

What are... Insects?



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Bookworm challenge

Can you find the answers to these questions?

1. Why is a spider not an insect? (Page 7)
2. What are the main groups of insects? (Page 8)
3. What is the next stage after hatching an egg? (Page 16)
4. What is a young dragonfly called? (Page 19)
5. What are the names of different kinds of social insects? (Page 26)

Answers at the back of the book



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Quick facts

An insect has three pairs of legs and a body divided into three parts. These parts are called the head, thorax and abdomen.

On the head are a pair of feelers called antennae. Most insects have a pair of eyes made of hundreds of small eyes stuck together in a dome shape. The insect sees by building a picture from each small eye.

The middle part of the body is called the thorax. The middle part of the body is full of muscles to work the wings.



Bee

On the underside are three pairs of legs. On the upper side there may be one or two pairs of wings. Flies and midges have one pair of wings. Bees, butterflies, beetles and dragonflies have two pairs. One pair of beetle wings is a hard case.

The back end of the body is called the abdomen. It holds most of an insect's guts - and sometimes a sting in its tail.



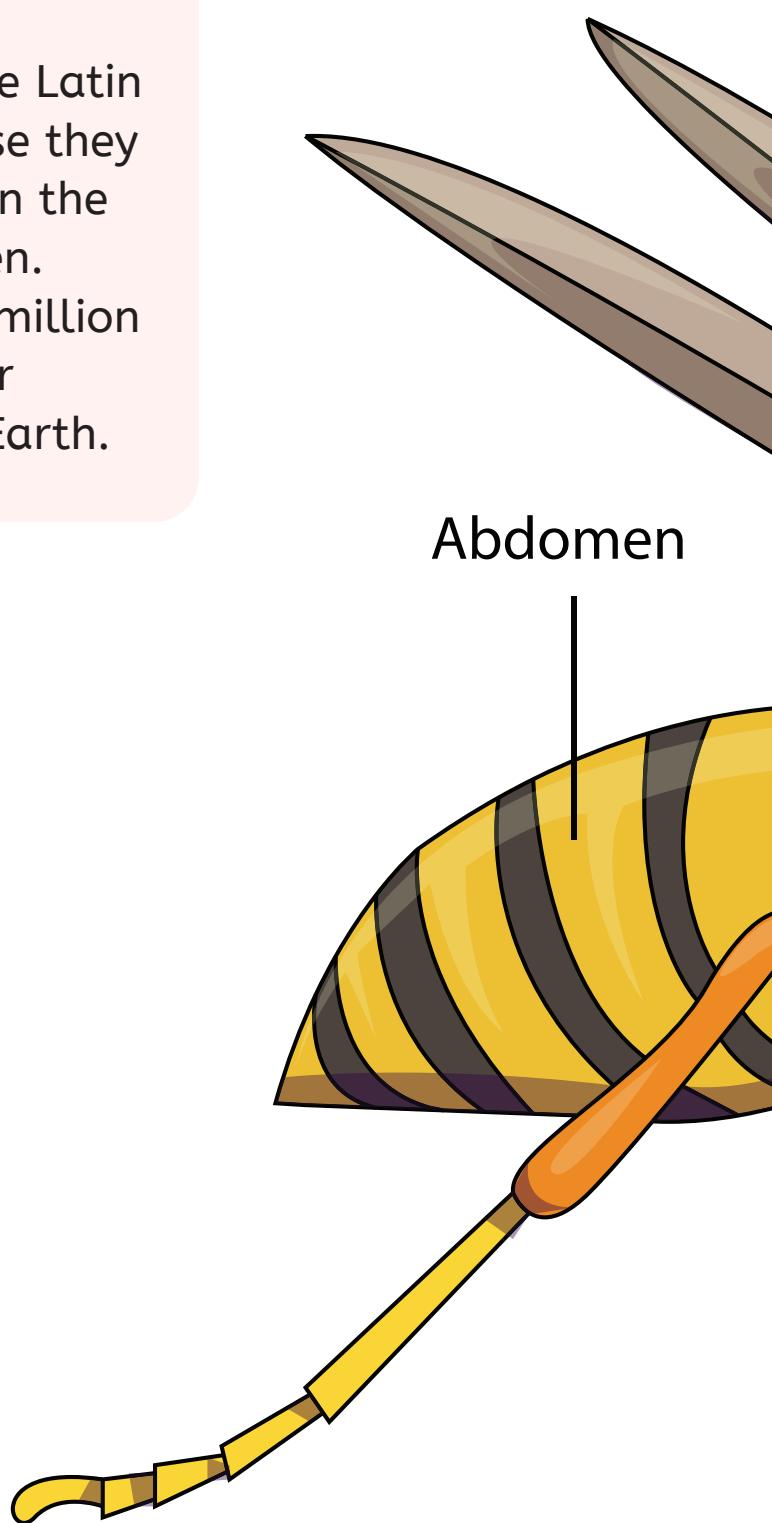
Stag beetle.
Notice one
pair of wings
has become
a pair of
wing cases in
beetles.

What are insects?

Insects are six-legged animals with a hard armour-like skeleton. Insects have a three-part body (head, thorax and abdomen). Insects also have compound eyes and one pair of antennae.

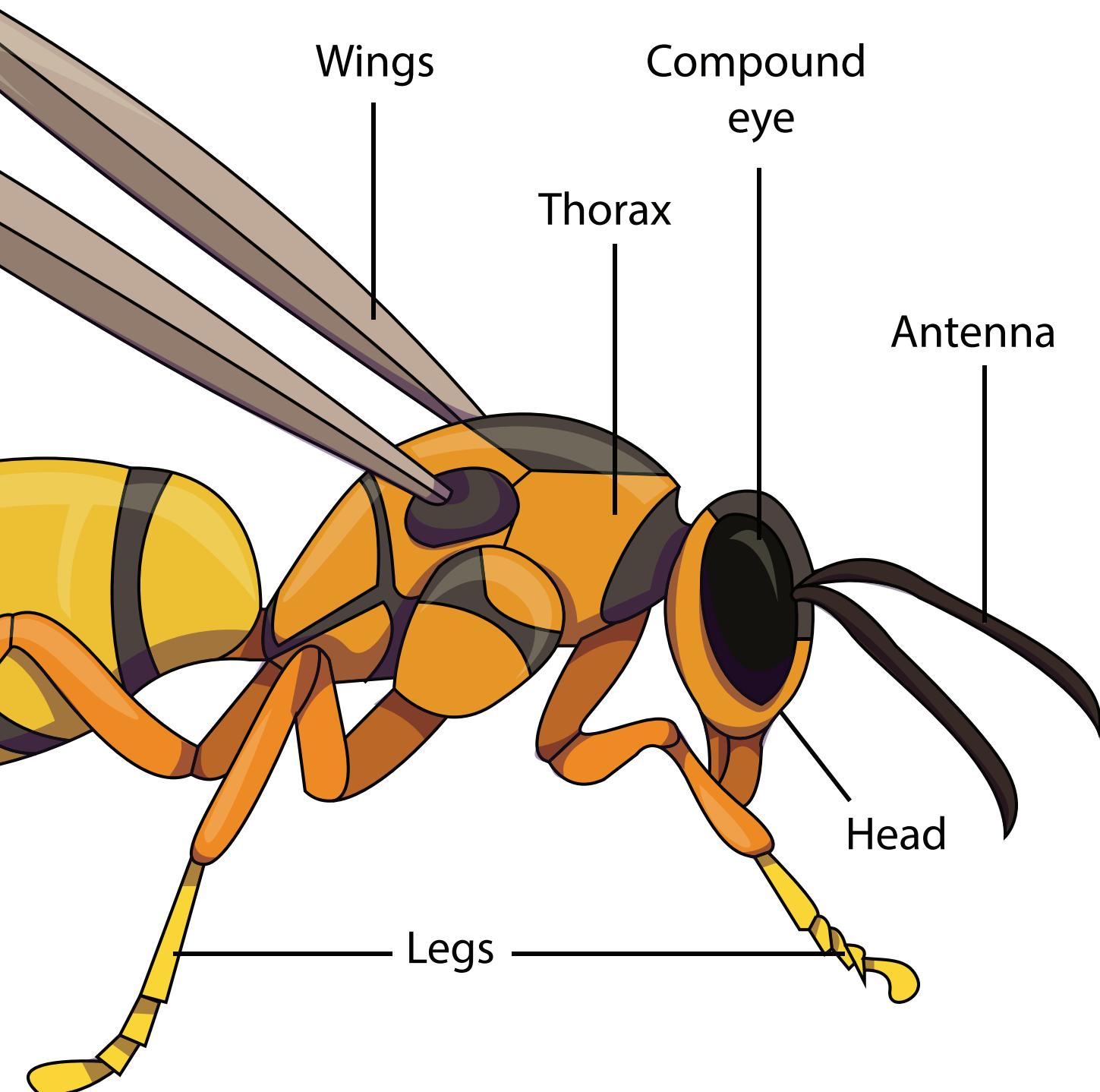
The word insect comes from the Latin meaning ‘to cut up’. This is because they have such narrow ‘waists’ between the head and thorax and the abdomen.

The term insect applies to ten million species. Insects also make up over ninety percent of all animals on Earth.



These are not insects...!

Spiders, and a few other insect-looking animals, such as millipedes, are not insects, because they have a different number of legs. Spiders, for example, have eight legs. Some insect-looking animals – like shrimps – live in the oceans, but these are not insects either. They are called crustaceans.



How many groups of insects are there?

There are many main groups of insects: beetles (over 40% of all insects), flies, moths/butterflies and wasps/bees.



Fly. Just one pair of wings.



Butterfly. Two large, colourful sets of wings.



Ladybird beetle. One pair of wings make wing cases.



Bee. Two pairs of wings that hook together and look like one pair.



When were the first insects?

The first insects date back 400 million years, and they had wings 300 million years ago. Fossil insects are often found preserved in amber (shown here).

Insects and flowering plants developed together. For millions of years they have depended on one another.





Insects are food

Insects have to feed. Some of them are carnivorous, they feed on other insects, but others feed on sap, leaves, fruit and wood. This is when they can become a problem for people. A few also carry diseases.

A wide range of insects – not just bees – carry pollen between flowers. Flowering plants will only live as long as there are insects to pollinate them.

Insects make up a large amount of all animals. They are an important food for many larger animals. They are an important part of many food chains. We depend on insects just as much as wild animals.

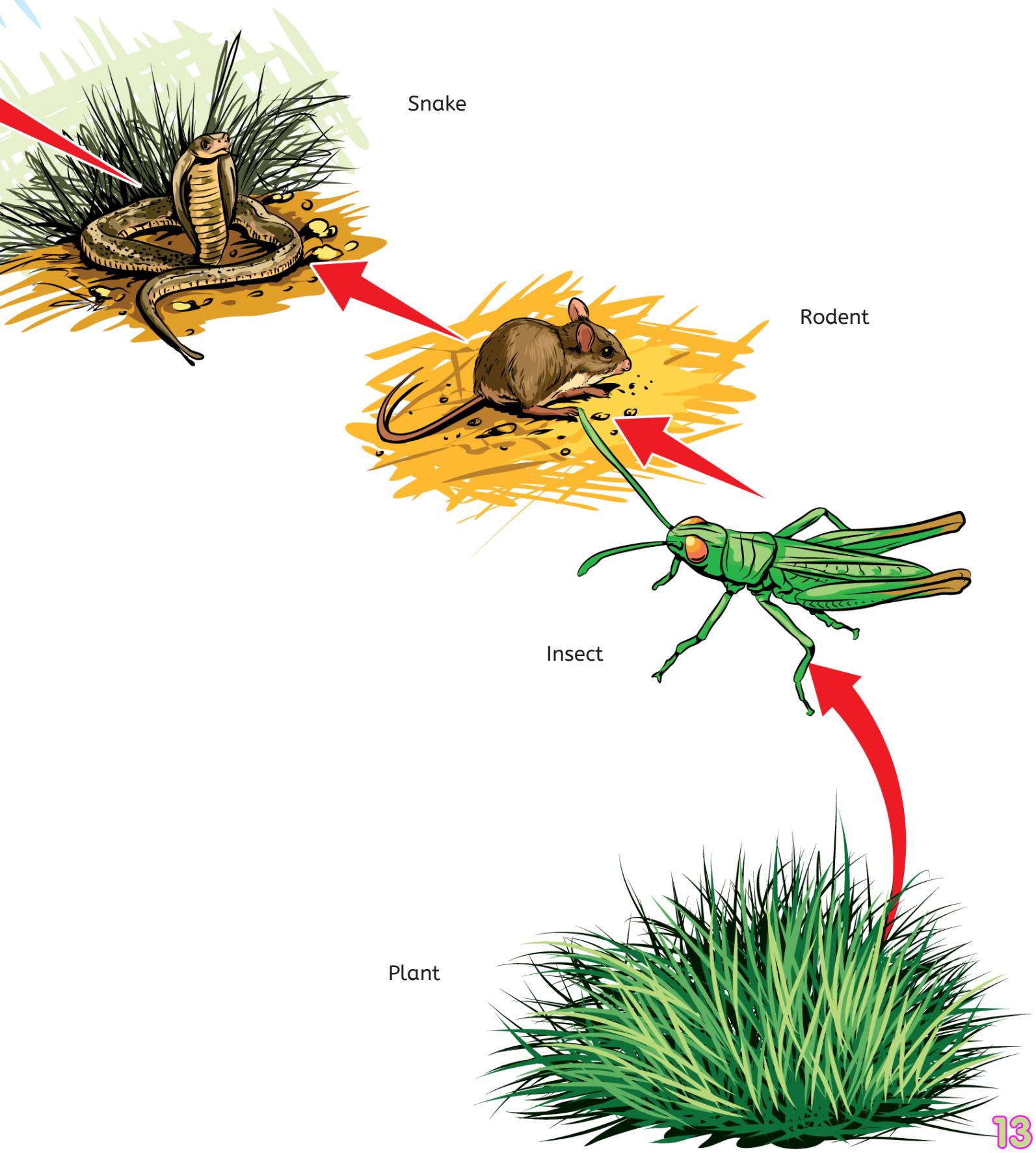


Bird



This food chain uses the insect: grasshopper. Can you make up another food chain that includes an insect.

A food chain.



Insects moult

Insects all have a ‘coat of armour’ for their skeleton. All of their muscles are attached to its case, not to anything inside. They do not have inside skeletons like us.

As they grow, their stiff skeleton becomes too tight, and they have to moult it off and grow a new one.

The skeleton of an insect is a very thin case. The main component of its skeleton is chitin.





Insects hatch from eggs

Most insects lay eggs and then leave the eggs to hatch without any help from the adult. When the eggs hatch, the little grubs have to find their own food.

With social insects like ants and bees, the eggs hatch in special nurseries. Food is brought to them, and they never go outside until they change into adults.



How eggs change to larvae inside a beehive.

Monarch butterfly eggs on the underside of a leaf, and a caterpillar hatching from an egg. The leaf is its food.



Insect life cycle (1)

All insects must change from one form to another during their lives.

There are two ways they can do this. On this page you see what happens with insects like dragonflies. On the next page you see the other way.

Some insect larvae look a bit like the adults but without wings. Dragonflies are like this.

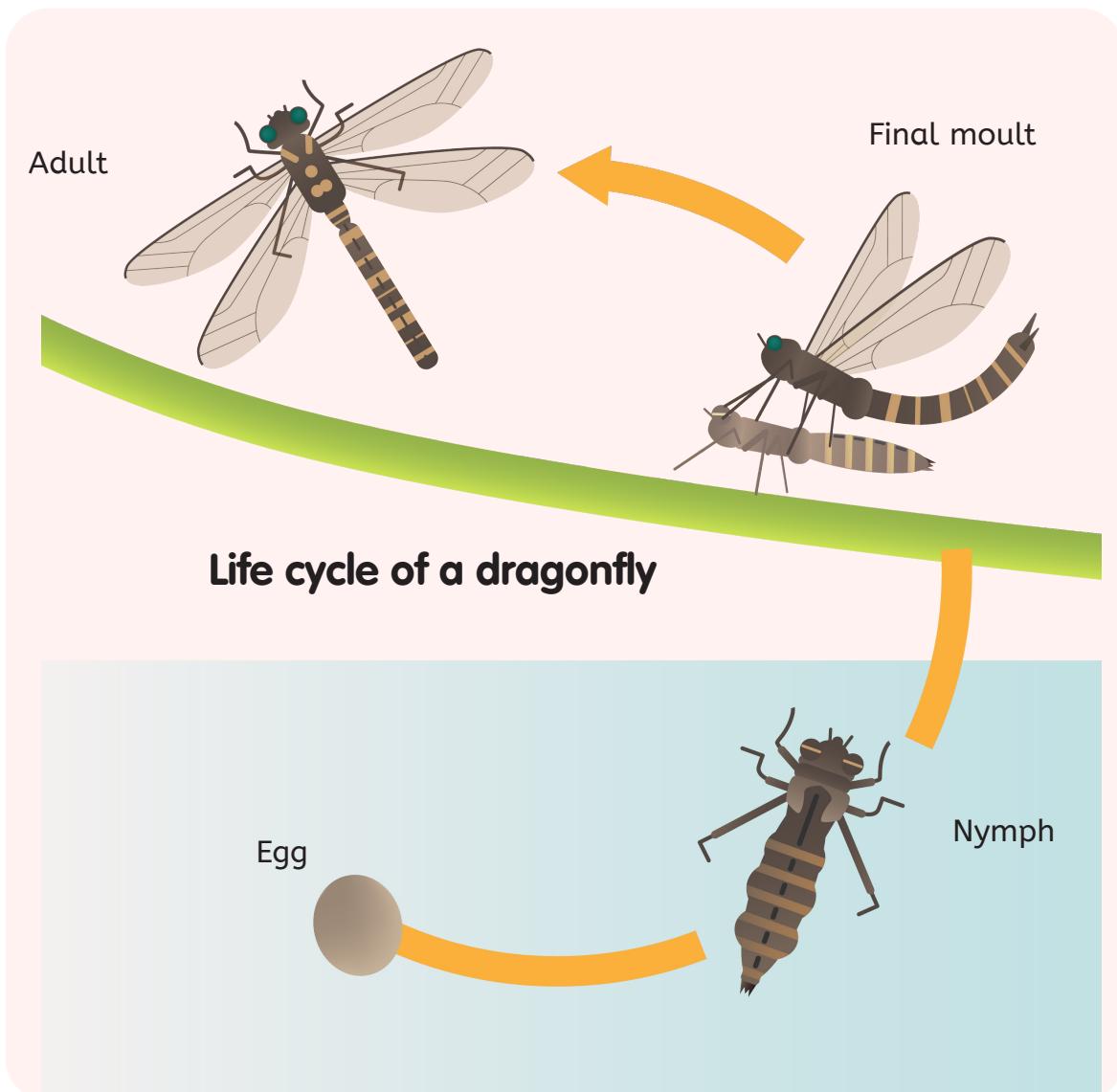
Dragonflies live entirely underwater while they are growing. But from time to time they grow too big for their skins, and moult. Young insects that are still going through this stage are called nymphs.

Each time they moult they look more and more like adults.

Finally they crawl out of the water and moult for the last time, growing wings and flying away.

Dragonfly laying eggs.





Insect life cycle (2)

Most insect larvae look nothing like their adults. Caterpillars, maggots and grubs are good examples.

As a result, the insect larva has a lot of work to do to change in one go.

There are four stages to this kind of change:

1. egg
2. larva (caterpillar, maggot etc)
3. pupa
4. adult

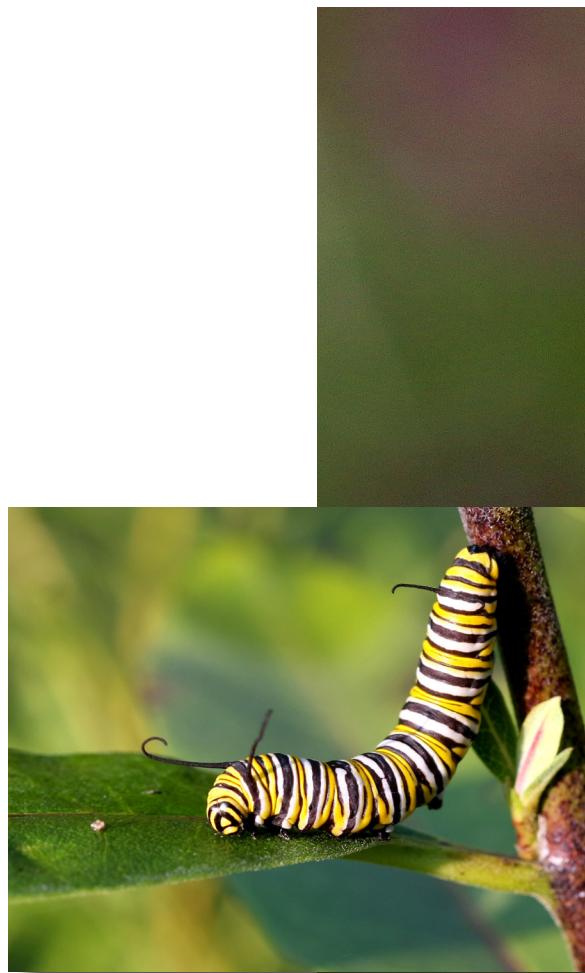
An egg hatches to produce a larva, which is generally grub-like. The larva grows, perhaps over several years.

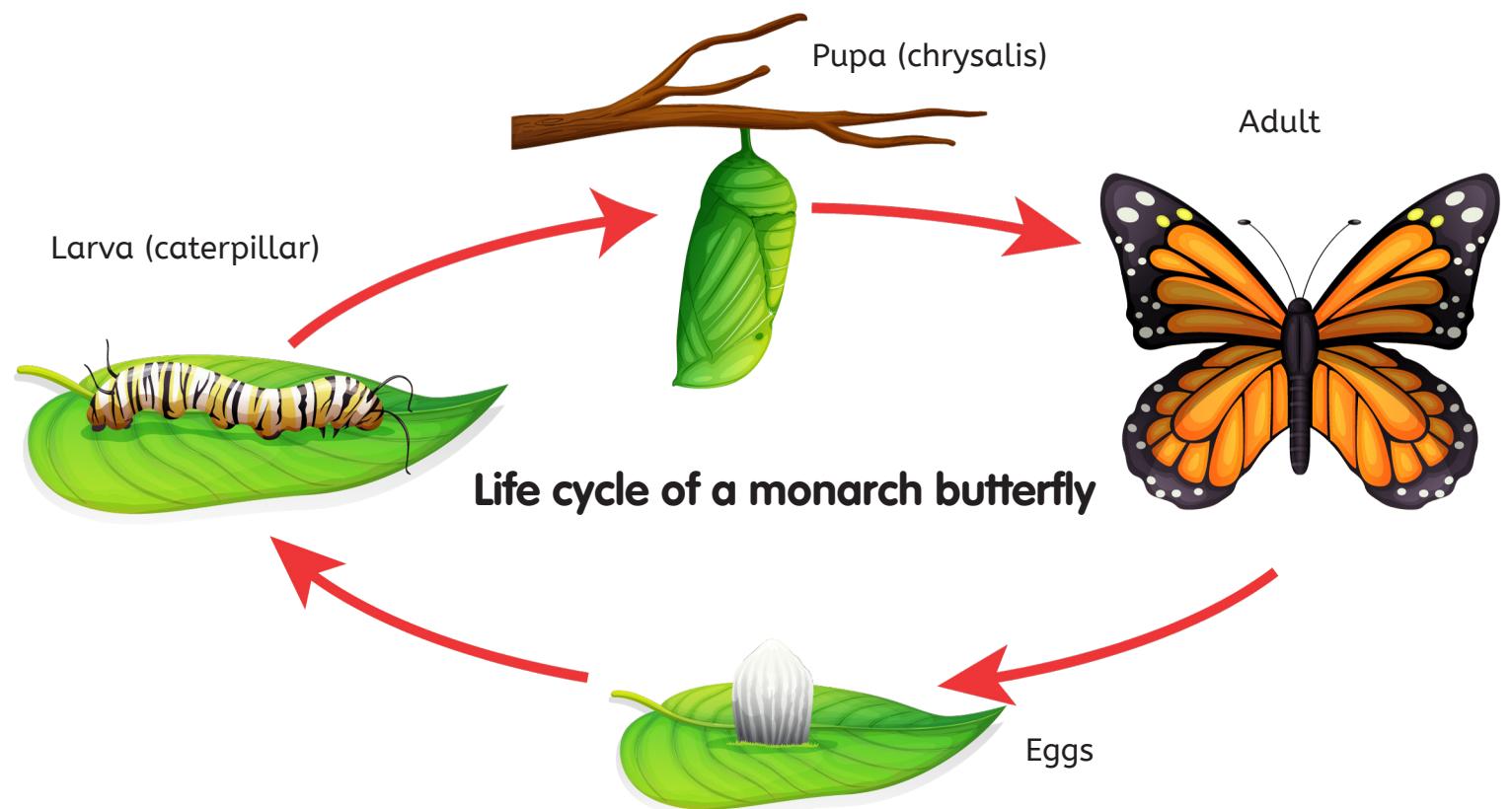
Then the time comes for it to change to an adult. It suddenly becomes still and forms a hardened case, for example a silkworm spins a cocoon.

At this time the larva grows wings and legs. Then, when all has changed, it splits open the cocoon and comes out as an adult.

Flies, butterflies and moths and bees, wasps and ants all have a life cycle like this.

The growing stages usually last very much longer than the grown-up stage. For example, a may bug spends 3 years growing. Once grown it spends just a few days as an adult before it dies. This short adult life is just long enough to lay eggs for the next generation.





Insects conquer the world

Most insect eggs can survive being dried out. Larvae and adult insects can live through cold and dry conditions.

In a few cases, such as the cockroaches, aphids (shown here) and tsetse flies, the eggs grow entirely inside the female, and then hatch immediately upon being laid, or are even born alive.

Some insects migrate to a warmer climate, while others ‘hibernate’.



Wikipedia



Why aren't insects huge?

Insects do not use blood to carry oxygen about the body. They have no veins and arteries. They are generally very small. Instead they take in air through openings in the sides of the body. These are connected to tubes that take oxygen to where it is needed directly.

This simple way of getting oxygen is no use when you get large. This is why the heaviest insect weighs less than 100g.



Size depends on how much oxygen is in the air. In the past, from time to time there was very much more oxygen in the air. This is what allowed ancient dragonflies to grow to have wingspans of about 1 meter.



The atlas moth is one of the world's largest insects.

Do insects live alone?

Most insects live alone. Only a few live as groups. The most famous of these are bees, wasps, termites and ants. These are called ‘social insects’. They tend to live in nests, with different insect types doing different jobs. It is these social insects that have ‘queens’ that do all the egg laying, workers that bring food and look after the young, and soldiers that guard the nest.

Termite mound made by white ants (termites) to help get fresh air into the nest which is underground.

Leafcutter ants taking food back for the fungi gardens they keep underground.

Bees making a natural beehive.





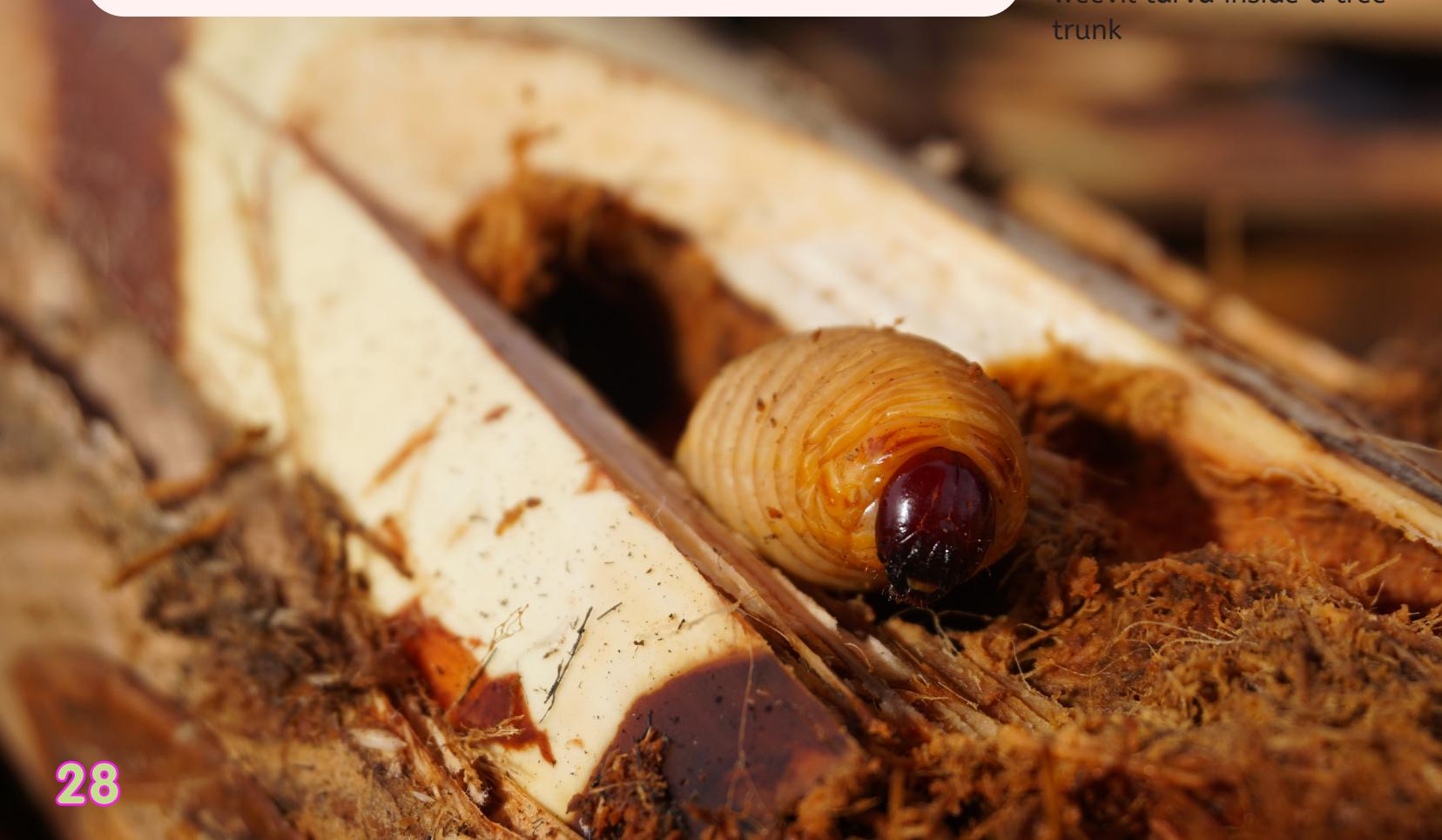
Protecting themselves

Insects have to protect themselves. Some do this by having ways of stinging (bees/wasps) or shooting out acids (ants). Others do it by mimicking another poisonous or stinging insect. The viceroy butterfly (top) appears very similar to the bad-tasting monarch butterfly (bottom).

Insects are mostly defenseless. Most use camouflage, having patterns like the surface they rest on. Oak-leaf butterfly use this method. Some, like stick insects, look like dead twigs. Feeding at night, living in the soil or in wood, and hiding by day are other methods widely used.



weevil larva inside a tree trunk



stick insect



oak-leaf butterfly looking
like a dead leaf.



The good insects do

Insects play one of the most important roles of any living thing in their environment. They have many roles, such as soil turning and getting air into the soil (which is needed by plant roots and for rotting).

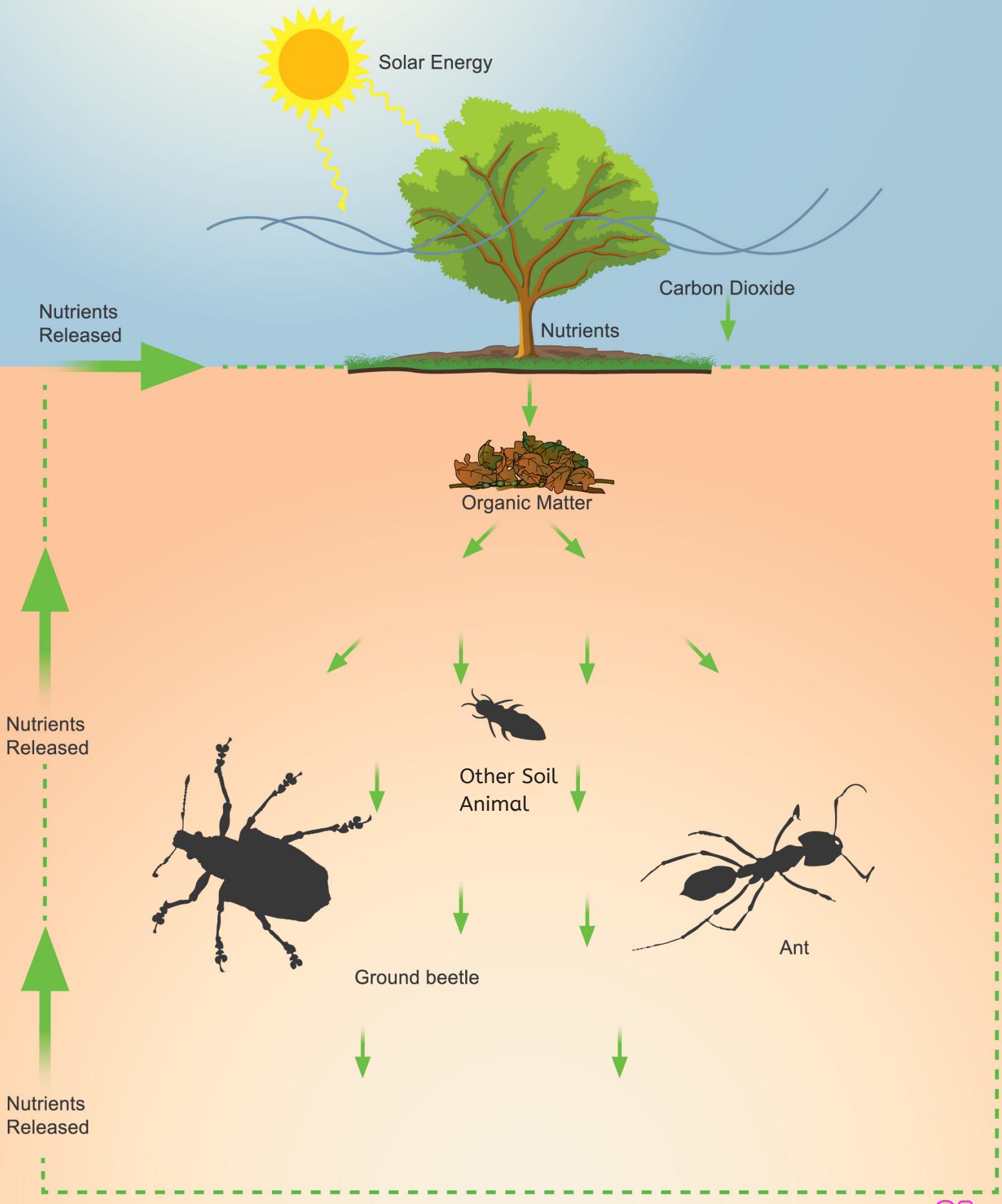
Insects bury dung, drag dead leaves into the soil to make humus. Both of these bring nourishment into the soil for plants.

Many insects, and not just bees, are vital for pollination of flowers.

Some beetles are scavengers that feed on dead animals and fallen trees. They chew up dead material and release what they don't need as waste matter. What leaves a beetle dissolves in water and so is much more useful to plant roots. Beetles (as well as worms) are responsible for making the topsoil that grows our food.

A ground beetle







And finally:

This is a dung beetle hard at work. In nature nothing goes to waste and everything is recycled. If only we did the same...



Bookworm challenge

Here are the answers

1. Why is a spider not an insect? (Page 7) **Because it has 8 legs not 6**
2. What are the main groups of insects? (Page 8) **Beetles, flies, wasps/bees and moths/butterflies**
3. What is the next stage after hatching an egg? (Page 16) **A larva**
4. What is a young dragonfly called? (Page 19) **Nymph**
5. What are the names of different kinds of social insects? (Page 26) **Ants, termites, wasps, bees**

