

# Dragonflies

## Amazing dragonflies

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Dragonflies belong to the insect order known as Odonata, and are among the most beautiful and captivating creatures of the insect world.

They capture our attention and imagination as they hover weightless mid-air before darting off in a flash of brilliance. Unlike some insects, which can cause some of us fear (and not necessarily for good reason), these attractive insects charm us with their fairy-like appearance, varied brightness and large yet delicate wings.



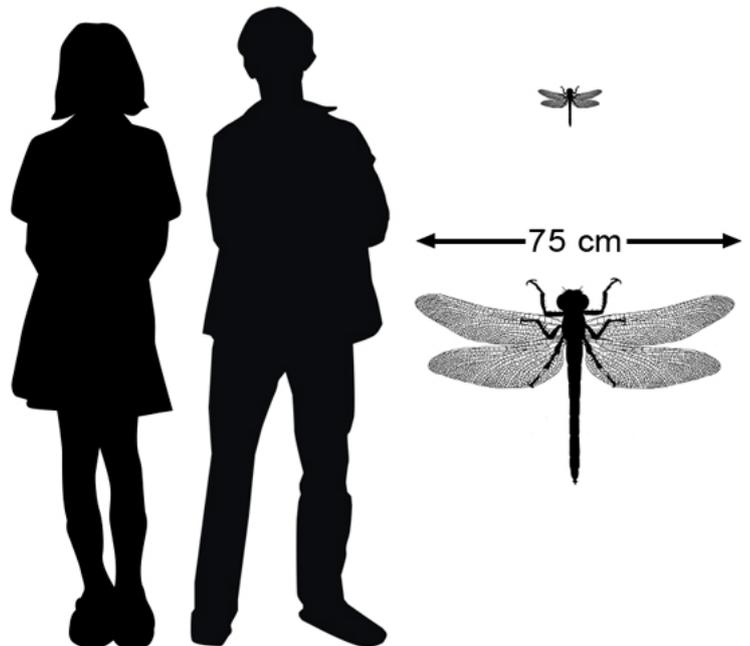
### The remarkable dragonfly

The dragonfly is remarkable for reasons other than its visual appearance. Would you believe that the dragonfly has inhabited the Earth for around 300 million years?

The original dragonflies pre-dated dinosaurs and were among the first winged insects to develop. Fossilised remains have been found from the Coniferous period (part of the Paleozoic Era) and these show that the dragonfly could have a wingspan of 75 centimetres. This amazing insect has adapted across geological eras to continue to thrive today. This is in part because of its well-developed eyes and capacity for flight.

There are around 6,000 known species of dragonfly worldwide today, and they are generally much smaller than their prehistoric relatives. Australia has five giant species (petalurids), which have been around for about 190 million years, possibly making them the oldest surviving family.

The dragonfly is historically significant to Australia. Here is a brief timeline of 'dragonfly events' as they relate to Australia.



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- 1770  
A dragonfly specimen is collected by Joseph Banks at Endeavour River, when Cook's ship *Endeavour* was grounded for repairs. It became our first faunal species to be described.
- 1775  
The specimen, *Neurothemis stigmatizans*, collected by Banks is described by Danish zoologist and entomologist (someone who studies insects) Johan Christian Fabricius. Fabricius created the term 'Odonata' for this order of insects.
- Late 1700s  
Four more Australian species of dragonfly are described and named.
- 1800s  
Ninety-seven more species are described and named.
- Today  
There are now around 325 recognised odonate species in Australia.

## Classification

Odonata is basically divided into two subgroups: Anisoptera (dragonflies) and Zygoptera (damselflies).

### Anisoptera

There are about 12 recognised families in this group and these are the true dragonflies. They are usually larger and more powerful fliers than damselflies.

True dragonflies have broader hindwings than forewings, especially at the base, and they rest with their wings outstretched. They can be found on all continents except Antarctica.



### Zygoptera

There are more than 12 families in this group and they can also be found on all continents except Antarctica.

Damselflies have lighter, usually smaller bodies than the dragonflies and their flight is weaker and flutterier. Their wings are evenly sized and when resting they will fold them close along their abdomen, as damselflies, unlike dragonflies, have a hinge on their wing; some species, however, hold their wings just above their bodies when at rest.



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A key difference in distinguishing the larvae of dragonflies from those of damselflies is the location of the gills. In dragonfly larvae the gills are internal (inside), but in damselfly larvae they are located externally (outside) at the end of the body.

### Appearance

Like other insects, dragonflies have a head, thorax (including the prothorax), abdomen and six legs. They have two pairs of wings that can move independently of each other. This is what gives this insect its amazing aerodynamic efficiency and phenomenal flying abilities.

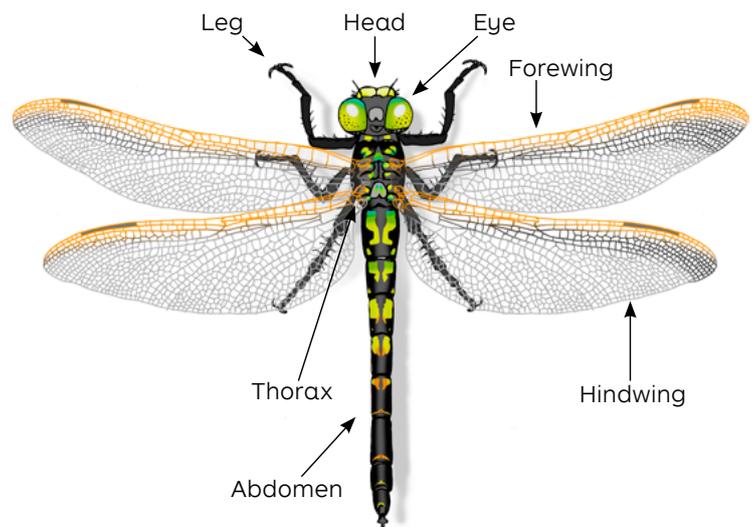
Dragonflies can propel themselves upwards, downwards, forwards and even backwards. They can also hover and turn sharply and unpredictably. Faster than most other flying insects, some species can travel up to 70 kilometres per hour.

Dragonflies have very large, complex eyes that make up most of their head and let them see in virtually every direction. These eyes, combined with superb aerial skills, make dragonflies exceptional predators; they catch other insects on the wing, clasp them in a basket-like manoeuvre with their legs.

### Habitat

Dragonflies are carnivorous flying insects that mainly inhabit areas near still and/or running freshwater sources. Their eggs are laid onto the water or into aquatic plant tissue, such as reeds, and the larvae live in the water (with a few exceptions).

Many species of dragonfly rely on water that has good oxygen levels, is a precise temperature and is unpolluted. However, some species can thrive in poor quality water. An ecosystem is thought to be very healthy if there are dragonflies around.



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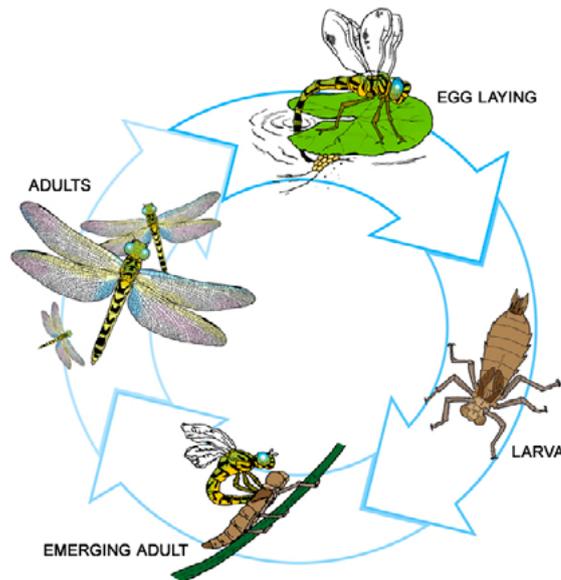
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### Life cycle

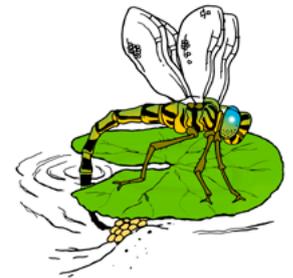
There are three stages in the dragonfly life cycle:

1. Egg
2. Larva
3. Adult



### Egg

Female dragonflies lay their creamy-coloured eggs on the water's surface or into aquatic plant tissue (such as reeds or rotting wood). In six to 30 days, these eggs hatch into aquatic larvae, known as 'nymphs' or 'mud-eyes'.

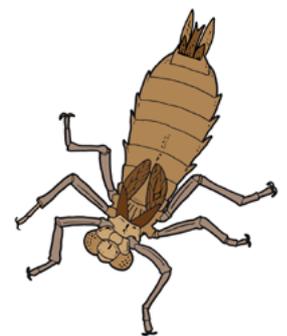


### Larva

This is the longest stage of a dragonfly's life. It can stay in the larval stage for several years, depending on the species. For some species it is less than a year.

During the larval stage, the nymph will moult (shed its exoskeleton); the exoskeleton is hard and prevents the larva from growing. When it moults, the new exoskeleton is initially soft and pliable, which allows the nymph to grow. The growth must be rapid, as the exoskeleton hardens within a few hours. This can happen up to 15 times during the larval stage. The wing buds also develop during this stage.

Larvae are highly effective hunters that feed on other aquatic larvae, insects and tadpoles; some species even take small fish or insects from the shoreline. Their tactic is either 'sit and wait' or 'attack'.



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### Adult

Unlike a lot of other insects, dragonflies do not have a pupal stage (one of the life stages during metamorphosis). The larva changes directly into an adult.

When the wing pads are fully formed, the larva is ready to metamorphose into an adult. It will position itself above the water's surface and wait for the weak area of larval skin behind its head to split, allowing the adult to emerge over an hour or so. The colourless young adult stays at the water's edge long enough for it to dry and for its wings to harden.

The adults generally reach sexual maturity at one to four weeks. Depending on the species, adults will have a lifespan of between a few weeks and a year.



### Reproduction

Mating (reproduction) is unusual and distinctive in dragonflies. The male grasps the female behind her head or on the prothorax with claspers at the end of his abdomen. She curls her abdomen to receive sperm from near his thorax area. This position is known as 'the wheel' and in silhouette looks remarkably like a love heart.

The eggs are often fertilised straight away and she can lay them soon after mating. She places the eggs on the water or in plants such as reeds or rotting wood near the water's surface. In some species, the male will protect the female and the eggs, remaining close during the laying process; in others the female will do this alone. A female will mate a number of times during her life.

