

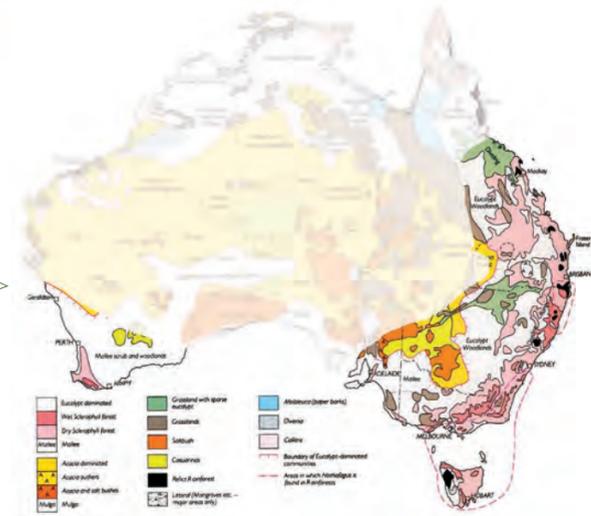
Australia - climate determines distribution

When first seen by Europeans in the late 1700's, Australian plants amazed botanists such as Banks, Solander and La Billardiare. They collected species new to science. This stimulated an interest in and study of Australian plants that continues to unlock the mysteries of an extremely diverse and specialized flora.

The Australian collection includes several young plantings; rainforest, cypress pines and wattles.

Although called the Australian collection, factors such as rainfall pattern, soil type and temperature restrict our collection to plants from the south of Western Australia, (the karri, marri and jarrah forests), and to the ranges and tablelands of the eastern states.

Shining gum [Eucalyptus nitens] from the Victorian highlands already takes a place in our collections. It is currently favoured as a plantation species in Tasmania.



The Burning Question

Some Australian vegetation has developed a relationship with fire as a result of most of the continent becoming drier and so more susceptible to burning.

The question of whether eucalypt dominated vegetation needs fire, or has come to tolerate it over ages of natural selection, intrigues ecologists and botanists.

Eucalypts [Eucalyptus] have developed mechanisms similar to other species to allow them to survive fire, such as thick or lighter coloured heat reflective bark, sometimes both on the one tree.

If fire also reaches into the canopy of forests, the buds sheltered by and hidden under the same bark allow some eucalypts to produce leaves, quickly dominating the site over any competition encouraged to germinate by fire, such as wattles.



Species like the smaller growing Banksia have woody capsules opening only once a fire has passed. Seeds of other species are stimulated to germinate by chemicals found in the smoke from bushfires and washed into the soil from the ash with the first rains following a fire.

As the climate became drier, rainforest species, less tolerant of fire, were overtaken by vegetation that evolved with fire.



Structure of a Tree

Trunk

[E] It is the above ground woody structure that determines the plants we record in our collections. The bark is the outer protective covering. It has evolved in response to its environment. Thick barks may protect trees from temperature extremes such as fire. As a tree grows outward the outer bark cracks into flakes or strips that fall or peel away from the inner bark. [E1]

Leaves [D]

Are the factories of the tree, taking the energy of solar radiation and through photosynthesis combining ground water [H2O] and dissolved salts with carbon dioxide [CO2] to produce the food for growth.

They also release the oxygen [O] from the H2O and CO2 used and to transpire the surplus water through the stomata. Leaved come in various shapes and sizes. In deciduous trees, leaves only live for one season, withering and falling in autumn, their fall often preceded by a magnificent display of colour. On evergreen trees, leaves may live as long as six to eight years before falling to the litter layer.

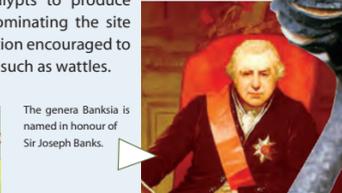


Annual Rings

Differing growth rates influence cell size. In temperate areas spring cells are larger [F2] and autumn cells smaller [F3] thus creating annual rings following woody plants to be aged.

Branches

Branches develop to increase the leaf area. They continue to extend and divide from the buds best positioned to take advantage of the available light. As summer growth reaches a maximum, buds for the next spring's of new growth are forming at the tips of the branchlets and between the leaves and their parent stems. Buds are formed as the precursors of branches, leaves and flowers, each containing within its tightly closed sheathing the embryonic structure for what it is to become.

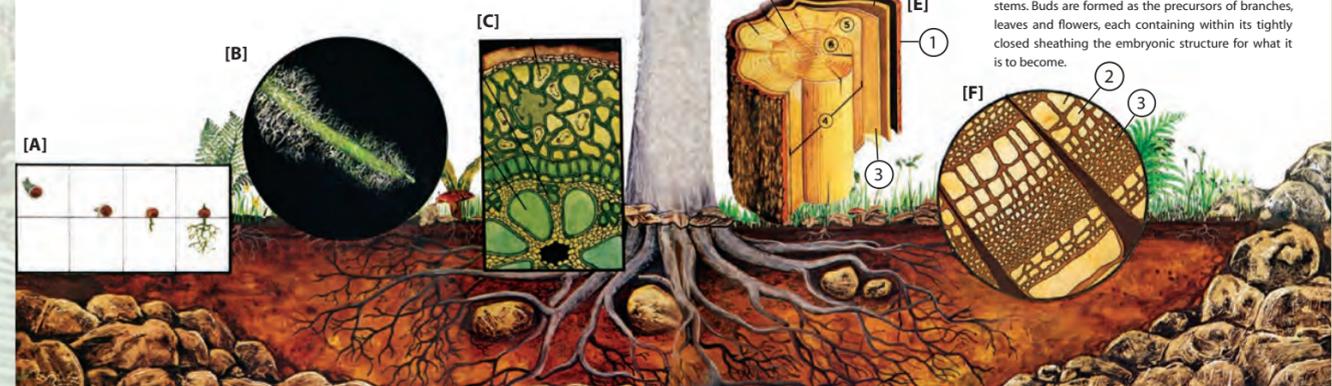


Roots

[A] When a seed germinates a taproot grows down to anchor the seed and penetrate the root mass of other plants to find water and nutrients. Some species taproots have been measured as up to 12m long.

[B] Lateral roots develop seeking more water and nutrients through the masses of root hairs that form behind the growing tip. These hairs interact with microscopic fungi to draw water and nutrients from the soil into the plant.

[C] Within plants are conducting tubes connecting the root tips with the tips of the branches. The Xylem carries the water and nutrients to the leaves to be photosynthesized into sugars in solution to be used by the plant to grow. [C] In the roots these tubes are in the centre but at the base move to where they grow outwards from under the bark.



Wattles (Acacia)

The golden wattle [Acacia pycnantha] is Australia's floral emblem. Wattles [Acacia] grow in Australia, South America and Africa. There are more than 1100 species and over 650 occur in Australia. The next largest group is in southern Africa.

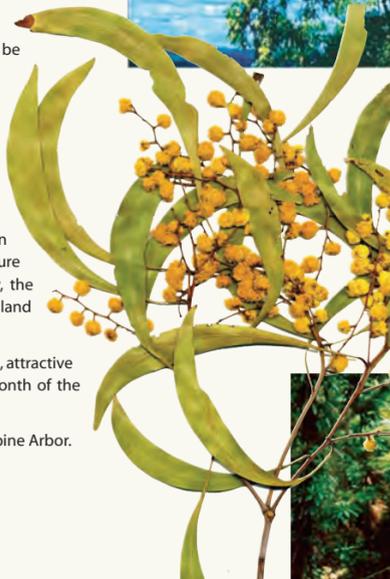
One view of the source for the common name is that the trees were used in wattle and daub construction by early settlers. They are useful in controlling soil erosion and are a colonizer of disturbed land.

Some wattles have bark high in tannins used to cure hides and in dyeing. Many are a source of food for wildlife, a few have edible seeds or store water in their roots and some produce sufficient pollen to be used for honey production.

Wattles are nitrogen fixing plants. Legumes, such as peas, peanuts and wattles, act in concert with nitrogen fixing bacteria on their roots to fix nitrogen from the atmosphere for their own use as a nutrient. Legumes are found on all the continents. In the temperate zones, woody legumes are more common in the southern hemisphere. This reflects the nature of the climate and vegetation. Comparatively, the southern hemisphere is drier with more woodland than forest.

With a wide range of leaf shapes, growth habits, attractive flowers and with species flowering in every month of the year wattles make excellent garden plants.

Wattles can be seen opposite the Tasmanian Alpine Arbor.



Remnant Rainforest Refuges

Temperate and tropical rainforests in Australia are remnants from a warmer and wetter period when rainforests were widespread.

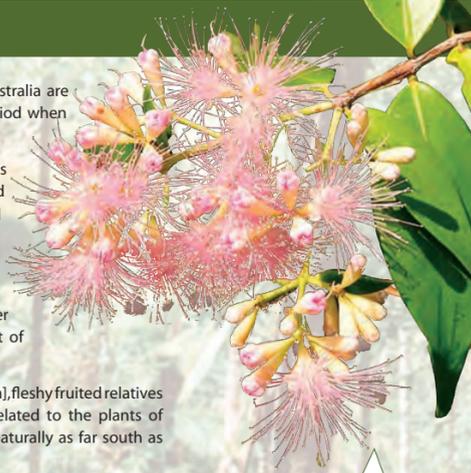
Rainforests are now restricted to areas where rainfall is usually high and spread over the year, such as north Queensland and the rainforests in the high mountain cloud of the Great Dividing Range.

Australian plants have had ages to adjust to changes in rainfall pattern and the drier climate that have accompanied the drift of the continent.

Lillypillis [Syzygium, Acmena, Waterhouseia], fleshy fruited relatives of the woody capsuled eucalypts, are related to the plants of the drier areas of Australia. They range naturally as far south as Victoria [Acmena smithii].

The tree lomatia [Lomatia arborescens] is closely related to banksias, and occurs in north eastern NSW and south eastern Queensland, where many other plants closely related to species naturally found in Tasmania occur.

When climate shifted in their favour, species more tolerant of warmer and wetter conditions spread from these refuges.



Beautiful flowers of a Lilly pilli

Many others continued to or can still tolerate cold conditions. Some of these are exhibited in our collections. There are examples of rainforest plants, cypress pines and eucalypts on the western hill.

As this collection grows it will create a microclimate assisting established plants, and allowing for establishment of some others that are less tolerant of cold.

A lowland tropical rainforest

