

# The TROPICAL HOTHOUSE

# PLANTS FROM THE DAWN OF TIME

Start

## 1. MOSSES AND LIVERWORTS

**Origin** Global  
*Non-Vascular*

Mosses and liverworts absorb water and food directly through the surfaces of their leaves and stems.

Mosses are widespread in rainy and humid places and thrive in conditions such as the Tropical House. Mosses characteristically form extensive groups or colonies on moist soil, rocks and wood. These colonies can help to prevent soil erosion. In general mosses are quite sensitive to air pollution, and they are often absent or poorly represented in highly polluted areas.

## 2. TASSEL FERN, CLUB MOSS *Huperzia squarrosus*

**Origin** Australia, South East Asia  
*Vascular and Seedless*

There are 12 species of tassel fern in Australia. They have been around since dinosaurs roamed the earth!

Tassel ferns are not strictly ferns, but early relatives. They date back to about 408 million years ago and formed the Giant Clubmoss forests – growing 4 metres tall in a luxuriant equatorial swamp!

Once the dominant vegetation, the distribution of tassel ferns has been reduced by continental drift and changing climates. They are now mostly found only in rainforests.

The majority of coal mined in Europe today was formed from the un-decomposed remains of ancient tassel ferns.

## 3. WHISK FERN *Psilotum nudum*

**Origin** Australia, Pantropical  
*Vascular and Seedless*

This plant has changed little in 400 million years. The root-like hairs on the Whisk Ferns' underground stems (rhizomes) absorb water and nutrients, which are then carried up the primitive stems. Commonly growing on other plants (as an epiphyte), the Whisk Fern reproduces by spores. They are visible along the stems.

## 4. GIANT OR KING FERN *Angiopteris evecta*

**Origin** Australia, South East Asia  
*Vascular and Seedless*

It is no surprise that this plant is the king of the ferns! Towering to over 2.5 metres tall, the fronds of the Giant Fern emerge from the rounded sheaths (stipules) found on the trunk.

Like all ferns, the Giant Fern reproduces from spores which can be seen under their leaves in the black capsules (sporangia). When ripe, the sporangia burst open and the spores settle in damp spots ready to begin life again.

**300 million years ago the great land mass Pangea split, and Australia drifted towards the South Pole. Half of our continent was under ice. As millions of years passed the climate became warm and wet and then gradually hotter and drier. Approximately 225 million years ago early cone bearing plants evolved including cycads. Cycads more than any other group of plants deserve to be called living fossils.**

## 5. MEXICAN HORN CONE *Ceratozamia mexicana*

**Origin** Mexico  
*Vascular, cone and seed bearing (Gymnosperm)*

Instead of flowers, this cycad reproduces using cones.

Usually pollinated by beetles, the seeds develop inside the cone. Male and female cones are borne on separate plants. The Mexican Horn Cone develops a trunk of 15 cm tall and 20 cm across.

Unlike dinosaurs the cycads still cling to life today. Unfortunately, this cycad is threatened in its natural habitat due to the clearing of land for coffee and banana crops.

**Our walk through time continues and 140 million years ago true flowering plants (angiosperms) appeared. Angiosperms have covered seeds and flowers, as distinct from their gymnosperm predecessors that have naked seeds. Angiosperms are divided into 2 groups, one of which is the monocotyledons.**

## 6. BAT PLANT *Tacca integrifolia*

**Origin** China  
*Vascular, flower and seed bearing (Angiosperm - Monocotyledon)*

One of the early flower-bearing plants, the flower of the *Tacca* looks remarkably like a bat and surprisingly is thought to be pollinated by flies. This flower sits just below the bracts in varying colours including white, green, mauve and deep purple. The Bat Plant has only one seed-leaf (cotyledon) which appears when seeds germinate. It is a good example of a monocotyledon. The flower parts are usually arranged in clusters of threes or sixes.

## 7. SCREW PINE *Pandanus montanus*

**Origin** Reunion Island, Indian Ocean  
*Vascular, flower and seed bearing (Angiosperm - Monocotyledon)*

Although the Screw Pine looks like a tree, its fleshy stems lack both wood and annual growth rings. Its leaves have parallel veins - a distinctive characteristic of monocotyledons which often have long tapering leaves.

The Screw Pine most commonly grows on sandy beaches and forms tripod-like aerial roots that act as supports against the strong coastal winds.

Screw Pines are a good example of monocots along with grasses, lillies, palms, bromeliads and orchids.

**The Orchid family is one of the largest plant families, with over 30,000 species. They first appeared in the fossil record about 100 million years ago.**

**Orchids vary enormously in size - from relative giants with 1 metre leaves, to tiny flowers only a few millimetres across. They can be found growing in all climates and countries. Many are terrestrial; others are epiphytic, perched on trees or rocks. Two unique Australian species spend their entire life-cycle underground!**

## 8. ORCHID SPECIES

**Origin** Global  
*Vascular, flower and seed bearing (Angiosperm - Monocotyledon)*

Orchid flowers differ from all other flower forms in the way they carry the male (stamen) and female (stigma) parts. Most are pollinated by insects, and many rely on a single species of insect. This has helped to earn them the reputation for the most highly evolved plants on Earth.

# PLANT EVOLUTION

## 8. ORCHID SPECIES continued

Colour, pattern, hairy fringes and varying scents, some very pleasant and some offensive to the human nose, are the primary attractants for insects. Orchid flowers also attract insects by mimicking the appearance of the female insect pollinator.

There are over 200 orchids in the Royal Botanic Gardens' collection. Examples in the Tropical House include:

**TONGUE ORCHID, *Bulbophyllum fletcherianum***, from Papua New Guinea. It has 1m long strap-like leaves and a very large inflorescence with an incredibly potent smell likened to a mixture of manure and rotting flesh!

**THE UPSIDE-DOWN ORCHIDS, *Stanhopea wardii* and *Stanhopea hernandezii***, are appropriately named because the weird waxy flowers are in fact upside-down! These epiphytic orchids from Central and South America are pollinated by specific bee species attracted by their strong, pleasant fragrances.

The second group of angiosperms, called dicotyledons, have two seed leaves when their seeds germinate. All trees and shrubs with woody growth and many other familiar plants are dicotyledons.

## 9. COFFEE *Coffea arabica*

**Origin** Probably Ethiopia  
*Vascular, flower and seed bearing (Angiosperm - Dicotyledon)*

Coffee is a great example of a dicotyledon. In the rainforest, coffee grows to a height of three metres with shiny green leaves, fragrant white flowers and clusters of pulpy red berries, each of which encloses two seeds or beans.

Coffee seeds are extremely fertile, and in some sub-tropical parts of NSW coffee has become an environmental weed.

As early as 1000 AD, the coffee industry was protected by making beans for export infertile by parching and boiling them. Coffee is so popular worldwide that in 2001 approximately 500 billion cups were consumed annually, and the industry employed roughly 25 million people.

*Finish*



Royal Botanic Gardens Melbourne

PLANTS FROM THE

DAWN OF TIME

About 3,500 million years ago, one celled organisms known as cyanobacteria gave rise to algae, lichens, fungi and slime moulds. From these humble beginnings, all plant life evolved.

The mosses and liverworts were among the first plants to colonise land (1). Plants with internal conductive tissue (vascular plants) adapted to life on land by forming woody vessels (xylem) to transport water. All land plants today except for mosses and liverworts are vascular plants.

The early vascular plants were ferns and their allies (2-4), from which evolved the seedless vascular plants (5). Reproduction involving flowers evolved and lead to the vast plant diversity we see today (6-8).

By following this walk you will discover more of the amazing story that is plant evolution!

*please:*

consider the environment and return this guide for other visitors to enjoy.

The TROPICAL HOTHOUSE

Evolve

# PLANT EVOLUTION



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