

Gardenwise



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Singapore Orchid festival 2003

Message from the Director

In the last six months, the Gardens was particularly active in playing its role as the flagship park in the National Parks Board's stable of some 300 parks. It was repeatedly used as the showcase of the best in the Board, because the Board, through its commercial arm, markets its expertise and ability in park planning and execution to potential clients. In addition, we saw a steady stream of key stakeholders using the Gardens as their park of choice. Together with other important visitors, the flow of VIPs kept staff on their toes.

The major public event, however, was the Singapore Orchid Festival, jointly organised with the Orchid Society of South East Asia (OSSEA). It was boldly conceived, carefully planned to the last detail and meticulously implemented with quality plants, displays and activities. It was a classic example of Gardens' staff from various branches cooperating and collaborating with their colleagues from other Divisions and working with external parties. The result was the creation of one of the most outstanding flower festivals seen in Singapore in recent years. Despite inclement weather and despite imposing an entry charge for the first time to an orchid show in the Gardens, there were long queues into the main pavilion.

almost completed. Designed as an educational journey through time, visitors will be brought through different periods of our planet's history with the story told through innovative landscapes and plants. An important feature is the Gardens' substantial cycad collection, but other wonders await. The Garden will be opened to the public later in the year.

A focus for the Gardens in the coming year will be establishing links with regional botanic gardens. We will be working together with Botanic Gardens Conservation International (BGCI) to host the first ever meeting of Southeast Asian botanic gardens in late January 2004. This meeting sponsored by BGCI will provide a unique opportunity for interaction and networking and building a framework for future exchanges and collaboration in research and conservation, management and education. A specific objective of this inaugural meeting is to compile and publish a directory of Southeast Asian gardens with basic information on each garden. We will look forward to active involvement in building a strong network of Southeast Asian gardens to further our common interests and concerns. 

In January 2004, the Cool House in the National Orchid Garden with its tropical montane plants and landscape finally opened to the public. This conservatory contributes an extraordinary element to the Gardens' horticultural and botanical displays and we are sure it will be a pleasing surprise to our many visitors.

After a flurry of activities in the recent months, the Evolution Garden, just north of the Visitor Centre in the Discovery Core of the Gardens, is

Chin See Chung

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Front Cover:
Backdrop at the stage set up for the
Singapore Orchid Festival
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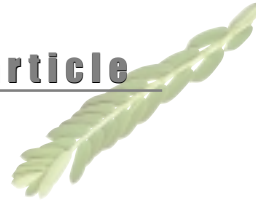
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Tropical Gesneriads in Cultivation

Horticulturally, Gesneriaceae is a very important family as it contains many species developed for the plant trade. Many are particularly popular house pot plants, the most well-known being the African Violets (*Saintpaulia*) and Gloxinias (*Sinningia*). *Streptocarpus*, *Columnnea*, *Achimenes*, *Episcea* and *Aeschynanthus* are now becoming equally well-known especially as hanging basket plants.

The family was named by Dumortier to honour Conrad Gesner who died in 1565. Gesner was a major influence in the development of a number of sciences in his time and wrote a book on the History of Plants.

Gesneriaceae is reputed to contain 125 to 139 genera with 2000 to 2900 species, and of these 300 or so species are in cultivation with many hybrids and cultivars having been produced. For instance, the 20 species of *Saintpaulia* originating in East Africa have produced over 2,000 cultivars of African Violets.

Gems for Horticulture

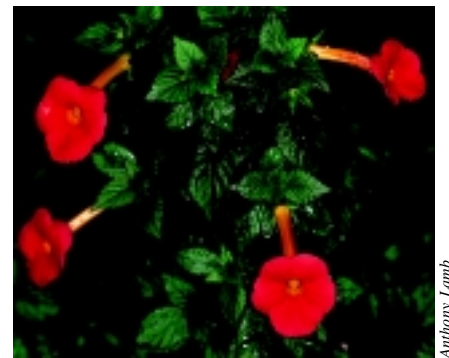
Apart from *Saintpaulia*, other important genera from a horticultural point of view include *Sinningia* with about 40-60 species from tropical America, including *S. speciosa* from Brazil, known in the horticultural trade as Gloxinia, with its



Another very popular pot plant in the trade is the Florist's Gloxinia, derived from the many cultivars of *Sinningia speciosa*.

many cultivars. This must not be confused with the genus *Gloxinia* itself, with 15 species.

Smithiantha, with four species in Mexico and *Kohleria* with 17 species from Colombia and Ecuador are less well-known. *Achimenes* (the so-called "Hot-water Plants") contains 22 species and is becoming very popular, with many hybrids coming from cultivated species such as *A. erecta* and *A. grandiflora*.

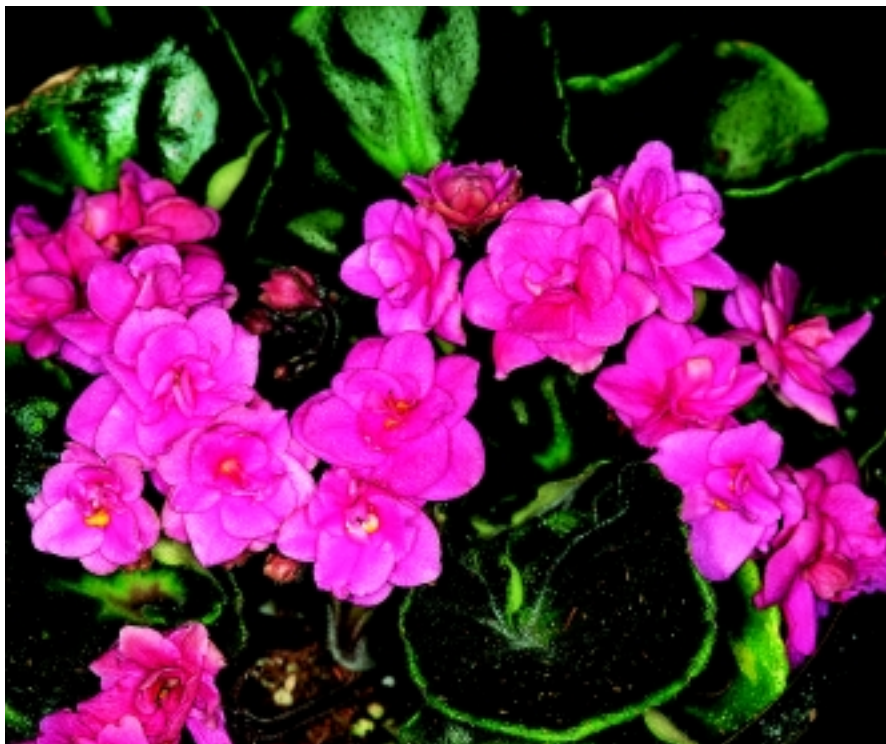


A favourite hanging basket plant is the so-called Hot-water Plant with many hybrids coming from species of *Achimenes*.

Lipstick Flower is the common name often given to some members in the mainly epiphytic genus *Aeschynanthus*. The name was applied to *A. pulcher*, from Java, because the flower buds emerging from the cylindrical calyx tube look like a lady's lipstick. Many other species have a similar appearance, for example *A. curtisii* and *A. parvifolius*.



Lipstick Flowers are so named for the appearance of the red flower buds emerging from the calyx tube as in this *Aeschynanthus curtisii*.



The African Violets (*Saintpaulia*) with over 2000 hybrids and cultivars are one of the most popular pot-plants in horticulture.



Anthony Lamb

Another Lipstick Flower, *Aeschynanthus parvifolius*.

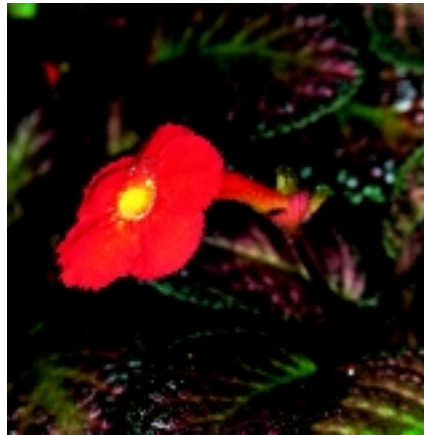
Columnnea with 75 species in tropical South and Central America is the Lipstick Flower of the New World, and can now be seen on sale in Singapore nurseries. Their bright yellow or red flowers attract bird pollinators, as do their Old World equivalents in *Aeschynanthus*. *C. arguta* makes a wonderful basket plant, as do some *Aeschynanthus*. *Hypocerta* is a genus with species that have become popular in the plant trade in the Americas but have not yet reached Asian markets.



Anthony Lamb

Columnnea species are the Lipstick Flowers of South America coming in reds and yellows and now appearing in Singapore nurseries.

Another well-known genus is *Episcia* with nine tropical American species familiar to most people in Southeast Asia where it is a popular house-plant and often used as a ground cover in shaded landscapes. The most common is *Episcia cupreata* from Colombia with red flowers, but cultivars come in pink, yellow and mauve as well.



Anthony Lamb

Episcia cupreata is another favourite house plant and often used in landscaping shaded areas.

An important African genus, which prefers a cooler climate, is *Streptocarpus*, the Cape Primrose, with 125 species found in South Africa and Southeast Africa.



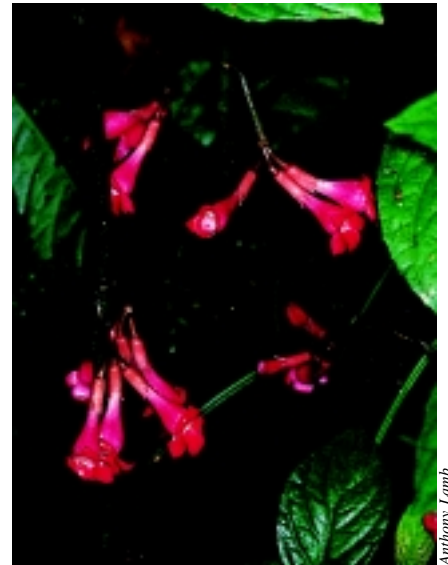
Anthony Lamb

Streptocarpus, Cape Primrose, derived from species in the Southern African region, is more easily grown in a cool temperate climate or in air-conditioned spaces.

Chirita is a genus of 130 species found from China (with 80 species) to the South-East Asian region. Several are cultivated as ornamentals.

Cyrtandra, a very large genus with over 600 species is spread from China (only one species) through Borneo (about 150 species) to New Guinea (about 150 species) and the Pacific Islands. *Cyrtandra dicitata* from Borneo is one of the few

rheophytes in the family. Many Bornean species are very ornamental but are not yet seen in cultivation.



Anthony Lamb

Cyrtandra clarkei, from Mount Kinabalu, Sabah.

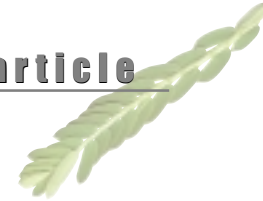
The genus *Monophyllea* includes at least 36 species with the largest number found in Sarawak (16). This is a very unusual genus in that plants consist of a large single leaf-like cotyledon rooted at the base of the petiole, with flowering stems arising from the base of the cotyledon itself. They often grow in rocky areas, many being lithophytes.

Monophyllea – the One-leaf Plant

Monophylleas are bizarre one-leaf plants. They are really monstrous seedlings of bloated proportions. They start life as normal tiny seedlings with two seed leaves (cotyledons), but one grows and grows to become the plant as no other leaves are produced.

In *Monophyllea horsfieldii* the leaf reaches about 45 cm long and 55 cm wide. The weird thing about this leaf is that it is able to keep on growing for its entire life (which is only about 60 weeks) something that most leaves, which rapidly reach their maximum size, cannot do.

While the *Monophyllea* leaf keeps on growing from its base, the tip begins to decay so the leaf changes shape from oval

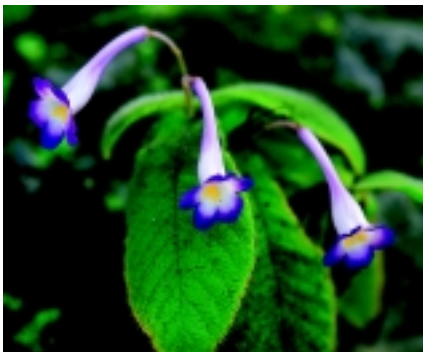


Henckelia (which now includes many species from Peninsular Malaysia and Borneo previously in *Didymocarpus* and *Loxocarpus*) is another genus with some



Anthony Lamb

Henckelia violoides from Mt. Kinabalu and related species are very similar to the African Violets of Africa.



Anthony Lamb

Henckelia quinquevulnera is a beautiful species from Peninsular Malaysia.

very beautiful species. It has about 180 species with about 100 in Peninsular Malaysia and about 50 species in Borneo with the rest from South India to New Guinea. They often have fern-like leaves and flowers that range from purple to white, yellow or red. Ruth Kiew of the Singapore Botanic Gardens has spent much time studying and describing species of this genus. *Henckelia violoides* found in Sabah, is very reminiscent of the African Violets.

Didymocarpus with about 80 species and well represented in China with about 30 species has several species in cultivation. It has a Sino-Himalayan distribution with eight species in Peninsular Malaysia, its southernmost territory.

Ridleyandra, previously known as *Didissandra*, with eight species in Peninsular Malaysia, Sumatra, Java and Borneo is a genus with very pretty flowers (see page 25).



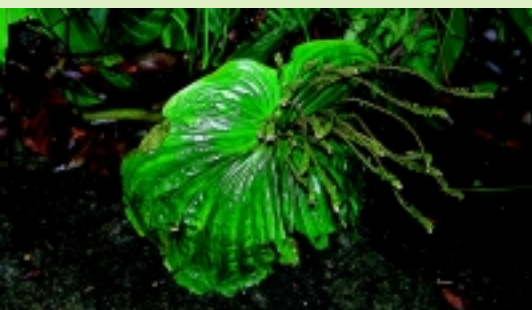
Anthony Lamb

Mount Kinabalu in Sabah is now a World Heritage Site.



Ruth Kiew

Young plant of *Monophyllaea horsfieldii* with an oval leaf. Note the flowering stalks growing from the leaf base.



Ruth Kiew

Old plant of *Monophyllaea horsfieldii* with a leaf about 45 cm across with a tattered, decayed tip. The stalk is toppling over under the weight of the large leaf.

in young plants to broadly heart-shaped in old ones. But *Monophyllaea* has an Achilles heel. Its fleshy stalk, which can reach 60 cm tall, is poorly rooted and eventually topples over as it cannot support the weight of the monster leaf, and so the plant dies. No matter, it begins to flower when 15 weeks old and produces many minute seeds, which germinate into tiny seedlings and so the cycle goes on.

Monophyllaea horsfieldii has been grown in the Gardens since 1918 and there is now a small and fragile, self-seedling population. Its natural habitat is on limestone or granite rocks in Peninsula Malaysia in damp, shaded places.

Ruth Kiew
Herbarium and Library

A few Javan species of *Aeschynanthus* have been in cultivation for a long time, such as *A. pulcher* and *A. lobbianus* and they are generally popular as hanging basket plants. On the other hand, *Agalmyla*, which are delicate climbers, mostly epiphytic, does not seem to have been utilized probably because they are much more difficult to grow.

While many plants from this large family are already in cultivation, there are other attractive and unusual types waiting for the enterprising horticulturist. In the region, Mount Kinabalu, a World Heritage Site, and a “hot spot” for plant diversity is home to many exceptional species of Gesneriads.

Anthony Lamb
Horticultural Consultant

Usun Apau!

Where's that?

That was our first reaction on being asked to join the Tree Flora of Sabah and Sarawak Expedition to the proposed Usun Apau State Park in Sarawak. Out came the atlas – Usun Apau is in the southeast of Sarawak 300 km from Miri and 12 km from the Kalimantan border. The proposed state park is large covering 498 sq km. (Singapore covers just 670 sq km). The area was chosen as the site of the expedition by the Sarawak Forest Department, who arranged all the logistics, because the area had not been botanically explored before. It was an exciting prospect to go where no botanists had ever been!

In March 2003, the team of 16 botanists from the Sarawak Forest Research Centre, Sabah Forest Research Centre, Forest Research Institute Malaysia, Tree Flora of Sabah and Sarawak Project, and the Universities of Sarawak and Sabah and the two of us met in Miri and made an early start cramming our backpacks, perishable food and ourselves into the three 4-wheel drive vehicles for the nine-hour drive along logging roads to the expedition site at Sungai Palutan, a river only to be found on the largest scale maps.



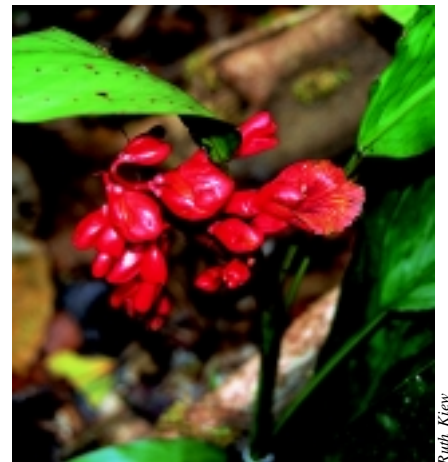
Cyrtandra (Gesneriaceae), the most speciose genus of herbs at Usun Apau.



Argostemma (Rubiaceae) growing on a mossy tree buttress.

That was our first surprise – that we could drive so far along logging roads and that logging was penetrating almost up to the Kalimantan border. The second surprise was how hilly the area was. Everyday, as we collected at different sites, we spent the day scrambling up and frequently slipping down the steep slopes of valleys or ridges.

Usun Apau at 500 to 1000 m altitude is mostly covered by Mixed Dipterocarp Forest with some *kerangas* forest (forest on poor acid soil) on a few ridges. While the other groups concentrated on trees and

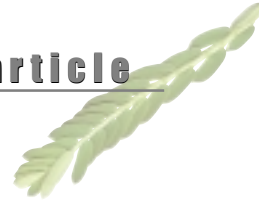


Alpinia glabra (Zingiberaceae), the most striking ginger at Usun Apau.



The Expedition Team.

palms, we aimed to make a comprehensive collection of herbaceous plants including orchids. Collecting on expeditions is just like potluck. Some species that you expect to be common are not well represented, like the orchids (see box), star-flowers (*Argostemma* species) or gingers. While others meet expectations, like *Cyrtandra* in the Gesneriaceae (African Violet family) or begonias that have a major centre of distribution on Borneo and so are expected to be diverse. We collected ten species of *Cyrtandra* and nine of begonia. However, what was unexpected was how very local many of the species were. For example, among the nine begonias only one was widespread and seven were only seen in one spot.



The Usun Apau Area. Note the logging road.



Paul Leong

The diminutive *Henckelia* (Gesneriaceae), a new species, has leaves about 3 cm long.



Ruth Kiew

This new *Hexatheca* (Gesneriaceae) was found on just one cliff face.

Hexatheca, also belonging to the Gesneriaceae, which is a genus endemic to Borneo with only three other species. The Usun Apau *Hexatheca* is unique in its long inflorescences that, on contact with the mossy cliff on which it grows, root and produce new plantlets. It was also very rare and found only on one steep cliff next to a waterfall.

In hunting for herbs, the area actually proved quite poor in habitats suitable for them. Usually streams and rock faces are



Ruth Kiew

Rocky streams were very rare at Usun Apau.



Ruth Kiew

One of the nine *Begonia* species (Begoniaceae) we collected.

It is the unexpected that provides the excitement, namely the discovery of rare or new species. Two outstanding examples of rare plants were the canary yellow *Aeschynanthus flavidus* and the slender pink banana, *Musa suratii*. *Aeschynanthus flavidus* was quite common in the Usun Apau area and provided a splash of colour against the green canopy. This species was



Ruth Kiew

Aeschynanthus flavidus (Gesneriaceae), a rare yellow-flowered species.

first collected in the Gunung Mulu National Park and is the only yellow-flowered Bornean species in a largely red-flowered genus.

The second was *Musa suratii* that has the most slender bright pink male bud and



Ruth Kiew

Musa suratii (Musaceae), the rare slender pink banana.

bananas as thin as your finger packed with tiny seeds. The undersides of the leaves are white being thickly encrusted by a layer of wax. This is a very rare species known from one place in Sabah, though it may prove to be the same as a species collected over the border in Kalimantan. The pink banana was very local in Usun Apau and we found it at only one spot.

We expect several of the begonias to be new species. Two other attractive species that are new to science are the diminutive *Henckelia* (Gesneriaceae) that we found covering one face of a large 2 m-high boulder and nowhere else. The other is a



Ruth Kiew

The strikingly variegated *Ardisia* (Myrsinaceae).

bursting with a wide variety of lush herbs but this was not the case at Usun Apau. The reason for this is the soil, which is a very crumbly sandstone so the banks of most streams had soft eroding banks where herbs could not get a foothold. Rock faces or large boulders were also few and far between, but it was on these that we found many of the rare and possibly new species.

Searching the steep and slippery slopes was not without its rewards as there were a surprising number of variegated plants, like the stunningly patterned dwarf variegated *Ardisia* or the *Phyllagathis* with unusual



Ruth Kiew

The variegated and the black-leaved *Phyllagathis* species (Melastomataceae) were widespread at Usun Apau.

minutely pimply leaves. Often growing with it was a different, equally beautiful *Phyllagathis* with shiny black leaves.

While it would have been impossible to reach such a remote area without the network of logging roads, it was nevertheless distressing to see the destruction to the environment that logging was causing. With the steep slopes, crumbly soil and high rainfall, erosion was occurring on a massive scale causing



Paul Leong

Logging roads caused landslips, severe erosion and siltation.

landslides and clogging the rivers with earth. Very few rivers and streams flowed with clear water. After rain they quickly became muddy as we discovered when we came to bathe in the evening.

The logging operation was so efficient that at the head of the logging roads was the house where the workers lived, complete with their families, dogs and chickens. As the road penetrated deeper, the house,

exhausting physically, the tough part comes afterwards when the collections must be put in order with the correct names and the literature and herbarium searched to confirm that new species really are new to science. In spite of the frequent rain and steep terrain, we shall always remember Usun Apau for the stunning views of primeval rain forest stretching into the distance with the ethereal mist rising from the canopy. 🌿



Ruth Kiew

A *rumah tarik* (pull-house).

which was built on two large logs was pulled by a bulldozer to the new site, earning the local name of *rumah tarik* (literally 'pull house'). The area we botanised will be logged in the coming year underlining the urgency of making botanical inventories while the forest is still pristine.

While the expedition itself may be

Ruth Kiew & Paul Leong
Herbarium

Acknowledgements: We thank Dr E Soepadmo, expedition leader, for inviting us to join the expedition, and to Yahud bin Wat and his team of 23 supporting staff from the Sarawak Forest Department who built the camp, climbed trees, pressed plants, cooked, and drove along dangerous steep slippery tracks.

Of sights and sounds, tastes and smells....

We did not need alarm clocks. The shrill of the ubiquitous cicadas permeated the forest; each species “sang” its unique song at specific time slots. So, a chirpy tune greeted the morn at 6.10 am as I gently peeled off my sleeping bag. As I trudged towards the muddy river to wash, I could smell the damp fresh air and I recalled the unrelenting furious rain that pelted the tarpaulin canopy above our beds throughout the night. Condensation was to be a nightly occurrence.

Breakfast was simple fare of fried rice noodles with eggs and canned beans or *nasi lemak* with *ikan bilis*. The Sarawakian coffee was a perfect perk-up for the day. We then filled our water bottles with firewood-boiled stream water with a resultant smoky flavour, not exactly delicious, but surprisingly agreeable when thirsty. By 7.30 am, we set out to survey the forest, exploring different habitats, sometimes having to drive for more than an hour.

By late afternoon, we returned to the base camp to press the collected plant specimens and bathe. I found a secret garden with lush vegetation and a trickling stream to wash away the day’s grime. Life’s little mercies were afforded by decent toilet facilities, completed with a toilet bowl, à la seventies kampung. Dinner, being the best meal of the day, consisted of mutton or chicken curry



Sleeping berths consist of canvas hammocks in a latticework of poles, raised half a metre above the ground.

with vegetables, rice and fruits, sometimes with an impromptu addition such as *buah tampoi* dip, the fruit having been collected during the day. Invariably, a sinister sounding cicada would herald the dusk while we ate.

At night, we wrote our diaries, viewed digital photographs of the day’s trip or keyed in field notes onto laptops, all the while having to fend off inquisitive large insects such as grasshoppers, long horn and rhinoceros beetles, which were attracted by the florescent light that was powered by a generator. There was a soft pervasive, background chant throughout

the night, which I initially thought came from an overzealous radio but was told that it was the frogs! When the generator was switched off at 10 pm, I saw little blobs of light floating from one mosquito netted bed to another in the pitch darkness. That was the first time I saw fireflies. Wrapped within the comfort of the sleeping bag, I drifted into dreamland amidst the litany of the chanting frogs and the rumbling thunder – a prelude to the impending rain. 🌧️

Paul Leong
Herbarium



Bathing and washing area with trickling stream and lush natural setting. Note the bucket.



Toilet facilities, complete with a toilet bowl à la seventies kampung.

Usun Apau Orchids

In total, we collected about 100 orchid specimens in flower. The breakdown of the genera were: 25% *Eria*; 20% *Dendrobium*; 16% *Bulbophyllum*; 14% *Coelogyne* and 25% various genera.

The most attractive finds were *Dimorphochis lowii* and *Bulbophyllum virescens*.

Dimorphochis lowii

This monopodial epiphytic orchid was perched 5m up a solitary tree on a ridge at an elevation of 800m. Much sought after by collectors, it has two distinctly different flower forms in the same inflorescence, which is pendant and about a metre in length. There are two basal flowers in an inflorescence. These strongly scented flowers, each measuring about 5 cm long and 5.5 cm across, are yellow with purple spots and the sepals and petals overlap. Apical flowers, each 5.5 cm long and 6 cm across, are cream with maroon blotches and wavy margins. There are 28 of these per inflorescence. Altogether, there were more than 300 flowers in this clump.



Dimorphochis lowii



Basal flower



Apical flower

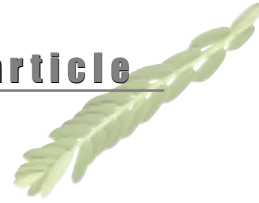


Bulbophyllum virescens

Bulbophyllum virescens

Found at an elevation of 500m, this epiphytic orchid has an inflorescence of 10 flowers that form a complete 20 cm diameter circle. With its mobile lip and long median and lateral sepals (more than 8 cm per sepal), it is quite spectacular to behold. Although common on mossy branches, few were in flower. The flowers emit a foetid fishy odour. 🐟

Paul Leong
Herbarium



More Than a GIFT

A donation, whether in cash or kind, is a gift. It is an act of giving by a benevolent giver who does not ask for economic value in return. A sponsorship, on the other hand, asks how much economic value the receiver (sponsee) can provide to the giver (sponsor). A sponsorship is therefore a dynamic two-way exchange.

The sponsee's role is that of a conduit providing a variety of benefits and opportunities that will help the sponsor connect with his target market. Through associating with the sponsee's event or product, the sponsorship creates a relationship between a sponsor and his target market. The sponsoring corporation recognizes that the association can generate business, enhance the organization's reputation, build goodwill, expand networks and markets, increase access to key consumer groups and provide a testing ground for new products. The concept of sponsorship has grown from a mere fundraising activity to a joint marketing activity involving both the sponsee and the sponsor.

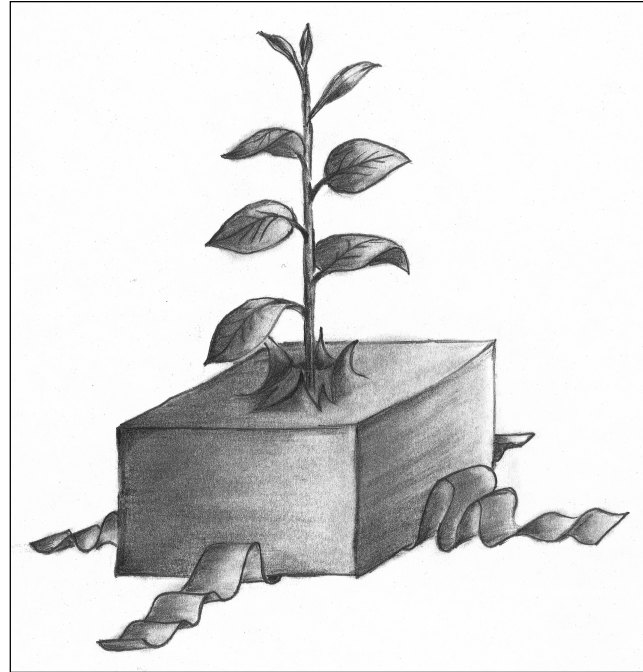
A Sponsorship Framework

A successful model of sponsorship or strategic alliance is based on a collaboration or partnership that produces outcomes that any sponsor will find difficult to leave. Alternatively, a sponsee may be successful in raising sponsorships but find difficulty in retaining the sponsors.

A framework by Austin (2000)* shows that alliances can evolve over time, moving from a traditional philanthropic to higher levels, viz., transactional and integrative sponsorships.

The framework known as a collaboration continuum defines three types of collaborations. The simplest, a philanthropic relationship is a donation where the corporation and the receiving organization play the roles of a charitable donor and recipient respectively. The engagement is generally limited to an annual or periodic solicitation.

A philanthropic relationship can evolve to a transactional collaboration when



Austin, 2000

organizations carry out their resource exchanges through specific activities. At this stage, engagement of partners is more active and the value flow more significantly two-way. The relationship begins to connect more directly with business operations. A good example of this type of collaboration would be a bank integrating a botanic garden's conservation efforts into its credit card operations so that each time a cardholder uses the credit card for his purchases, the bank donates a certain amount to the garden to promote its conservation work. While this is a fundraising activity for the botanic garden,

it is a marketing instrument for the bank to be connected with its target market, the environmentally conscious group.

As the relationship moves from stage to stage and the level of engagement of the two partners moves from low to high, the importance of the relationship to each collaborator's mission shifts from peripheral to strategic. The scope of activities encompassed by the partnership, broadens; the magnitude and nature of the resources allocated to the relationship expand significantly; the partners' interactions intensify, and the managerial

Collaboration Continuum			
Relationship Stage	Philanthropic	→ Transactional	→ Integrative
Level of engagement	Low	→ → →	→ High
Importance of mission	Peripheral	→ → →	→ Strategic
Magnitude of resources	Small	→ → →	→ Big
Scope of activities	Narrow	→ → →	→ Broad
Interaction level	Infrequent	→ → →	→ Intensive
Managerial complexity	Simple	→ → →	→ Complex
Strategic value	Modest	→ → →	→ Major

Diagram: Collaboration Continuum
Source: Austin (2000)

complexity of the alliance increases. The strategic value of the collaboration escalates from modest to major. At its highest and most complex level, the collaboration becomes an integrative one.

Starbucks & CARE

A good example of an integrative sponsorship is the relationship between Starbucks and CARE*, an international aid and development institution.

The collaboration between these organizations was formally launched in 1991. The initial collaborative activity was the creation of a coffee sampler containing coffees from three countries in which CARE operated. The samplers were sold in Starbucks stores and a portion of the proceeds from each sale went to CARE. In this collaboration, Starbucks used its business to generate benefits to CARE. In 1992 CARE recognized Starbucks with its 1992 Northwest International Humanitarian Award. Through reciprocal public recognition of the partnership, the partners were positively reinforcing their alliance. In 1993 CARE bestowed upon Starbucks' CEO its Corporate Leadership Award and Starbucks increased its commitment with a substantial donation to a CARE land restoration project in Ethiopia. Starbucks also sponsored the first of a series of concerts, the proceeds of which benefited CARE. The concert, sampler sales, and other donations generated additional funds for CARE. The CARE relationship also helped Starbucks realize one of its mission, "to be basically good citizens of our communities."

In 1995 Starbucks integrated CARE into its in-store and mail-order communication and promotion efforts. CARE's knowledge of the countries from which Starbucks sourced coffee became a valuable company resource providing Starbucks executive a reliable source of information about current events politically, economically, socially and environmentally. In 1998 CARE named a key Starbucks personnel to its Board. The relationship that started in 1991 has, over a period of about eight years, blossomed into an integrative relationship. By 1998 Starbucks had become CARE's largest corporate sponsor.

Learning Points

The CARE-Starbucks relationship offers an

inspiring example to us who manage botanic gardens. The objective of any botanic garden manager must be to nurture a collaborative relationship from a traditional philanthropic one towards a deeper, strategic alliance. Botanic garden managers are increasingly aware that well-managed collaborations can help to build brand identity and goodwill, reinforce employee commitment and uncover new business opportunities and sources of revenue. They must realize that progression along the collaboration continuum is not automatic but is the result of conscious acts and efforts.

There are growing opportunities for botanic gardens and businesses to work together and create new possibilities that further their respective missions. While botanic gardens strive to become more business-like, businesses are very conscious that they must become more socially responsible. Gardens are unique aesthetic and recreational spaces with horticultural and botanical displays, education and research roles. They must leverage on their public and social roles as many cooperations will want to be identified with them.

From research on 27 botanic gardens, I found that the better cost-recovery performing botanic gardens has created more win-win partnerships with external parties to help them raise revenue and achieve greater results. They are using revenue raised from strategic partnerships to create larger events, defray event expenses, fund operation and marketing activities. These better cost-recovery performing gardens offer models for others to emulate.

It is clear that the viability of an alliance depends fundamentally on its ability to create added value for both participants. The clearer the expected benefits can be articulated and quantified to both partners and to society, the greater success the collaboration will have. The value of a collaboration to a botanic garden is ultimately expressed as a sum of money or quantity of in-kind resources that a company provides in exchange for the botanic garden's services or, very often, the use of its name in a cause-related marketing strategy. This value is a key determinant of whether or not the collaboration is worth undertaking. Managers must also take a realistic look beyond the magnitude of the value created and justify the nature and quantum of the

resources deployed to create that value.

In any relationship it is important for the partners to continually review the value exchange with one another to ensure that they both perceive the benefit flow to be mutually beneficial and equitably balanced. A partner that perceives that it is giving much more than it is getting may well stop investing in a relationship or begin to exercise undue influence over the other partner. Botanic garden managers cannot underestimate the reality that any long-term relationship runs the risk of complacency.

One way to manage this risk proactively is to pay attention to the value renewal of the relationship. Collaboration benefits will depreciate over time as a consequence of changing partner circumstances and needs. Botanic garden managers need to continually innovate and create new value-adding collaborative activities otherwise they face the risk of being displaced by a more aggressive or creative competitor. This risk of displacement is greater when the relationship is at the lower philanthropic level. More developed, complex and dynamic relationships in the advanced transactional or integrative stages impose more barriers to entry by competitors.

Conclusion

Botanic gardens are increasingly conscious of the need to grow their donated income through strategic alliances to make up for the shrinking operating budget from traditional sources of funding. This is no easy task. The strategy is to seek both donations and sponsorships and to work towards integrative collaborations. The gardens must create value especially from their public and social roles and to articulate that value to the potential sponsor. Once value creation is done, the gardens have to constantly review this value. Once germinated and nurtured, the gift should surprise with bountiful harvests. 🌱

Wong Wei Har
Deputy Director

* Austin, James E (2000), *The Collaboration Challenge, How Nonprofits and Businesses Succeed Through Strategic Alliances*, Jossey-Bass Publishers, San Francisco, United States of America

From the Forest to the Garden

– *Sterculia parviflora*



S K Ganesan

The vivid, velvety fruit and black seeds of *Sterculia parviflora*.

Sterculia parviflora is a large tree that is found in our forests. It usually has a clear and straight trunk with a rounded thick crown that provides good shade. Its bright orange-red fruits that split to reveal jet-black seeds are striking and distinctive. The vernacular name is *Kelumpang Burung*.

This tree is naturally distributed from north-eastern India through Burma, Thailand, Peninsular Malaysia and Singapore to Borneo. It is common in the lowland forest of Malaysia. In Singapore, there are records of this tree from the Gardens' Rain Forest.

As part of NParks' efforts to bring more variety into our urban landscape, saplings of *Sterculia parviflora* were planted along



Derek Yap

Sterculia parviflora grows fast and provides good shade – this tree was planted in 1998 at an interchange along the Tampines Expressway, the author beside tree for scale and shade.



S K Ganesan

The seed germinates rapidly after the seed-coat and pulp are removed.

several roadsides starting from 1998. It was pleasant to learn that this tree thrives in our urban environment. In addition to growing fast, *Sterculia parviflora* transplants well. Specimens of about 10 cm dbh (diameter at breast height) can be transplanted without the need for crown reduction

Planted specimens fruit within four to five years. The orange-red fruits are outstanding and very attractive. Seeds are not difficult to germinate. Removing the black seed coat

and the white pulp surrounding the seed before sowing appears to facilitate germination.

The attractiveness and horticultural attributes of *Sterculia parviflora* make this indigenous tree a prime candidate for roadside gardens and parks. 🌿

S K Ganesan
Assistant Director (Arboriculture)
National Parks Board

Cool House in the Tropics

Some of the most wonderful places in the tropics are in the mountains. Up in the highlands of countries which lie within the tropical belt that girdle the earth, nature is on display in all its exuberance. At altitudes generally above 1200 meters and traversed daily by passing clouds, the plant life forms a cloak of vegetation adapted to receive their daily moisture-laden caress and thrive free from the bounds of earth and soil. In this Eden for epiphytes, some of the most exquisite members of the orchid family flourish. Other epiphytic plant families

share this habitat with the pantropical orchids, and help to define the regions: bromeliads take precedence as orchid companions in the New World tropics, while ferns, melastomes, rhododendrons and pitcher plants proclaim Old World territory. Aroids, ferns and mosses are, like orchids, at home in both hemispheres.

The attraction of a destination with eternal summer enjoyed in air-conditioned comfort has attracted hordes of developers to these montane areas. Along with indigenous

practitioners of shifting agriculture, these developers and timber extractors have placed the tropical montane forests of the world under intense siege. The green mantle, so wonderfully adapted to the unique mountain ecology, is ripped and torn, as settlements and resorts, agricultural and horticultural farms take hold, altering the very ecology and climate that was reason for invasion in the first instance. Many components of this mantle can now be viewed only in collections of plant lovers or in botanic and horticultural institutions. And even then, only in situations where some semblance of the ecological conditions have been duplicated.

The National Orchid Garden of Singapore is situated on the slopes of a small hill in the Singapore Botanic Gardens. The 'summit' of this molehill towers 34 meters above sea level, capped by the 137-year-old hand-built residence of former directors of the Garden where today state visitors to the Republic of Singapore are honored with the naming of an orchid hybrid. This 3-hectare garden is devoted to the exhibition of some 60,000 orchid plants representing about 1000 orchid species and 2000 hybrids in a lush tropical landscape out of a Rousseau painting. The temperature ranges from a midday high of 31°C, cooling to 24°C in the evening by the tropical breezes that fan the island. It would be impossible for *Phragmipedium kovachii* to survive in this heat, not to mention the added heat its very presence itself would generate.

Since the National Orchid Garden aspires to a comprehensive exposition of the Orchid Family to its visitors numbering up to 800,000 annually, orchids from cooler habitats must also be represented. But how does one chill the balmy air down from a daily high of 31°C to a low of 15°C while raising the humidity from a moist 84% to an even soggy 90%? The Gardens' staff decided upon an experimental glass house enveloping 320 sq m of display space, and rising to 8 meters in height. The air inside is chilled from a daily high of 27°C down to 15°C at night. Humidity is increased by use of a high-pressure fog system that creates the simulation of a cloud passing



John Ariffin

An unidentified species of *Aeschynanthus* with the cataract as a backdrop.



Wiang Lay Keng

An internal view of the Cool House with the fogging system on. Two flowering orchids are clearly seen (upper half, middle of picture; a red *Renanthera bella* on the left and a white *Phalaenopsis philippinensis* on the right.

through the space. Rock cliffs inspired by moss-covered rocky outcrops in Borneo, a cataract from an Andean valley, and tropical tree trunks, all fabricated from glass-fiber reinforced concrete, provide the growing surface for the epiphytic community of plants selected for the trial. The fabricated surfaces were acid-washed to decrease pH for better plant growth. Ron Determan from Atlanta came to offer technical advice. Other visiting specialists like Cal Dodson, Joyce Stewart, Harry Zelenko and Bob Scully came through and offered constructive comment. Less constructive commentators were consigned to the mulch bed beneath the rocks.

The actual chilled floor space is small. So it was decided to thrust a bridge at mid-level though the cooled space to allow the

visitor to be enveloped by the display. This sky-walk continues beyond the glass doors to encircle the site. Tropical lianes, trained to scramble over the structure, convey the airiness of a walk among the tree-tops outside the glass structure. A garden of orchids in a grove of palms, frangipanis and casuarinas festoon the hill slope beneath the sky-walk.

Looking down from the bridge in the cooled area, begonias, palms, gesneriads and aroids give depth to the undergrowth. On the rocks and trunks and tree ferns, the orchids from low montane forests of South East Asia and South America have established and are starting to bloom. Surprisingly, *Pleurothallis*, *Cyrtorchilum*, *Zygopetalum* and *Masdevallia* species are also starting to establish. Ericads, gesneriads, melastomes and a variety of

carnivorous pitcher plants add interest and variety. The roar of the falling water and the cloak of mist swirling amidst the rock, fern and vegetation replete with pendent tresses of *Phalaenopsis*, *Oncidium*, *Coelogyne* and *Dendrochilum* blooms create a magical moment. One is transported to the tropical mountain slopes of a distant, yet vaguely familiar land. This latest addition to the Orchid Garden in Singapore will certainly be welcomed not only by orchid lovers, but their less enthusiastic spouses who have been dragged through the heat and humidity of a lowland tropical garden. Singapore's Cool House in the Tropics awaits your visit in 2004.

Kiat W Tan
CEO
National Parks Board

Protecting the Living Monuments of the Gardens

Among the tremendous diversity of plants in the Gardens, the most prominent are trees. Mature trees set the scene and ambience of most areas the Gardens.

At the edge of the Swan Lake, the 100-year-old fig, a Burmese Banyan (*Ficus kurzii*) its drooping branches touching the waters, is distinctive framing one end of the lake. The Kapok tree (*Ceiba pentandra*) near the Bandstand, with its imposing buttress roots, is a favourite. Every morning, tai chi practitioners hone their skills under its spreading crown and wedding couples make a beeline for photo shoots by its flanking buttresses. At the entrance to the Rain Forest, the 47 m-tall Malayan Terminalia (*Terminalia subspatulata*) stands guard and the enormous Rain tree (*Samanea saman*) with its huge canopy at the Visitor Center that welcomes every visitor into the Gardens are but a few examples.



Rain tree (*Samanea saman*), greeting visitors to the Visitor Centre.

SBG Archives

Lightning damage

Unfortunately, trees in the Gardens attract not only visitors but also lightning strikes.

When a tree is struck, the powerful charge of electricity travels down the tree trunk through the roots and exits into the soil. The heat generated, which may include steam explosions, causes injuries to the tree. A common sign on trees struck by lightning is a thin opening or crack in the bark that runs down the trunk to the collar of the tree.

In severe cases, steam explosions may blow the bark of the trees away and their wood may be shattered. Roots of the tree may also suffer heavy damage. Some trees die instantly from the strike. Others survive but die gradually over weeks, months or even years. Those that die slowly over the years usually succumb to secondary pest and diseases.

Since 1992, over eighty trees in the Gardens have been struck by lightning. Notable examples include a *Shorea* located along Cluny Road that was devastated with the main trunk shattered and a large area of bark completely blown away in a strike in 1995. It had to be removed immediately. One of



Burmese Banyan (*Ficus kurzii*), with its low branches touching the waters of the Swan Lake.

Ian Turner



Malayan terminalia (*Terminalia subspatulata*), guarding the entrance to the SBG Rain Forest.

Sajid Anwar



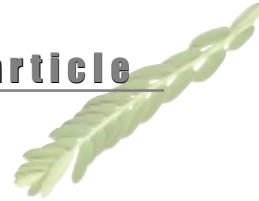
Trunk of Malayan Spindle tree (*Bhesa robusta*), near the old Herbarium building, showing a thin crack on its bark, a sign of lightning strike.

Sajid Anwar



West Indian Locust tree, *Hymenaea courbaril*, near the top end of Swan Lake showing extensive twig and branch dieback.

SBG Archives



Sajful Anuar

The Cuban Pine, *Pinus caribaea*, near the Plant House with the distinctive spiral gouge on its trunk.



Sajful Anuar

Kasai, *Pometia pinnata*, near the Gardens' Main Entrance, showing the sudden browning of its leaves on one of its branches.

the two Cuban Pines, *Pinus caribaea*, that guard the entrance to the Plant House, while still growing well, has a prominent gouge that spirals down its trunk, a scar from a strike in 1999. The massive Kasai tree, *Pometia pinnata* near the main entrance was struck in 2001, killing one side of the tree and had to be eventually removed. Another tree, a huge West Indian Locust Tree, *Hymenaea courbaril*, at the top end of Swan Lake, was a classic example of a tree struck several times but resisted death for a period of several years. It eventually died in 1997.

These lightning casualties serve as a reminder that our trees are vulnerable to the forces of nature.

Lightning protection

The concern over the loss of mature trees in the Gardens made us decide that there is a need to protect trees from lightning. One way to do this is to use a lightning protection system. The system, when installed and maintained properly, will be effective in preventing serious damage to trees.

A lightning protection system consists of three main parts: air terminals, copper conductors and grounding or earthing system. The air terminals are attached to the highest accessible points of a tree and the main branches. Conductors consisting of braided copper cables about 14 mm in diameter are then connected to these terminals. The conductors are attached to

the tree by special fasteners. Where necessary, conductors are connected together by special fittings. The entire conducting system is then connected to a grounding system.

When installed on a tree, the system will intercept the lightning strikes and safely conduct them to ground. The system provides a safe alternate path to the ground for the lightning so it does not travel down the trunk and into the roots and cause damage to the tree.

Trained tree climbers are needed to carry out the installation of the lightning protection system. These climbers use special climbing ropes and tree climbing techniques to install the system on trees.



Sajful Anuar

Some of the materials used for the lightning protection system. Clockwise from left: copper conductor cable attached to an air terminal (a), part of the ground rod, (b), two types of ground connectors (c), three types of cable fittings (d), and two different size of tree drive fasteners (e).



Sajful Anuar

Installing the grounding system to complete the Lightning Protection System.



Sajful Anuar

A trained climber all secured and going up the Kasah tree, *Pterygota alata*, in the Palm Valley, to start the installation.



Sajful Anuar

The upper branches of a Tembusu tree, *Fagraea fragrans*, being fixed with the main conducting cable.

With over one thousand mature trees in the Gardens and the fact that lightning strikes are impossible to predict, protecting all the trees would be too expensive. Prominent trees that give the landscape its distinguishing character, and others of historical and monumental value, were identified for protection. These include all eleven of our newly selected national

heritage trees. Some of the tallest trees in the Rain Forest are also included. Based on these criteria, sixty prominent and mature trees were selected. These were each installed with a lightning protection system and work was completed in May 2003. To inform and educate visitors, a special label was installed at each tree.

More trees will be installed with lightning protection in the future. The protection of these mature trees will ensure that our future generations would be able to enjoy the beauty of these magnificent trees. 🌿

Saiful Anuar
Living Collections

Trees with a lightning protection system (distributed from the south to north) in the Gardens

NO	NAME	HEIGHT (m)	LOCATION/LAWN
1	<i>Shorea roxburghii</i>	21	A
2	<i>Ficus kurzii</i>	27	A
3	<i>Stereospermum fimbriatum</i>	32	B
4	<i>Hevea brasiliensis</i>	18	C
5	<i>Calophyllum inophyllum</i>	24	C
6	<i>Michelia alba</i>	15	D
7	<i>Ceiba pentandra</i>	31	D
8	<i>Lecythis ollaria</i>	15	E
9	<i>Fagraea fragrans</i>	32	E
10	<i>Pterocarpus rohrii</i>	25	E
11	<i>Albizia lebbekioides</i>	40	E
12	<i>Albizia lebbek</i>	23	Entrance to National Orchid Garden
13	<i>Millettia atropurpurea</i>	32	F
14	<i>Shorea gratissima</i>	39	Forest
15	<i>Shorea curtisii</i>	42	Forest
16	<i>Shorea ovalis</i>	45	Forest
17	<i>Koompassia malaccensis</i>	46	Forest
18	<i>Shorea pauciflora</i>	43	Forest / Cluny Road
19	<i>Anisoptera megistocarpa</i>	45	Forest / Cluny Road
20	<i>Dyera costulata</i>	50	Forest / Upper Palm Valley Road
22	<i>Shorea macroptera</i>	48	Forest / Liane Road
21	<i>Scaphium macropodum</i>	45	Forest / Liane Road / Cluny Road
23	<i>Shorea leprosula</i>	40	Forest / Liane Rd / Water Tank Area
24	<i>Shorea gratissima</i>	45	Forest / Liane Road
25	<i>Terminalia subspatulata</i>	47	Forest / Liane Road
26	<i>Shorea pauciflora</i>	46	Forest / Liane Road
27	<i>Shorea pauciflora</i>	43	Forest / Watertank
28	<i>Lecythis ollaria</i>	22	H
29	<i>Lecythis ollaria</i>	22	H
30	<i>Fagraea fragrans</i>	40	H
31	<i>Copaiifera officinalis</i>	32	H

NO	NAME	HEIGHT (m)	LOCATION/LAWN
32	<i>Pangium edule</i>	18	H
33	<i>Alstonia pneumatophora</i>	30	H
34	<i>Dryobalanops aromatica</i>	25	J
35	<i>Adenanthera pavonina</i>	24	J
36	<i>Lagerstroemia tomentosa</i>	24	J
37	<i>Koompassia malaccensis</i>	31	K
38	<i>Ceiba pentandra</i>	40	O
39	<i>Bhesa robusta</i>	36	O
40	<i>Alstonia angustiloba</i>	32	P
41	<i>Sindora wallichii</i>	35	National Orchid Garden
42	<i>Sindora wallichii</i>	35	National Orchid Garden
43	<i>Samanea saman</i>	32	Visitor Centre
44	<i>Mesua ferrea</i>	33	Visitor Centre
45	<i>Hymenaea courbaril</i>	36	Visitor Centre
46	<i>Pterygota alata</i>	30	Palm Valley
47	<i>Fagraea fragrans</i>	42	W
48	<i>Koompassia malaccensis</i>	37	XA / Granite Car Park / Entrance from Cluny Park Road
49	<i>Parkia javanica</i>	35	Y
50	<i>Albizia lebbekioides</i>	35	Y
51	<i>Sterculia foetida</i>	30	Orchid Nursery
52	<i>Alstonia angustiloba</i>	50	Z
53	<i>Khaya grandifoliola</i>	33	Orchid Nursery
54	<i>Khaya senegalensis</i>	26	EG13
55	<i>Erythrophleum suaveolens</i>	25	Orchid Nursery
56	<i>Fagraea fragrans</i>	36	Lawn Y / Rubber Plot / Symphony Stage
57	<i>Palaquium obovatum</i>	28	XH
58	<i>Pterocarpus indicus</i>	23	EG12
59	<i>Pterocarpus indicus</i>	27	XK
60	<i>Pterocarpus indicus</i>	26.5	EG 13



NEW & EXCITING

Memecylon fruticosum



Memecylon fruticosum

Ian Turner

A shrub to 2 metres tall, its small leaves on thin twigs give the foliage a delicate appearance. This is enhanced by the multitude of tiny blue-purple flowers that appear in the leaf axils when the plant blooms. *Memecylon fruticosum* is native to the Malay Peninsula, Java and the Natuna Islands off Borneo. Several were planted in the border in front of the National Parks Board Headquarters Building in the Gardens. Their delicate appearance and hint of blue when flowering have blended in well with the dominant foliage texture provided by feathery casuarinas and fine-leaved conifers and the blue, purple and white highlights of blooming *Thunbergia erecta*, Cat's Whiskers (*Orthosiphon aristatus*), *Gardenia scabrella* and White Butterfly Bush (*Buddleja asiatica*).

Ian Turner
Living Collections



Close-up of flowering twigs of *Memecylon fruticosum*.

Ian Turner



AROUND THE GARDENS



Singapore Orchid Festival 2003

President S.R. Nathan admiring the cut flower display.

September saw the Gardens transformed into a blaze of colour and activity. The Singapore Orchid Festival 2003 held on 18–21 September, jointly organized by the Singapore Botanic Gardens and the Orchid Society of South East Asia (OSSEA) transformed the Central Core of the Gardens into a showcase of tropical orchids. Opened by President S.R. Nathan, the 3-day Festival was the largest such festival in recent years.

The highlight of the Festival was the Competitive Orchid Show. Housed in a beautiful landscaped pavilion set in the heart of the Gardens, the competition comprised three categories, flowering plants, cut flowers and landscape display. Over 700 competitive entries were received in total together with 5 non-competitive

landscape entries. International participants from Malaysia, Thailand, Indonesia, Japan, Philippines, United States of America and Taiwan added interest to the show. Grey skies and stormy weather did not deter the huge crowds which turned up to partake in this buffet of the region's finest orchids.

In the plants category, the outstanding *Dendrobium smillieae*, won the Best Plant of the Show and the Best Foreign Species awards. This "bottle brush" orchid has flowers bunched up at the end, which makes it look, well, like a bottle brush. Found in Irian Jaya, the orchid was submitted by Foresta Orchids from Indonesia. The *Paphiopedilum rothschildianum*, one of the rarest and most highly prized orchids in the world, bagged the Best Local Species award (includes species from Malaysia, Singapore and Brunei). It is known to exist in the wild only in Kinabalu National Park, Sabah. This award winning plant was submitted by Mr Makoto H a n a j i m a . *Renanthera* Kalsom,



The Champions of the Show.

submitted by Woon Leng Nursery, Singapore and *Dendrobium* Burana White, submitted by Mr Luo Jeng Nam, Singapore were awarded the Best Local Hybrid and Best Foreign Hybrid awards respectively. The Best Cut Flower award went to *Mokara* Gold Nugget, exhibited by the Commercial Orchid Growers Association of Malaysia.

The landscape display section was a treasure trove of ideas for those seeking inspiration on garden design. Featuring 23 mini gardens creatively transformed by garden designers into various themed gardens, the ideas ran the gamut from ultra modern designs to rustic and exotic recreations. Ngee Ann Polytechnic's entry was awarded the Most Innovative and Creative Display with their showcase of orchids in clear cylinders.

Various fringe activities were organized to engage the visitor and also to highlight how integral a part of our lives orchids have become. Talks on various aspects of orchids and orchid culture were conducted in English and Mandarin to capacity crowds. An exhibition, 'Our Orchid Heritage' featured orchids of prominence through the decades including, Singapore's national flower the *Vanda* Miss Joaquim, and the popular *Oncidium* Goldiana 'Golden Shower'. A stamp exhibition held in collaboration with the Singapore Philatelic Museum exhibited postage stamps featuring orchids and an Orchid Photography Exhibition featured photographic works submitted by members of the public.

Burkill Hall was converted into an art gallery where the works of leading, award-winning local artists were exhibited. Orchids were the subject of these fine works of Chinese art. Art demonstrations to introduce orchid painting to visitors were also held. For the fashion inclined, a collection of orchid themed apparel created by Milo Migliavacca, an Italian designer based in Bali, made its debut at a fashion show held at the Visitor Centre. Even the young ones had special orchid-centered activities organized just for them including, craft classes on painting orchids on T-shirts and tiles and an orchid mask competition.

Palm Valley was a hive of activity with stalls lined up along Upper Palm Valley Road and the Orchid Plaza. Stallholders saw brisk



Eager buyers thronging a stall selling orchids.

popular *Phalaenopsis* hybrids, and the less common *Catasetum* and *Cattleya* hybrids were all selling like hot cakes. It was heartening to see stallholders smilingly transporting the purchases of satisfied customers to their cars by the trolley!

The Orchid Festival attracted over 57,000 visitors. Perhaps more importantly, it brought together hobbyists, commercial growers and novice gardeners to share in our orchid heritage. 🌿

Camille Foo

Visitor Management

Whang Lay Keng

Living Collection

Yam Tim Wing

Orchid Breeding & Micropropagation

sales at their stalls selling plants and plant related paraphernalia such as gardening tools, books and accessories. The plant

stalls especially, were a myriad of colour. Many visitors were enthralled by the range of orchids available. The fashionable and

Training UPDATE

Since its inception for the landscaping/horticultural industry in April 2003, about 200 candidates, NParks employees as well as workers from the industry, have been trained and certified under the National Skills Recognition System (NSRS). Most of them have attained competency in the two skills 'Maintain plants' and 'Prune hedges & shrubs'.

To cope with the growing activities of NParks' NSRS Approved Training cum Assessment Centre, the Training & Certification Branch has added a Manager and an Assistant Manager. The Branch also looks to extending its training grounds to a disused depot in Serangoon so that preparations can be made to operationalise the modules 'Plant trees & palms' and 'Maintain amenity turf' for training and certification and to expand our training roles.

We will be working closely with the newly-established Workforce Development Agency (WDA) and the industry, to ensure that a significant pool of our horticultural/landscaping workforce will be NSRS-trained and certified.

The 7th run of the 'Developing and Managing a Garden City' Programme was conducted from 18 – 29 Aug 2003. This year saw

NParks hosting a total of 22 delegates from 19 developing countries. This programme, which falls under the auspices of the Singapore Cooperation Programme of the Ministry of Foreign Affairs (MFA), was conducted with the objective of sharing Singapore's success as a Garden City with other developing nations.

The target audience was middle to top government officials from developing nations. This year's participants included Parks and Reserves Senior Officers, Landscape Designers, Assistant Directors of Parks & Recreation Departments and Urban Planners/Designers who hail from countries as far afield as the Pacific Islands, Sri Lanka, India, Nepal, Maldives, Mongolia, Vietnam, Egypt, Jamaica, Indonesia, Bahamas, Mauritius and several African countries like Ghana, South Africa, Kenya, Swaziland and Zambia.

The training, conducted by experienced NParks' Officers, included both classroom briefings and field trips to various parks and nature reserves, as well as a visit to the Urban Redevelopment Authority (URA) to gain an understanding of Singapore's city and urban planning. There was ample opportunity for discussions, exchange of ideas and useful networking.

Feedback received from participants and MFA alike was very positive. Many were impressed with Singapore's achievement as a Garden City, and NParks, as custodian of the greenery in Singapore, was commended for a job well done. In the words of Carol Albury (Assistant Director/Physical Planning), Bahamas: "Singapore's example of developing and managing a garden city is a tough act to beat! To visually and physically experience the clean and aesthetically beautiful landscape of Singapore and to share ideas on a diverse range of topics was most rewarding and thought provoking allowing countries to think outside the box. The impression remains clear in my mind and will be lasting ones as we continue to build our nation and implement sustainable development goals with land use policy and administration of planning practices that address 21st Century development pressures." Indeed, this programme plays a significant role in not only putting Singapore on the world map as a renowned Garden City but also in promoting tourism. 🌿

Nashita Mustafa

Lau Wee Chuan

Training & Certification

Educational *Outreach*

Environmental Education in Botanic Gardens

At an altitude of 1200-1450 m on the eastern slope of Bukit Tapak, stands the 154.5 hectare Eka Karya Botanic Gardens in Bali, Indonesia. Located 50 km north of Denpasar (the capital of Bali Province), next to Lake Beratan, the Botanic Gardens lies on very scenic volcanic calderas, with a pleasant average temperatures of 18-20°C.

Founded on 15 July 1959, the Gardens is the first Indonesian Botanic Gardens developed by the Indonesian people. It is also the largest and youngest among the four Indonesian Botanic Gardens. The Gardens boasts a plant collection exceeding 262 families, 955 genera and 2090 species, predominantly from the wet mountainous habitats of eastern Indonesia.

At the invitation of Mr Bian Tan, Botanical Gardens Conservation International (BGCI) Programme Coordinator for SE Asia based in Bogor Botanic Gardens, we were in Bali from 19th to 22nd July 2003, as speakers at the 2nd National Training Course for (Indonesian) Botanic Gardens Staff. The theme for the training course was “Environmental Education in Botanic Gardens”. In the newly-opened Conference Hall, located amongst the surreal mature forest trees, we shared with the course participants what Singapore Botanic Gardens has to offer in terms of Educational Outreach, and our experience in designing and



Majestic Main Gate of Bali Botanic Gardens in the form of a split temple representing two large doors which can be closed (in a spiritual sense) to repel evil forces trying to enter a sacred place.



Scenic mountain view from within the Bali Botanic Gardens nursery grounds.



The Kumbakamalaga Statue, one of the two towering statues found within the Gardens' grounds.



Learning via “hypothesis and deduction” - led by Education Officer, Steve Meredith, from the Botanic Gardens of Adelaide.

conducting outreach programmes, with the “Sara, the forgetful dinosaur” tour (a.k.a. “Children’s Treasure Hunt”) as a case study.

We would like to thank BGCI and the

Indonesian Botanic Gardens for their hospitality, the invaluable opportunity to share ideas on environmental education and to experience Bali with its warm and friendly people. Our encounters with the world-

renowned Balinese architectural styles were also unforgettable. 🌿

Janice Yau & Winnie Wong
Education



Education Activities at Events



Lim Swee Cheng

Contestants showing their creations on stage at the Orchid Face Mask Competition held during the Singapore Orchid Festival (18 - 21 September 2003).

colourful facemasks, which attracted much attention throughout the competition. Although only some won attractive prizes, all participants enjoyed a fun Saturday morning in learning basic orchid anatomy and making their own unique “orchid” facemasks.


In November 2003, we brought our activities to the Singapore Blooms show at the Esplanade in the city. Over the 9 days, 23 public talks and 4 children’s tours covering 20 different topics on gardening and nature appreciation were organized. Planting demonstration with attractive plant displays, interesting topics and planting tips attracted more than 1700 people to our programmes. We thank all our speakers who contributed their time for making this possible.



Joyce Chua

Andrea Kee giving a talk on “The Magic of Water Plants” at the Singapore Blooms Show. Here she is showing the underside of a Victoria lily leaf with its intricate architectural beauty.

The Christmas Children’s Workshops were organized during the Christmas Fiesta in the Gardens on 29 & 30 November 2003. The children’s workshops (Christmas Dish Gardening, Christmas Potpourri, and decorating Christmas Baskets) received overwhelming response. Using colourful and sparkling Christmas decorations, pine and casuarina cones, dried seeds and spices, children shared a fun time with their parents and friends in making festive ornaments for this coming Christmas season.

If you have missed the above activities and programmes, do look out for our new programmes for children and adults in year 2004 at www.nparks.gov.sg or www.sbg.org.sg. Alternatively contact us at tel. (65) 64719961 and fax (65) 64674832. 

**Winnie Wong, Janice Yau
& Hayuni Hadi**
Education

In the last six months, we had opportunities to further promote nature awareness to the public at three major events; the Singapore Orchid Festival and the Christmas Fiesta, both in the Gardens, and at the Singapore Blooms Show.

The Orchid Mask Competition was organized during the Singapore Orchid Festival on 20 September 2003. Despite the heavy rainfall, 27 child-adult teams from two categories (Lower Primary and Upper Primary) competed at the Visitor Centre. Using the theme “orchids”, contestants creatively designed and decorated their



Lim Swee Cheng

Mum and kid with their dish garden created at a workshop held during the Christmas Fiesta in the Gardens (29 – 30 November 2003).

Malaxis

Most species of the orchid genus *Malaxis* are so-called 'soft' terrestrials; juicy plants with fleshy, brittle stems or pseudobulbs and thin, shiny leaves. They grow in damp primary forests, often near streams or places where water wells up from underground. However, they avoid the deepest shade, or places with restricted air circulation. In short: they like it cool and damp, but not stuffy. This is perhaps why the second best place to find these plants are mountain roadsides with secondary growth. They grow along roadside drains (not the concrete type) and on wet spots on slopes, usually tucked away under overhanging ferns and other vegetation

Malaxis orchids can only be kept in cultivation in an environment more or less similar to where they grow in the wild. In our greenhouses, *Malaxis* had a hard time until we mounted a mister of the type that is sometimes used to keep the environment cool during outdoor events. All the left-over bits and pieces of our plants were re-potted and placed near the fans. *Malaxis* proved to be resilient, even the most miserable bits of stem with a single node left and rotting on both ends, sent out new shoots and recovered quickly.

Half a year later, the first plants started flowering. The flowers may be small (those in Fig. 3a and 3b are only a few millimeters across), but they make up for this in delicate colours and shape. Each flower starts off in its brightest colours, but after a few days



Malaxis carinatifolia

J J Vermeulen

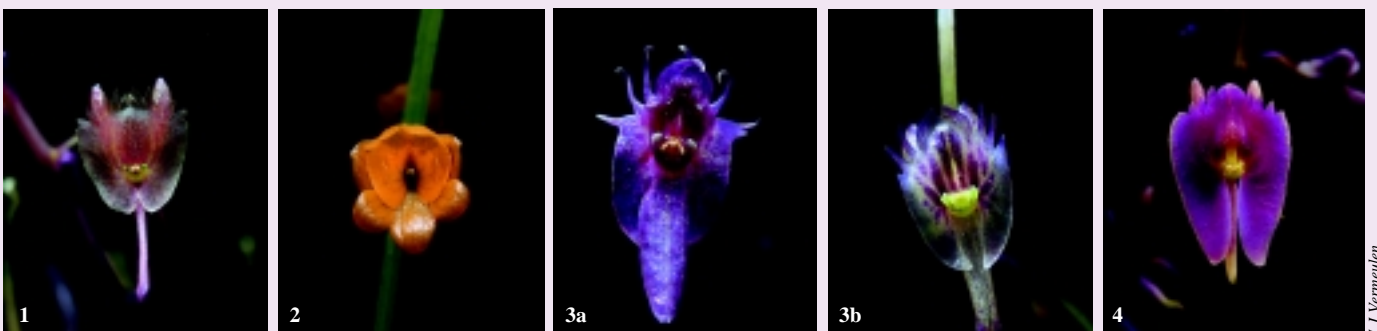
fades into a dull yellow, then falls off. Another flower in the spike is waiting to take its place. Thus, the flowering period may extend over several weeks or even months, and some even flower almost continuously.

We now have two substantial problems left with these plants. The first is that the introduced *Deroceras* slugs consider them a delicacy in spite of (or perhaps because of) the bug-like smell of the plant. A cordon of snail pellets around

the plants helps a little, but the best way to keep the slugs down is to check daily and to personally grind the offenders underfoot.

The second problem is that we have been totally unsuccessful in identifying the majority of the plants, probably because most of them are new species. 🐌

J J Vermeulen & Paul Leong
Herbarium



A picture gallery of *Malaxis* species, all are unidentified so far. 3a and 3b are two forms of one species.

J J Vermeulen



TAXONOMY CORNER

Naming Plants for People

In 1737, Linnaeus wrote that “generic names formed to preserve the memory of a botanist who has deserved well of the science I retain as a religious duty.” The first three Directors of the Botanic Gardens Singapore and the Superintendent of the Botanic Garden in Penang have all been commemorated in this way. H.N. Ridley (1888-1912) is honoured by *Ridleyandra*, a genus with beautiful, almost gloxinia-like, flowers in the Gesneriaceae. It was a family that interested him and he collected and described many new species, so it is appropriate to remember him in this way. I.H. Burkill (1912-1925) is honoured by two generic names. *Burkillanthus*, a genus related to the lime, *Citrus*, of which he made a special study, and *Burkilliodendron* in the bean family for which he collected the only known specimen. R.E. Holttum (1925-1949) produced meticulous taxonomic accounts of many monocot families, including the

bamboos. He is therefore honoured by having the bamboo genus *Holttumochloa* named for him. For his pioneering work on orchid hybridization, Holttum is also commemorated by the trigenic hybrid *Holttumara* (*Vanda* x *Arachnis* x *Renanthera*). Mohamed Haniff (1890-1925) was based in the Penang Botanic Garden and served under all three directors. The ginger genus *Haniffia* honours, not only his long service, but also his extensive and meticulous botanical collecting, including a specimen of the genus.

While a generic name can only be used once, the species epithet can be used many times for different species, as the name of the species will be unique when it is combined with the generic name. For example, two trees that grow in the Gardens’ Rain Forest, *Diospyros ridleyi* and *Syzygium ridleyi*, can have the same

species epithet because they are combined with different generic names. About 175 species have been named for Ridley – not surprising since he is reputed to have collected over 50,000 specimens from his explorations of remote and unknown areas.

A distinction is sometimes made in the endings of names. The ‘i’ or ‘ii’ if a person’s name ends in a consonant signifies that he collected the specimen while ‘ana’, as in *Vatica ridleyana*, is used purely in an honorary sense.

For lady botanists, the ending ‘ae’ is used. I.H. Burkill has several plants named for him, such as the wild pepper, *Piper burkillii*, whereas his wife Ethel had several toadstools, such as *Entoloma burkillae*, named to recognise that she collected them (see *From the Archives*). Since the species epithet is never capitalized, people’s names are also spelt with a small letter. 🌿

Ruth Kiew
Herbarium & Library



Ridleyandra, a genus named in honour of H.N. Ridley, includes some of the most beautiful and unusual gesneriads. [1] *Ridleyandra quercifolia* (left, with strongly scalloped leaf margins) and [2] *R. atrocyanea* (above).

Ruth Kiew

Ruth Kiew

Dr Towering Talent

His talent for drawing manifested early in life. He recalls having numerous tiny stuffed toys in his childhood days which became the heroes in many of the stories he wrote. He typed the stories on an antique *Remington* and illustrated them with indian ink. All these done before he was 10 years old. Illustrations included the characters in his stories and ranged from flowers, animals and even dinosaurs.

He has had no formal training, instead his drawing techniques were acquired little by little over the years. It was his interest in the techniques for painting and drawing that drove him. He has experimented with egg tempera, etching, engraving, oil painting and many more. You name it and he has probably tried it. He, however, still finds pencil drawing to be his forte and preference.

“Who is this person?” you might be wondering. He is none other than our very own Dr Jaap Jan Vermeulen! He stands at an elevated height of 2.10m and is the Singapore Herbarium’s resident Orchidologist and Malacologist.

Snails and orchids are indeed two very



Jaap at work.

different things to be interested in, both a challenge to draw. Though orchids to Jaap are simple-shaped plants to draw, they have few repetitive patterns and hence are not boring. The 3-dimensional shapes of floral parts do require shading and that poses a challenge.

Snails on the other hand are rather mathematical and exacting objects to draw. A snail shell is essentially a tube that is open at one end, tapered at the other and drawn into a coil. Various

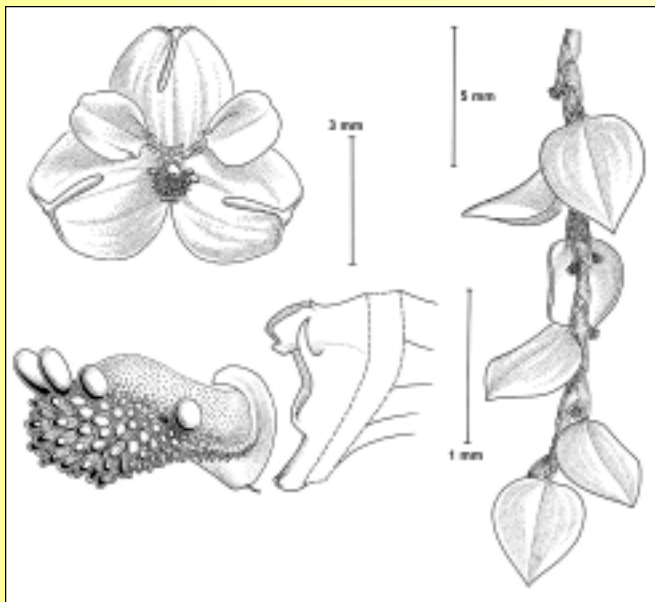


Drawings can be used for courtship too!
This picture (*Artium* sp.) was drawn for his wife Leni’s research.

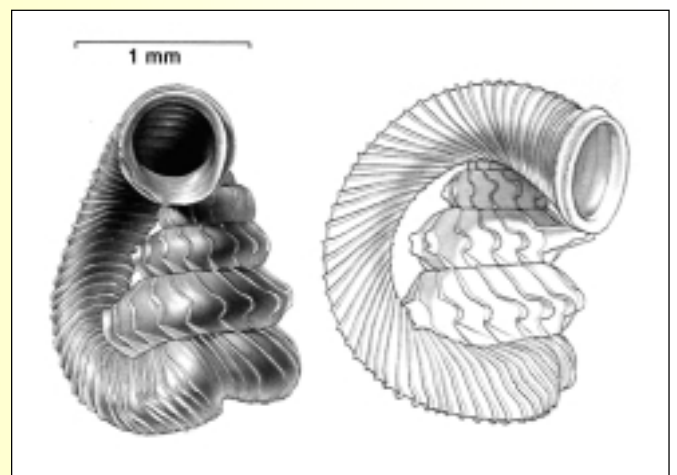
configuration of that tube can make snails extremely odd looking. This is where the real challenge lies, as any imprecision in drawing would distort the true nature of the snail’s form thus requiring a redraw.

To date he has published or co-published books such as *Orchids of Borneo*, *Snails of Bali*, and many others. More than 800 plates have been drawn for orchids and 300-400 snail plates have come from his talented fingers.

Serena Lee
Herbarium



The Orchid (*Bulbophyllum inquirendum*)



Bizarre snails (*Opisthostoma* sp.)



KEY VISITORS TO THE GARDENS (JUL-DEC 2003)

NAME	FROM
Ms Ayako Fuji	Pop Music Celebrity, Japan
Dr Brigitte Duyfries	National Herbarium, The Netherlands
Dr Chai P K Paul	Sarawak Herbarium, Kuching, Sarawak
Mr Cheng Zheng Gao	Mayor, Shengyang, People's Republic of China
Dr De Wilde, W J J O	National Herbarium, The Netherlands
Mr Denis Filer	Department of Plant Science, Oxford University, UK
Ms Duentem Amornphan	Department of City Planning, Bangkok, Thailand
Dr Francis Ng	Forest Research Institute of Malaysia
Mr Fu Zhao Hui	Organisation Department of Dongguan Government, Dongguan, People's Republic of China
Mr Furukawa	Tsukuba University, Japan
Mr Hua Zhong Xing	Tai Cang Port Development Administrative Committee, Suzhou, People's Republic of China
Ms Jana Skornickova	Charles University, Prague, Czech Republic
Mr Jiang Ze Qing	Huaian City Government, Jiangsu, People's Republic of China
Mr John Hill	Minister for Environment and Conservation, Australia
Dr Jun Wen	Herbarium of Chicago Field Musuem, USA
Mr Kiyoshi Hikawa	Pop Music Celebrity, Japan
Mr Lau Kah Hoo	Forest Research Institute of Malaysia
Mrs Laura Bush	First Lady of the United States of America
Mr & Mrs Lee Hsien Loong	Deputy Prime Minister of Singapore and Spouse
Mr Li Hong Wei	Guangzhou Urban Planning Bureau, People's Republic of China
Dato' Lim Chong Keat	Forest Research Institute of Malaysia
Mr M S Zahid	University of Malaya, Kuala Lumpur, Malaysia
Mr Mohamed Zahir Hussain	Minister of Youth Development and Sports, Republic of Maldives
Puan Noorainshah	Spouse of First President, Mr Yusof Ishak, Singapore

NAME	FROM
Mr Ong Eng Lee	University of Malaya, Kuala Lumpur, Malaysia
Dr Oradee Saharacharia	Chulalongkorn University, Bangkok, Thailand
Mr Ran Shen De	Bureau of Urban Utilities & Landscaping, Guangzhou, People's Republic of China
Mr Ricky Martin	Pop Music Celebrity, USA
Mr Robert Freeman	CEO, Department of Water, Land & Biodiversity Conservation, Australia
Mrs Roh Moo-Hyun	First Lady of the Republic of Korea
HE S R Nathan	President of the Republic of Singapore
Mrs S R Nathan	First Lady of the Republic of Singapore
Mr Shunsuke Lio	Nagoya City Orchid Garden, Japan
Ms Sun Ya Jie	Guangzhou Municipal Gardens Bureau, People's Republic of China
Dr Thaya Tenjittikul	Chulalongkorn University, Bangkok, Thailand
Dr & Mrs Tony Tan	Deputy Prime Minister of Singapore and Spouse
Mr Toranosuke Katayama	Minister for Public Management, Home Affairs, Posts and Telecommunications, Japan
Ms Tzeng Hsy-Yu	Taiwan Forestry Research Institute
Mr Uday Chandbasak	Regional Plant Resource Centre, India
Dr Vassilis Sarafis	University of Queensland, Australia
Dr & Mrs Vivian Balakrishnan	Minister of State for National Development of Singapore and Spouse
Dr Wong Khoo Meng	University of Malaya, Kuala Lumpur, Malaysia
Mr Xu Rui Sheng	Vice Mayor, Guangzhou Municipal Government, People's Republic of China
Mr Xu Wei Guang	Pangyu District Government, Guangzhou, People's Republic of China
Mr Yang Li Ping	Urban Redevelopment Authority, Sichuan, People's Republic of China
Mr Yii Puan Ching	Sarawak Herbarium, Kuching, Sarawak
Mr Yong Kien Thai	University of Malaya, Kuala Lumpur, Malaysia
Dr Yukino Ochiai	The Kagoshima University Museum, Kagoshima, Japan

Mrs Laura Bush, First Lady of USA and Mrs Goh Chok Tong, wife of the Prime Minister of Singapore, at the National Orchid Garden during their visit on the 21st of October. A new hybrid, *Mokara* Laura Bush, was named.



A new orchid hybrid, *Dendrobium* Roh Moo-Hyun 'Yang-suk' was named on the occasion of the visit of Mrs Roh Moo-Hyun, First Lady of the Republic of Korea, to the National Orchid Garden. On her left is Dr Chin See Chung.

Ethel Burkill's Paintings Return to Singapore

Ethel Maud Burkill came to Singapore in 1912 as the wife of I.H. Burkill, the second Director of the Gardens. During her first year, she collected mushrooms and toadstools from the Gardens making them into herbarium specimens complete with notes and illustrating them with watercolour paintings. Although Ethel Burkill was an amateur, her paintings capture the colour and form of these ephemeral fungi.

That was an exciting time as the tropical fungal flora was very unknown, particular the soft, short-lived species. The Gardens with its fragment of Rain Forest was an ideal place to collect them and many proved to be new species. As T.F. Chipp, who prepared the first catalogue of fungi of the Malay Peninsula wrote: "The

only way these [perishable fungi] can be recorded is by coloured sketches made from fresh material on the spot."

In 1913, the Annual Report mentions that '164 coloured drawings prepared by Mrs Burkill' were sent together with the specimens and notes to the Royal Botanic Gardens, Kew, for identification and that 'they would be returned and added to the Singapore collections, where there are duplicates of all the specimens.'



Ethel Maud Burkill at about 30.

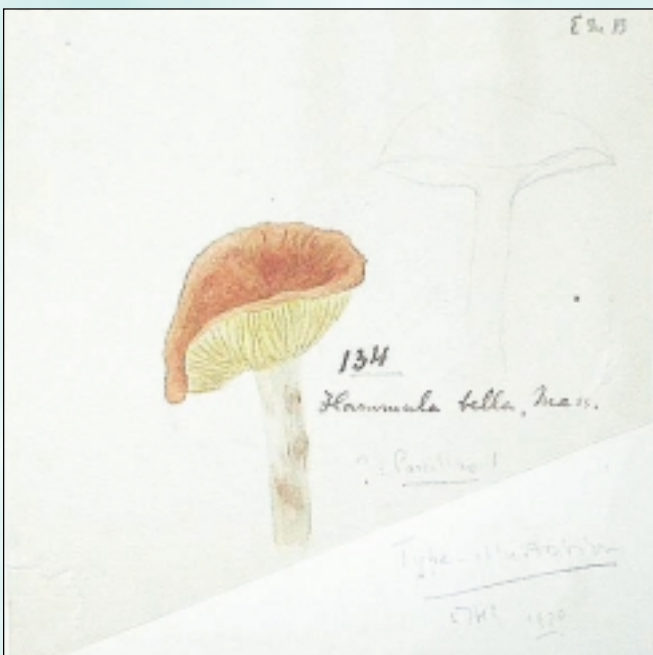
courtesy of H M Burkill



Entoloma umbrinatum, which Massee described as 'distinguished by the grey pileus and whitish stem' E.M.Burkill 61 on the ground. 14 x 20 cm.



Flammula bella. Massee described this as 'a very beautiful fungus with a tawny-orange cap and clear yellow gills'. E.M.Burkill 134 on path on the Jungle. 12 x 12 cm.



Agaricus tenuiceps, which Massee speculated 'in all probability edible'. E.M.Burkill 267 on the ground under trees. 13 x 15.5 cm.

Of the specimens Ethel Burkill had collected, G. Massee at Kew described more than 27 as new species. Two, *Annularia burkillae* Massee and *Entoloma burkillae*, were named in her honour.

However, when I looked for the paintings in our archive collection they were not there. I then consulted the mycologists at Kew where Massee had worked. They had a set of the specimens (Singapore has a duplicate set), but their watercolours were copies of E.M. Burkill's paintings. Eventually some were found among the mycological materials that had been bequeathed to the Royal Botanic Gardens Edinburgh by E.J.H. Corner, who had borrowed them together with the Charles de Alwis fungal paintings when Corner left Singapore after the Japanese Occupation (*Gardenwise* 15 (2000) 24). However, only 26 of the original 164 paintings were located and returned to Singapore in 2003. The whereabouts of the remainder remains unknown.

Each painting (or sheet) was initialed 'EMB', presumably by Ethel Burkill herself, with the number of the herbarium specimen written in a different hand. Who wrote the original scientific name is not known, but Corner has annotated many of them in pencil with his new identifications. The original paintings were cut up by Corner to include only one species and mounted to fit a loose leaf book. Most of the 26 paintings returned illustrate the type specimen and so are of great scientific importance.

Why Ethel Burkill stopped her fungal studies after one year in Singapore is not known but one may speculate that the impending birth of her only son in 1915 deflected her interest from fungi. 🌱