Activity - Dragonfly life cycle

Overview: This activity provides an introduction to insects, life-cycles and the need for a healthy aquatic environment. The most common type of aquatic animals in wetlands are insects. As insects grow from an egg to an adult they change their body shape and size, a process known as 'metamorphoses'. Understanding the life-cycle of wetland insects identifies the link between aquatic and terrestrial habitats, and demonstrates the importance of water quality, as well as suitable habitat types such as reeds, and fringing woody vegetation. The aim of this set of activities is to use dragonflies as an education resource to teach children about the link between aquatic and terrestrial habitats, and the need for a good aquatic habitat to ensure a healthy community of invertebrates in wetlands. As invertebrates are the base of wetland food chains, and wetlands are feeding areas for broader terrestrial animal communities, healthy wetlands are necessary to maintain biodiversity.

Task: Print out and read through a set of 5 Information cards with the class. Provide time to talk through each card, and perhaps complete the questions and activities along the way. Activities include making dragonflies out of art materials, and drawing dragonfly life cycles and wetland food webs.

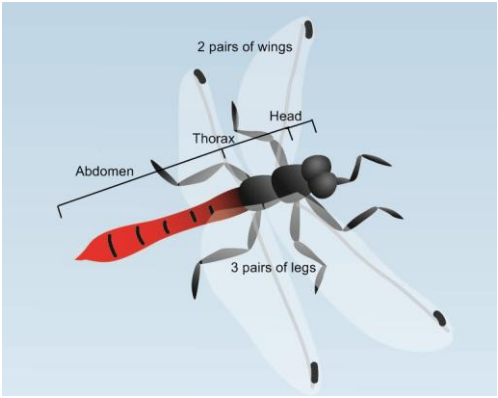
CARD 1 - Exoskeletons

- Only about 3% of animal species have a vertebrae or 'backbone', and an internal skeleton (for example humans). This means that the remaining 97% of animals are invertebrates.
- Familiar examples of invertebrates include insects, worms, clams, crabs, octopus, snails, and starfish. Invertebrates are a common type of animals in wetlands.

Q: What are some other examples of vertebrates and invertebrates?

- Some invertebrates are soft-bodied, with no hard parts, while other invertebrates have an exoskeleton.
- An exoskeleton is an external skeleton or hardened surface that supports and protects an animal's internal body parts.
- The exoskeleton of insects is made of chiton. Some chitinous exoskeletons feel leathery, while others feel rock hard. Chiton is also found in the exoskeleton of crustaceans such as crabs and crayfish, and in hardened body parts of some other invertebrates.

CARD 2 - Dragonfly Anatomy



- As well as an exoskeleton, all insects also have a body that is segmented into three-parts (head, thorax, and abdomen), three pairs of jointed legs, compound eyes, and one pair of antennae.

Q: What is the difference between an insect and a spider?

- Dragonflies are a very common and highly visible wetland invertebrate.
- They are an easily identifiable insect due to their distinctive body shape.
- Dragonflies have huge eyes on a large head. Two pairs of wings and three pairs of legs are attached to their thorax. Their long tail is actually a long segmented abdomen.
- Dragonfly is an insect whose adult wings are beautifully coloured.
- Damselflies are closely related to Dragonflies and look very similar.
- There are twelve species of dragonfly that occur in wetlands of South eastern Tasmania.
- At least three species occur in tidal wetlands of the Derwent estuary.

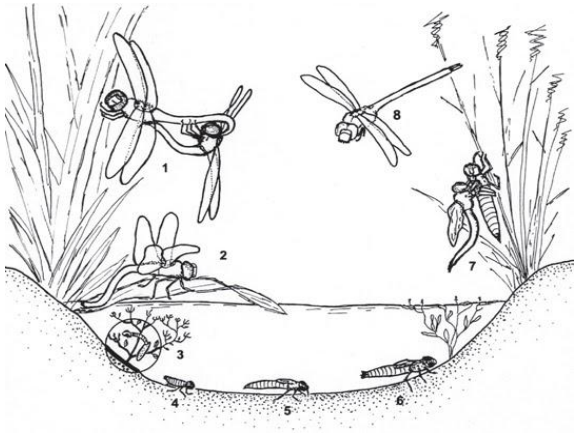
<u>Activity 1:</u> Ask each student to draw a dragonfly. Can they clearly identify the head, thorax, abdomen six legs, and wings. Label each of these body features on their drawing. What other materials can you find in the classroom to make dragonflies.

<u>Activity 2:</u> Make insects out of classroom art materials. Provide students with a set of standard materials and ask them to create their own insect of their choice, making sure they clearly show the main bodily characteristics of an insect (see above).

<u>Activity 3:</u> Identify insect body parts and their functions online:
http://www.goldridge08.com/anking/insec.htm

<u>Activity 4:</u> Make your own super bug by selecting different body parts with special form and functions.
http://www.mylearning.org/interactive.asp?journeyid=77

CARD 3 - Dragonfly Life Cycle



(1) Mating (2) Egg-laying (3-6) larval development (7) last moulting – emergence (8) adult insect
Drawing: M. Bedjanič, http://iogyba.blogspot.com.au/

- We know dragonflies from their adult phase, as they are highly visible flying around near rivers, streams, wetlands, marshes, pools and lakes. But this phase makes up only a brief period of a dragon flies life. They spend most of their lives hidden from human eyes as larvae in the water. For many weeks, and sometimes years, they grow from an egg, through several larval stages under water in wetlands.
- A one year life cycle is common to most dragonflies, but some species may be shorter (two months) or longer (seven years).
- The first larva is very small. Larvae then pass through several moults, called 'instars', becoming increasingly larger each time.
- Larvae are a clumsy looking creature with spidery legs and have very little in common with the beautiful winged adults.
- Aquatic life ceases when the last 'instar' leave the water by crawling up a plant stem, rock or log. Once exposed to the air metamorphosis begins, and the adult emerges from the last nymphal skin.
- Dragonfly life cycles generally include nine to thirteen moults, but this varies widely between and within species depending on temperature, season and food supply.
- Adults then spend the rest of their lives living in air in a 'terrestrial' environment, meaning 'on land'.
- Despite relying on water for most of their life cycle, adult they can be found of living well away from the water, and are often seen feeding at forest edges. But adults must come back to wetlands to mate. Most dragonfly eggs are oval shaped and gelatinous and are scattered by the female directly into the water

<u>Activity:</u> Ask students to draw their own dragonfly life cycle representing each stage, with arrows to show the direction of the cycle, and where each life-stage occurs (aquatic or terrestrial)
-Discuss what food, shelter, temperatures, and other environmental conditions dragonflies need during each stage of their life cycle.
-Now consider the other animals that feed on dragonflies during their life-cycle. Perhaps include them on the life cycle drawing with arrows to identify who eats who.

Q: What would happen to dragonflies if: the wetland became polluted, the wetland was drained, all vegetation was cleared from the banks of the wetland?

CARD 4 - Metamorphoses

Image: Clinton and Charles Robertson from Del Rio, Texas & College Station, USA

- Metamorphosis involves abrupt changes in the animal's body structure as it grows from an immature to adult. This marked change in form, texture and physical appearance is usually accompanied by a major change of behaviour or habitat.
- Some, but not all insects go through metamorphosis. A range of other animals also undertake metamorphosis, such as amphibians, molluscs, and crustaceans (crabs, shrimp, crayfish).
- Metamorphoses can involve an egg hatching into a nymph, which moults through a number of juvenile stages, each looking more and more like the adult form. This type is common to damselflies, dragonflies, mayflies. Another type of metamorphoses involves the egg hatching into a larva, then a pupa, then an adult.
- For most insects the juvenile stage is aquatic, and occupies by far the largest proportion of the life cycle.
- During metamorphosis the skin splits and the new adult with crumpled wings leaving behind the empty shell clinging to the plant, rock or log. The new exoskeleton is soft initially but hardens over time.

<u>Activity:</u> Check out a time lapse video of the 'Life Cycle of a Dragonfly'
http://www.neok12.com/Metamorphosis.htm

CARD 5 - Interesting Dragonfly Facts

Image: Ingen større versjoner tilgjengelig.

- The attractive wing colouration develops only after several days after emergence from their larval or nymph stage of the life cycle.
- During the breeding season adult males often display territorial behaviour at wetlands by constantly patrolling the water's surface. They fly fast and low just above the water to exclude other males from mating with prospective females.
- Dragonfly mating biology is very peculiar. When mating the male and female cling together to form what is known as a 'copulation wheel'. The female is securely held by tiny appendages at the tip of the males abdomen. The female then bends her abdomen to join with the male near their thorax. The partners are joined in a heart-shaped "wheel" or "copula".
- Both larvae and adults are predatory animals. Larva have a modified lower lip, which is folded beneath the head, but can be projected outwards at with lightning speed to grasp prey. They eat small aquatic insects, such as mosquito larvae, and sometimes they feed on small fish.
- *Hemicordulid tau* is the most common dragonfly species in TAS. Compared to other wetland invertebrates they are very tolerant of water pollution and habitat degradation.

Activity: Print out and play these insect word search games.
http://bogglesworldesl.com/insect_worksheets.htm