

Look after trees and their leaves

WHY DO trees have leaves? When I asked some children this question a few years ago I got some interesting answers.

"For possums to eat," one boy said. "To give us shade in the summer," said another. "To shelter birds and hide their nests from cats," said a girl. "Trees make leaves so they look pretty," said someone else.

They all thought trees made leaves to help birds or animals, or for use to look at. But trees aren't so kind hearted. Trees don't make leaves at all, really. It's the other way round. It's the leaves that make the trees.

If that sounds silly, I'll explain how and why.

Chemical factories

Leaves are not for decoration or shade. They are highly sophisticated, fully automated, super-miniaturised chemical factories. They can do something that scientists have not yet learnt to do.

Each leaf is a solar cell. It uses the energy in sunlight to extract a gas called carbon dioxide (CO_2) from the air and another gas, hydrogen (H_2), from the water it sucks up through its roots.

Next, the leaf links the carbon and the hydrogen together to make new substances called **carbohydrates**. This process is called photosynthesis and it depends on a green-coloured chemical called chlorophyll, which is made by the leaf. That is why leaves are mostly green.

There are several different kinds of carbohydrates, but the most important are sugar,

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By David Gregorie

cellulose, and starch. Sugar dissolves in water; so the plant can pump it around in its sap where it is needed. Some plants have so much sugar that their sap tastes sweet — sugar cane and sugar maple, for example.

The plant can change the sugar into cellulose, which is used to make wood. Or it can change the sugar into starch and store it in seeds or nuts, or underground in tubers like potatoes or kumara. This is to provide food for the growing baby plant before it has leaves and roots of its own.

Or the trees can put the sugar into its flowers as nectar so that bees will crawl in looking for it and, quite without meaning to, spread pollen from flower to

flower and fertilise the seeds. The bees use the nectar to make honey.

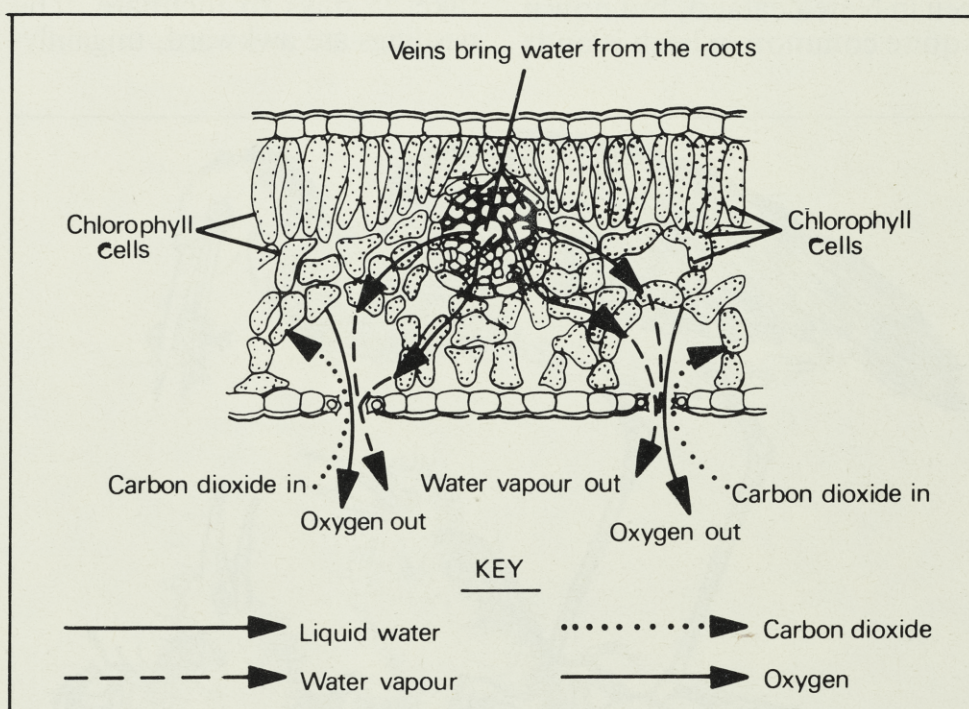
So the leaves are very important. The whole tree, no matter how big it is, is made by its leaves out of carbon from the air and hydrogen from water in the ground.

Release of oxygen

Photosynthesis has a curious side effect. When the leaf takes carbon from the air and hydrogen from the water, there is a lot of oxygen left over which the plant does not need. The oxygen is released into the air and we breathe it.

About 23 percent of the air is oxygen and all of it comes from trees and plants. Without oxygen all animals would die. So would we.

This is one reason why trees



This drawing shows what you would see if you cut a leaf in half across the middle and then looked at the edge under a microscope. Water flows up from the roots and along the veins in the leaf. Air comes in through holes in the under side of the leaf. The sugar made by the chlorophyll with the help of sun-power is taken back down the veins to where it is needed. The unwanted oxygen and spare water go out through the holes in the under side of the leaf.