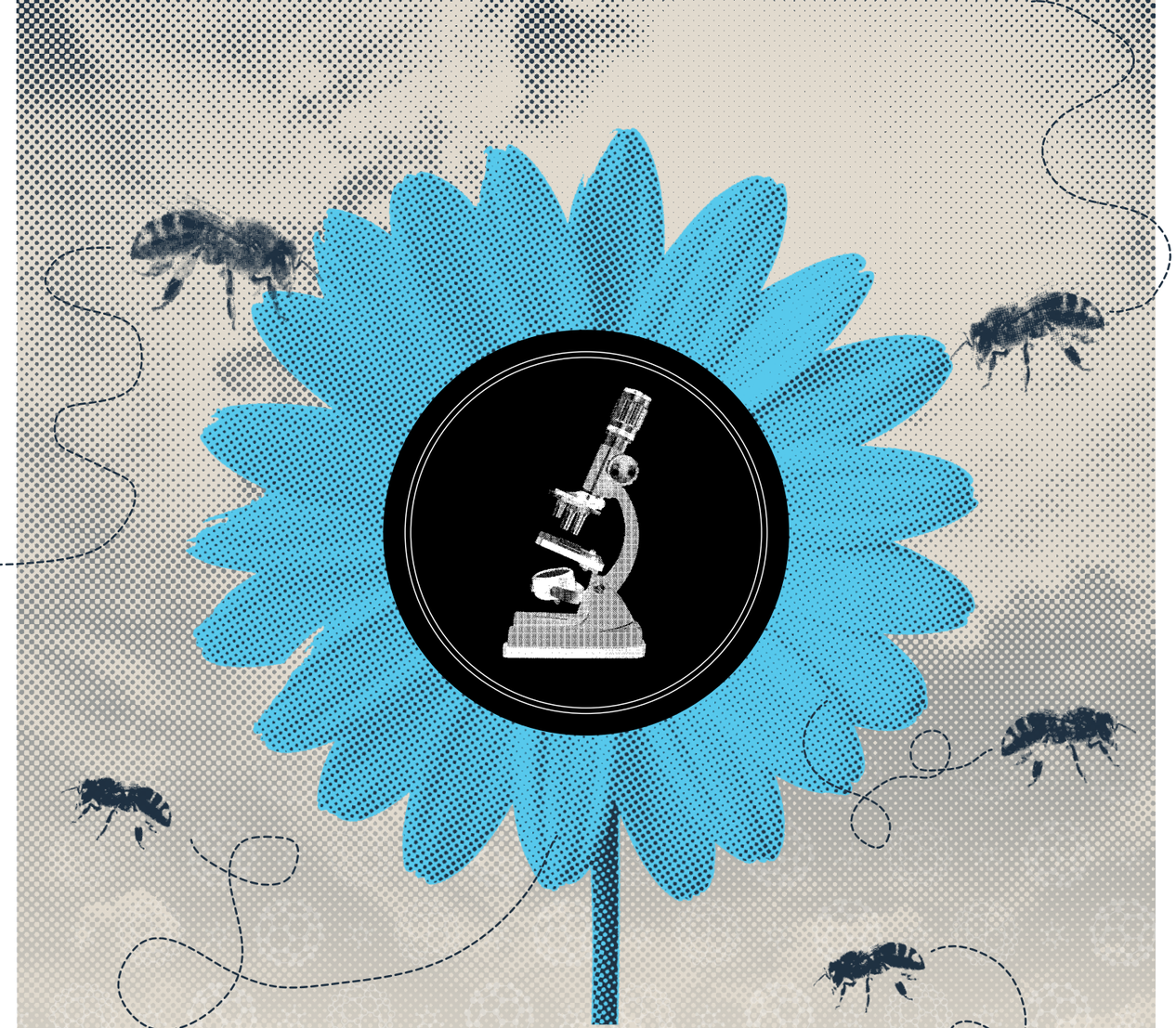


Pollen under the microscope

By Kate Barnard

Have you ever looked closely at a flower and seen some powdery-looking stuff on it? If you touch it, it brushes off easily onto your finger. Those tiny grains of powder are pollen grains. It's what flowering plants use to make the seeds that grow to become new plants.

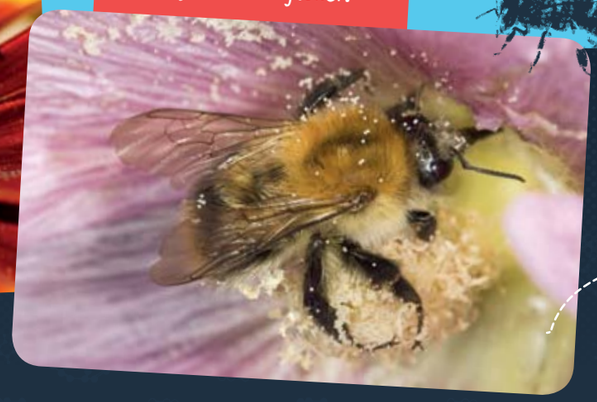
The birds and the bees

To reproduce, a plant needs to get pollen from the male part of a flower to the female part of a flower. That forms a seed which can grow into a new plant.

So, how does pollen get from one flower to another? One way is to use animals such as insects, birds or bats to transfer the pollen. These animals are called 'pollinators'. To entice pollinators to pay a visit, flowers attract them with beautiful petals, sweet smells and delicious nectar.

Imagine you're a butterfly, fluttering around the garden. You see a gorgeous pink flower and fly down to it, knowing there will be a tasty nectar treat to drink. While you move around and drink the nectar, pollen brushes off onto your body. When you fly to the next flower for more delicious nectar, some of this pollen will fall off onto the new flower. Bingo! The flower has been pollinated and now a seed can develop and grow into a new plant!

Pollen can hitch a ride on animals which take it from flower to flower.



What's so important about pollen?

Australia has thousands of flowering plant species, many of which are found nowhere else in the world. Pollen is very important to our environment because it is how these flowering plants reproduce.

We depend on a healthy environment to live – it provides everything from the food we eat to the clean air we breathe. People are part of the environment too. Anything that affects Australia's environment will affect us.

About a third of the food you eat comes from insect-pollinated plants. So, for example, if a disease killed lots of the insects that pollinate those plants, our dinner plates wouldn't be quite so full.

If scientists can work out which type of pollen is where and who's pollinating what, we can get really useful information about the environment. They will then be better able to predict how environmental changes could affect different plants and animals, and, in turn, affect us.

Image credits Photolibrary.com, istockphoto.com

Pollen up close

They might look like a weird sort of tennis ball or a rockmelon, but the pictures below are actually pollen grains as well as the flowers they come from. They're so tiny that we need a microscope to see them!

The pollen pictures were taken by a large and powerful scanning electron microscope. The images taken by the microscope are black and white – colour is added later to make them look more interesting. These pictures are 'false colour images' because they don't show the object's real colour.

Passion flower

Passion flower pollen

Hellebore pollen

Hellebore

Image credits Photolibrary.com, istockphoto.com

Powering up pollen research

To understand nature, we must know what species are out there. But identifying species takes a long time, and is pretty labour-intensive work. To speed up the research, scientists are developing technologies to identify species automatically.

For example, the Atlas of Living Australia project has bought a light microscope that automatically identifies pollen. The microscope, built by Massey University in New Zealand, has a camera and computer attached to it. Scientists called 'image analysts' write computer programs that work out what sort of pollen the microscope is looking at.

To identify pollen, first a digital photograph is taken of it. These photos are just like the ones you would take with your digital camera or mobile phone. A digital photograph is made up of thousands of pixels (tiny squares or 'picture elements'). Each square can be given a number, depending on its colour and brightness. Once the pictures are turned into numbers, computer programs do maths on the picture to work out different things about it. For example, maths is used to find an object's edges. It's then possible to work out if that object is a pollen grain, and if so, what type of pollen it is.

CSIRO image analysts along with pollen experts will 'teach' the microscope to recognise Australian pollen. Once it can do that, scientists can use it to research relationships between plants and animals, learn about the history of plants, and maybe even find some new species!

This light microscope will be programmed to identify pollen automatically. It is hoped it will even find some new species of flowering plants!

Image credits The Massey University Pollen Research Group

A closer look at microscopes

Not all microscopes work the same way. Scanning electron microscopes (SEMs) fire a beam of really small particles called electrons. A very detailed picture is built by looking at how electrons bounce off the surface of an object.

The Atlas of Living Australia's pollen identification microscope is a light microscope. It's like a powerful magnifying glass. A light shines on the object, and it is looked at through glass lenses that make the object appear bigger than it is.

SEMs can magnify objects much more than light microscopes can. SEMs also produce three-dimensional (3D) pictures, rather than the flat-looking two-dimensional (2D) pictures produced by a light microscope.

Compare the image of a pine pollen grain from a scanning electron microscope (left) to the image from the light microscope (right).

You can help with scientific research!

The Atlas of Living Australia is an Australia-wide project for sharing knowledge about Australian animals, fungi, microorganisms and plants. You can help with the project by visiting **www.ala.org.au** and recording your observations of Australian wildlife.

The Atlas of Living Australia is a partnership between CSIRO, Australian museums and herbaria, biological collections and the Australian Government.