
Leafless Orchids

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Leafless orchids

At the October meeting in 2013, Tony and Mavis Watkinson displayed their very large specimen plant of *Solenangis cornuta*, a leafless orchid species from Madagascar. While many of us have seen (and purchased) leafless orchids from Thailand, more specifically species of *Chilochista*, I thought that it would be interesting to look a little further afield and discover more about these fascinating plants.

While relatively uncommon in the orchid world, they are more numerous than one might think. Those most commonly seen in collections are epiphytic, where the roots perform the photosynthesis functions otherwise undertaken by the leaves. However, there are also a number of saprophytic, primarily terrestrial species that have no chlorophyll whatsoever.

For the purposes of this article, I will concentrate on the epiphytic species where the roots perform the functions normally undertaken by the leaves. In these plants, the stem and leaves have been reduced to little more than scales (although sometimes diminutive leaves can be present). Principally, the plant consists of flattened, cord-like green roots with distinctive 'track marks' that are the pneumatodes that act as stomata enabling the photosynthetic roots to perform the gas exchange required to support photosynthesis. In common with other epiphytic orchids, the velamen coating both protects the inner layer root structures and acquires nutrient and water for the plant. Epiphytic leafless orchids are found throughout the tropical and sub-tropical zones.

While the leafless orchids are not common in collections, they do deserve our attention as although the flowers are generally small and insignificant, the plants make up for it by the number of flowers on each raceme and by flowering more frequently than many other species. Successful cultivation of these plants is conditional upon them being grown on some form of mount as the roots require exposure to sunlight for photosynthesis. I have seen and grown them on small terra cotta pots, wooden slab and tree fern mounts and on plastic mesh. Many of the recently imported plants have been mounted on plastic mesh as they do not have to be removed from the mount before shipping to Australia, however in my experience unless you are able to maintain high humidity and cooler temperatures during summer, the plants do not do well as they tend to dry out and become desiccated.

While all the genera in the following list are not readily available in Australia, they are those that are more often seen in specialised collections:

- ❖ *Campylocentrum* (not all species are leafless)
- ❖ *Chilochista*
- ❖ *Dendrophylax* (previously *Polyrhiza*)
- ❖ *Microcoelia*
- ❖ *Microtatorchis*
- ❖ *Taeniophyllum*
- ❖ *Solenangis*
- ❖ *Vanilla* (not all species are leafless)

Campylocentrum

This genus comprises some 90 species and occurs from Florida through Central America, the Caribbean and northern South America. They are seldom seen in hobbyist collections and can be challenging to grow as they require high humidity all year round.



Campylocentrum burchelli is one of the species and demonstrates the typical growth and flowering habit of this genus.

However, at the risk of becoming a bit technical, the broader question of leaflessness in angiosperms (flowering plants) is of interest to us as growers of flowering plants. The type of leaflessness found in monopodial *Vandaeae* is unique. Typically, leafless vascular plants are either; succulent and xeric adapted (for example Cactii and Euphorbias); are parasitic on other plants; or are fungi. The stems and shoots of these plants are well developed and form the main body of the plant. This is similar to one of the leafless orchids, *Vanilla aphylla* where the stem is robust and performs

photosynthesis for the plant.

Conversely, the shoot system of leafless monopodial *Vandaeae* is extremely reduced, contributing no net carbon gain to the plant. Instead, the roots form the main body of the plant and have taken on the role of food assimilation using a Crassulacean Acid Metabolism (CAM)-like system of recycling CO₂. The degree of reduction is so extreme that these leafless orchids have even been referred to as “shootless” and “semishootless” by some observers who have hypothesized that these extreme epiphytes have reduced their carbon investment in vegetative organs by limiting shoot formation, while increasing their potential fitness by allocating more resources for flower and fruit production.

The genus *Campylocentrum* comprising some 90 or more (or less) species (the number is subject to debate by various taxonomists) is found from Florida south to northern areas of South America. Some 15-20 species are aphyllous (naturally leafless) or only occasionally have leaves present. The flowers have a small spur which is in part an explanation for some of the taxonomic difficulties when the genus was first described.

The type species is *Campylocentrum micranthum* (Bentham, 1881) although Lindley originally described and illustrated the first specimen belonging to the genus *Campylocentrum* in 1835 as an *Angraecum* Bory (Lindley, 1835). The type species which was originally described as *Angraecum micranthum* Lindl. was identified from a collection supposedly from Sierra Leone, Africa, which was flowered in by Loddiges in England. However, this was an African, not a South American plant. Subsequently, the locality data was found to be incorrect.

Several explanations have been proposed to clarify the origin of this specimen, ostensibly belonging to Neotropical *Angraecinae*. Without going into detail, some authors favour Jamaican origin of *Angraecum macranthum* while others suggest the type locality to be Guatemala. While more recently, Robert Dressler observed that Lindley’s specimen at Kew is consistent with the Guatemalan form of this species, the exact origin of Lindley’s specimen, alternatively assigned to Surinam and Guatemala, seems difficult to ascertain, because *Campylocentrum micranthum* ranges from Mexico and the Antilles to South America, and it shows considerable morphological variation in the shape and size of leaves and flowers throughout its distribution.



While my research showed that there are many more *Campylocentrum* species that have leaves (including the type species) than those that are leafless, I was not able to find a convenient list which showed those that were leafless and those that were not. Therefore, those I found were as a result of further detailed research, but as they are seldom seen in collections in our part of the world, a few examples will suffice to illustrate this genus.

Ricardo Valentin in his blog <http://ricardogupi.blogspot.com> discusses *Campylocentrum filiforme* which he describes as “a bizarre native orchid that challenges our concept of what an orchid

must be.”

The photo shows the roots which are silvery white when dry but turning green when wet. Clearly this plant has been pollinated and is carrying many seed pods – the flowers are small and insignificant. Both live and dead roots are visible in the photo. In this species, the stem or body of the plant has been reduced to about 1 cm in length, making it practically invisible. The roots completely dominate and form a tangled mass over time.

This species comes from Puerto Rico and the Virgin Islands, and while is said to be uncommon, it may be more abundant than records indicate given its ‘non-orchid like’ appearance and possibility that it is short lived in the wild as all the plants that Ricardo monitored died when the twigs in which they were growing decayed. Popular theory is that the leafless orchids are among the most highly advanced in evolutionary terms allowing them to survive on meagre nutrient resources where many other plants would struggle. While they most often are found in swampy or moist forests, they are also recorded growing in disturbed and secondary forest areas where suitable conditions exist.

Campylocentrum fasciola is a species from Mexico, Guatemala, Belize, Honduras, Costa Rica, Cuba, Dominican Republic, Haiti, Jamaica, Puerto Rico, Trinidad & Tobago, Windwards, French Guiana, Surinam, Guyana, Venezuela, Colombia, Ecuador, Peru, Bolivia and Brazil. It is found in wet montane forests as a miniature sized, monopodial, leafless epiphyte at low to moderate elevations of 1,500 metres. Its wiry green roots and flowers on subfiliform, terete, straight, 3 1/4" [8 cm] long, densely distichous, many flowered, racemose inflorescences with nonresupinate flowers. It flowers all year round.

The photo from <http://www.orchidstudium.com/Estrangeiras/Campylocentrum%20fasciola.html> shows just how small these flowers are when compared with a match head.



This following photo shows another characteristic of these small-flowered species. Frequently, they are very fertile and many of the insignificant flowers are pollinated. In this instance, almost every flower on some racemes is now a seed pod.

Photo source:

http://www.ecuagenera.com/epages/whitelabel4.sf/en_gb/?ObjectPath=/Shops/ecuagenera/Products/PRS0087

Campylocentrum grisebachii is from Brazil, Bolivia, Argentina and Paraguay where it is epiphytic at low to medium elevations as a small sized, warm to cool growing in shady, damp environments on lower branches of permanent-barked hardwood trees. The flowers are tiny, a pale ochre to white colour, with the sepals and petals free, and small nectary at the back of the lip. The flowers are pleasantly fragrant.



Photo source: <http://www.rednaturaleza.com.ar/planta/142>

Culture of *Campylocentrum* species requires the plants to be mounted as the roots undertake nearly all the food-making functions for the plant. In their native habitat, they generally occur in medium- bright light situations, and intermediate

to warm temperatures along with high humidity (70% or more), and high rainfall in the wet season (normally following flowering). In response to higher moisture and humidity levels at this time, occasionally the plants will commence growing new roots from either the base of the plant, or existing root tips. During this growth phase, regular fertiliser application will help develop a robust plant. It is recommended that in cultivation, *Campylocentrum* orchids should be left dry for a day or two in autumn between waterings to enable the plant to experience the change in moisture levels that occurs in nature. In winter, water should be applied sparingly to avoid desiccation. Good air movement is essential for successful cultivation of this genus. *Campylocentrum* species generally flower in spring with the flower development commencing late winter, so care needs to be taken with watering to ensure that the plant neither desiccates, nor rots from too much water. Most of the species are pleasantly fragrant.

The next leafless genus is one with which we are more familiar, *Chilochista*. They are members of the Aeridinae tribe rather than Angraecinae tribe and are found throughout mainland and island Asia extending into northern Australia. All twenty species are leafless although occasionally ephemeral leaves may be present during periods of active growth in spring and summer. Generally, we mostly see the Thailand species on display as these plants have been imported over the years. These include *Chilochista lunifera*, *parishii*, *useneoides*, and *viridiflava*.

The type species is *Chilochista useneoides*. It had already been described and the name validly published by David Don. But it was John Lindley, who reclassified it into the valid botanical systematics in 1832.

Chilochista lunifera is a small hot to cool growing epiphyte from the eastern Himalayas, India, Assam, Myanmar, Thailand and Laos at low to moderate elevations. It has the typical grey roots and an occasional small, deciduous leaves. Blooming in autumn or winter, it has up to 20 fragrant reddish coloured flowers with a pleasant, subtle fragrance.

The flower colour is unusual as the majority of species in this genus are white, yellow, green or light brown. The photo from http://commons.wikimedia.org/wiki/File:Chiloschista_lunifera_Orchi_004.jpg shows the attractive, well-displayed flower of this species. An alba form also exists, and has previously been displayed by Tony Watkinson.



Chilochista parishii Seidenf. 1988

Commonly named Parish's Chilochista after an English orchid collector in Burma in the 1800's, *Chiloschista parishii* is found in Vietnam, Myanmar, Thailand, India and the Himalayas in semi-deciduous and deciduous dry lowland forests and savannah-like woodlands at elevations of sea-level to 700 m. This miniature sized, leafless epiphyte has small leaves that wither before flowering in spring and summer on an erect, 10-20 cm pubescent raceme with 10 to 20 fragrant flowers. It is a bright light orchid, and high humidity/regular rainfall.

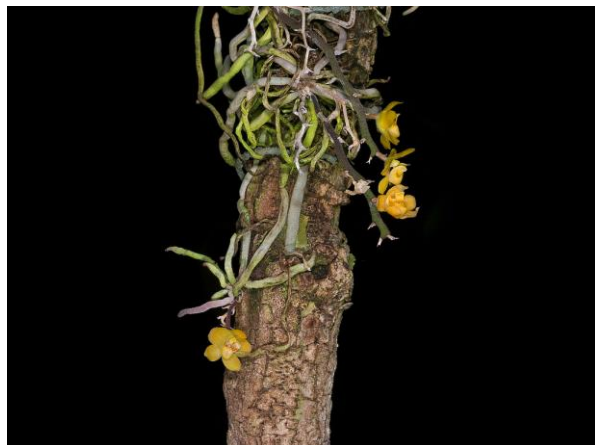


Photo source:

<http://www.hortusorchis.org/en/botanical-orchids/107-c/1183-chiloschista-parishii.html>

The Australian species, *Chilochista phyllorhiza* (F.Muell.) Schltr., Bot. Jahrb. Syst. 56: 492 (1921) is found in the Northern Territory, including Bathurst Island, some Torres Strait islands and between Cape York and the Tully River in northern Queensland. It grows on trees and rocks in rainforest, streamside vegetation, swamps, moist gullies and gorges, and is



often found on mangroves. The flowers of *Chillochista phyllorhiza* only last a few hours and are produced in spasms, usually by all the plants in an area flowering simultaneously (similar to the gregarious flowering habit of species such as *Dendrobium crumenatum*). They appear to be pollinated by native bees.

Photo source: http://keys.trin.org.au/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Chiloschista_phyllorhiza.htm

Vigorous growth occurs in spring and summer, with flowering occurring early in this period. As is the case with other leafless orchids, there is some debate amongst taxonomists about this species, although its name is valid according to Kew. The debate is whether it is in fact a *Chiloschista* given its flowering habit and difference in flower form (quite similar to *Sarcochilus*). In this regard, *Sarcochilus phyllorhizus* F.Muell. (1866) and *Thrixspermum phyllorhizum* (F.Muell.) Rchb.f., Beitr. 1871) are synonymous.



Chillochista ramifera Seidenf. 1988

Found in Thailand as a small sized, hot to warm growing epiphyte native to the humid forests of Thailand where it blooms in the spring on a pendulous, many branched, to 13.2" [33 cm] long, branched many [22] flowered inflorescence that arises with two leaves present and carries pleasantly 1cm fragrant flowers. This species is subject to clearing pressure in the wild and is becoming less common.

Photo Source:
<http://forum.theorchidsource.com/ubbthreads.php/topics/140450.html>

Chiloschista trudelii Seidenf. 1987

Found in Thailand and Vietnam in humid, mossy, mixed and coniferous forests on mossy branches of old, dwarf, gnarled trees at low to moderate elevations and has grey green roots that bloom with an erect, fleshy, 3 1/4 to 4" [8 to 10 cm] long, branched, few flowered inflorescence occurring in the spring.



Photo Source:
http://www.orchidarium.pl/AdoZ/html/Chiloschista_trudelii.htm

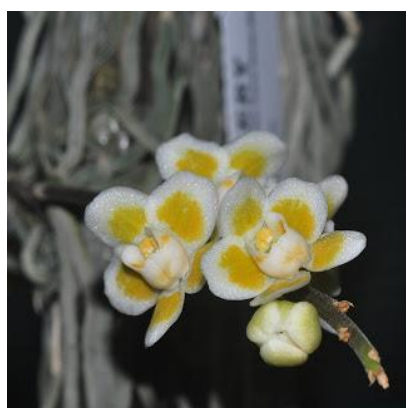


Chiloschista usneoides (D.Don) Lindl. 1832 comes from the Himalayan foothills in northern India and surrounding countries. The Eastern Western and Northern Himalayas region from Garhwal in the west, through Nepal, and into Bhutan and Thailand at elevations of

1,600 -1,700m as an almost leafless, hot to warm growing, miniature epiphyte or lithophyte. The plant has many long, twisted, tufted roots and blooms in the summer on an erect, pubescent, flexuous, 5- 11 cm racemose inflorescence with a few fragrant flowers.

This species is reported to be under threat in Nepal due to habitat destruction and indiscriminate removal of wild plants for the orchid trade.

Photo source: <http://www.orchidstudygroup.org.uk/a-trip-to-see-the-orchid-wonders-of-sikkim/>



Chilochista viridiflava G.Seidenfaden 1988

Found in Thailand as a miniature sized, cool to hot growing epiphyte that blooms in the spring on a pendant several to many [20] flowered inflorescence. It is sometime incorrectly referred to as *Chilochista viridiflora* and was primarily described by the Danish botanist and diplomat Dr. Gunnar Seidenfaden in 1988. In Thai, its common name is Phaya rai bai, which means without leaves. The small flowers are approximately 1.2cm across and in their natural habitat, flower in April-June.

Photo Source: [http://paphyeo.blogspot.com.au/2013/05/chiloschista-](http://paphyeo.blogspot.com.au/2013/05/chiloschista-leafless-orchid.html)

[leafless-orchid.html](http://paphyeo.blogspot.com.au/2013/05/chiloschista-leafless-orchid.html)

Chilochista culture

- Water/Humidity - members of this genus come from the wet tropics and therefore are exposed to high moisture and humidity for most of the year. During the cooler winter months, rainfall is somewhat reduced and accordingly, we can reduce watering frequency during our winter although it is important to prevent desiccation. Humidity needs to be maintained at approximately 80% throughout the year.
- Temperature/light – in their natural habitat, diurnal variation is about 6°C (26-28°C max and 20-23°C min) with temperatures somewhat lower in winter. The warmest temperatures are in spring as there are less overcast rainy days than in mid-summer. These plants are generally found in shady locations in filtered or diffuse light at 15,000-25,000 lux.
- Air movement – excellent air movement is essential for successful cultivation of the members of this genus. In a confined space such as a glasshouse, this can be achieved by the use of oscillating fans or plate fans and polysock tubes that ensure even air distribution.
- Fertiliser - while these plants are efficient consumers of nutrients, they are small in size and therefore benefit from regular fertiliser application. Prior to flowering, the fertiliser should be higher in potassium and phosphorus, and during flowering, higher in nitrogen. During the rest period, it is also prudent to reduce the rate of fertiliser application as the plants are partially dormant.
- Media - as the members of this genus have no leaves, or at the most only occasional and ephemeral leaves, they are not suitable for the more common method of potting up that we would use for other orchids. The roots must be exposed to sunlight and accordingly, the most successful way to grow *Chiloschista* species is mounted on smooth hardwood or cork slabs, terracotta or plastic pots and baskets, or plastic mesh. The plant should be firmly, but gently attached until the roots naturally adhere to the surface over time at which time the wire or thread can be removed.
- Flowering - generally, flower spikes appear from mid-winter to early spring. The racemes elongate slowly over winter, accelerating in spring. During this time, watering frequency needs to be increased to maintain high humidity and support the flowering. The condition of the roots is a good indicator – if there are signs of shrivelling and desiccation, your orchid needs more water and humidity. At the same time, ensure that you have lots of air movement as the plants should not remain wet for any extended period of time, that is, the

roots should be wet then dry as you would see with other tropical genera such as *Vanda*. The flowers normally open mid to late spring. *Chilochista* flowers often have a pleasant fragrance in the late morning reminiscent of a mixture of vanilla and menthol.

The next genus is *Dendrophylax* consisting of some 11 species, although recent research indicates that *Polyrrhiza* should be included in *Dendrophylax*. The best known member of this genus is *Dendrophylax lindenii* (previously *Polyrrhiza lindenii*) or the Ghost Orchid from the Florida Everglades. The genus was established by Reichenbach 1864 with the type species *Dendrophylax hymenanthus*. With the exception of *Dendrophylax funalis*, they are uncommon in other than specialist collections as they seem difficult to establish, and even once established, to maintain in a healthy and vigorous condition.

As a genus, these orchids are unusual as they consist of masses of photosynthetic roots with reduced stems and ephemeral leaves which have been reduced to scales. The major vegetative characteristic of this genus is the flat, cord-like, green roots with distinctive 'track marks' called pneumatodes. The pneumatodes operate in a similar manner to the stomata found on the undersides of plant leaves allowing the gas exchange to support photosynthesis to take place. In leafless orchids, this function is performed by the roots.

Members of this genus are distant relatives of the African and Indian Ocean genus *Angraecum*. This leads to the theory that orchid seed was wind-carried across the Atlantic Ocean and colonised new habitat. Evidence derived from molecular (DNA) studies indicates that the original seeds from Africa were most likely to have been a member of the *Angraecineae* family, likely to have had small leaves and flowers, and a monopodial growth habit. The related genus *Harriselia* seems to have had similar origins. The leafless characteristic developed in a similar time frame in both Africa and the Caribbean since common genes are present in all members of the family *Angraecineae*, and the leafless habit is common in several families within *Vandeae* (*Chilochista*, *Aerangidinae*, *Angraecineae*, *Sarcanthinae*, *Telipogoninae*, *Dendrophylax*, and *Harriselia*).

Several species such as *Dendrophylax funalis*, *Dendrophylax fawcetti*, and *Dendrophylax lindenii* produce large, highly fragrant white flowers. The species in this genus are mostly pollinated by moths with very long proboscises as the flowers of most species in this genus possess very long nectaries (spurs) ranging from 10-20cm in length (the giant sphinx moth is known to pollinate several species within this genus). *Dendrophylax funalis* is the most easily cultivated species and over time given the right cultural conditions can become a large root mass both in nature and cultivation. Other species including *Dendrophylax lindenii* are often very difficult orchids to even grow.

Dendrophylax varius (syn. *Dendrophylax hymenanthus*) (C.C. Gmel.) Urb. 1918 is found in Cuba, Haiti and the Dominican Republic as a small, hot to cool growing leafless epiphyte that blooms on an erect, 14-30cm long, simple or paniculate inflorescence arising from low on the stem and carrying a few to several, resupinate, successively opening flowers towards the apex.

Photo Source: <http://www.orchidspecies.com/denvarius.htm>



Dendrophylax barrettiae Fawc. & Rendle 1909 is from Cuba, Dominican Republic, Haiti and Jamaica in very wet and steamy areas at sea level to 1800m. It is a miniature-sized hot to warm growing epiphyte with flattened grey-green roots. Summer to autumn flowering occurs on short, successively few flowered inflorescences with a single non resupinate, fragrant flower open at any one time. It is synonymous with *Campylocentrum ariza-juliae*.

Photo Source: <http://buildingofeden.blogspot.com.au/2011/10/dendrophylax-ghost-orchids-on-trees.html>

Dendrophylax fawcettii Rolfe. 1888. Found only on Grand Cayman Island as a small sized, hot to warm growing leafless epiphyte that blooms in late spring on an erect or ascendant, 7 cm inflorescence with 1 to 2 bracts and carrying a single, non-resupinate, diurnally fragrant flower. Articles reviewed indicate that this species has a tendency to keiki. An inflorescence-like growth that is about 5cm long will sometimes have at its apex a new growth rather than a flower. In their natural habitat, this additional growth sometimes persists, or falls off and attaches to a suitable substrate.

Its habitat is the Ironwood Forest, a unique, self-sustaining ancient growth forest anchored on a ridge of pinnacled Cayman Dolostone limestone rock. Located south east of George Town on a fresh water lens in a high rainfall area, the forest contains an amazing diversity of Cayman indigenous plants, including endemics and single-neighbor endemics. One of these plants, *Dendrophylax fawcettii* is confined to last remaining one square kilometre of old growth forest in the Ironwood Forest that is classified as critically endangered.



Photo Source: http://caymannature.wordpress.com/2012/11/11/405/dendrophylax-fl-apr4-11_113/

In a report from the International Union for Conservation of Nature, the Species Survival Commission and the Zoological Society to the Grand Cayman government about this threatened forest where *Dendrophylax fawcettii* is found, the authors say that habitat destruction due to infrastructure development is the cause of the species decline. They say that preserving this forest would not only protect the ghost orchid but numerous other indigenous species as well including Cayman's national flower, the banana orchid *Myrmecophila thomsoniana*.



Dendrophylax funalis Sw.] Fawcett 1889

Found in Jamaica, this epiphytic species is found at low altitude where it is hot growing with constant high humidity and bright indirect light. Flowering from autumn to spring, 5-10 cm inflorescences arising from the central stem carry a single medium sized, pleasantly citrus fragrant flower.

Photo Source:
<http://buildingofeden.blogspot.com.au/2011/10/dendrophylax-ghost-orchids-on-trees.html>

Dendrophylax lindenii [Lindley] Garay 1969. The best-known member of this genus is the Ghost Orchid from the Florida Everglades that was the central feature of the book 'The Orchid Thief' and the movie made from the



book. It is small-sized, leafless epiphyte found growing in hot-cool swampy forest thickets and coastal brush land in southern Florida, Cuba and the Bahamas. The best-known location in the US is the Fakahatchee strand in the northern Everglades.

While researching this article I found a really interesting web page <http://www.ghostorchid.info/generalinformation.htm>. This page provided a wealth of information about this legendary species, saying that in the author's view, it is the most revered orchid in the US. Originally discovered by Linden in Cuba in 1844, it was subsequently discovered in Florida some 50 years later. While numbers in the wild have declined considerably, it can still be found in concealed swamps in Cuba, Fakahatchee Strand Preserve State Park, Big Cypress National Preserve and other

guarded locations in South Florida, although it seems that it may now be extinct in Cuba due to habitat destruction.

Photo Source: <http://www.ghostorchid.info/pictures2.htm>

Chris Little, who has generously allowed me to use photos and information from his web site says that it is rare to see a ghost orchid in bloom. He further notes that his research indicates that only approximately 2,000 individual plants remain in the swamps of South Florida, and of these, only 5-10% bloom each year. Of these blooming plants, only about 10% are pollinated by *Cocytius antaeus*, the giant sphinx moth. The prevailing theory is that the sphinx moth follows the odour of the ghost orchid where it then uses its long proboscis to access the nectar in the nectary at the lower extremity of the spur. The same moth must then find another blooming ghost orchid to pollinate.

Dendrophylax lindenii usually has only one flower open at a time, although in some instances, a plant may have more than one flower and may have more than one flower raceme. Chris Little says that on July 7, 2007 a previously unknown and outstandingly large ghost orchid was discovered in Corkscrew Swamp Sanctuary in Naples, Florida. This plant, dubbed the "Super Ghost", was growing 14m above ground and had 11 blooms at its peak. It is currently the only wild ghost orchid whose location is not kept secret! The story of the decrease in the number of plants in the wild includes interesting tales of snow in the Bahamas, the devastating logging of the mysterious Fakahatchee Strand, digging of the canal system throughout South Florida, and perhaps the most well-known reason, illegal removal by poachers.

Chris explains that life was tough for the Ghost Orchid on the 20th Century. Many elderly bushwalkers and orchid enthusiasts have told him that plants used to be much more numerous but were never common. One of the reasons given was adverse weather conditions including a freeze in Florida in the 1970s. While this might seem to be part of a normal long term weather pattern, the construction of canals and draining of water from much of South Florida led to a substantial reduction in water levels throughout the orchid's habitat. During the cold weather, the modifying effect of the standing water was lost, and the vegetation was subject to frost, perhaps for the first time. He measured the temperature during a freeze in January of 2008 in Big Cypress Nation Preserve and at 1.5m above water level (the zone in which most *Dendrophylax lindenii* are found) in a water-filled swamp and found it to be about 2.5° C higher than temperatures outside the area. It seems that thousands of plants may have perished since as a consequence. Weather data for the Miami International Airport shows that most of the overnight freezes since the late 40s occurred the 1970s and 80s. The record 1977 freeze brought snow to both Miami and the Bahamas and it is therefore quite reasonable to assume that it had a disastrous effect on the population of *Dendrophylax lindenii*.

For most of the 20th century, orchid collecting was a legal activity, but has since been banned. During that period, many orchids including *Cryptopodium punctatum* and *Oncidium luridum* were also over-collected and are now rarely found in South Florida.

The Fakahatchee Strand State Preserve is considered to be the Ghost Orchid capital of the world. However, during the 1940s and 50s, the bald cypress timber that was so valuable due to its excellent structural qualities and resistance to rotting was heavily felled. An extensive system of train lines was constructed over the much of the Fakahatchee Strand's 85,000 acres, and the large cypress trees were cut by hand and then hauled out using trams (logging rail beds) and trains, devastating everything in their path. This unfettered logging left the Fakahatchee with very few primary forest cypress trees and dramatically changed the landscape. Orchids that were not taken by collectors; killed by logs or building of trams were now exposed to higher levels of sunlight from canopy removal leading to massive plant death. While the trains and tracks are now gone, the trams remain and are now walking trails. Despite local ordinances to protect endangered plant species including *Dendrophylax lindenii*, they are still illegally removed and in most instances doomed to death as the thieves often have no knowledge of, or access to the environment necessary for their survival.

Another issue impacting the viability of this species is an apparent decline in the population of the Giant Sphinx Moth (*Cocytius antaeus*). It is rare and little is known about its



environmental requirements and overall population dynamics. The diminishing presence of its critical pollinating insect is just another impediment to the orchid's long term survival, and is one of the side-effects of vegetation destruction.

Photo Source: <http://www.ghostorchid.info/pictures2.htm> Campylocentrum:

The real challenge however is growing some of the species in this genus. Chris Little acknowledges the difficulty in cultivating *Dendrophylax lindenii* outside its natural habitat, and to be fair, this applies to pretty much all the species. Despite this view, he emphasises the need to maintain high humidity and ensure that there is no build-up of salts left after evaporation. In the natural habitat, these plants grow in quite low light and in an environment that we might regard as stagnant with relatively little air movement, and at relatively high temperature. He says that while he has seen plants in flower that have survived in environments other than that described, generally those grown in conditions that approximate those of their natural habitat are more vigorous. He grows *Dendrophylax* species hanging inside a container partially filled with water – they might do well in an aquarium. His plants are mounted on natural cork, but hardwood or treefern slab and plastic mesh should also be suitable. In this regard, *Chilochista* species grow well on terra cotta pots and in plastic baskets and these might also be suitable for *Dendrophylax*. He mists plants several times a week and is careful to use de-ionised water (distilled water) to ensure that any salt build up from daily watering is removed.

Studies of both native and greenhouse grown plants show that the roots contain the usual mycorrhizal fungus, as well as some types of algae. The plants use these symbiotic agents as an additional supply of food. For this reason, leafless orchids are less tolerant of fungicide and algaecide treatments. However, if you need to apply fungicide or algaecide, make sure that you manage your fertiliser regime, and be prepared for some plant losses.

J Watts says that while mounting an orchid is a simple process, mounting leafless orchids is different. While almost any timber can be used, those with aromatic characteristics must be naturally or artificially weathered to remove the oils. Timber which does not have these aromatic oils, cork, small branches with bark attached, shingles or cut wood, tree fern slabs and upside-down clay pots will all work, subject to your unique cultural conditions. He uses a cork wallboard product to mount his leafless orchids (this sounds similar to the cork tiles that Tony Watkinson uses so successfully to mount a wide variety of genera). Watts uses a small pad of sphagnum moss when attaching his plants although there is considerable debate about the efficacy of this approach as it can provide a haven for fungal pathogens and bacteria as it remains wet for much longer than an impervious substrate. He says that it is important for the mount to dry out in about 30 minutes. He also notes that cultivated plants over time become used to receiving nutrition from fertiliser and therefore less susceptible to fungicide application that can damage the mycorrhizal fungus and algae present in the roots. The most common disease problems are crown and root rot and can quickly lead to plant death if not addressed, however, the best way of preventing this is careful management of cultural conditions such as ensuring good air movement.

When *Dendrophylax lindenii* is growing well, it will regularly send out new roots from the small inconspicuous stem in the centre of the plant. These roots may grow as much as 2cm a month. In common with all other orchids, it is normal for the plant to have some dead roots, however it is recommended that these be allowed to remain as their removal can damage active roots. The solitary (most often) flower arises from the centre of the plant over several months until the bud forms and opens. The flowers cannot be self-pollinated and must be cross-pollinated from another plant. The seed pot forms soon after fertilisation and takes 10-12 months to mature before turning brown and splitting to release the seed.

The next genus is *Encheiridion* from Africa and is closely related to *Microcoelia*. However, I was unable to find anything much about this genus, although did find a reference to *Encheiridion macrorrhynchium* (Schltr.) Summerh from West Africa. This is described as a miniature leafless species with white flowers and curved spur. It is shown as a sub-genus in *Microcoelia*. It is said to comprise one to three species but is not known in cultivation. No photos or further information were available.

Harrisella is a genus of four species is found in Florida, Jamaica and Cuba, although DNA studies have relegated it into *Dendrophylax*. However, to follow earlier taxonomy, I will cover two of the species here, but accord them their proper names while noting that *Harrisella* as the synonym. In researching this genus, I noted that it has many synonyms including *Aeranthus*, *Campylocentrum* and *Epidendrum*.

Dendrophylax porrectus (Rchb.f.) Fawc. & Rendle 1909, syn *Harrisella porrecta* (known commonly as the Jingle Bell Orchid or Needleroot Orchid) is the type species for the genus *Harrisella*. Found in Florida, Mexico, El Salvador, Cuba, Jamaica, Hispanola and Puerto Rico in hardwood hammocks, juniper and old citrus trees on smaller branches and twigs in swampy areas at sea-level to 700m is a miniature sized, leafless, cool to warm growing epiphyte. It was reassigned to *Dendrophylax* after DNA sequencing that placed it in that genus. However, it is curious that this species with one of the smallest orchid flowers in Florida is part of the genus that also has one of the largest flowers, i.e., *Dendrophylax lindenii*. In central Florida, this diminutive species begins flowering in September.



The photo from

<http://www.orchidsforum.com/threads/dendrophylax-porrectus.6798/> shows the diminutive size of this flower.

The flowers, only slightly larger than a pinhead, are remarkable in that they faithfully replicate the orchid flower structure in a small package of just a few thousand cells when compared with the millions of cells in larger orchid flowers. The tiny flowers that make it difficult to find produce a strong night fragrance to attract their pollinator, a night insect perhaps a moth. In Florida, this species is found on small twigs of cypress, eastern red cedar, pop ash, pond apple, and occasionally in old citrus groves. It is often found growing in association with *Encyclia tampensis*, *Epidendrum magnoliae*, and several *Tillandsia* species on the undersides of branches. The slender, silvery orchid roots don't connect to anything resembling a plant, but during the flowering season, you might see the tiny green flowers amongst split seed pods that look like little brown bells. After flowering, the seed pods expand to become one of the most conspicuous aspects of this plant, turning a deep brownish orange prior to dehiscing.

It is thought to be the most common epiphytic orchid in Florida, but given its diminutive nature, is rarely seen. It has a state protected status of Threatened. However, while the range of some other epiphytic orchids has decreased due to the freezes in the 70s and 80s, new northern populations of this species have been identified extending its known range. Although common in citrus groves in the past, the use of herbicides to control ball mosses, wild pines and other *Tillandsia* species has significantly reduced its presence. The blogspot <http://flnativeorchids.blogspot.com.au/search/label/Jingle%20Bell%20Orchid%20%28Harrisella%20porrecta%29> provides information and pictures of this interesting species.

Dendrophylax filiformis (Sw.) Benth. ex Fawc. (Syn *Harrisella filiformis*) is found in Cuba, Jamaica, Dominican Republic, Haiti and Puerto Rico on twigs and small branches in regrowth woodland at 500 to 950m as a small sized, hot to warm growing epiphyte with numerous, grey-green, fascicled roots, mostly attached to the substrate. There is some doubt about the status of this species as some authors consider it to be synonymous with *Dendrophylax porrectus*.

Species in the genus *Kingidium* can often appear to be leafless however it appears that this more often than not associated with their deciduous nature than being truly leafless. In cultivation where conditions are often more favourable, this species will permanently retain its leaves. Therefore, I have chosen to exclude this genus from this article.

The genus *Microcoelia* includes approximately 40 species and is found in Madagascar and throughout tropical Africa. *Gussonea* is a prior name for *Solenangis* and *Microcoelia* and is sometimes used in literature and in the trade. The type species is *Microcoelia exilis* Lindl., 1830. This species is found in Natal province of South Africa, Kenya, Swaziland, Madagascar, Uganda, Zimbabwe, Tanzania and Zambia on trees in riverine, lake-shore and coastal forests as a miniature sized, hot to cool growing, leafless twig epiphyte at sea level to 1,800m. It is also occasionally found in high rainfall areas.



Photo Source: <http://www.zimbabweflora.co.zw/speciesdata/images/11/118870-1.jpg>

It is principally epiphytic and rarely lithophytic to 3.5 cm long, usually less. The roots are branched, 1–3 mm in diameter, clinging closely young but later forming hanging masses which detached. The photo to the right shows the over time. Photo Source:



with the living stem up numerous, much-to the substrate when often become large colony formed

<http://www.zimbabweflora.co.zw/speciesdata/images/11/118870-7.jpg>

Microcoelia aphylla (Thouars) Summerh. (syn. *Solenangis aphylla*) is found in Tanzania, Uganda, Kenya, Zimbabwe, Madagascar, Zanzibar, the Mascarene Islands and Mozambique at sea level to 300m in thickets and bushes near the coast as a miniature sized, hot to warm growing twig epiphyte.



Photo Source:

http://farm6.static.flickr.com/5517/11594951385_36ac430981_m.jpg

A great range of pictures of *Microcoelia* species can be found at <http://www.picsearch.com/Microcoelia-pictures.html>.

Microcoelia corallina Summerh is found in Kenya, Malawi, Mozambique and Tanzania growing in open dry woodland, generally adjacent to watercourses, and most often on smooth barked trees such as *Baobab* at 200-600m elevation. It is interesting that species inhabits smooth rather than the rough-barked trees generally preferred by epiphytic orchids. The species is distinctive due to its red coloured column, and pink flushing in the petals and sepals.



Photo Source:

http://farm4.staticflickr.com/3183/2901454482_b432bb58af_b.jpg



Microcoelia cornuta (Ridl.) Carlsward. Found in the Comoros and north-western Madagascar as an epiphyte in dry semi-deciduous forests and as a lithophyte on partially exposed calcareous rocks and sand at sea-level to 300m. Formerly *Solenangis cornuta*, it was this species grown by Tony Watkinson that led to this article, and the photo is of his plant. For many of

you, this was also your introduction to cultivating leafless orchids and what a great introduction it proved to be as it is very vigorous.

Microcoelia gilpinae (Rchb. f. & eastern Madagascar in mossy branches at elevations of 100 - cool growing epiphyte. This cultivation. In Madagascar, it is evergreen forests and secondary/regrowth forests and understory. It has been recorded from Antananarivo, Antsiranana, Fianarantsoa, Mahajanga, Toamasina and Toliara provinces.



S. Moore) Summerh. Found in rainforests on twigs and small 1,800m as a small sized, hot to species is uncommon in endemic in dense, humid,

Photo Source: <http://www.orchidphotography.com/resources/Microcoelia%20gilpinae%20flower.jpg>

A twig epiphyte, *Microcoelia gilpinae* is often attached by one or a few roots only to small branches. It was named after Helen Gilpin, a British missionary who collected Herbarium specimens for Kew in the late nineteenth century. Another closely related orange, leafless *Microcoelia* species named *Microcoelia elloitii* has nectary spurs that are curved rather than *Microcoelia gilpinae*'s straight spurs. The text with the preceding photos says that it is in a private collection grown under intermediate conditions with average summer daytime temperature of 26-28°C, and an average year-round night temperature of 13°C with bright light in winter 2000fc and bright shade in summer 1000fc. Its roots grow through curtain of living *Tillandsia usneoides*. It gets watered daily year-round. And high humidity (85% or higher) is maintained year-round accompanied by good air movement.

Microcoelia caespitosa (Rolfe) Summerh Found in Cameroon, Central African Republic, Democratic Republic of Congo, Equatorial Guinea, Gabon, Ghana, Gulf of Guinea Is., Ivory Coast, Liberia, Nigeria, Sierra Leone, Uganda and Zaire at elevations of 50 – 1,000m in rainforests on understory branches often near watercourses, as a small sized, hot to warm growing epiphyte with a long branching, loosely attached pendulous roots attached to a short stout, central stem that blooms in the spring through fall.

Photo Source: http://www.orchid-africa.net/espece_detail.asp?espPK=13754



Microcoelia konduensis (De Wild.) Summerh Benin, Cameroon, Democratic Republic of Congo, Ghana, Ivory Coast, Nigeria, Togo, Nigeria, Zaire and Uganda in rainforests, plantations and secondary forests on finer twigs and branches at elevations of 50 – 500m as a small sized, hot growing epiphyte with a short stem carrying many, slender, densely crowded, many branched

smooth roots attached to the substrate that blooms in the spring through fall. As the photo shows, this species often has only a few roots attached to the substrate.

Photo Source: http://www.orchid-africa.net/espece_detail.asp?espPK=13758

Microcoelia macrantha (H.Perrier) Summerh. Found in Madagascar in coastal rainforests and humid evergreen forests, often near streams at elevations to 1,000 meters on branches as a small sized, hot to warm growing epiphyte with cylindrical roots blooming on up to 5 to 8, simultaneous, very short, rigid, upright to spreading, 3 to 8 flowered inflorescence. This species is reported to be adaptable to high and low light environments.



Photo Source: http://www.pflanzen-im-web.de/files/Orchideen/pflanzen-im-web-de-Microcoelia-macrantha-Syn-Gussonea-macrantha-Orchidee-image_galerie_gross.jpg



Microcoelia perrieri (Finet) Summerh is found in west and northwest Madagascar in woodlands and dry bush areas from 0-500m as a small sized, hot growing epiphyte or occasional lithophyte. It grows as an epiphyte on Didieraceae.

As the photo demonstrates, this species has fewer flowers than some other members of the genus, but the flowers have an attractive crystalline appearance, and the short spur is prominent.

Photo Source: <http://www.lonisorchideenforum.de/t66f4-Afrikanische-Monopods-Aerangis-Angraecum-und-Co.html>

Microcoelia stolzii (Schltr.) Summerh is found in Kenya, Tanzania, Uganda, Malawi, Mozambique, Zambia and Zimbabwe in evergreen forests and high rainfall woodlands at elevations of 800-2,450m as a small sized, hot to cool growing epiphyte, generally it grows along the margins of riverine and evergreen forests. It is similar to *Microcoelia exilis*, but can be distinguished by the slightly larger flowers and unbranched roots. As the in-situ photo shows, this species flowers sparsely in the wild, although in cultivation, it can be much more floriferous. Photo Source: http://www.zimbabweflora.co.zw/speciesdata/species.php?species_id=11



8900

This photo of an awarded plant, *Microcoelia stolzii* 'Cathy Fenwick's Medusa' CHM/AOS demonstrates just what is possible with good cultural conditions.

Photo Source: <https://www.pinterest.com/pin/394276142349577750/>

Unfortunately, I was unable to find much information about culture of the genus. However, from Tony's experience, some of the species are very vigorous (eg his plant of *Microcoelia comuta*). Accordingly, I suspect that the same rules apply, that is high humidity, good air movement and plant husbandry. Isobyl and Eric La Croix advise that *Microcoelia* species require slab mounting and good light to enable their roots to photosynthesise. They have found that smooth slabs of wood are better than rough barked timber or natural cork. They also suggest freshwater driftwood, but I suspect that smooth cut hardwood such as aged jarrah or teak would also work well. They say that plants can take some time to establish, but once they are established, they generally grow well and flower. Intermediate glasshouse conditions are required in moderate to light shade, with high humidity year-round that stops plants drying out.

The genus of *Microtatorchis* has approximately 30 members found in New Guinea, but also New Caledonia, Indonesia, Philippines, Samoa and Australia. The type species, *Microtatorchis perpurilla* Schltr 1905 is found in New Guinea, and one member, *Microtatorchis clementsii* named after Mark Clements is found in Australia. The genus name is derived from the Greek *mikros* (small) and *orchis* (orchid), suggesting the minute habit. Not all *Microtatorchis* species are wholly leafless with some displaying rudimentary or ephemeral leaves from time-to-time similar to *Chilochista*.

Consistent with the other leafless orchids, they have flattened roots which are firmly attached to the host tree. They are predominantly small flowered with fleshy sepals and petals that are fused together while the triangular labellum has a sharply recurved apex with a filiform appendage. This genus is similar in appearance to *Taeniophyllum*, but is distinguished by its two pollinia, whereas species of *Taeniophyllum* have four. These species are generally found in high, cloud surrounded mountainous areas in New Guinea, and are extremely complex in structure, though largely unknown in anything but highly specialised herbarium collections. Unlike other leafless orchids, *Microtatorchis* are generally singular plants rather than large colonies.

Some species of *Microtatorchis* have leaves present as juvenile plants that disappear as plants reach maturity and begin flowering. Schlechter (1982) noted that these orchids often grow near the tips of young branches, and that some species flower when less than one year old. In this context, they may be amongst the pioneering plants colonising fallen trees resulting from storms and trees in open sites while persisting in living trees along rainforest margins and road verges.

Microtatorchis clementsii D.L.Jones & B.Gray is the single species from Australia in this genus. It is found around Mt Windsor Tableland, Henrietta Creek and Paluma in north-eastern Queensland at 1,000-1,250 where it grows on the branches of trees in highland rainforest. It flowers May-October. The flowers, which each last 3-5 days, are produced in succession over many months, and a single inflorescence may display buds, open flowers and capsules at the same time. *Microtatorchis clementsii* appears to share some similarities with *Microtatorchis platyrhachis* Schltr. from the Dischore Range in New Guinea (Schlechter 1982), but has smaller flowers with ovate rather than oblong sepals.



Photo Source: http://keys.trin.org.au/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Microtatorchis_clementsii.htm

Microtatorchis compacta (Ames) Schltr. Found in central Taiwan and the Philippines on trees in coniferous and broad-leaved forests at elevations below 1000 to 1600m as a mini miniature sized, warm to cool, twig growing epiphyte with a short roots that are radiately adpressed to mossy twigs, this species

carries leaves on a permanent basis. The roots however are photosynthetic in common with the other members of the genus.

Photo Source: <http://www.orchidspecies.com/microcompacta.htm>

Microtatorchis javanica
Malaysia, Java, New
montane forests at
meters as a miniature
epiphyte with a very short

Photo Source:



J.J.Sm. 1918 Found in peninsular
Guinea and Borneo in lower
elevations around 900 to 1500
sized, hot to warm growing, twig
stem carrying 2 to 4 flowers.

http://www.nationaalherbarium.nl/pubs/orchidweb/genera/Microtatorchis/Microtatorchis_javanicaPO.jpg



Microtatorchis schlechteri var *schlechteri* Garay Found in New
Caledonia and Vanuatu in dense forests and scrublands at
elevations of 500 to 1500 meters as a miniature sized, hot to
cool growing epiphyte with ribboned roots. This species is
protected in New Caledonia

Photo Source:

<http://www.orchidspecies.com/orphotdir/microtschlechteri.jpg>



Microtatorchis oreophila Schltr. 1906 Found in New Caledonia in dense rain
forests on mossy trees at elevations of 900 to 1600m as a mini miniature sized,
warm to cool growing epiphyte. The photo is several times magnification.

Photo Source: <http://www.endemia.nc/flore/fiche5123.html>

While searching for information about
species in this genus, I came across a
PNG Orchid Society report on an
expedition to the Minj, Waghi Valley,
Western Highlands, Papua New Guinea in
2003 where they documented among
many other orchids, an undescribed
Microtatorchis ssp which also shows the
rudimentary leaves common amongst
members of this genus while retaining the photosynthetic roots.



Photo Source: <http://gallery.orchidspng.com/displayimage.php?album=random&cat=3&pos=-1950>

Given the almost total absence of this genus in collections, the cultural information available was similarly
scarce, although it is reasonable to assume that the principles applying to other leafless orchids probably apply
equally to this genus.

Taeniophyllum, Blume 1825 is a genus of some 200 species from India, Sri Lanka, Japan, the Philippines to New Guinea, Australia, some Pacific Islands as far as Tahiti, with a single emigrant to Africa, *Taeniophyllum coxii*. New Guinea is considered to be the centre of distribution with some eighty species alone, although some may prove to be conspecific. These species are small leafless epiphytes with flattened photosynthetic green roots, with the leaves reduced to minute, overlapping scales covering the stem apex. In common with other leafless orchids, the flowers of the species are generally short-lived and mostly greenish-white to yellow. Mostly the species is epiphytic on tree close to the forest floor or among the dense foliage of the smaller twigs from sea level to 1000m.



Taeniophyllum aff. lobatum is found along creeks in rainforests around Brisbane, but is not consistent with any known described orchid for south east Queensland. Its flower is similar to both *Taeniophyllum lobatum* and *Taeniophyllum flavum*. The somewhat fleshy flower is yellow green about 4mm long with a 2mm spur which expands. The only other orchid in south east Queensland similar to this orchid is *Taeniophyllum muelleri*, although this species is easily distinguished from *T. muelleri* as the latter is much smaller, it doesn't have aerial roots, the flower stem is not echinate (white 'hairs') and doesn't have large bracts.

Photo Source:

<http://www.ourshopfront.com/kabi/html/Natives/Taeniophyllum%20aff.%20lobatum.php>

According to the ANOS Qld Kabi Group (Inc) website, this orchid was discovered in 2008. Initial flower dissection showed characteristics similar to *Taeniophyllum lobatum* which is found in the Paluma range just north of Townsville) and *Taeniophyllum flavum* (found around Cairns). However, there is some confusion over the status of these two northern species, and it will take further work to determine whether this orchid is in fact a new species or a southern form of one or other of the northern species..

Taeniophyllum biocellatum J.J.Sm. 1913 is found in Java on forest trees as well as coffee trees at elevations of 300 – 1000m as a miniature sized, leafless, hot growing, monopodial epiphyte. This species blooms frequently (sequentially) on the same flower raceme with small, pleasantly fragrant flowers.



Photo Source:

http://www.orchidsonline.com.au/files/images/taeniophyllum_sp_JAVA009.preview.JPG



Taeniophyllum fragrans Schltr. 1913 SUBGENUS *Liberosepalum* SECTION *Trachylepus*. Found only in New Guinea on trees in hill forests at elevations of 500 to 900 meters as a medium to large sized, hot to warm growing epiphyte with no leaves and thin roots in a rosette. This species has a flower considerably larger than many others in the genus.

Photo Source:

http://www.nationaalherbarium.nl/pubs/orchidweb/genera/Taeniophyllum/Taeniophyllum_fragransAS_1616.jpg

Taeniophyllum gracillimum Schltr 1906. This orchid is found in lowland and lower mountain forests at 900-1,500m in Thailand, Borneo and Peninsular Malaysia and Sabah.

Photo Source: <http://www.orchidspecies.com/taengracillimum.htm>

It has been badly affected by habitat loss, for example many of the specimen sites on mainland Thailand are now urban areas. There are some national parks in which it can be found and preserved habitat from which specimens recorded from the Thai islands originated. In Peninsular Malaysia, the pattern is mixed, while in Borneo there still remains much potential habitat. While not yet declared endangered (it has been assessed as 'Least Concern'), monitoring of existing populations is recommended to



detect any further decline.

An alba form exists and is shown here.

Photo Source: <http://2.bp.blogspot.com/-Ra2CE2WLKcg/TztzOIJd9XI/AAAAAAAAADE4/1k-ZnisW65o/s1600/Taeniophyllum+alba+2.jpg>



Taeniophyllum grandiflorum Schltr. 1905 SUBGENUS *Liberosepalum* SECTION *Loboglossum*. The so called 'large flowering' *Taeniophyllum* is found in Papua and New Guinea in lowland forests as a small sized, hot growing, leafless epiphyte at elevations of 50-600m in dense semi-deciduous forest. As with many other leafless orchids, it grows on the lower trunks and branches of large mature trees in deep shade.

Photo Source:

<http://www.orchidspecies.com/orphotdir/taeniograndiflorum.jpg>



Taeniophyllum malianum Schltr. 1913 SUBGENUS *Liberosepalum* SECTION *Rhynchanthera* is found in north-eastern Queensland on the Iron Range and McIlwraith Range and in New Guinea. Its common name is the Tangled Ribbonroot which aptly describes its growth habit. Found in sparse scrub and rainforests at 200-600m where it grows in humid environments including moist slopes and ridges and along streams, this species has a tangled clump of roots, the majority of which are pendulous or spreading and grow through the air, with only a few attaching the plant to the host. Its insect-pollinated flowers are honey-scented, generally opening for less than a day in late afternoon. Typical of one-day or gregarious flowering orchids, the majority of the population in in area will flower on the same day.

Photo Source: http://keys.trin.org.au/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Taeniophyllum_malianum.htm

Taeniophyllum montanum Carr 1932. As the photos shows, this species from peninsular Malaysia is a small sized, warm growing epiphyte with flattened, thick roots which firmly attach it to the substrate.

Photo Source:

https://orchid.unibas.ch/phpMyHerbarium/2010404/1/Taeniophyllum/montanum/Carr_Cedric_Errol/specimen.php



Taeniophyllum norfolkianum D.L. Jones, B. Gray & M.A. Clem. This species is found on Norfolk Island where it was regarded as endemic until its recent discovery on a hillside in the Waipu Ecological District North Island of New Zealand.

Photo Source: http://www.nativeorchids.co.nz/images/Taeniophyllum_norfolkianum.jpg

The recent New Zealand discovery records this species from the upper trunk and branches of gorse (*Ulex europaeus*), while on Norfolk Island it is a locally common epiphyte on Norfolk Island pine (*Araucaria heterophylla*) and *Wilkstroemia australis* within the Mt Bates central forested area of the island. However, it is rare on Norfolk Island where it is classified as "vulnerable", based on the IUCN red book classification system as less than 1,000 mature plants were recorded in 2003.

In New Zealand, some 140 plants were discovered. The plants were flowering and fruiting when observed in November 2009 and it appeared that some plants were at least two years old as the remains of the previous year's flower stalks as well as current flower stalks were present on some of the plants. This population may not be the only occurrence of this species at this site because there are large tracts of suitable habitat occupied by suitable host plants.



Taeniophyllum obtusum Blume 1825. Found in south-central China, Malaysia, Cambodia, Thailand, Borneo, Java, Sumatra and Vietnam, this small-sized hot to warm growing epiphyte occurs at 150-1,600m in swampy primary montane forests principally on mangrove and coffee plants. As the photo shows, flowers are produced on short flower spikes and are yellow with a white bulbous lip and sweetly fragrant.

Photo Source:

<http://orchidofsumatra.blogspot.com.au/2012/02/taeniophyllum-obtusum-blume-1825.html>

I found another article which reminisced that this while this species was once an abundant native species of Singapore, it has disappeared from many of the known sites although can still be found in a few isolated swamp forest areas such as the Ngee Soon Swamp Forest. Previously it was collected from multiple sites including the Botanic Gardens, Bukit Mandai, Serangoon Road etc. It can still be grown in Singapore, but given its diminutive size, it does not cope well with cultivation stress. It needs bright area with constant air movement and high year-round humidity.

Taeniophyllum retrospiculatum (King & Pantl.) King & Pantl. 1898 SUBGENUS *Liberosepalum* SECTION *Sepalocodon*. Found in the eastern Himalayas and Laos on mossy tree trunks at 1,300 to 2,400m. it is a miniature warm to cool growing epiphyte. While researching this article, I came across a 2013 paper describing this species in Assam (India) where it was not previously known to exist. Occurring as an epiphyte in heavily-shaded primary forest, this (and many other) species is under threat due to clearing for other purposes, and given its limited botanical appeal, does not appear to be regarded as important.



Photo Source: <http://orkidland.blogspot.com.au/2011/07/taeniophyllum-retrospiculatum.html>

The picture gallery Orchids of PNG (<http://gallery.orchidspng.com>) has many images of unidentified *Taeniophyllum* species. There are some very attractive, though small flowers well worth a look if you are interested.

There are other species of orchids that are either constantly, or occasionally leafless and do not have photosynthetic root structures. For this article I have focused on those where the leaves (if any) are ephemeral and where the flattened, cord-like green roots with distinctive pneumatodes act as stomata to enable the photosynthetic roots to perform the gas exchange required to support photosynthesis.

However, for general information, there are several leafless tropical, sub-tropical and temperate terrestrial species that are principally saprophytic, for example, *Rhizanthella gardneri*. There are also several epiphytic species including *Phalaenopsis* that will drop their leaves in stressful periods, and *Vanilla aphylla*, *barbellata*, *decaryana*, and *dilloniana* where the thickened stem replaces the leaves and performs photosynthetic function for the plant. However, these species do not have photosynthetic roots.

Summary

In summary, cultivation of leafless orchids without specialised environmental controls can be challenging. As the photosynthesis process for these plants is achieved by the chlorophyll in the roots, they need to be mounted with the roots fully exposed to light. By way of further complication, some are classic 'twig epiphytes' in their natural habitat and have few roots adhering to the substrate necessitating some other means of securing the plant to its mount.

Most need a warm, humid environment with filtered light (the majority grow in the lower primary forest) with some, but not extreme air movement. While some commentators suggest that the use of fans is injurious to these plants, I have found that there needs to be some level of air movement and if there is no natural movement, then fans are the only solution.

Leafless orchids do not like to be permanently wet, so careful management of the environment is necessary to avoid soft rots and other fungus pathogens while maintaining high humidity and ensuring plants are dry when the temperature drops at night. Like all orchids, leafless orchids are gross feeders and benefit from regular but weak fertilising.

A vivarium-type environment can be a cost-effective solution in WA where the summer conditions of extremely low humidity and high temperatures are the anathema to what these plants require for healthy and vigorous growth.