

DISCOVER...



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BOTANIC GARDENS

INFORMATION
RESOURCES

Rainforest

surviving the wet and dark



AUSTRALIAN NATIONAL BOTANIC GARDENS

Artwork

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To inspire, inform and connect people to the Australian flora

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The Rainforest Gully

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Planning the Excursion

We want you to use the Information Resource Notes and example Student Worksheets as resources for planning your excursion. **Select questions that relate to the purpose of the excursion, cut and paste, modify and add your own activities.** There is some repetition of concepts and students cannot complete all activities within an hour. The concepts can be adapted to all levels, and the activities tailored to the time available in the Gardens.

About the Questions

Questions are

- are open-ended so that students are encouraged to observe and think
- intended for onsite and post visit activities
- written for adults and may need to be modified to suit your group

Purpose

Plants of the Rainforest Gully activities focus on investigating some adaptations of plants to the rainforest environments, with their distinctive geographical and climatic conditions.

Rainforests in Australia

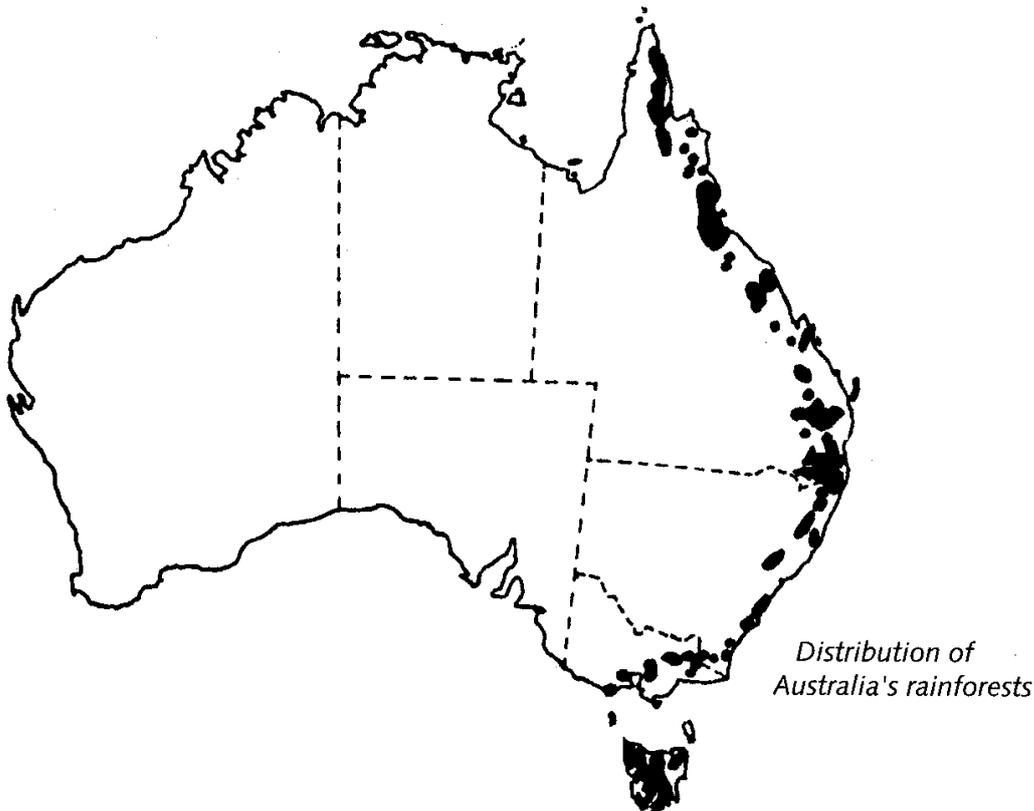
A rainforest is a shady, damp place where tall trees, ferns, mosses and vines grow. The tree canopies overlap forming a closed forest. Rainforests are home to a great diversity of plants and animals.

Distribution of rainforests

- Millions of years ago rainforest was very widespread in Australia. Climatic and geological changes over the past 50 million years have led to the evolution of flora and fauna adapted to drier and more impoverished conditions. These plants now occupy a vast area of the continent. Only small areas of rainforest remain.
- Since European settlement 75% of our rainforests have been cleared through logging, mining, road building, real estate development and agriculture. Today rainforest covers 20,000 square kilometres, less than 1% of Australia's land surface.

There are many types of rainforest and they occur in a variety of latitudes from Tasmania to North Queensland. The main types are :

Cool-temperate, Warm-temperate, Subtropical, tropical and Dry Rainforest.



Common features of rainforests

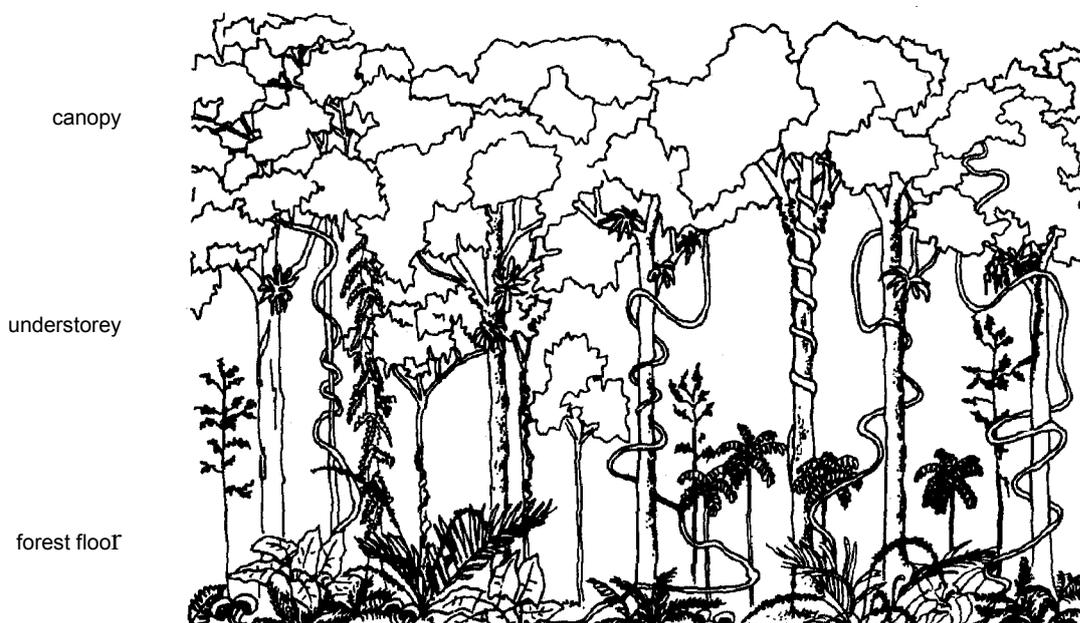
Layers in the rainforest

There are several layers of vegetation in a rainforest.

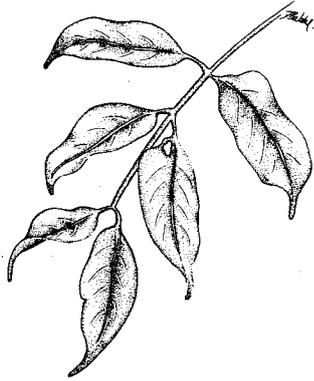
The crowns of the trees form the upper layer or **canopy**. The canopy shades and shelters the plants below from wind and keeps the humidity high. The tree trunks and branches support vines and epiphytes.

The **understorey** or middle layer is made up of smaller trees and tall tree ferns and, in warmer and wetter areas, palms.

The **forest floor** is covered with decomposing litter, trunks and branches and supports the growth of small ferns, mosses and fungi which thrive in the shady, moist conditions. Tree seedlings are also seen here.



Stylised "tropical Forest"



drip tip

Tall trees

The dominant plants of the rainforest are tall trees with straight trunks growing to between 10 and 40 m. Trees are mostly evergreen and moisture loving and their leaves form a dense crown. Their bark is often encrusted with lichens, giving it a mottled appearance.

In tropical areas many rainforest trees have large smooth edged leaves which have an extended drawn out leaf tip called a 'drip tip'. This enables water to quickly run off the leaf and so prevent the growth of harmful fungi and bacteria on the leaf surface.

Climbers

A wide range of vines are associated with rainforests. They climb to the light using tendrils, spines or twining stems.

Thin, wiry vines are common in warm-temperate and dry rainforests.

Larger woody vines called **lianas** occur in sub-tropical and tropical rainforests.



hooked spines or barbs on special Lawyer Palm branches help it climb



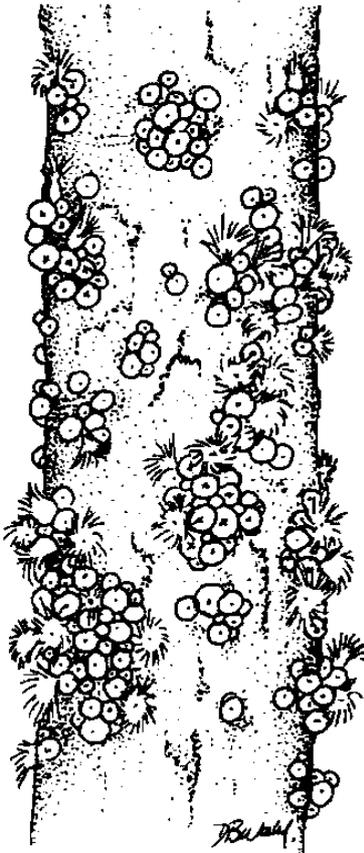
Elkhorn Ferns

Epiphytes

These are plants which grow on the surface of other plants. They use the plant as a support but do not extract food from it. Some examples are mosses, lichens, elkhorn and staghorn ferns, birds nest ferns and orchids.

Special flowers and pollination

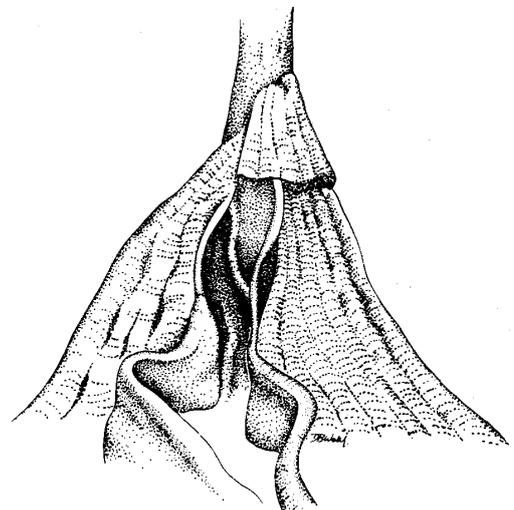
The low light levels under the rainforest canopy mean insects and other pollinators have trouble seeing flowers. Plants overcome this by having large, white, strong smelling flowers some of which open at night to attract moths and bats. Others produce flowers on their trunks. This trunk-flowering habit is called **cauliflory** - it takes advantage of pollination agents that live under the canopy.



cauliflory -
trunk-flowering

Buttress roots

These occur in many rainforest trees. The root system spreads horizontally at ground level. Buttress roots help the tree balance in the shallow rainforest soils. As well, the bulk of the nutrients in the soil are in the top layers and buttressing helps the roots spread out more effectively to obtain these nutrients.



buttress roots

The Rainforest Gully at the Gardens

The Rainforest Gully has been developed from a naturally occurring dry gully. This gully once supported scattered eucalypts, shrubs and grasses. The stream in the gully flowed only after rain.

The first rainforest plants were placed in the Gully in the early 1960's. Plants are arranged to represent rainforest types along the east coast of Australia, with Tasmanian rainforest at the lower end of the gully and mountain rainforest of northern Queensland at the upper end.

The environment within the gully is controlled in a number of ways to ensure the plants thrive:

Shelter

Rainforest plants generally require moist conditions and shelter from winds and Canberra's frosts and very cold winter nights. The eucalypts originally growing in the gully provided shelter. However many have died because of the increased water content of the soil. You will notice the remains of their large trunks throughout the Gully. Fast growing wattles and some eucalypts which grow naturally in association with rainforest areas have been planted to supplement this protection.

Water

Most rainforests naturally receive a high rainfall and the humidity beneath the dominant trees is also high. To achieve this in the Rainforest Gully about 2000 fine misting sprays have been installed. These sprays turn on for about two minutes at regular intervals. The spray period can be changed depending on the season and the weather conditions. The sprays keep the humidity high (usually higher than 80% within a metre of the ground) and add about 1200 mm of water to the natural rainfall of 655 mm.

Plant selection

Most plants in the Gardens are propagated from cuttings and seeds collected from plants in the wild. The selection of plants for the Rainforest Gully has been experimental as few rainforest species have been trialled in Canberra. Many species have survived despite a shortened growing season in Canberra's environment. Species from northern Queensland have been difficult to grow in the open and many are kept in the nursery glasshouses.

Rainforests of Tasmania

Plants in this area represent species from cool temperate rainforests in Tasmania. Much of Tasmania's rainforest occurs in the south-west of the state, with smaller occurrences elsewhere. These areas have a cool climate and receive a rainfall of over 1100 mm.

The 'roof', or canopy layer, is usually formed by one or two dominant tree species. The lower layer commonly includes tree ferns and ground ferns. Mosses and lichens are also common and often grow as epiphytes on branches. Larger epiphytes do not occur and vines are rare. The leaves of many of the plants are small or have toothed margins.

Myrtle Beech (*Nothofagus cunninghamii*) and Southern Sassafras (*Atherosperma moschatum*) are major canopy trees in most Tasmanian rainforests. Conifers such as Huon Pine (*Lagarostrobos franklinii*) and Celery Top Pine (*Phyllocladus aspleniifolius*) occur on particular sites.

Temperate Rainforests of South-eastern Australia

Plants in this area represent species from both cool and warm temperate rainforests from Victoria, eastern New South Wales and far south-eastern Queensland.

Cool temperate rainforests occur at high altitudes on the New South Wales-Queensland border and range south to Tasmania, where they occur at low altitudes. The canopy of the forest is usually composed of one or two dominant tree species. Many plants have small, toothed leaves and moss and fern epiphytes are common.

The canopy trees of cool temperate rainforests differ in various regions. In Tasmania and Victoria, Myrtle Beech (*Nothofagus cunninghamii*) is generally dominant, Pinkwood (*Eucryphia moorei*) is abundant in southern New South Wales, while Antarctic Beech (*Nothofagus moorei*) is common in northern New South Wales.

Warm temperate rainforests occur in pockets in eastern Victoria and increase in extent further north. The canopy is usually formed by 3 to 15 tree species. Thin, wiry vines and large epiphytes are common. Coachwood (*Ceratopetalum apetalum*), Yellow Sassafras (*Doryphora sassafras*) and Lilly Pilly (*Acmena smithii*) are dominant canopy trees in different areas.

Mosses

The humid conditions of rainforests provide ideal conditions for the growth of many moss species. Some mosses grow as epiphytes on the branches and leaves of plants, others grow on rock, the ground and on logs. Other simple plants such as lichens and liverworts also occur in great numbers in rainforest areas.

Palms

Palms are commonly associated with tropical and subtropical rainforests and also occur more rarely in other types of rainforest. Rainforest palms include lawyer or rattan palms (*Calamus* species), which climb to the light by scrambling over other plants using large spines. Palms with trunks, such as fan palms (*Licuala* species) and walking stick palms (*Linospadix* species) may form part of the canopy or occur in the understory of the forest.

Vines

A wide range of vines are associated with rainforests. They climb to the light using tendrils, spines and twining stems. Thin, wiry vines are common in warm temperate and dry rainforests. Larger woody vines, called lianas, occur in subtropical and tropical rainforests. Common rainforest vines include *Cissus*, *Pandorea* and *Hibbertia* species.

Araucarian dry rainforest

The plants in this area of the Gully represent species found in the dry rainforests of southern Queensland.

The eastern coast dry rainforests are found in areas of Queensland where there are dry periods in the rainfall pattern. Dry rainforest usually occurs in areas which are not often burnt by bushfires. Large vines and some epiphytes are common, although mosses, ferns and palms are rare. The Mary Valley, north of Brisbane, contains fine examples of this kind of rainforest.

Distinctive features of some dry araucarian rainforests are the two large conifers, Hoop Pine (*Araucaria cunninghamii*) and Bunya Pine (*Araucaria bidwillii*), which tower over the forests. Hoop Pine occurs over a wider range than Bunya Pine and extends to drier climatic areas.

Lowland subtropical rainforest

The plants in this area of the Gully represent species found in lowland subtropical rainforests occurring from south east Queensland to central New South Wales.

The forests share many features with tropical rainforest. Many tree species form the layers of the canopy, some of these have large buttressed trunks. The branches and trunks of the trees also provide support for ferns and flowering plants such as orchids. Large vines, palms, strangler figs and orchids are common in subtropical rainforest.

White Beech (*Gmelina leichhardtii*), Booyong (*Argyrodendron* species), Yellow Carabeen (*Sloanea woollsii*) and Rose Mahogany (*Dysoxylum fraserianum*) are trees often associated with subtropical rainforests. Red Cedar (*Toona ciliata*) also occurs in these areas.

Epiphytes

Epiphytes are plants which grow on the surface of other plants. They use the plant as a support but do not obtain any food from it. Epiphytes are common in most rainforests. They include mosses and lichens, ferns such as Elkhorn (*Platycerium bifurcatum*) and Bird's Nest Fern (*Asplenium* species) and flowering plants such as orchids.

Rainforests of Eastern-central Queensland

Plants in this area of the Gully represent species found in the rainforests and allied communities of eastern central Queensland.

Patches of tropical and subtropical rainforest occur along the coastal regions of central Queensland which have consistently high rainfall. These forests are rich in palms, vines and figs and contain a diverse range of plant species, including many different tree species which form the canopy.

In areas with dry periods in the rainfall pattern, dry rainforest and closely allied plant communities occur. The different forests tend to blend into each other, making it difficult to define particular vegetation types. Bottle Tree (*Brachychiton rupestris*) and Crow's Ash (*Flindersia australis*) are important trees.

Rainforests of Northern Queensland

The plants in this area of the Gully represent species found in the rainforests of northern Queensland.

Canberra's cold winters limit the cultivation of many northern Queensland species so the great diversity of plants from these forests is not well represented. Many of the plants grown here were collected from the mountain rainforests between Townsville and Cooktown in Queensland, where the altitude provides cooler conditions similar to those of temperate rainforest.

The mountain rainforests of Queensland are home to Australia's only species of rhododendron, the red-flowered *Rhododendron lochiaie*. The world's largest known dracophyllum, *Dracophyllum sayeri* occurs in forests in the Bellenden Ker Range. High winds on some of the mountains can cause plants to develop unusual twisted shapes.

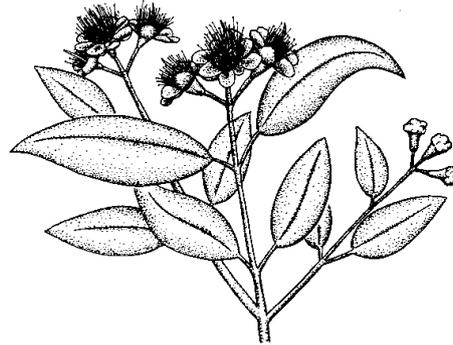
Some plants of the Rainforest Gully

Coachwood (*Ceratopetalum apetalum*)

This is a canopy tree growing to a height of 25 m. It has a straight trunk with circular markings and lives in warm temperate rainforests. Coachwood is a beautiful timber used in cabinet making and wood turning. It was once used to make coaches.

Lilly Pilly (*Acmena smithii*)

This is a medium sized tree reaching a height of 20 m. It has oval leaves about 10 cm long and in summer bears white fluffy flowers followed by soft pink fruits. It grows in rainforests of Queensland, NSW and Victoria. It is also found in moist areas in the Northern Territory.

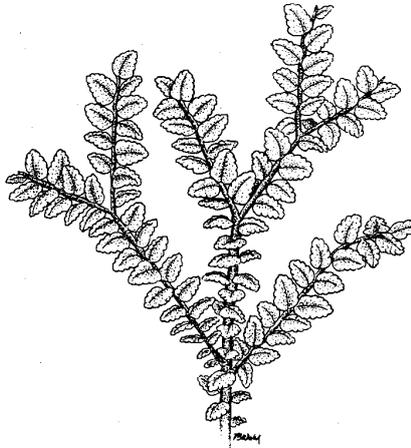


Acmena smithii

Antarctic Beech (*Nothofagus moorei*)

These trees are found in temperate rainforests at altitudes greater than 800 m. They can reach a height of 40 m and sometimes have very twisted trunks covered in mosses, lichens and ferns. This tree grows in mountain areas of northern NSW and southern Queensland.

The Deciduous Beech (*Nothofagus gunnii*) grows in the sub-alpine rainforests of Tasmania where it is an understorey shrub growing to a height of 5 m.



Nothofagus gunnii

Hoop Pine (*Araucaria cunninghamii*)

This tree grows in drier subtropical rainforests and can reach a height of 60 m. If you look closely at the bark it has markings which look like hoops. These give the tree its common name. Hoop Pines were heavily logged by early European settlers. They are now grown in plantations in Queensland.



Hoop Pine cone

Australian Red Cedar (*Toona ciliata*)

This is one of very few Australian native plants which loses its leaves in winter (dry season). It can grow to a height of 60 m and a diameter of over 3 m. Cedars were very heavily logged by the early settlers and mature trees are now very rare.

Soft Tree Fern (*Dicksonia antarctica*)

This plant grows in wet gullies and on moist mountain slopes. It often forms dense layers under trees and can grow to 15 m. The brown spots seen on the underside of the fronds contain the spores by which the plant reproduces. The spore bearing leaf parts are often eaten by Crimson Rosellas



Dicksonia antarctica

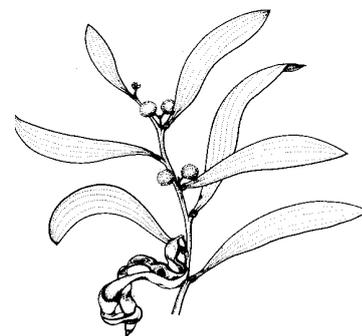


Blue Quandong (*Elaeocarpus grandis*)

This is a tall tree with a straight buttressed trunk. It has large glossy leaves which turn red just before falling. Its bluish-purple fruit is spherical and the stone is wrinkled (similar to a peach stone). The fruits are eaten by a wide variety of animals including bats, possums, Wonga Pigeons, Cassowaries and Crimson Rosellas. This tree grows in rainforests in Queensland and northern NSW.

Blackwood (*Acacia melanoxylon*)

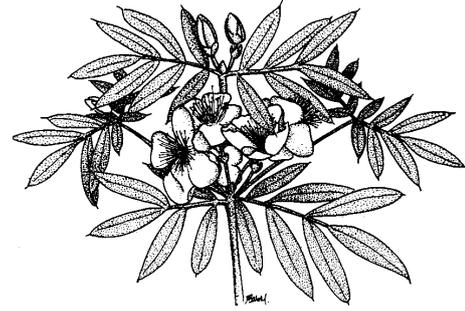
This is one of Australia's tallest wattles reaching a height of 30 m. In spring it has many pale yellow flowers. It is widely distributed from the tropics to cool temperate regions, and its timber has many uses, for example crafts and furniture.



Acacia melanoxylon

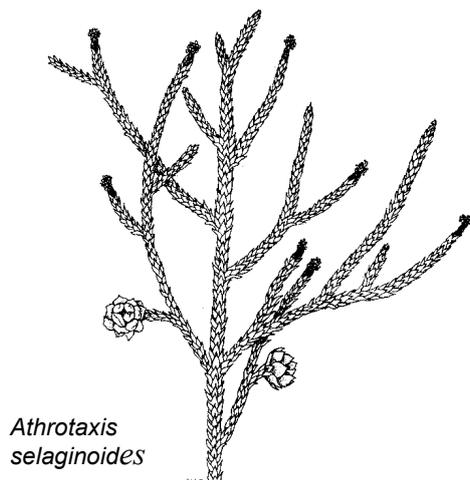
Leatherwood (*Eucryphia lucida*)

This tree can reach a height of about 15 m. Its stiff glossy green leaves are oblong shaped with a rounded point. The flowers have four large white petals and many white stamens with red anthers. Leatherwood is a typical rainforest species as it is shade tolerant. It grows only in Tasmania in areas with a rainfall of 1000 – 2000 m per year. The nectar of the Leatherwood flowers is prized by beekeepers for the production of a distinctively flavoured honey.



Stream Lily (*Helmholtzia glaberrima*)

These plants thrive on rich volcanic soils in rainforests of northern NSW and southern Queensland. They grow along creeks and on cliffs surrounding waterfalls. They have fluffy pink flowers.



Athrotaxis selaginoides

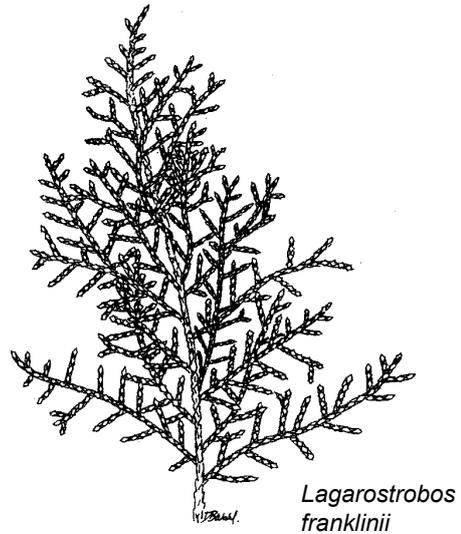
King Billy Pine (*Athrotaxis selaginoides*)

This tree reaches a height of 40 m. Its leaves are spirally arranged, crowded and overlapping on the branchlets. Male and female cones form on the same tree, at the ends of short shoots.

The cones are up to 2 cm in diameter with flat woody pointed scales. The trees produce cones once every 5 years and the seed is only viable for a few months after it is shed. It grows in the mountainous wet areas of Tasmania. They are slow growing and live for 500 years or more.

Huon Pine (*Lagarostrobos franklinii*)

The Huon Pine grows to a height of about 30 m. It has feathery foliage and drooping branches. Its leaves are reduced to scales, spirally arranged on twigs. The male and female cones are on separate trees. Huon Pines grow only in the west and south west of Tasmania, particularly along river banks where they are often straggly trees covered in lichens. They are extremely slow growing and can live for 2300 years. They are shade tolerant and can survive swampy conditions. Their timber is soft and durable. The durability is due to the presence of an essential oil, methyl eugenol, which gives the timber a distinctive odour. The oil can represent up to 7% of the wood by weight and can be extracted by steam distillation. The timber has a high resistance to attack by rot or marine organisms, making it very useful for ship-building.



Student Discussion Questions

1. The cool temperate rainforests of Tasmania usually have two layers of plants - the roof or canopy layer and the forest floor. As you enter the Rainforest Gully, how many different kinds of forest floor plants can you see (including the Soft Tree Fern)?

Intention: *Encourages students to focus on their surroundings*

2. At the bottom of the steps, describe the changes in light and temperature as you enter this moist environment.

Answer: *Light intensity decreases, temperature appears to decrease, humidity increases*

3. Southern Sassafras (*Atherosperma moschatum*) has separate male and female flowers, hidden by the leaves and flowering in Spring. Suggest an advantage for separate flowers, and for them being “hidden” by the leaves?

Answer: *Separate flowers on the same plant might mean the males and females mature at different times, thereby forcing cross pollination which increases genetic diversity. The small flowers are protected by the leaves from damage from snow/hail*

4. Celery Top Pine (*Phyllocladus aspleniifolius*) has flattened stems (or cladodes) that look like leaves. Observe the cladodes and leaves. Suggest an advantage for having such an arrangement?

Answer: *Small leaves not damaged by snow/hail, while tougher cladodes carry out photosynthesis. Small leaves implies reduced water loss from open stomates, and this is very important where the soil is very cold in winter and water uptake is slow.*

5. Myrtle Beech (*Nothofagus cunninghamii*) also has interesting leaflets/leaves which enable the plants to survive in their environment. Suggest some adaptations?

Answer: *as above for Q4 – reduce damage and water loss from plant*

6. On the map of Australia mark the areas where this and the other types of rainforest are found.

Answer: *as per map in Information Resources booklet*

7. You might notice some orange coloured sludge in the water of the creek. These are colonies of bacteria that oxidise the iron in the water. Suggest something about the quality of the water in the stream?

Answer: This bacterium is actually removing the dissolved iron salts from the water. Students might make other pertinent suggestions.

8. Some plants like *Vesselowskya* and *Helmholtzia glaberrima* occupy narrow ranges in the wild. Mark their ranges on the map and suggest why it is important for places like the Australian National Botanic Gardens to be growing them.

Answer: The point is that places like the ANBG can help to educate people about endangered plants and habitats, and the need to conserve remnants

9. Leaves of rainforest trees have special features or adaptations which suit them to their environment.

- (a) The leaves are usually soft (non-waxy). Suggest how this might be an adaptation?

Answer: They absorb light rather than reflect, making use of available light for photosynthesis

- (b) The leaves often face towards the sun. Suggest how this might be an adaptation?

Answer: Leaves tend to grow toward patches of brighter light, increasing the opportunity to absorb as much light as possible for photosynthesis

- (c) The leaves are often a darker green colour. Suggest how this might be an adaptation?

Answer: darker green implies more chlorophyll pigment for absorbing light

- (d) Many leaves end in a slight downward curve called a 'drip tip'. This helps water run off the leaf quickly. Suggest how this might be an adaptation?

Answer: Allows water to run off and prevents the leaf surface staying damp and becoming a suitable habitat for mosses, lichens and fungi.

10. The canopy is very important to the rainforest because it protects the other plants below. Suggest how?

Answer: Canopy trees protect plants below from drying winds, sudden changes in temperature, heat from direct sun. They also reduce loss of moisture and this keeps the humidity levels high.

11. Gum trees (*Eucalyptus* species) do not usually occur in such large numbers in rainforest, but here there are a huge number. Suggest why canopy trees like *Eucalyptus grandis* have been deliberately planted?

Answer: *as for Q10 and many Eucalypts are quick growers. As the rainforest canopy takes over these trees are now slowly being removed by our horticulture staff.*

12. Notice the shapes of the tips of the leaves of the middle storey plant of *Tasmannia insipida*. Suggest how these “drip tips” might work for rainforest plants.

Answer: *As for Q9(d) Allows water to run off and prevents the leaf surface staying damp and becoming a suitable habitat for mosses, lichens and fungi.*

13. The Black Wattle (*Callicoma serratifolia*), another upper canopy species, was well known in the early days of settlement for making “wattle and daub” homes. Suggest why this tree has been planted here?

Answer: *It grows naturally in the area that this section of rainforest depicts, and it provides protection for smaller plants*

14. *Acacia elata* is another upper canopy plant, and on either side of it notice the understorey plants with different labels. *Alyxia orophila* and *Acronychia* spp are rare or endangered. Suggest why it is important for places like the ANBG to grow them here?

Answer: *As for Q8 - The point is that places like the ANBG can help to educate people about endangered plants and habitats, and the need to conserve remnants)*

15. At 108.5 the large *Livistona* palm is ideally suited to the understorey habitat. Suggest why?

Answer: *The large surface area and presentation toward the light of the leaves maximises light capture, important for understorey plants.*

16. 112.6 Note the vines. Suggest how they are adapted to their existence, and suggest how they might affect their environment over time?

Answer: *Vines climb toward the light using tendrils, spines or twining stems. They do not need to provide strong trunks of their own for support. They do not get their nutrients from the plants they climb, but the twiners can constrict plants. Once they reach the upper canopy their foliage reduces light penetrating to the forest floor*

17. Plants which perch on the branches and trunks of trees are called **epiphytes**. They only use the plant for support and do not obtain nutrients (food) from it. Suggest how they obtain their water and nutrients?

Answer: Epiphytes obtain water from rain that runs off other plants, collecting nutrients from decaying debris washed or falling onto the plant.

18. 113.5 A different species of myrtle beech occurs in the Temperate rainforests. What adaptations to survival can you suggest from the appearance of the *Nothofagus moorei* leaves?

Answer: Dense, dark green, drip tips, face upwards – covered in previous Qs

19. 116 Note the different decomposer fungi on the log below the walkway. Suggest why they are important in rainforests?

Answer: return nutrients to the soil for other plants to take up

20. 121.5 *Pittosporum undulatum* demonstrates adaptations to its habit as an understorey plant. You can now demonstrate what you have learnt from the rainforest walk by suggesting what they are?

Answer: as for 18(b). It also has bright yellow fruits, attracting birds to take the seeds, which they transport elsewhere and deposit in droppings – excellent seed dispersal mechanism

21. 123.5 *Syzygium* and 124 *Acmena* species are both Lilly Pillies, providing large sweet fruits when in season. Suggest adaptations that enable them to survive as understorey plants in the rainforest?

Answer: as for Q20. The fruits of Lilly Pillies are edible to humans – make great jelly

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History of Australia's rainforests

Over 200 million years ago, Australia, Africa, South America, India and Antarctica were one continent – Gondwana.

At the beginning of the Tertiary period, about 65 million years ago, Australia was still joined to Antarctica and South America. The seas around the south east coast were much warmer than today and rain-bearing winds penetrated inland much further. Rainforest was the major vegetation type over much of Australia until the continent drifted sufficiently northwards to allow the Antarctic ocean and associated cold currents to develop (about 30 million years ago). As Australia moved northwards the climate became drier, producing changes in the types of plants and their distribution. The drier conditions caused the rainforests to retreat.

The **tropical rainforests** we see today have evolved from rainforest on Gondwana more than 60 million years ago. There are also some plants which arrived in the last 12 million years from south-east Asia.

Many of the plants of the **temperate rainforests** were widespread on mainland Australia 66 – 2 million years ago. As the climate became drier, the frequency of bushfires increased, the rainforest contracted and many species became extinct. Species that survived did so in isolated valleys and mountain tops. In recent times the arrival of Aboriginal peoples (50,000+ years ago) and their use of fire has reduced the remaining rainforests still further. Now European land use with widespread clearing for agriculture has further reduced the rainforest.

Leaf, flower and fruit fossils from 50 million years ago have been found near Adelaide, South Australia, Anglesea in Victoria and Nerriga on the NSW south coast. Nearly 300 distinct leaf types have been identified from these three sites indicating that the vegetation was either subtropical or warm temperate rainforest.

Land masses close to the ancient coast became separated as the Tasman and Coral seas opened up to form island arcs to the east, e.g. Lord Howe Island, Norfolk Island and New Caledonia. There are a number of tree genera in northern NSW which have most of their species in New Caledonia.

The importance of rainforests in Australia can be judged by their containing representatives of 60% of all families of vascular plants found in Australia with eight being restricted to the Australian rainforests. They contain the greatest concentration of primitive groups (98 genera of primitive angiosperms and gymnosperms) in the world, having undergone the least evolutionary change.

Some pre-visit and post-visit ideas

1. Make a list of the different plant adaptations you observed using the following table:

species	Adaptation	Why I think it is an adaptation

2. Find out about past and present uses of rainforest plants that occur in the Rainforest Gully. eg Huon Pine, Sassafras, Myrtle Beech, Blackwood, Red Cedar, Coachwood, Hoop Pine, *Rubus*, *Eucryphia*.
3. Imagine you wanted to establish a rainforest like the one at the ANBG. What locational and design features would you need to include in your plan? What sorts of things would you need to research? How would you go about the work? Which plants might you try and establish first?
4. Why conserve species? Find out about some of the plants growing in the Rainforest Gully, like Red cedar, Huon Pine, King Billy Pine, and how they are being conserved.
5. Why conserve habitat? Plants like *Vesselowskya* and *Helmholtzia glaberrima* have a very small range of rainforest in which they occur. *Alyxia orophila* and *Acronychia* species are in danger of becoming extinct.
6. Many plants on display, including the *Richea* spp. have been saved from the bulldozer. Wherever clear-felling occurs the protective upper canopy is removed and the understorey is no longer protected from the elements. Why do you think the ANBG has collected these specimens? What sorts of messages should we all be getting out to the general public?
7. Most rainforests grow on relatively nutrient-poor soils. Investigate reasons for this and the means by which rainforest plants survive in this low nutrient environment.
(hint: Or is it really all that low?)

Shapes of rainforest leaves

Look closely at the leaves of the rainforest plants and draw **two** (2) which you find interesting. Write the names of the plants they come from beside them.

Birds of the rainforest

Birds you are likely to see in the rainforest include Crimson and Eastern Rosellas (parrots), White-browed Scrubwren, Yellow Robin, Bronze-wing Pigeon and Eastern Spinebill (a honeyeater).

Describe a bird you saw.

How many different birds did you see?

Insects and spiders in the rainforest

Describe an insect or spider you saw.

The Eastern Water Dragon is a lizard which lives in the Rainforest Gully. If you are very lucky you will see one. When disturbed they drop into the water and you'll hear a little 'plop'!

Eastern Water Dragon

Rainforest trees

See what you can find out about the following rainforest trees :
Red Cedar, Fig, Antarctic Beech, Coachwood, Lilly Pilly, Bunya Pine, Sassafras, Huon Pine, Brush Box.

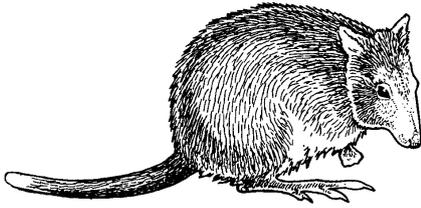
In what types of rainforest do they grow?
What do their leaves and fruit look like?
What animals use them for food or shelter?
How big do they grow?



Crimson Rosella



Rainforest animals



Potoroo

Select 2 or 3 animals from the following list.
Prepare a class talk about the animals you have chosen using the following headings:

Description (what they look like), distribution (where they live), diet (food), camouflage, reproduction.

- Birds:** Noisy Pitta, Green Catbird, Regent Bowerbird, King Parrot, Fig Parrot, Wompoo Fruitdove, Albert's Lyrebird, Australian Brush Turkey, Satin Bower Bird, Rainbow Bee-eaters
- Mammals:** Pademelons, Long-nosed potoroo, Possums, Queensland Blossom Bat
- Reptiles:** Diamond Python, Leaf-tailed Gecko, Southern Angle-headed Dragon
- Amphibians:** Green Tree Frog, Pouched Frog, Torrens Tree Frog, Fletchers Forest Frog
- Others:** Spiders, snails, butterflies, beetles, green tree ants, leeches, Blue Crayfish



Creative Writing

Imagine you are a rainforest plant or animal. Write a story, a play or a poem about your life in the rainforest.

Rainforest Gully

