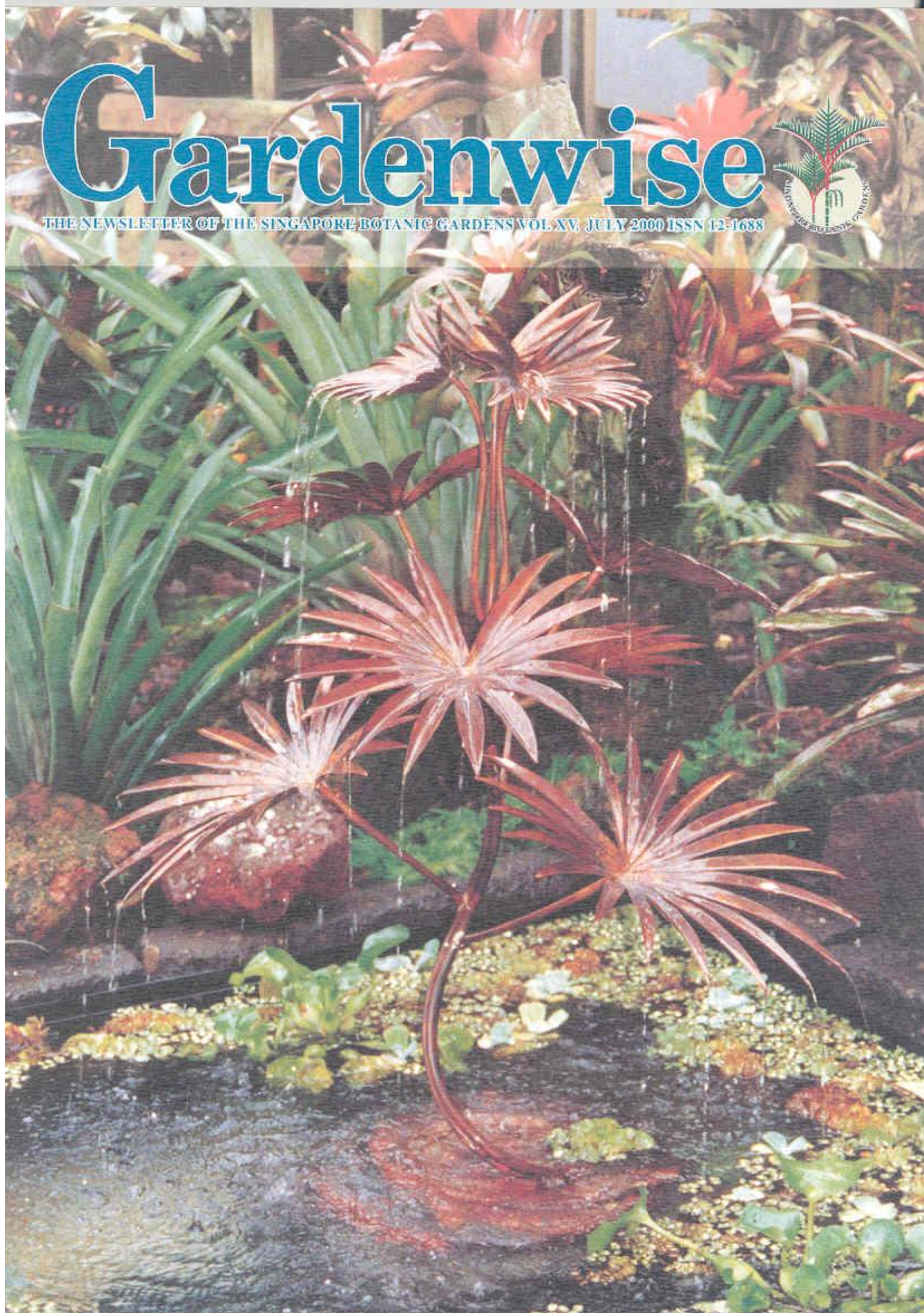


# Gardenwise

THE NEWSLETTER OF THE SINGAPORE BOTANIC GARDENS VOL XV, JULY 2000 ISSN 12-1688





# Message from the CEO

I have a pre-teen nephew who is bright, quick and clever. He is the first to catch on to what is hinted at, and the fastest at solving problems when it comes to electronic equipment and appliances. Reading moods of adults around him and finding out the lay of the land pose no problems. The flip side is that he is too impatient with details or advice of any kind. Get him a new toy that needs assembling, and he is fiddling with it and getting it to some working order without regard to instructions or the troublesome parts that he cannot figure a use for without referring to the printed instructions. Some of his toys have never been put to the full range of use as a consequence. At school, he is the first to hand in tests and assignments, but he rarely achieves full marks because careless mistakes creep in constantly. It is his teachers' lament that he underachieves because of this trait.

His older sister's personality is a photonegative of his. Blame it on genetic segregation. She is slow and deliberate,

mulling over every step and decision. Needless to say, she drives her brother (and uncle) crazy, and vice-versa. The situation is a tinderbox for sibling rivalry, especially since she out-performs her brother at school. What she likes to do is an anathema to her brother — read, research, reflect, record and redo. The deliberate pace she sets drives him up a wall. I am glad that as a doting uncle, I am spared the tribulations of parenting these two children with such diverse personalities. I wonder how either one would fare in the current climate confronting all of us in government service in Singapore.

In recent months, exhortations to civil servants to be creative, innovative and risk-venturesome has reached a crescendo. The call to review and discard old practices and procedures that may impede progress and preparations to meet the New Age and survive in the New Economy carries with it the implication that corporate memory and continuities may be excess baggage at best, ball-and-chains at worst. My nephew would likely thrive in this environment. The caveat is that he must be given allowance for mistakes, and for re-inventing the wheel. There appears, after all, little encouragement to look backward, which includes checking what has been done before when embarking in a specific direction. Avuncular advice to him would be to make time to refer to the information that has been acquired by others where appropriate. Those bits and pieces left out of the toys he assembled without referring to instructions may have made the toys perform better or do more than he was able to figure out for himself.

It would appear my niece might have a harder time adjusting to the New Age. After all, speed is of the essence, and she is more of the type to remind one that haste makes waste, that you should look before you leap, and that slow and steady wins the race. Rejoinders for my niece would be that she who hesitates is lost, that time and tide await no woman, and that the early bird catches the worm. I would not, however, discourage her inclinations to be reflective, to analyse and do research, and to make use of references. Nonetheless, recourse to stored information must merely be a means to an end, and not become an end in itself. Acquisition of knowledge and the addition to it can be objectives, but should not, perhaps be the goal in itself. Goals must instead be achieved through the utilization of the knowledge acquired. My niece needs to know when to say enough is enough, and launch her actions from a platform elevated by cumulated knowledge.

As CEO of an organisation that is largely operational and knowledge based, my advice to the staff hews closer to that I would impart to my niece. NParks is the authority on nature conservation as well as the provider of green infrastructure and recreation in Singapore. As such, we deal with living entities. Some of the trees we plant can only be appreciated in their prime by future generations. Our goals and objectives are usually long-term, and cycle-times for our projects may even exceed individual career spans. Our conservation and horticultural practices draw upon data and information gleaned from practical application since the formative years of the Garden City programme initiated by then Prime Minister Lee Kuan Yew. Experience is a prized commodity, and horticultural expertise has to be acquired first hand and usually without recourse to shortcuts. How then can I reconcile this with the national imperatives to discard the old paradigms and be forward looking instead of referring to what went on before? Or with the implication that bright young minds, imbued with innovative spirit and creativity, are hampered by reference to the past and to previously acquired knowledge?

First and foremost, the New Economy is widely recognised as knowledge-based. Knowledge is only meaningful if you access it and make use of it. Obviously, previously acquired knowledge must not only not be discarded, but referred to and made use of, hopefully in innovative ways. The new paradigm must then be to encompass value-addition: existing knowledge must be used with innovation and creativity. In the process, new knowledge is acquired to enrich the databanks. A successful organisation must have its quota of individuals with the capacity to spark its drive and sustain its momentum. Its strength would be the diversity of skills, talents, personalities and predilections among its staff, brought to bear upon its various initiatives. Both quicksilver and stolid iron has great intrinsic value. My nephew and niece are precious to me. The degree they can contribute meaningfully to society in no small measure depends upon how well they recognise their strengths, and shore up their shortcomings. Similarly, all our staff is of value to NParks. How valuable depends upon how well the individual members make use of existing professional knowledge to meet the challenges and demands facing NParks, and how productively they can add to the knowledge capital of our organisation.

Dr Tan Wee Kiat

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Front Cover: The Fan Palm Fountain sculpted by Garth Bowden welcomes visitors at the entrance of the Bromeliad House.

Photo by  
Tan Wee Kiat



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# *Ochrobryum kurzianum*, a new ornamental moss introduced from Thailand

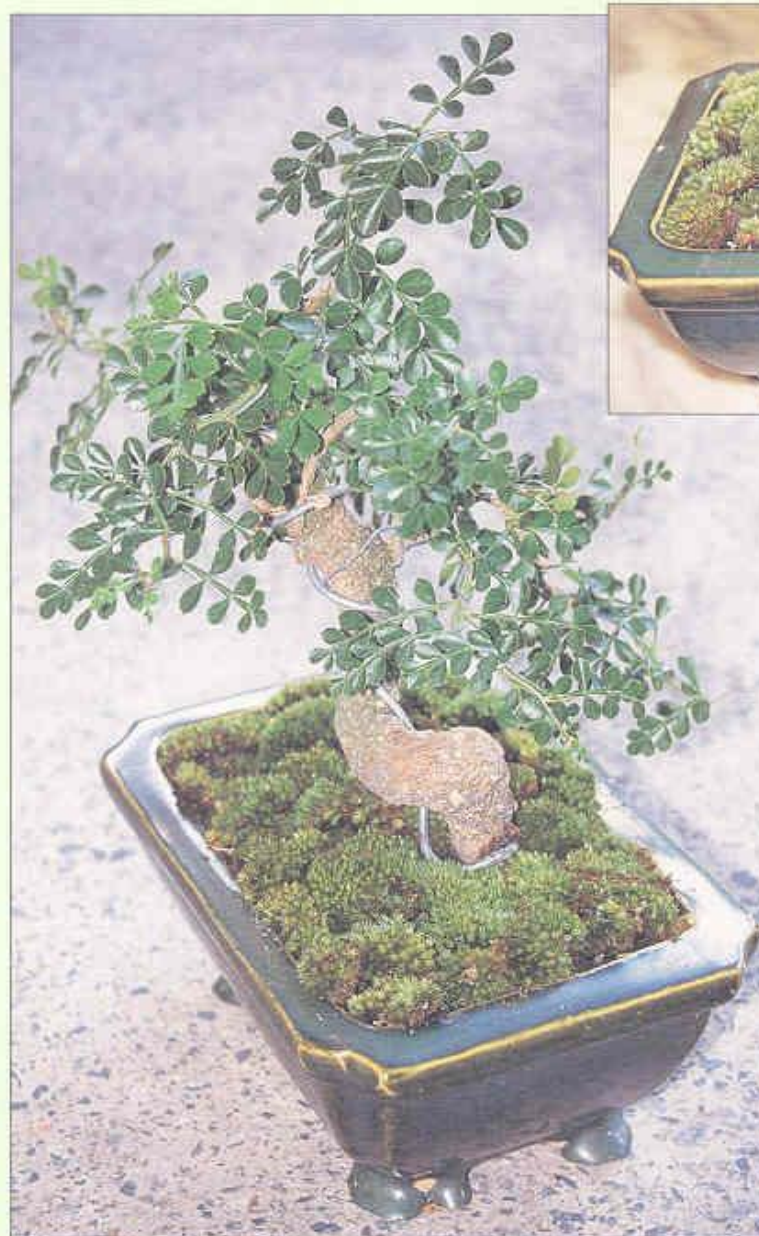
Cultivating mosses as ornamental plants around temples, shrines and in private gardens has a long tradition in China and Japan. The velvety green, mat and cushion forming mosses are often grown as ground cover to simulate grassy

lawns in miniature landscapes. The same practice is seen in bonsai potting. Other mosses of moderate sizes have also been used as focal ornamental plants for indoor decoration in Taiwan and Japan.

The two popular mosses

commonly cultivated as decorative table plants in Japanese households are the *lumut putih* (*Leucobryum* spp.) and the *Pyrrhobryum dozyanum*.

Recently we found in a private



*Ochrobryum kurzianum*, the newly introduced ground moss to Singapore used on a potted bonsai: it augments well the beauty of the bonsai.

garden in Singapore an introduced moss grown as an ornamental plant to cover the exposed soil of a bonsai pot. The green mossy cover augments very well the attractiveness of the potted plant.

The moss was bought in Thailand under the trade name, 'Resurrection Moss.' It is sold packed in plastic bags at Jatuchak Market in Bangkok for the equivalent of about S\$1.00 per bag. Each bag contains enough chunks of the moss to cover about 250 cm<sup>2</sup>. We have identified it as *Ochrobryum kurzianum*, a moss native and widespread in the Himalayas and SW China reaching south to Thailand but not Malaysia.



This newly introduced moss to Singapore, *Ochrobryum kurzianum*, belongs to the family of *lumut putih*, the Leucobryaceae. Typical plants form a soft, thick, green carpet in places where they grow giving their surroundings a refreshing and vibrant appearance. The leaf of this moss consists of 2-3 layers of dead cells that can store water for use during dry months. This species has been observed to tolerate long period of drought in the wild. When fully watered, the whitish green colour of the dry and leaves turns immediately to a watery green, giving the impression that the plants have come back to life; hence, the appropriate common name of 'Resurrection Moss.'

Aside from being a beautiful and sturdy cover plant, *Ochrobryum kurzianum* has a number of biological peculiarities worthy of a closer look. In addition to the thick leaf made up of layers of dead

cells, this moss has a rather long operculum (the lid covering the capsule mouth), which, in turn, is enclosed inside an exceedingly long calyptra (the sheath that covers the capsule). The length of the calyptra, measuring 4-6 cm is easily a record in the moss world. The base of the calyptra is fringed with long hairs, another distinctive feature of this moss. When the operculum splits and falls off, the mouth of the top-shaped capsule becomes exposed. Unlike other mosses, its capsule has no peristome (teeth-like structures) to help control the release of spores to the air current. It is therefore not surprising to find many of the opened capsules empty.

According to the owner of the garden where we first saw this moss in Singapore, all the care that it needs is simply giving enough water each day. The species does not seem to prefer a particular type

of soil. Since this moss is a good absorber of water, too much water will cause the root system of the potted plants to become waterlogged and may hamper aeration in the soil. 🌿

**Benito C. Tan <sup>1,2</sup> and  
Hugh T. W. Tan<sup>2</sup>**

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<sup>2</sup> Department of Biological Sciences  
National University of Singapore



A *Leucobryum* species used as an ornamental table plant in Japan.



Close-up of *Ochrobryum kurzianum* showing the whitish green leaves, several opened, top-shaped capsules (some empty and others still filled with spores) and two long calyptras that have hairs at the base.



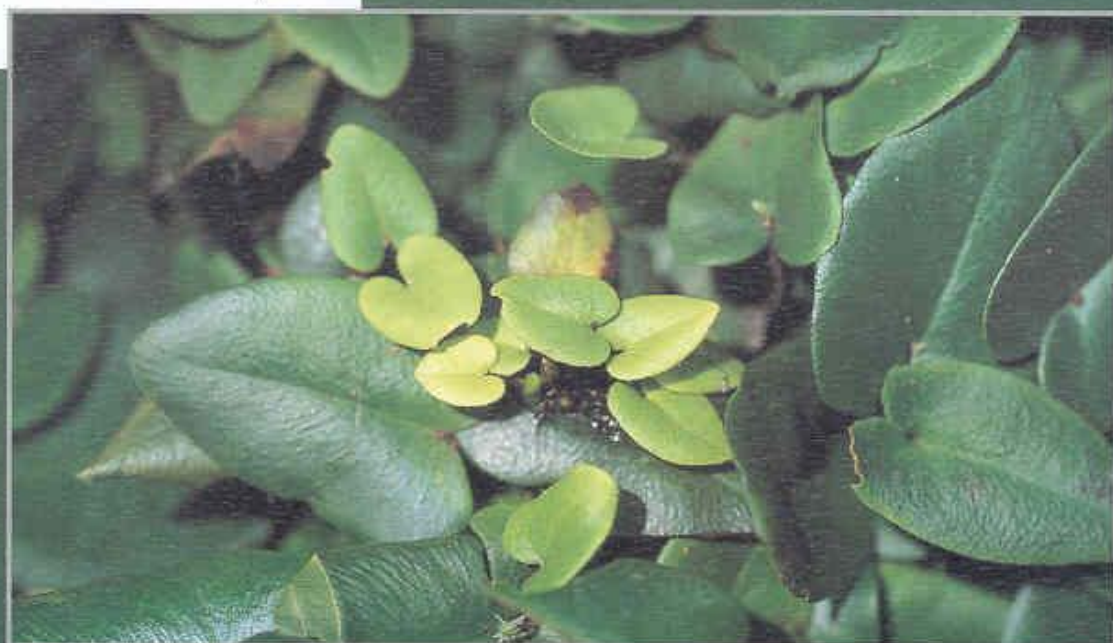
# Three Uncommon and Exotic Ornamental Ferns and Fern Allies Cultivated in the Gardens

This is the second instalment on the rare, uncommon and exotic ornamental ferns and fern allies cultivated in the Singapore Botanic Gardens (see also Gardenwise Vol. XIV, Jan 2000), which aims to generate public appreciation for the lesser known, yet highly ornamental, pteridophytes grown successfully in the grounds of the Gardens. Many of them are also well suited for growing as home garden or indoor decorative plants.



*Doryopteris ludens* with beautiful geometric-shaped leaves.

Andrew Lee



*Hemionitis arifolia* showing the young and the mature heart-shaped leaves.

Andrew Lee

## ***Hemionitis arifolia***

*Hemionitis arifolia* is a small shade fern with suberect stems producing clusters of thick, green fronds that resemble the shape of a narrow heart or an arrowhead. The fertile frond is lifted well above the vegetative leaves. The sori or clusters of sporangia form a

network over the under surface producing a brownish coloration. When grown in deep shade places, the fronds have a bluish tinge. It prefers a light soil mix of burnt earth, coco-peat and grit.

In Peninsular Malaya, *H. arifolia* is a semi-open, rock plant. It is the only Asian species in a principally

American genus and is widely distributed from Sri Lanka, India, Indochina to Malaysia and the Philippines. According to Piggott and Piggott (1988, *Ferns of Malaysia in Colour*), the Indians believe that this fern possesses magical power. In Singapore, it is only known from cultivation.



## ***Doryopteris ludens***

While this is a pretty ornamental fern grown in many parts of Southeast Asia, it is not a popular horticultural plant in Singapore. The simple fronds are lobed or segmented, forming eye-catching architectural configurations. The leaf venation is netted and the stem is long and creeping. The fertile frond is somewhat similar to the vegetative leaf but is raised higher above the ground. The shiny, dark brown leaf stalk and leaf veins contrast well with the dull green coloured leathery laminae. The sori are continued along the leaf margins of the frond and are protected by a reflexed marginal flap. In cultivation, *D. ludens* prefers well drained and alkaline soil. It can also be grown directly on shaded, coral rocks.

*Doryopteris ludens* is an Asian species in a primarily American genus of 35 species. Its natural distribution in Asia parallels that of *Hemionitis arifolia*. In the wild, it is found in limestone areas. The lack of suitable habitats in Singapore probably explains the absence of natural populations of this species.

Another widespread species of the genus, *D. concolor*, has a similar leaf outline but the lobes are much narrower and finely dissected. This, too, is widely cultivated in many gardens in the tropics.

## ***Selaginella erythropus***

This is a Central and South American species that has been introduced into many gardens around the world. It has a startling coppery red color on the underside



Underside of a mature leaf of *Hemionitis arifolia* showing the brownish soral arrangement forming a net network pattern.



A clump of *Selaginella erythropus*.



The startling coppery-red underside of the frond of *S. erythropus*.

of the dull green fronds. The creeping stem is profusely branched and the branches bear terminally many angular, long reproductive structures called strobili.

Because of its attractive foliage, the genus *Selaginella* is well known to many gardeners. Some species, such as *S. wildenowii* (the peacock fern) and *S. uncinata*, have a lovely bluish sheen on the leaves. *S. erythropus* with its reddish coloration is distinctive.

The plant can be easily propagated by division. It forms a neat and dense ground cover and thrives

well in warm, moist soil. No special attention is needed once the plants become established. It can also be grown in a hanging basket. 🌿

**Benito C. Tan**  
**Evonne Low**

Department of Biological Sciences  
National University of Singapore  
**Andrea Kee**  
Plant Introduction Unit



# Four Pillars for Tropical Landscapes

Beauty, they say, lies in the eyes of the beholder. In the eyes of landscape architects and garden designers beauty often lies in the shape of trees. Broad spreading trees can give shade and a fine tracery of foliage. More compact crown shapes may provide a formal architectural element to planting schemes.

Tightly columnar trees are particularly useful for offering focal points in landscape designs and also in providing greenery in planting sites of limited width. In Singapore there has been a recent resurgence of interest in columnar varieties because of the need to grow trees in ever-narrower parcels of land and the appearance of some new species suited for this use.

## MENINJAU

A columnar tree, possibly native to Singapore but cultivated here for many centuries, is the *meninjau* (*Gnetum gnemon*). The gnetums are a botanical oddity. They are gymnosperms, like conifers and cycads, but vegetatively seem much more similar to typical flowering plants particularly in possessing 'normal' leaves rather than needles or fronds. It is still not clear whether the gnetums are the linking group between the angiosperms and the gymnosperms, or whether superficially similar plants arose on two different evolutionary lines. *Gnetum gnemon* is cultivated in kampongs throughout Southeast Asia not for its ornamental but for its economic

value, particularly for its edible leafy shoots and 'fruits.' The latter can be made into a sort of flour most famously used to prepare the fried crackers known as *keropok* or *embing*. *Meninjau* trees are naturally columnar, with short side branches coming out almost horizontally from the main trunk. The glossy foliage and strong shape of the tree make it suitable for use in landscaping. Several roads in Singapore are successfully planted as *meninjau* avenues. Male trees (*meninjau* trees come in separate sexes) are better for roadside planting as they do not drop squashy seeds.

## TEMPLE PIKA

The ashoka tree has been planted in Singapore since the 1960s. It is a columnar form of *Polyalthia longifolia* – a tree native to southern India and Sri Lanka. In its common or typical form, *Polyalthia longifolia* is quite a spreading tree and is to be found as an ornamental in many tropical locations. Ashoka seems to differ from the typical form purely in its branching. The branches are short and pendulous resulting in a very tight pillar of foliage. A well-grown tree can exceed 10 m in height and provide a beautifully straight and narrow column of green. Unfortunately, the ashoka has a tendency to bend and buckle which probably explains its decline in popularity over recent years. However, if well maintained, it is probably superior to the others.

*The columnar form of Garcinia cymosa forma pendula mirrors the neo-classical style of an up-market residence in the Tanglin district of Singapore.*





## CARALLIA BRACHIATA 'HONIARA'

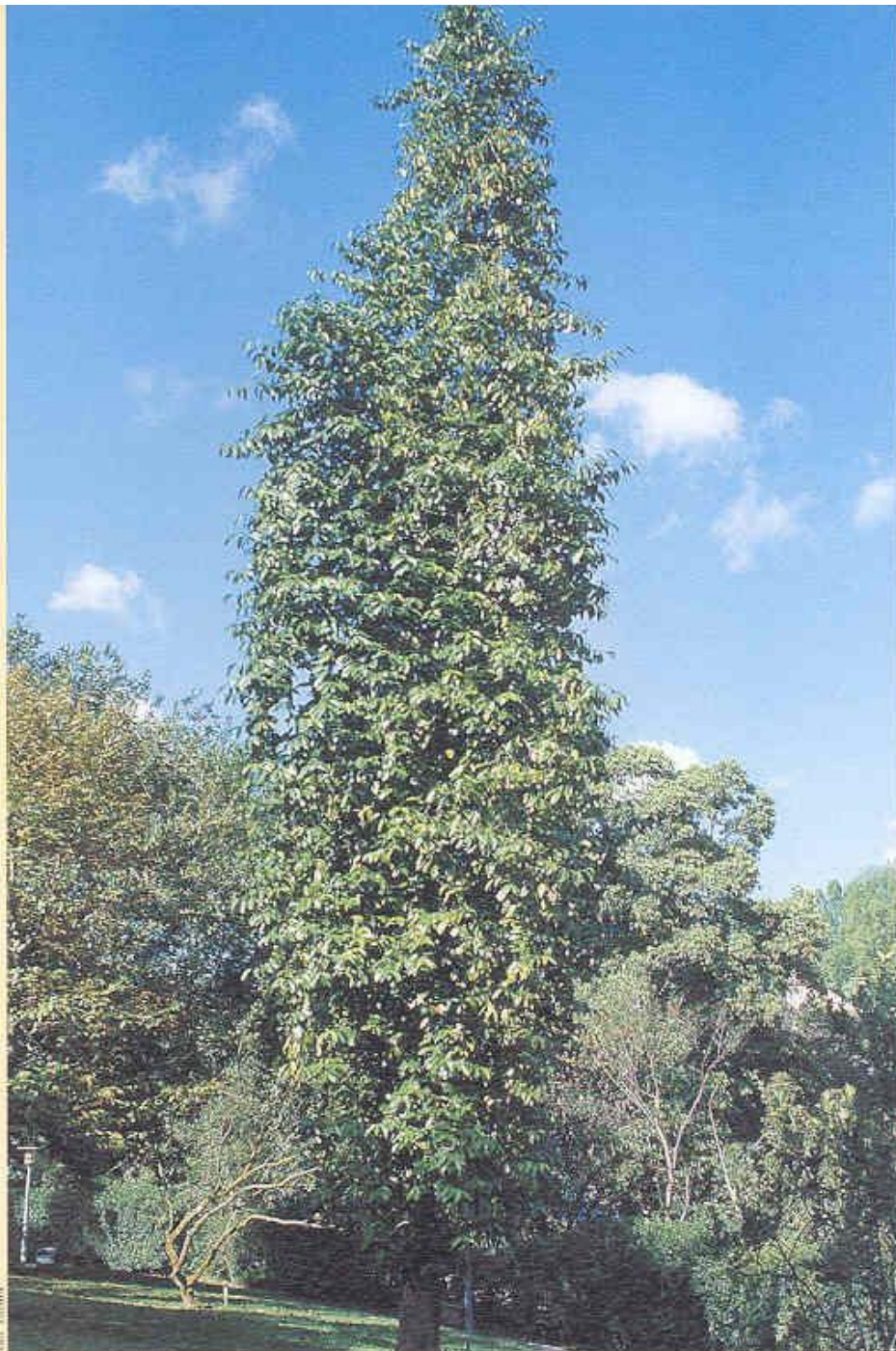
Another recent addition, also from the western Pacific region, is *Carallia brachiata* 'Honiara'. Introduced to Singapore from the Solomon Islands in 1986, it is a weeping form of a widespread forest tree *Carallia brachiata*. Not quite as narrow or regular as the other three, it has a certain grace to its weeping branches and provides a much-needed softening touch when planted next to high-rise buildings.

## GARCINIA

The newest columnar tree around is *Garcinia cymosa* forma *pendula*, generally referred to under the name *Tripetalum cymosum*. As the only notable difference between *Tripetalum* and *Garcinia* is a flower with 3 petals instead of 4 or 5, the former is best included in the latter. *Garcinia cymosa* forma *pendula* has traditionally been grown in villages in its native New Guinea. It is another example of a crown-form mutation being favoured in cultivation. The columnar form has weeping, pendulous branches that produce an almost untapered pillar of foliage. The bright red fruits are also attractive.

## A BOTANICAL NAME FOR THE ASHOKA TREE

The ashoka tree lacks a botanical name. A number of books refer to it as *Polyalthia longifolia* var. *pendula*, but this name has never been validly published. A cultivar name is most appropriate as the plant only seems to be known from cultivation. Therefore I here provide a name and diagnosis of the columnar form.



A mentinjau (*Gnetum gnemon*) tree growing in the Gardens.



The typical form of *Polyalthia longifolia* with a spreading crown shape growing in the Gardens.





A group of ashoka trees (*Polyalthia longifolia* 'Temple Pillar') growing on the campus of the National Institute of Education which is adjacent to the Gardens.



*Carallia brachiata* 'Honiara' growing at the margins of Fort Canning Park in Singapore.

A sideview of the top of a *Polyalthia longifolia* 'Temple Pillar' clearly shows the short, pendulous side branches typical of this cultivar.

## POLYALTHIA LONGIFOLIA (SONN.) THWAITES 'TEMPLE PILLAR'

A tightly columnar form apparently indistinguishable from the typical form except in branching. The side branches remain relatively short (about 1m long), branch little, and are held about 45° below the horizontal. The photographs accompanying this article are designated as the standard for 'Temple Pillar' as a herbarium specimen gives limited information on crown form. The cultivar name chosen reflects the frequently reported practice of growing this tree near temples in Southern India. 🌿

**Ian Turner**  
Horticulture Branch



# GOING 'NUTS' and 'BANANAS'

## — My Learning Curve in Pollination

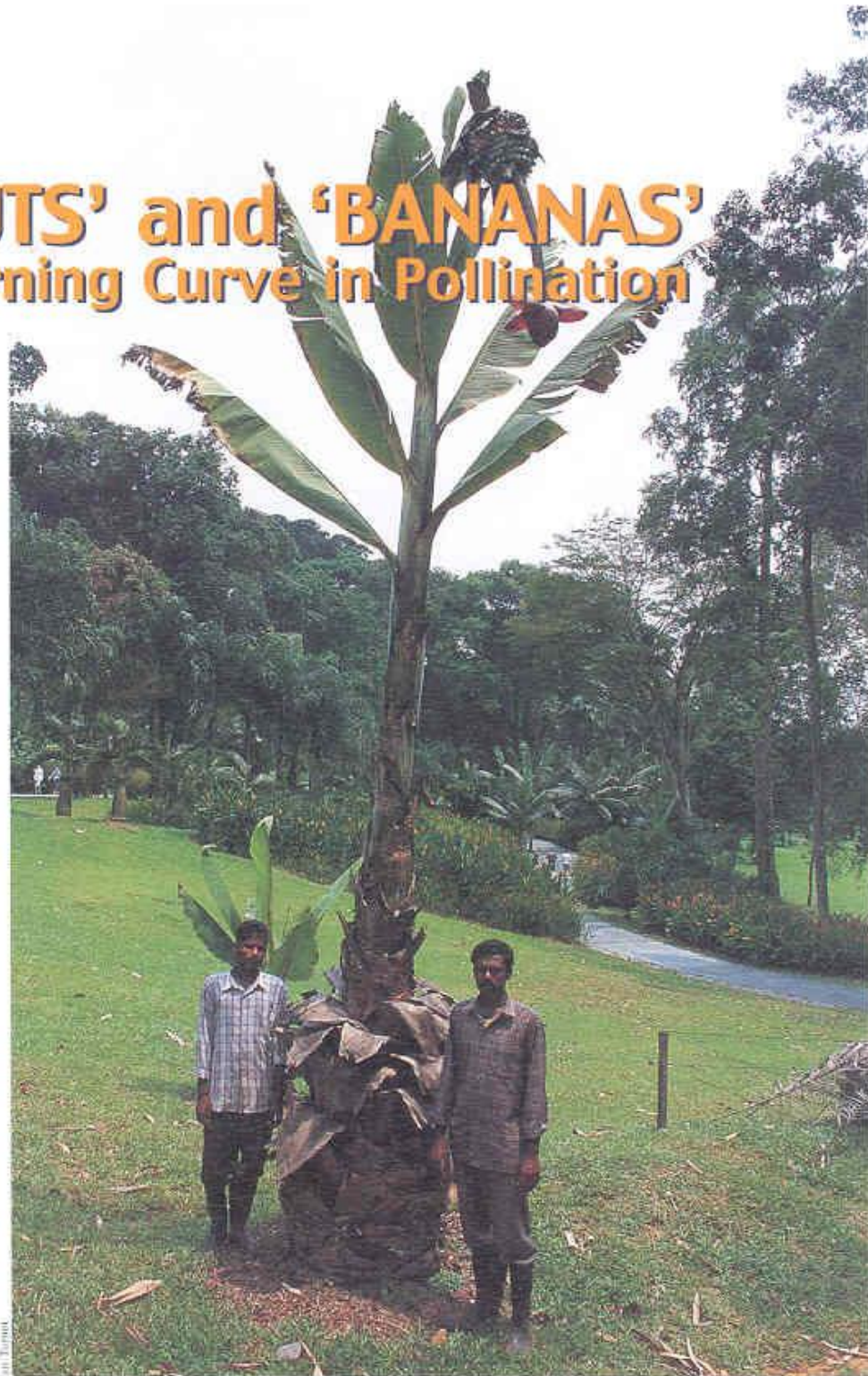
The nut is the Double Coconut (*Lodoicea maldivica*, Palmae) in Lawn D, and the banana look-alike is *Ensete superbum* (Musaceae) in Lawn W.

The two mature *Lodoicea* (a male and a female) in the Gardens are about 400 m apart and the female is not known to set fruits without artificial pollination. Likewise, the first of our several *Ensete* plants that formed an inflorescence also did not set any fruits. We decided we should artificially pollinate subsequent inflorescences that form. I therefore took up the challenge to induce some fruits in the two species. As it turned out, my effort has been fruitful literally — two fertilized nuts and two whole bunches of bananas. The first bunch turned yellow recently after a long wait of six months after fertilization.

### ENSETE SUPERBUM

Raised from seeds given by the Tropical Botanic Garden and Research Institute, Trivandrum, India, five *Ensete* individuals were planted in Lawn W. The male flowers from the first plant provided the pollen for cross-pollinating the second and third plants when their short-lived female flowers appeared.

That was the time I really flew into a flurry of excitement and anticipation. No time was wasted in dusting a one-inch paintbrush with pollen and smearing them generously onto the freshly-opened female flowers — not just once, but



*Ensete* Plant with a ripening bunch of fruits.

for a few mornings in a row — just to be on the sure side. I was not at all prepared to fail in my special assignment.

But admittedly, I felt that the business of pollination not only involved perseverance but literally, a brush with Lady Luck, even though I had armed myself with all the botanical references I could lay my hands on.

To begin with, I could not tell for sure whether the pollen was fertile or when the stigmas were receptive. As both *Lodoicea* and *Ensete* female flowers are said to be short-lived, I had to be vigilant, climbing and checking the emerging flowers every morning without fail to make sure the first few days of 'stickiness' (receptiveness) were not missed, especially as *Ensete* is monocarpic (fruiting once only).



It did not help too when it rained the first few days during those crucial periods. A few more hairs on my head must have turned silver then. But I was thrilled when the fruits started swelling. The sight of the swollen fruits was enough compensation for all the worries I had gone through as well as the fear I experienced climbing up that tall ladder used to reach them. *Ensete*, apparently bears nocturnal unisexual flowers held in different positions on the peduncle that in its native home guarantee cross-pollination by bats. The observation that *Ensete* flowers in the Gardens were not pollinated naturally, tended to suggest that either bats were absent or those present were not attracted to the flowers. It is interesting therefore that they could successfully be artificially pollinated in the day time.

## LODOICEA MALDIVICA

*Lodoicea maldivica* is classified into a very natural and clearly defined tribe, Borasseae. All Borassoids are dioecious, i.e. they have separate male and female trees. The female flower of the Double Coconut happens to be the largest in palms.

The Double Coconut is endemic in the Seychelles, in the Indian Ocean. It does not originate from the Maldives as its botanical name suggests. In fact, a Malay name recorded in the 15th century, *kayu pauh janggi*, is more accurate in a sense. 'Janggi' meaning Ethiopian, points its origin in the right direction. Isn't that interesting?

Books and atlas aside, reinforced knowledge can only come about through actual hands-on experience. Horticulturists like myself are specially blessed with this invaluable opportunity.

In the crown of the female *Lodoicea*, when the first time I came face to face with the female flower, I had doubted whether the 'flower' was really a flower. It really looked like a 'nut.' Apart from the big

ovary, the ordinary delicate floral parts are nowhere to be seen. It was back to the books again to confirm that the shallow concave opening at the apex of the 'nut' is indeed the stigmatic pad.

Half the fun of the experience is reading up as much as possible on the plants concerned. In the process, I gained a great deal more knowledge about both plants.

I must say after working with the flowers of the Double Coconut and the *Ensete*, I have gained a more appreciative third eye when looking at other plants and flowers now. Floral engineering, and its intimate partnership with pollinating animals are fine-tuned elements of the natural world. It is not surprising that a whole range of scientific pursuits is devoted to the exploration of the floral domain, which ensures the continuation of life.

There's a Chinese proverb that says, 'A house need not be big to be beautiful. A flower need not be big to be fragrant.' The flower, though small in form, has evolved in a big way to ensure the effective out-crossing of genetic material for its progeny. The collective floral blueprint that greens the earth is vital for our own survival too.

Joseph Lai

SBG Management Branch



The ripe fruits. The white pulp is scanty but sweet; the seeds are very hard and glossy black.



The fruit bunch. Ripe fruits fell off when the bunch was cut; the green fruits are mature but have yet to turn yellow.

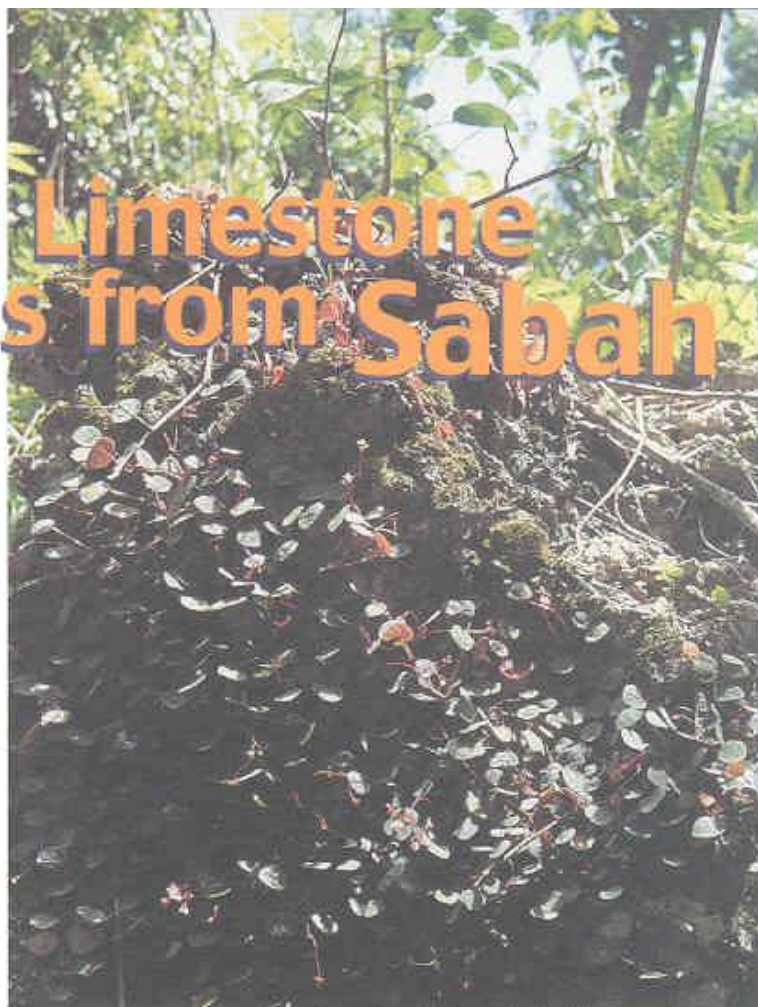


# Decorative Limestone Begonias from Sabah

Not only do the limestone hills in Sabah look like a living Chinese painting but, on closer inspection, they appear to be made up of a collection of individual rock gardens. And begonias are some of the most striking and decorative of the wild plants that adorn these Nature's gardens.

The first begonias encountered on these limestone hills are on the steep earth slope up to the cliff face. Here, begonias like the low *B. lambii* with its dark green leaves that nestle on the leaf litter catch the eye. Its leaves are unusually corrugate and have a thick coat of magenta or purple hairs. Further up, on fallen boulders at the base of hills, creeping plants of *B. diuollii* with its dainty round leaves and delicate white flowers can be found in profusion zigzagging over the rock surface.

Common on almost every limestone hill on narrow, soil-covered ledges is the tufted *B. gueritziana* with its round leaves and its modest flowers. This species has proved easy to grow on rocks under damp, shaded conditions, where it is self-seeding.



Keith Kiew

Nature's garden with *Begonia diuollii*.



Keith Kiew

*Begonia lambii*



Keith Kiew

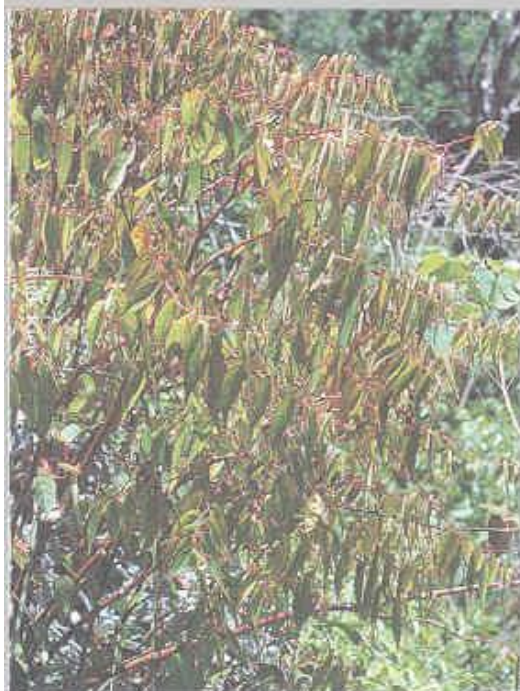
*Begonia diuollii*



Keith Kiew

*Begonia gueritziana*

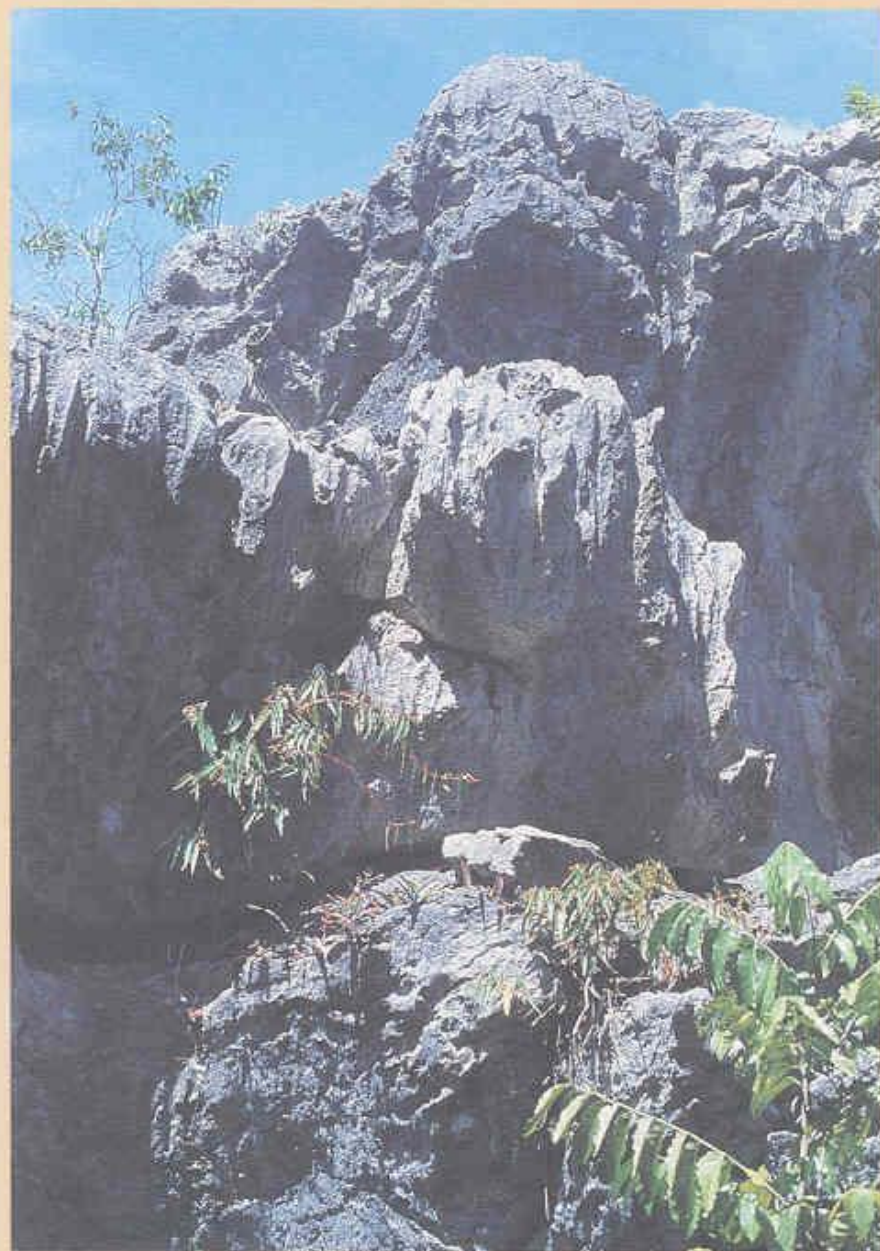




*Begonia keithii*



*Begonia amphioxys*



*Begonia can even grow on the hot, dry summits.*

Steep limestone cliffs, lightly shaded by the tree canopy, provide a toe-hold for some of the most beautiful Sabah begonias, like the newly discovered *B. keeana* with lush, glossy leaves with silvery splashes and opulent purple undersides. This species has been introduced into cultivation in the Gardens by Andrea Kee, for whom the species is named.

The most amazing group of limestone begonias are those that grow on the jagged summit, which is totally exposed to dazzling sunshine and heat from the white rock that becomes uncomfortably hot to touch by midday. These are all cane begonias with shiny, red stems and narrow, rather pointed, succulent leaves. Several of these begonias have leaves spotted red or silver-grey with attractive scalloped, red margins. Among these species, *B. keithii* is one of the most decorative with glossy, carmine stems that appear lacquered and many tiny heart-shaped carmine male flowers. From the way these begonias become pendent and dangle over the top of sheer cliffs, they could



# COLLECTING BEGONIAS FROM THE WILD

On the first day of our 1999 expedition to Sabah, we stumbled upon two species of begonia that had not been described or recorded before. It was after about an hour's boat ride that we arrived at the Bukit Tempadong limestone hills on the Segama River. Upon our reaching the first hill, these two were amongst the very first plants that we encountered. They were growing on the rock face at the foot of the limestone hill. As well as these two, we collected other begonias that grew on the forest floor or near streams in the lowlands.

The easiest method of collecting begonias is to look for mature seed pods. Each pod contains hundreds of tiny dust-like seeds. These are very light and were stored dry in a

small container or envelop. Back at the nursery, the seeds were sprinkled onto a damp perlite (horticultural grade) or vermiculite and the tray covered by plastic. This helps to retain the moisture so it is not necessary to water the seedlings. Once the seeds have germinated and the seedlings grown to about 5 cm long, they can be potted out individually using the same medium.

From the conservation point of view, collecting some seed does not deplete the wild population. Unfortunately, because begonias show a wide range of variation within a population from rather plain green plants to spectacularly coloured or variegated ones, plants from seed may not produce the finest ornamental plants. Collecting

wild plants is therefore necessary, but care must be taken to choose only a few or not at all, if it is a really rare species.

In a way, collecting begonias requires a little more care than usual as their foliage and stems are quite brittle. Begonias have to be gently uprooted and, to prevent bruising, immediately placed into a rectangular plastic container, a method that works best for delicate plants.

Collecting the plants is the easier part of the job; to ensure that they are kept alive until they were taken back to our nursery is relatively harder. At base camp, the roots of the begonia need to be wrapped in slightly moist kitchen paper towels to lessen the shock of being



*Bukit Tempadong limestone hill on the Segama river*

Booth Kiew



*Begonia keana plants thriving in our nursery; they need light shade.*

Andrea Kiew



*Begonia diwoollii establishes well on old coral rock in our nursery.*

Andrea Kiew



*Seed pods of Begonia madaiensis.*

Booth Kiew



uprooted. They are then put in special plastic bags (the sort that keeps vegetables crisp in the refrigerator) with the tops tied. This helps to keep the plants fresh. On alternate days, begonias should be given a thorough check to see if they are still in good condition. Any damaged or rotted leaves or stems should be removed.

When we returned to the Gardens after three weeks, the begonias, which were no longer at their best, were potted immediately. Field notes of the collected plants proved to be most useful as individual specimens were planted taking into consideration their natural habitat. Begonias found on limestone hills were tucked between the crevices of old coral rocks in our nursery and they established very well in this simulated condition.

For the other begonia species, a potting mix of 1 part coco-peat, 1 part perlite and 1 part burnt earth worked well. The pots were covered with transparent plastic bags to retain humidity and moisture, and kept in the shade.

After a couple of weeks, the begonias had recovered very well and had produced new shoots; and the plastic bags could be removed. They are now well established in light shade but care must still be taken when watering to avoid wetting the leaves, as this will often give rise to fungal attack. 🌿

**Andrea Kee**

*Plant Introduction Unit*



*A new species of angel's wing begonia.*

have potential as plants to grow in hanging baskets. Indeed, in common with Asian begonias that gave rise to the Rex cultivars, it is the foliage that is attractive in the asymmetric shapes, wide range of colours,

With the help and collaboration of the herbarium staff of the Forest Research Centre, Sabah Forest Department, we have explored representatives of most of the 50-odd limestone hills in Sabah. This survey was carried out with

the view to providing baseline data on the floristic diversity of the individual hills and their conservation standing (whether the vegetation on each hill is still pristine or has been heavily disturbed) to enable formulation of a conservation strategy to protect maximum biodiversity.



*Begonia baturongensis*



The high number of endemic species, many confined to a single hill, means that the limestone flora is especially vulnerable to disturbance. The greatest threat is from accidental fires in El Nino years. In addition, some hills are quarried for marble, road metal or cement. The lucrative collecting of edible birds' nests from the caves can also lead to localised disturbance around cave mouths and the base of cliffs. The hill with Gomantong Cave even has a village built on its summit! Tourism, in the form of access to the summit, is also a cause of degradation of the flora.

Our exploration has led to the discovery of 18 begonia species on these hills of which 15 are new to science. In fact, *Begonia* is the most speciose genus on limestone in Sabah and, because begonias occupy a variety of habitats, a single limestone hill can be home to up to four species.

Begonias are a useful conservation icon as they are well-known to many people being clearly related to popular house plants, they are attractive in their habit and foliage, and they exemplify the diversity and fragility of the limestone flora.

From our exploration, we have mapped the distribution of begonias on limestone in Sabah. All 18 species are endemic to Sabah. Only one species, *B. gueritziana*, is widespread, not only on limestone, but also on other rock types too. All the others are confined to limestone, and 12 are each known from a



*Begonia keeana*



Marble quarrying eats up entire hills.

single hill, which underlines the need for a network of hills to be conserved.

Besides *in situ* conservation, it is important to carry out trials to assess whether these rare and endemic species can be conserved *ex situ* in botanic gardens and the Singapore Botanic Gardens is making a contribution to this (see box). Bringing plants into

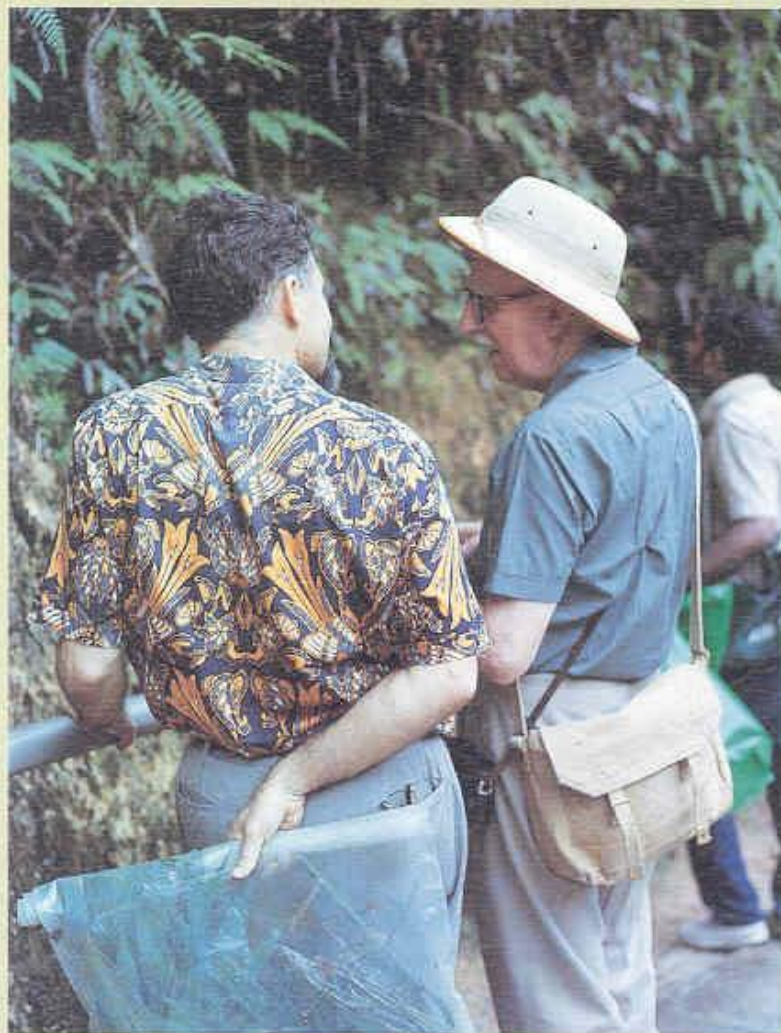
cultivation not only provides an extra safety net for their continued existence but also has educational value in that a fine display of begonias will stimulate public interest in the beautiful, rare and endangered begonias and the need to protect them. 🌿

Ruth Kiew  
Herbarium & Library



# HOLTUM Memorial Volume

R.J. Johns (ed.), Royal Botanic Gardens, Kew, U.K., 1997.



*Professor Holttum in field gear with the characteristic solar topi planted firmly on his head. Fraser's Hill, 1970; the late Benjamin Stone is on his left.*

Ruth Kiew

The publication of this volume commemorates the centenary of the birth of R. Eric Holttum in 1895. (He died at the ripe old age of 95). It celebrates Holttum's contribution to fern taxonomy, which in Singapore is not as well known as his contribution to the taxonomy and hybridisation of orchids.

Holttum began his study of Malayan ferns when he joined the Singapore Botanic Gardens as Assistant Director in 1922, which study culminated in the publication

of the *Flora of Malaya*, Vol. II Ferns in 1954. It was based on thirty years' research, which included field work that enabled him to see all but a few species growing under natural conditions and to make complete herbarium specimens and bring living material back for cultivation, all of which stood him in good stead when he was interned in the Gardens during the Japanese Occupation. He used to say that botanically the Japanese Occupation was a blessing in disguise as, freed from

administrative and social duties as Director, he could concentrate on taxonomic research without interruption. His contribution to the fern herbarium collection means that it is one of the best in the region.

After his retirement from the Professorship of Botany at University of Malaya in Singapore in 1955, he based himself at Kew and concentrated on fern taxonomy.

His publications on ferns are numerous (about 110 in all). As William Stearn writes in his excellent biography in this volume, the hall mark of Holttum's research is his uniformly high standards of accuracy based on first hand observations, his scholarly attitude, untiring industry and judicious assessment. His contribution to fern taxonomy lies not only in his own writings but also his meticulous editing of the pteridophyte section of *Flora Malesiana*, which as Stearn says tested to the utmost his tenacity and discrimination.

The commemorative volume reflects the worldwide esteem in which he is held. It includes 17 papers with contributors from Argentina, China, Cuba, Mexico, Netherlands, New Zealand, South Africa, United Kingdom, and the United States and covers a wide breadth of topics from fern reproduction to ethnobotany, from molecular biology to ecology, as well as taxonomy and classification. 🌿

*Ruth Kiew*  
Herbarium & Library



# AROUND THE MUSIC FOR THE BROMELIADS



Tan Wei Kiat

*The pitter-patter of dripping water from the Farfugium Fountain (by Dr Humphrey Bowden) reminds you of a brook tripping over stones.*

Water fountains improve visual serenity and very often soothe the soul with the musical cadence of falling water. These days, a visit to the Bromeliad House is doubly therapeutic because it is alive with the sound of 'music' and the 'musicians' are none other than the elegant new copper fountains.

The two fountains have traveled a long way from West Sussex, United Kingdom. Sculpted by Dr Humphrey Bowden and Mr Garth Bowden (father and son),

the Farfugium Fountain and the Fan Palm Fountain are made of pure copper brazed together with a silver/copper alloy. The warm oxide colour of the copper harmonises the fountains with the landscape and brings it to life. Providing the desired natural weathered mossy look are volcanic rocks as well as the Paras stone coping of the pond which was custom designed. The floating duckweeds and water hyacinths soften the warm metal leaves.

Just like bromeliads, these fountains exude simplicity and

natural elegance. It is therefore no surprise that the donor of the fountains is also Lady Yuen Peng McNeice, who earlier had donated the bromeliad collection.

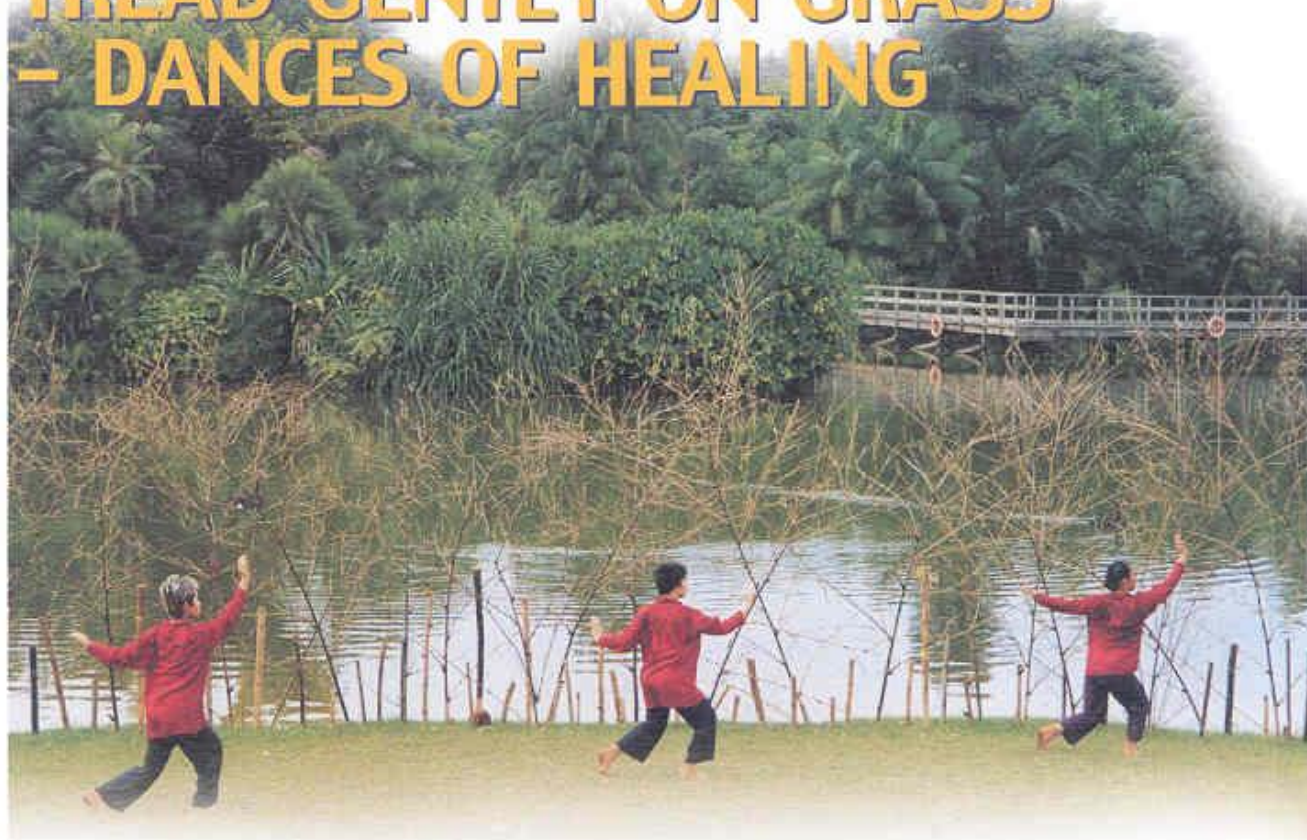
So if you are down by the Bromeliad House, see and feel the tranquility the fountains have created and you can even almost hear laughter as the water drips. 🌿

**Yap Siow Hong**  
Visitor Services Unit



# GARDENS

## TREAD GENTLY ON GRASS – DANCES OF HEALING



Wang Ruo Bin

*The dance was the first performance held at Eco-Lake.*

It was not the usual weekend concert at the usual performance venue, Symphony Stage. With the aroma of herbal tea whiffing in the air, the audiences sat by the banks of \*Eco-Lake sipping tea and watched dancers tread on grass and dip their toes into the edge of the shallow waters.

The 'Dances of Healing' was inspired by 'The Herbal Catalogue', which is a 16th-century classic on Chinese medicinal herbs and plants compiled by the renowned Ming Dynasty physician, Li Shie Ch'ing. The catalogue aims to search for the perfect remedy

and healing for both human and nature. The philosophy of Chinese medicine places great importance on the equilibrium among man, the elements and the universe. With this balance in jeopardy, Ms Angela Liong, who is the artistic director and choreographer of the production, hopes to remind Singaporeans of the silent but transforming power of nature. The performance was called 'Dances of Healing' because she believes that spiritual healing can come through dances, a form of art.

Serving as the focal point for the audiences during the

performance was a special bamboo screen which took over a week to construct. It was created by Wang Ruo Bin, an earth art artist who is herself the daughter of a Chinese physician. The dance was segmented into five thematic portions and it ended with the dancers putting together a yin yang icon from stacks of plants, wild flowers and coconut husk. 🌿

**Yap Siow Hong**  
Visitor Services Unit

*\*Eco-Lake is located at the Bukit Timah Core of the Gardens. The site was chosen because of its natural setting and serenity. The nearest entrance is along Cluny Park Road.*



# Highlights from the School of Horticulture

## Overseas Visitors to SBG



*Students of the Nishinippon Junior College at the National Orchid Garden.*

May 30th marked the ninth annual visit by students of the Nishinippon Junior College at Fukuoka-City, Japan, to the Gardens (SBG). Since Dec 1992, the graduating cohort of landscaping students from the College has been embarking on study tours to the Southeast Asian region, with the Gardens as one of the highlights.

This year, 87 students and 7 accompanying professors came for a 3-hour study tour. Although the onset of the programme was disrupted by a morning shower, the weather soon turned fine to allow our visitors to savour sights in the National Orchid Garden and the Gardens' Rain Forest. The party

was separated into eight groups, each led by a Gardens staff as guide and a Japanese volunteer as translator. (Our special thanks go to Ms Eiko Nishida, Ms Yoshiko Takahashi, Ms Miho Katuura, Ms Naomi Matumura, Ms Toshie Fukamizu, Ms Fumiko Katayama, Ms Emiko Nagai and Ms Eiko Tamura.)

The programme ended at the Gardens' Visitor Centre with a presentation of the Board's corporate CD-ROM followed by an exchange of gifts between the two organisations. 🌿

*Janice Yau*  
Education Branch





# NEW & EXCITING

## THE RED TORCH GINGER

(*Etlingera elatior*)



Ohn Set

'Torch Gingers' native to Southeast Asia are widely grown as ornamentals in the tropics for their large, showy inflorescence which spreads out at the top resembling a torch. Long before their use in horticulture, the species has been cultivated for its inflorescence which is used as a herb item valued for its unusual flavour found against a sourish background.

The red torch ginger is new to the horticulture world. This magnificent plant is about 6 m in height with lance shaped leaves which are 75 cm long. The brilliant red, torch-like inflorescence is produced on the top of a 1.5 m dark maroon, leafless stalk. The thick waxy dark red bracts are stunning with white margin and the small red flowers are brightened by yellow-margined lips.

It grows well under bright filtered light and needs a humus-rich fertile and well-drained soil. Regular feeding with a balanced fertiliser is a must. Native to SE Asia, Torch Gingers are grown as an ornamental around the world.

Ohn Set  
Plant Introduction Unit



# WHAT'S BLOOMING

## *Tarenna odorata* (Buah karang hutan)



A closer view of the flowers.



Recently opened flowers are white, the older ones have turned a creamy yellow.

While inspecting plants in the Gardens, the sight of a shrub in full bloom planted in the fragrant section of the Economic Gardens caught our attention. A quick examination showed that it was a *Tarenna odorata*.

This 1.8 m tall shrub with its white to creamy yellow flowers was planted out in February 1997. Seeds were collected in March 1995 during a plant collecting trip to Pulau Tekong, one of the smaller islands off the main island of Singapore, when a staff stumbled upon this native species. The seeds were germinated and nurtured in the nursery.

When the flowers first open they are pure white but gradually change to a creamy yellow. The fruits are berry-like, light green in colour with one or several seeds in each fruit chamber. The sweet and subtle odour of the flowers is not noticeable unless one goes close. Besides being fragrant, it was also used in traditional medicine in where the flowers are eaten with

betel-nut to treat coughs. The local name, *Buah karang hutan* (Forest syphilis fruit), suggested that it was used for treating syphilis as well.

There are about 370 species in the genus *Tarenna* distributed tropically and subtropically in the regions of Africa, Madagascar, Asia, Australia and the western Pacific. About 37 species are found in Malaya. *Tarenna odorata* is adapted to lowland forest and swampy areas. However, it can be cultivated as an ornamental plant in garden landscapes and thrives well in semi to full sun. It can grow up to 6 m tall. When planted in a group, the effect of the blooms is spectacular. 🌿

**Camelia Marican**  
SBG Management Branch



*Tarenna odorata*. A five-year old plant in full bloom.



# KEY VISITORS TO THE GARDENS



Lion Dancers welcome the President and the First Lady at the Opening of the Chinese Cultural Festival



The President learning the tricks of tea ceremony

## KEY VISITORS TO THE GARDENS (JAN- JUN 2000)

NAME	FROM
Mr Anders J Lindstrom	Noong Naoch Tropical Garden, Bangkok, Thailand
Mrs Anne Kemp	Spouse of the Minister for Education, Training and Youth Affairs, Australia
Mr Bram Westerduin	Director-General for Freight Transport, Ministry of Transport, The Netherlands
Mdm Bun Rany Hun Sen	Spouse of the Prime Minister of the Kingdom Of Cambodia
Dr Carlos F Gurgel	University of Louisiana at Lafayette, USA
Asso Prof Dr Chaichon Lochareernkul	Spouse of Princess Chulabhorn Mahidol, Kingdom of Thailand
Mr Christopher Bond	Senator, USA
Mr Dave Everett	Forest Research Institute, Malaysia
Mrs Fernando Fernandez	Spouse of the Director of Defence Advanced Projects Research Agency, USA
Mr Fr Robert Brown	Likarampa, Papua New Guinea
Datin Hajah Hazizah	Spouse of the Commander-in-Chief, Royal Brunei Armed Forces, Brunei
Mrs Harold Rogers	Spouse of Congressman, USA
Mrs Heng Sun Hout	Spouse of the Minister for Health, Kingdom of Cambodia
Dr Hwa Zhu	Xishuangbanna Tropical Garden, Yunnan, People's Republic Of China
HE Ismail Amat	Top Minority Leader, People's Republic Of China
Mr Jay Hansker	Hawaii, USA
Mr Jeremy Purselove	Son of a former director of the Gardens, Mr John William Purselove, London, UK
Prof John Cram	University of Newcastle, UK
Dr Kamaruddin Salleh	National University of Malaysia, Bangi, Malaysia
Lady Kate Guthrie	Spouse of the Chief of Defence Staff, UK
Mr Katsuji Doi	Vice Minister for International Affairs, Ministry of Transport, Japan
HE Kofi A Annan and Mrs Nane Annan	Secretary General, United Nations
Mrs Ligia de Aleman	Wife of Permanent Representative of Ecuador
Dr Masatoshi Hara	History Museum & Institute, Chiba, Japan
Mrs Michiko Takegouchi	Spouse of the Chief of Staff, Air Self Defence Force, Japan
Mrs Natalie Sychova	Spouse of Permanent Representative of Belarus
Mrs Patricia Cerjan	Sponse of Lt Gen Paul G Cerjan, President, Regent University, USA
Dr Paul Kessler	National Herbarium Netherlands, Leiden, Netherlands
Mrs Pramod Mahajan	Spouse of Minister for Parliamentary Affairs and Information Technology, India
Prof Robert Johns	Royal Botanic Gardens, Kew, UK
Mr & Mrs S R Nathan	President & First Lady of the Republic of Singapore
Begum Sahib	Spouse of the Chief Executive of Pakistan
Mrs Serlyn Nakayama	Spouse of the Minister for Foreign Affairs, Japan
Ms Sheh May Tam	University of Cambridge, UK
Mrs Sonny Callahan	Spouse of Congressman, USA
Dr Steve Hooper	CEO, Botanic Gardens and Park Authority, Perth, Australia
Mr Steve Meredith	Education Officer, Adelaide Botanical Garden, Australia
Ms Susanna Barber	Forest Research Institute, Malaysia
Ms Tatyana Livshultz	Cornell University, USA
Mr Tim Ufferidge	Royal Botanic Gardens, Kew, UK
Mrs Wang Daohan	Spouse of the President-Association for Relations Across the Taiwan Straits



# FROM THE ARCHIVES

## Paintings of Toadstools by Charles de Alwis



A selection of single toadstools.

Painting of the type specimen of *Hypholoma elatum*.

Ridley wrote in the Annual Report for the Year 1906: '...towards the end of the year, in the rainy season, [the Artist] made a large series of drawings of the soft fungi, of which little or nothing is at present known, and which are almost impossible to preserve even in alcohol in this country, so that coloured drawings are the only way of recording and identifying them satisfactorily'.

Ridley's specimens together with the de Alwis paintings were sent to Kew where it was discovered that the majority of them represented new species. These were described by G. Massee, who commented on the importance of the 'very beautifully executed coloured drawings' in making descriptions

of these new species. The drawing of *Hypholoma elatum* Massee of Ridley's collection numbered 83E is painted from life from what became the type specimen, so the painting is also a valuable part of the scientific identity of this species.

Many of Ridley's specimens were collected from the Gardens and in particular from the Gardens' Rain Forest, which is therefore valuable as a type site, i.e. the original location from where the type specimen was collected.

The documenting of Singapore's fungal flora continued with the work of, among others, E.J.H. Corner who referred to the paintings during the course of his research. In his publications he commented that "they are excellent

and characteristic". After Corner's death in 1996, the paintings went with the rest of his mycological materials to the Royal Botanic Gardens, Edinburgh prior to their return to the Gardens archives in May this year.

They comprise a collection of 25 paintings made between 1905 and 1907. Originally on 12 x 18 inch paper, many were reduced in size to include just a single toadstool. Although the paper has suffered from handling over the years, the colours are still fresh and the paintings will remain an important scientific resource as well as being pleasing in themselves. 

Ruth Kiew  
Herbarium & Library