various containers for use in transporting creatures to the classroom (for example, yogurt containers with lids replaced by clear cellophane poked with holes and held in place with an elastic)</p>	Care must be taken when transferring the small animals to their new homes.
Observing the characteristics and feeding habits of one or more small crawling and flying animals	2, 3, 4, 7	<p><i>Explorations in Science, Level 2, Creatures and Crawlers (One Very Hungry Caterpillar!)</i>, p. 18</p> <p><i>Explorations in Science, Level 2, Creatures and Crawlers (Eating Others)</i>, p. 19</p> <p><i>Explorations in Science, Level 2, Creatures and Crawlers (What's For Lunch?)</i>, p. 20</p>	containers with punctured lids, food for the animals to eat, ant colony, terrarium, wormery or other creature homes, <i>The Very Hungry Caterpillar</i> (Carle), jars with lids	Gather books on butterflies, bees, grasshoppers and other small animals.

Key Activity	SLE	Print Resources	Essential Materials	Comments
Observing camouflage in small crawling and flying animals	2, 6	<i>Innovations in Science, Level 2, Looking for a Home (Hide and Seek)</i> , p. 24 <i>Critters</i> (Allen et al.) (<i>Under Cover</i>), p. 115	green and brown pipe cleaners, coloured toothpicks, macaroni or unpopped popcorn, potato, white and coloured paint, paintbrushes, cloth scraps, buttons, toothpicks and/or other camouflaging materials	Note: Check for student food allergies when working with food.
Observing the impact of humans on small crawling and flying animals	5, 8	<i>Explorations in Science, Level 2, In the Field (Traffic Patterns)</i> , p. 17	recording materials	If the study site is in the school yard, children can count the number of people in the area for one minute, every 30 minutes.

Extension Activities

Extension Activity	SLE	Print Resources	Essential Materials	Comments
Observing growth and metamorphosis of small crawling and flying animals (to be studied further in grade 3)	6	<i>Explorations in Science, Level 2, Creatures and Crawlers (What a Life!)</i> , p. 24 <i>Explorations in Science, Level 2, Creatures and Crawlers (Our Experiments)</i> , p. 25	mealworms, caterpillars or butterfly larvae, jar, screening, elastics, apple or potato, rolled oats, container of grass and soil	As children record the progress and growth of the larvae, the teacher can also monitor the students' growth through the daily journal recordings.
Designing and maintaining a habitat for earthworms and constructing a how-to poster or booklet	3, 7	<i>Innovations in Science, Level 4, Down Under (Home Away from Home)</i> , p. 31	glass jars with lids (or cotton cloth or cheesecloth), moist sand and soil, opaque paper, worms (about five per habitat), food such as grass cuttings or coffee grounds, plant mister or spray bottle, shovels or trowels	After developing a list of worm needs with the children, make a step-by-step checklist of how to build a wormery. Students can also set up their wormeries following the directions in <i>Innovations, Level 4</i> , p. 32 and 33.
Creating models of small crawling and flying animals		<i>Explorations in Science, Level 2, Creatures and Crawlers (Models of Creatures)</i> , p. 26	a variety of art and drawing materials, egg cartons, boxes, reference books	

Extension Activity	SLE	Print Resources	Essential Materials	Comments
Designing and building a home for an imaginary animal		<i>Innovations in Science, Level 2, Looking for a Home (A Home for a Critter), p. 38</i>	natural materials, newspapers, tape, cardboard boxes, wallpaper paste, wide shallow containers, craft materials, Plasticine	
Observing earthworms		<i>Innovations in Science, Level 4, Down Under (Worm Watch), p. 26</i> <i>Critters (Allen et al.) (Warming Up to Worms), p. 39</i>	black line master 2, coloured markers, coloured pencils, paints, paint brushes, mural paper, paper plates or newspaper, plastic containers with air holes punched in lids, magnifying glasses, plant mister	Organize a space for the worm containers that is cool and out of the light.
Role-playing the components of an ecosystem	4, 5, 8	<i>Explorations in Science, Level 6, The Endangered (The Web of Life), p. 10</i>	yarn, name cards, coloured markers	
Finding, observing and studying insects in winter	3, 6	<i>Innovations in Science, Level 2, Looking for a Home (The Long Cold Sleep), p. 29</i> <i>Innovations in Science, Level 2, Looking for a Home (Going South for the Winter), p. 33</i>	<i>The Grouchy Ladybug</i> by Eric Carle, mural paper, cardboard, drawing paper, colouring and painting materials, one large piece of cardboard per child, masking tape	Encourage the children to think about where they would live over winter if they were an insect. Extend this into a writing activity.

Assessment

For a broader discussion of science classroom assessment techniques see *Assessing Student Learning* in the introduction of this publication on p. 15. Good places to begin looking for the unit-related ideas are *Explorations in Science* assessment handbooks, *Innovations in Science* teaching notes, Unit tests and Portfolio ideas, Alberta Education sample tests at www.education.gov.ab.ca and Alberta Assessment Consortium at www.aac.ab.ca

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