

Teacher notes — Animals for scientific observation by students

When using animals to achieve learning goals, teachers and students should consider their duty of care: they must demonstrate a genuine commitment to the welfare of the animals, a respect for the contribution the animals make to research and teaching, and a desire to promote the animals' wellbeing.

Teachers should model ethical behaviour to students. They should select appropriate species and ensure they have researched the specific needs of the organism/s. Information about keeping invertebrates is readily available from museums, environmental education centres, books and the internet. An excellent reference for keeping invertebrates is *Bugs alive! A guide to keeping Australian invertebrates*.

The specimens for observations of living things for young and primary-aged students are ideally sourced from a combination of those observed undisturbed in the natural environment and some kept in class which can be observed over a period of time and possibly handled. The timing of this learning will have implications for the availability and type of specimens, particularly in the natural, outdoor environment. This will also vary for individual regions and climate zones, e.g. most invertebrate species are easier to locate, are more active and are more likely to reproduce in warmer and wetter times. Plants also will tend to grow more rapidly in warmer months.

Excellent resources for identifying, keeping and observing backyard animals are as follows:

- Text — Henderson, A, Henderson, D & Sinclair, J 2008, *Bugs alive! A guide to keeping Australian invertebrates* Museum of Victoria, Melbourne
- Website — *Keeping live insects* (Queensland Museum)
<http://www.qm.qld.gov.au/Find+out+about/Animals+of+Queensland/Insects/Keeping+insects+at+home>
- Website — *Bugs* (Museum Victoria) <http://museumvictoria.com.au/bugs/>

Some animals suitable for this unit are briefly outlined below.

Animal	Background information
Caterpillars/ butterflies	<p>Garden butterflies will vary across regions. If students bring caterpillars, you must ensure that the food source is also identified and can be readily supplied (it's rarely grass). Research the individual species to ensure hazards are minimised, e.g. hairy caterpillars can cause skin irritation if handled, and food sources which contain sap can cause a reaction to skin and eyes if the food source itself is handled.</p> <p>Stems of food sources can be kept fresher by placing them in a bottle of water. Push some paper towel into the neck of the bottle to ensure caterpillars do not drown when they move down the stems at night (typical defense behavior). Specimens need to be kept in a protected fresh-air environment (but not in cold air conditioning) to match the outside conditions so they will pupate. See the supporting learning resource <i>Teacher notes — Housing invertebrates</i> (https://learningplace.eq.edu.au/cx/resources/items/ae311d0d-39bc-40d9-9f7b-aacf8856ddc6/1/Sci_Prep_U1_SLR_HousingInvertebrates.docx) for a cheap, easily constructed enclosure.</p>

	<p>Common varieties include Orchard Swallowtail, <i>Papilio Aegeus</i>; Orange Palmdart, <i>Cephrènes augiades</i>; Cabbage White, <i>Pieris rapae</i>; Blue Triangle, <i>Graphium sarpedon</i>; Common Crow, <i>Euploea core</i>; and Monarch/Wanderer, <i>Danaus plexippus</i>. A quick look at the above websites will help you with care and identification of the above species and others you may have observed.</p>
<p>Phasmids/stick insects</p>	<p>Varieties of phasmids and stick insects make excellent, low-maintenance class pets that can be handled. They live primarily on the eucalypt species. While these invertebrates require a longer-term commitment and a little research into food sources and conditions, they provide a rich source of biological learning and sensory experience. Most like a misting with rain/tank water on a regular basis.</p>
<p>Silkworms</p>	<p>Silkworms are emerging as an available insect specimen to study and are excellent class pets. However, they are only available from September onwards in many parts of Queensland, and require an abundant supply of mulberry leaves to fully develop. They must be fed daily and cannot be left in a classroom over a weekend.</p> <p>Silkworm eggs can be kept in the fridge until trees are well laden with leaves. This also avoids eggs being forgotten about and then hatching without food available. Young larvae may be fed on lettuce, but caterpillars will not complete metamorphosis without some mulberry leaves. Very young silkworms are best moved to fresh food using a soft, thin paintbrush to gently scoop them up. They must be kept indoors out of direct sun, and safe from ants.</p> <p>Once bigger, the worms can easily be handled and grow to be about six cm long if well fed. When mature, it is best to move them to a cardboard box with egg cartons and just a couple of leaves. They will begin to 'wave' their heads around, looking for a place to spin a cocoon. Cocoons are spun in corners or attached to egg cartons and it is amazing to see the worm inside eventually disappear. Approximately two weeks later, flightless white moths emerge and, as they do not eat anything, they can be placed in a fresh cardboard box with other moths. Their sole purpose is to reproduce. Males and females remain joined for some time. You will begin to identify different abdomen shapes as females start to lay their small eggs.</p> <p>Eventually, males and females all die and the cardboard box can be stored with the lid on in a fridge or dark cupboard until the following spring (be careful not to forget them, if in the cupboard). You can also cut the box into pieces and share the eggs with other responsible enthusiasts, as you will not want to be responsible for all of the eggs that hatch! (Remember, they must have access to mulberry leaves.) If you do not wish to hatch them or give them away, please dispose of them humanely.</p>

<p>Mealworms</p>	<p>Mealworms are not worms. They are actually caterpillars and will surprise you when they pupate into beetles (the Darkling beetle). They are fun and safe to handle. Several species are sold by pet shops.</p> <p>Food: natural bran (also chicken feed and oats). Occasional carrot peelings and apple pieces can be added for additional moisture/food, but must be replaced regularly.</p> <p>Water: damp balls of paper towel (no perfumes or colours).</p> <p>Home: an ice-cream container or similar in a dry, cool, darkish place is fine.</p> <p>Care: please replace fruit and vegetables before they go mouldy and re-moisten/add more paper towel for dampness every few days. Check for mealworms inside old food and paper before disposing of used material. Teach students to handle mealworms carefully. After some beetles have emerged, you can try to sift the bran to look for tiny eggs.</p>
<p>Tadpoles/frogs</p>	<p>The taking and keeping of native frogs is prohibited in Queensland without a permit. The most ethical and successful way of observing tadpoles and frogs is to set up a frog habitat in the school grounds or a backyard. If eggs or tadpoles are found in a container or in a school pond, these can offer rich learning opportunities. However, teachers must commit to their care and observe some strict rules. Providing for the wellbeing of the animals is considered paramount and the raising of tadpoles found in the local area is considered a low-impact activity as per Categories of Animal Use Activities in Queensland Schools (Queensland Government).</p> <p>Native frog species are being killed by the chytrid fungus, and removing tadpoles from their natural environment, or cross infecting tadpoles, poses a serious threat to native frogs' survival. Once raised, the frogs MUST be returned to their original location to prevent the spread of diseases.</p> <p>Tadpoles from different water sources must be kept separate. The water and habitat in which tadpoles are kept in must be free from chemicals. The animals must be released within seven days after they have morphed.</p> <p>Research on setting up a frog habitat and feeding tadpoles needs to be conducted to ensure the health and wellbeing of the animals. The following sources may be of assistance:</p> <ul style="list-style-type: none"> • Amphibian Research Centre • Queensland Frog Society • Website — <i>Frogs</i> (Queensland Government, Department of Environment and Heritage Protection) <p>https://www.ehp.qld.gov.au/wildlife/livingwith/frogs/index.html</p>

Crickets	<p>Also available from pet stores, crickets are low-cost, easily maintained animals to observe. A small tank with a little sand in the base for females to lay eggs in, and an egg carton, is all that is needed. A small clump of grass, roots and all, provides additional hiding place as crickets are nocturnal.</p> <p>A few dog pellets and some carrot peelings provide most of the food and a water-holding gel can be purchased from the pet shop also to provide water needs. Of course, netting or a similar cover is required to keep the crickets contained. A warm cover should be placed over the tank at night in colder weather/areas.</p>
Harlequin beetles	<p>Harlequin beetles are often seen on hibiscus varieties and native cotton trees. They are brilliantly coloured and the female lays a cluster of beautiful pinkish eggs around the stem of her food source. She will guard her eggs until they hatch. Best observed briefly and returned.</p>

DET provides additional information about other possible species (axolotis, birds, cats, dogs, fish, etc) in the species-specific information resource located on the DET website.