

Gardenwise

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NParks team
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an 'overlooked'
Bulbophyllum
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Clayton Lee from NParks' Streetscape Division climbs to the canopy of Nee Soon Freshwater Swamp to reach a rare native orchid. (Photo credit: Chang Chee Linn)

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Opposite page
An iconic climber, *Morinda umbellata*, rooted at the base of a Heritage tembusu tree overlooking Palm Valley. (Photo credit: Dennis Sng)

MESSAGE FROM THE DIRECTOR



IN this issue, as usual, our readers can enjoy a variety of material from our familiar and regular contributors amongst the Gardens' staff. Two authors, however, will be new to at least some readers, namely David Middleton and Nick Baker. Dr Middleton recently joined SBG's staff as Head of Research and Conservation, where he is also Keeper of the Singapore Herbarium and editor of *The Gardens' Bulletin, Singapore*. He was previously a botanical researcher and journal editor at the Royal Botanic Garden, Edinburgh, Scotland and brings to SBG a wealth of experience in Southeast Asian botany as well as specialisms in the gesneriad (Gesneriaceae) and periwinkle (Apocynaceae) families, some of which he shares with us in pages 4–9. Nick, our second new author, will be familiar to all those Singaporeans with a love of wildlife, since he is famous for his remarkable zoological photographs, many of which have documented rare or little known creatures from Singapore and Malaysia, and can be seen on his website www.ecologyasia.com. Here, he gives us an insight into one of the Gardens' most intriguing and specialised inhabitants, the bamboo bat (pages 12–13).

Elsewhere in this issue we continue with the now established heritage theme, be it the antics and artistry of former staff or the fortunes of our ancient trees, but we report on new discoveries too – who ever thought that there was so much still to be found in Singapore's forests? The weather so far this year has also been quite unusual – some might say this is more evidence of climate change – with a severe drought lasting nine weeks at SBG, followed by a quite extraordinary mass flowering and then fruiting of many previously shy bloomers, as reported on pages 28–31.

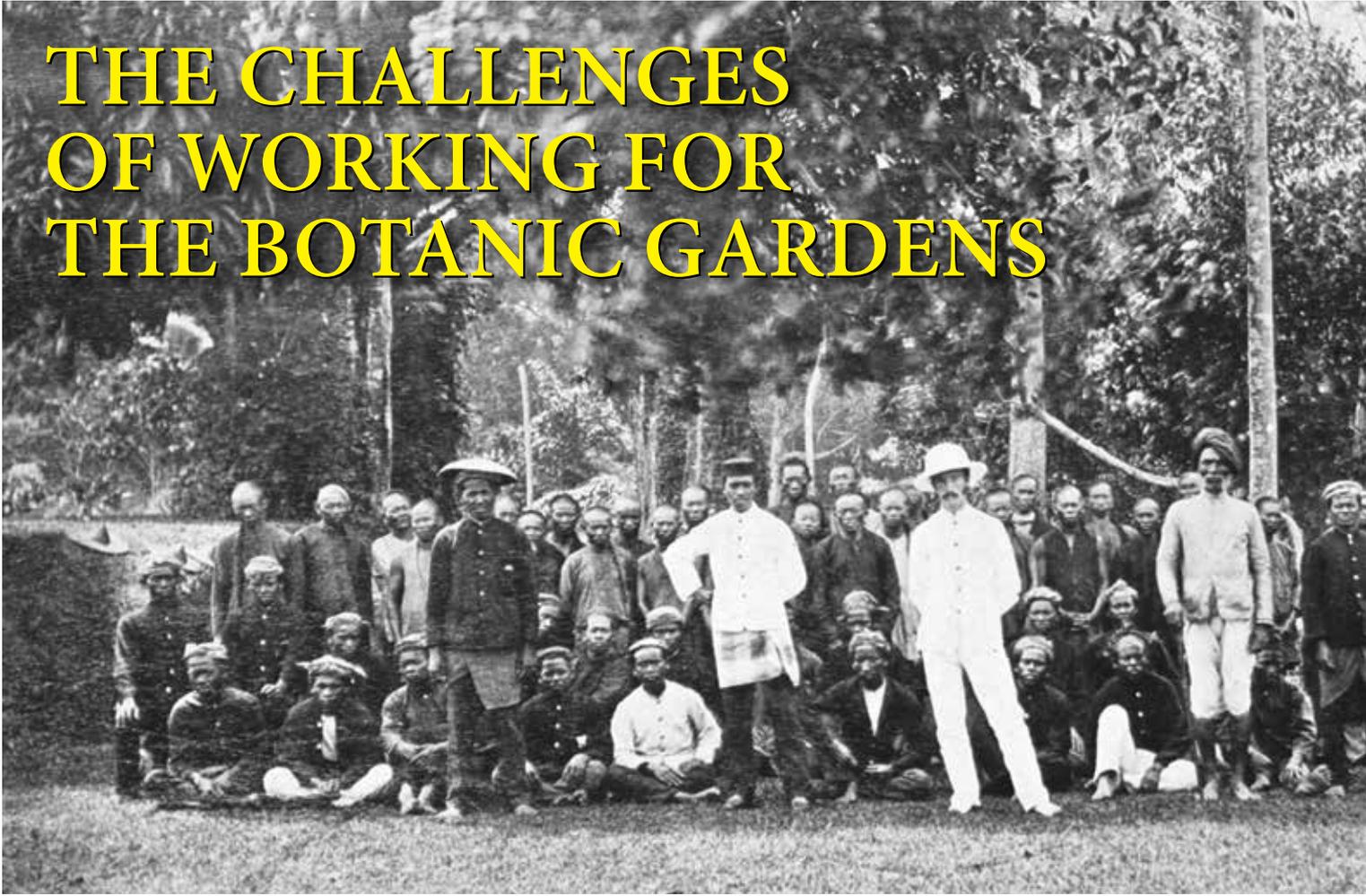
Helping others to learn about managing botanical gardens and their collections is a key role of SBG, and we are delighted that our partners from overseas are now regularly taking up the opportunities we offer to share the experience that we have built up over more than 150 years (p. 20). Meanwhile at home, we are equally delighted to be training both school and university students in plant propagation, and the planting of seedlings of *Cinnamomum camphora*, derived from a Hiroshima tree that survived the blast of the 1945 atomic bomb, goes to show

how resilient nature really is. Let us hope that this green symbol of peace will teach us to avoid the evils of war and stimulate learning across continents, as its Japanese guardians are striving to promote. Botany, above all else, is a collaborative science and thus we report on staff attendance at conferences and consortia, where SBG is reaching out well beyond Singapore's borders, while at home we are hosting a variety of visiting researchers to study our herbarium and living collections.

Last, but certainly not least, I am delighted to be able to record another record year for visitors to SBG (around 4.5 million!), and for the second successive year we have been awarded TripAdvisor's highest accolade, that of being voted Asia's number one park by the public. Clearly, we must be doing something right! 🌿

Nigel P. Taylor

THE CHALLENGES OF WORKING FOR THE BOTANIC GARDENS



► Murton with his staff in 1877. The Javanese *mandor* is standing to the left of Murton in the image (to Murton's right), wearing a light-coloured outfit and a *songkok*.

IN continuance of the Singapore Botanic Gardens (SBG) heritage theme in *Gardenwise*, we will look at a couple of little known events that coloured the lives of past Gardens' staff, the first from the 19th century and the second from the 20th.

SUPERINTENDENT IN DANGER

In 1875, when the colonial government took charge of SBG after its founders, the Agri-Horticultural Society, fell into serious debt, it sought a qualified man to be its new leader. On the recommendation of Kew Gardens, a young man was appointed as the first Superintendent. James Murton was by all accounts a talented, if rather young, gardener-botanist, who had impressed Sir Joseph Hooker, the Director of Kew. His recommendation catapulted the 22-year-old into being responsible for SBG becoming a proper botanically-focused organisation, a transformation from the mere pleasure gardens that former 'manager' Lawrence Niven had presided over on behalf of the Society from 1860.

Young as he might have been, Murton was not a man to be trifled with. Undoubtedly he was much younger than many of his staff, but what he lacked in experience he made up for with energy, to the point where Henry Burkill, the Director who first recorded SBG's history in 1918,

suggests that he "burnt the candle at both ends", eventually leading to his removal from office in 1880. Certainly, you needed to be tough to do the job in those days, what with the punishing climate (and no air-con!) and the sometimes difficult-to-manage immigrant labour.

Thus, on 14 September 1877, *The Straits Times* reported an alarming incident that had taken place the day before in the Botanic Gardens. The report begins by noting that it was fortunate that no loss of life had occurred! The paper goes on to state that Murton had been losing possessions from his office in the Gardens and suspected the Javanese coolies – you can see him posing with them and their *mandor* (foreman) in the 1877 photograph reproduced here. (This image must have been made before the incident in question took place.) In the interest of getting his belongings back, Murton withheld their wages until some items were returned, but not all. Then, on the afternoon of 13 September, the *mandor* called on Murton

and demanded the wages owed, but was told that these would be paid only when *all* items had been returned. One might speculate that this was likely an impossible request for the coolies to comply with, since surely they would have converted some of the stolen goods into cash. Becoming angry, the *mandor* verbally abused Murton, who slapped the older man in the face, provoking him to draw his stick and whack the Superintendent. Murton apparently caught the stick and broke it, further provoking the *mandor* to draw his *parang* – a big cutlass used for clearing vegetation in the jungle – before chasing his victim around the Monkey House* until Murton escaped to his residence at Burkill Hall. One might guess that Murton could run faster than the older *mandor*, which is definitely something in favour of appointing a youthful Superintendent!

But the trouble did not end there, because a while later a posse of 30 armed coolies, led by the *mandor*, arrived at Burkill Hall to continue their claim to be paid. Murton decided to confront them with his revolver in hand, firing shots above their heads after his demand that the *mandor* hand over his *parang* was refused. Then



the besieged Superintendent had recourse to lock himself in the bathroom until the angry protesters went away, after the Head Gardener, Mr Smith, managed to calm the situation down. The paper tells us that a warrant was issued against the ringleader of this disturbance, presumably the *mandor*, and one wonders how Murton's relations with his Javanese staff panned out in the days after the disturbance.

A NOISY AMPHIBIAN

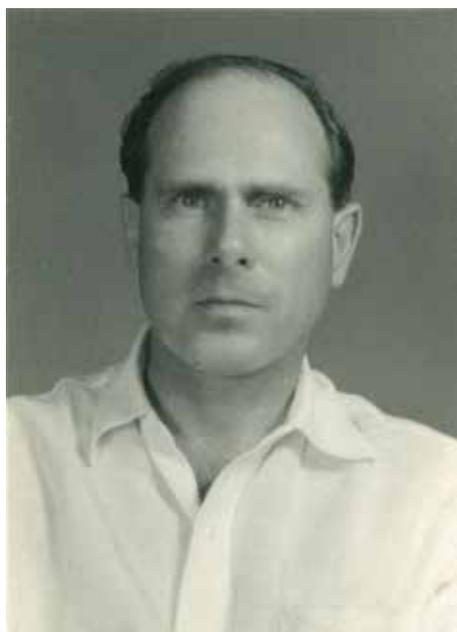
By the 20th century, life at SBG seems to have been less dangerous for its leaders and staff, but not without its frustrations. Humphrey (H.M.) Burkill, son of Henry, was Director from 1957 to 1969, straddling the period of Singapore's transition from British colony to independent Republic. The annual reports compiled by Humphrey are in general more entertaining to read than those written by previous incumbents, since he includes remarks about events that might otherwise seem out of place in a formal report. However, we must be grateful for his sometimes jocular style, especially in a piece about a bullfrog.

For many years, SBG's responsibilities extended to the provision of horticultural



► A common inhabitant of urban areas and forests in Singapore, a banded bull frog (*Kaloula pulchra*) may have been responsible for the anxiety of Burkill and his staff during the 1967 state visit of Japan's Prime Minister. (Photo credit: Nick Baker)

displays at official events outside the Gardens, including at the Istana for state receptions. In 1967, the newly established Republic of Singapore received a state visit from the Prime Minister of Japan (*Annual Report*, pp. 36–37). SBG staff arrived at the Istana the day before to install a display as backdrop to a banquet in which the dignitaries would make after dinner speeches. As the display was nearing completion and darkness was falling, the Gardens' staff heard the croaking of a bullfrog that had somehow come into the Istana with the horticultural display



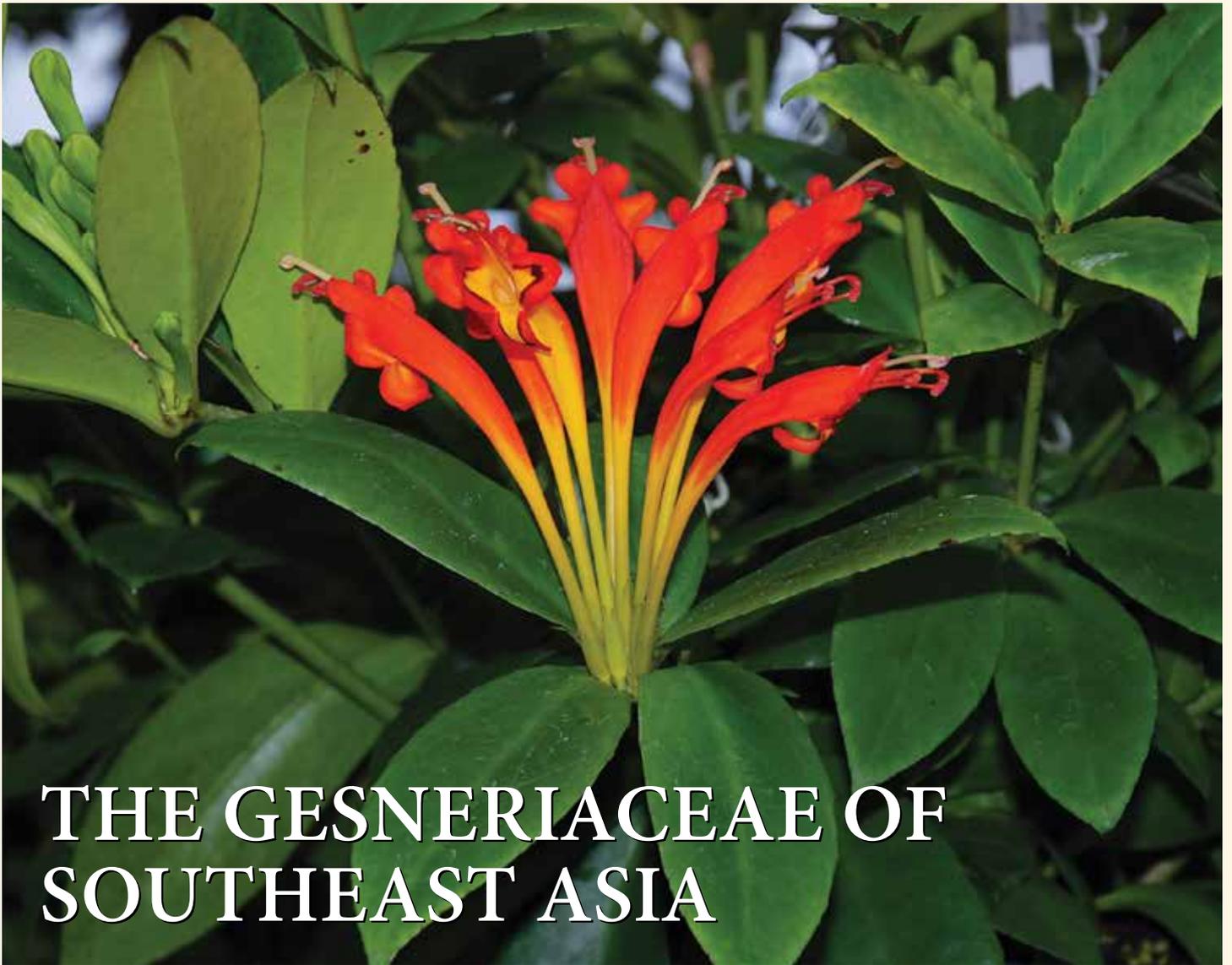
► Former SBG Director H.M. Burkill. (Courtesy of Singapore Botanic Gardens Archives)

material. Burkill's report states it was "small in body but very loud in voice".

The staff feared that the following evening, this animal would make its presence felt in the most undiplomatic way, competing with the speechmakers ("frog barracking" as Burkill put it), so they resolved to disassemble the display and try to catch the culprit. Working into the night the display was eventually taken apart, but alas no bullfrog could be found! Now what to do? The display was put back together and the Istana catering staff instructed to be on guard the following evening as a "killer squad with torch and knife", around the time when the bullfrog might start to croak again. Apparently the poor animal clearly had gotten the message, for during the state banquet he remained quiet, no doubt to the great relief of the SBG team and their Director. One wonders whether such an undignified interruption by an unscripted amphibian would have been a sack-able offence, or would the assembled company have found the whole thing as amusing as we can today? I will leave others to speculate on that! 🌿

Nigel P. Taylor
Director SBG

* Much of Murton's work as Superintendent involved the development of a zoological collection; it was during this time that a structure was erected to contain monkeys. The Monkey House was removed in 1913.



THE GESNERIACEAE OF SOUTHEAST ASIA

► The flowers of *Aeschynanthus speciosus* from Peninsular Malaysia can be over 10 cm long. (Photo credit: David Middleton)

WE all know, of course, that there is not a prettier family of flowering plants than the Gesneriaceae! Given this, it is surprising that there are not more species in cultivation beyond the rather familiar lipstick flowers (*Aeschynanthus* spp.), flame violets (*Episcia* spp.), African violets (*Saintpaulia* spp.) and just a handful of others.

As most species are not cultivated, they are perhaps not well known to the readers of *Gardenwise*, so in this article I would like to give an overview of the research being done to catalogue and describe the diversity of the Gesneriaceae in Asia, and the efforts being made to better understand the relationships between the genera and species.

The Gesneriaceae has around 3,500 species in 140–150 genera. They are primarily plants of tropical regions in the Americas, Africa and Asia. Africa is relatively depauperate in Gesneriaceae with around nine genera and only about 150 species, the neotropics has around 72 genera and over 1,200 species, and Asia has around 63 genera and over 2,100 species. In

addition there is a small number of genera and species in the temperate regions of Europe, New Zealand and Australia.

Most Gesneriaceae are herbs, either growing on the forest floor or on rocks or cliff faces. Some species are epiphytes in trees (for example *Aeschynanthus* spp.), climbers (*Agalmyla*), or can be shrubby (*Cyrtandra*). Large numbers of the species which are found on rocks grow on karst limestone.

The flowers come in a wide range of sizes, from the tiny flowers of *Epithema* species, some only around 0.5 cm long, to the long and robust bird-pollinated flowers of *Aeschynanthus*, some over 10 cm long. They also come in a wide range of colours,



► *Codonoboea porphyrea* from Thailand is part of a large genus that was until recently included within *Henckelia*. (Photo credit: David Middleton)



► The most common flower colour in *Aeschynanthus* is red to attract bird pollinators, like in this *Aeschynanthus persimilis* from Thailand. (Photo credit: David Middleton)



► *Epithema saxatile* has tiny flowers enveloped in a bract. (Photo credit: David Middleton)

sometimes even bright green. The fruits are mostly dry and split open to release tiny seeds, but in some genera they do not split and are presumably dispersed by animals (e.g. *Billolivia*, *Cyrtandra*). In those that do split open, the seeds are mostly shaken out, possibly aided by the wind, to be dispersed over a rather short distance. In some the fruit or other parts of the flower form a little cup or gutter, so that the seeds are splashed or funnelled out by rain (e.g. *Epithema*, *Loxocarpus*).

There has been a great deal of research on Asian Gesneriaceae in recent years. This has been both traditional taxonomic research and investigations of relationships between genera and species using molecular techniques. The advent of DNA sequencing has revolutionised our understanding of relationships in the Gesneriaceae, as it has in almost all plant families. Much of this molecular research has supported what we already suspected, but some has led to radical rethinks in the composition of genera and the characters used to define them. Luckily nothing much has changed in some of the largest genera, such as *Cyrtandra*, *Aeschynanthus* and *Agalmyla*, but research on *Chirita* has led to its complete demise, with part absorbed into *Henckelia* and part into *Primulina*, along with the resurrection or establishment of three other genera. *Paraboea* has been greatly enlarged by the addition of two other genera and *Oreocharis* has absorbed 10 other genera. Many very small and single-species genera have now disappeared, as it has become clear they are just oddities within other larger genera.



► *Cyrtandra pendula* from Peninsular Malaysia is a member of the largest genus in the Gesneriaceae. (Photo credit: Thamarat Phutthai)

As a result of this research, we now have a much clearer idea of the composition of genera, based on the idea that all species in a genus should be descended from a single common ancestor, and that all of the descendants of that ancestor should be in the same genus. The differences in composition of genera between the old and new systems are an inevitable consequence of our improved understanding of the relationships amongst these species, and with time the newly defined genera will become less confusing.

The recent molecular work complements the traditional taxonomic research for Floras and monographs. The only recent large Asian Flora account to have been completed is the *Flora of China* in which 56 genera and 442 species were recognised. Similar such accounts are actively underway for the *Flora of Thailand* and the *Flora of Peninsular Malaysia*, the former coordinated from Singapore Botanic Gardens (SBG). Monographs of Asian genera have also been written, as well as regional accounts of some of the large genera. These works



► *Ornithoboea arachnoidea*, as the name suggests, is covered in a dense spider-web-like hair covering. (Photo credit: Preecha Karaket)



► The genus *Microchirita*, including *Microchirita tubulosa*, used to belong in the large genus *Chirita*, which is no longer recognised at all. (Photo credit: David Middleton)



► The genus *Billolivia* and this species, *Billolivia minutiflora* from Vietnam, were only newly described in 2014. (Photo credit: Jana Leong-Škorničková)

always lead to increases in the numbers of species, sometimes quite spectacularly so. For example, when *Agalmyla* was revised, 62 of the 97 recognised species were newly described, and when *Liebigia* was revised, half of the 12 recognised species were new.

Agalmyla is the largest Asian genus fully revised in recent years. However, even for those genera that have not been completely revised, huge numbers of new species have nevertheless been described in the last 20 years – including over 90 new species of *Cyrtandra*, around 60 new species of *Chirita* and approximately 40 new species of *Paraboea*. *Aeschynanthus* and *Didymocarpus* have each had around 25 new species described, and smaller numbers of species have been added to a range of other genera as well. Altogether, almost 500 new species of Gesneriaceae from Asia have been described in this period.

Why has there been this profusion of new species described in such a relatively short period? The reasons are many but can perhaps be encapsulated in three headings, two of them to do with the activities of botanists and one in the nature of the plants themselves.

1. Intensive field work – Our knowledge of Asian plant diversity is ultimately based on collections and observations made in the field. Unless botanists continue to get their boots on and explore forests and other habitats in both better known and poorly known parts of the region, our knowledge will become frozen in time. New collections from better explored areas bring us insights into the variation of known species. New collections from poorly known areas can inform us on the distributions of previously described species and can also turn up new species that have never been collected before. Collecting patterns across Asia are very uneven. Some parts are relatively well collected, such as Peninsular Malaysia and Java. Other parts are very poorly collected, such as Laos, Cambodia, Vietnam, Sulawesi and Papua. All of Southeast Asia is poorly collected in comparison to Europe, so even in better collected areas new species can still be found.
2. Focused research – By the very nature of research we should know more once someone investigates a group of plants than we did before! Given that Asian plants are relatively under-researched, in almost every family of plants in the Asian tropics focused research



► The fruits of *Loxocarpus incanus* split open to form a little cup and the seeds are splashed out by water when it rains. (Photo credit: Thamarat Phutthai)



► *Henckelia anachoreta* is common in northern Thailand. (Photo credit: Preecha Karaket)



► *Paraboea amplifolia* from southern Thailand, which is covered in spider-web-like hairs, is Critically Endangered. (Photo credit: Preecha Karaket)



► *Petrocosmea pubescens*, which was only recently discovered, belongs in a genus that is reminiscent of, but not closely related to, the well-known African violets. (Photo credit: Preecha Karaket)



► *Somrania albiflora* is the type species of a genus that was only very recently described. It is named after the Thai botanist Somran Suddee. (Photo credit: David Middleton)



► *Tribounia grandiflora* is also in a new genus, named after the Thai botanist Pramote Triboun. (Photo credit: David Middleton)

will lead to the discovery of new species. While intensive field work is essential to provide the raw materials for focused research, only through study of the collected specimens by taxonomists can these new species be revealed.

3. Local endemism – Many species of Gesneriaceae have very restricted distributions. This is particularly true of the species that occur on karst limestone outcrops, which give way to other substrates across the landscape. Due to the localised nature of these outcrops, suitable habitats are often lacking within the dispersal distance of the plants. However, many terrestrial forest dwelling species also have limited distributions, often due to being found in higher altitude areas with, again, a limited ability to colonise suitable habitats when the next area at high enough altitude may be far away. When plants are only found in one area, and that area has not previously been well collected, then collecting activities in these areas will bring many new species to light.

As many species are very local in their distributions and large parts of Southeast Asia are only sporadically and lightly collected, then it is likely that there are huge numbers of species of Gesneriaceae that we simply do not yet know exist. However, the logistics of collecting in some of these areas, particularly on karst limestone, can be daunting due to the challenging terrain. These challenges not only mean that there are many new species awaiting discovery in the foreseeable future, but that our knowledge of many already-described species is likely rather poor. Almost half of all species of Gesneriaceae in Southeast Asia are known from only three specimens or fewer, many from only one specimen. With so few collections we know very little of their variation and almost nothing of their biology.

The very restricted distribution of many species and, for most, their very precise habitat requirements means that they may be threatened with extinction if those localities are disturbed or destroyed. Gesneriaceae species are only rarely found in secondary forest so if the forest is logged the species disappear. Karst limestone is the raw material of cement and many limestone areas are being quarried away with the total loss of the vegetation that once grew on it. If a species is restricted to only that area it will be lost for good if the site is



► A limestone mountain in Southeast Asia being quarried away along with its biodiversity.
(Photo credit: Peter Wilkie)

destroyed. Even plants in protected areas are at risk: those that grow on rocks can be trampled by unaware tourists, fires set in surrounding agricultural land can spread into protected areas, and clearance of forest in surrounding areas can severely affect the microclimate. For example, of the approximately 130 species in the genus *Paraboea*, 47 have been assessed under the International Union for the Conservation of Nature (IUCN) threat categories as being in danger of extinction and 23 of these have the IUCN's highest category of Critically Endangered. This is despite the fact that some of these species do occur in protected areas. But we must not despair, as the act of highlighting these dangers may lead to focused action plans to protect species under threat.

Only seven species of Gesneriaceae are recorded for Singapore, according to the Singapore Red Data Book (2008), three of which are listed as Presumed Nationally Extinct and the rest are Critically Endangered. One of the Presumed Nationally Extinct species, *Aeschynanthus*

pulcher, has been rediscovered in Nee Soon Freshwater Swamp. A concerted effort should be made to see if the other species presumed to be locally extinct have been overlooked and ensure that all species are brought into *ex situ* cultivation.

Ridley described almost 200 species of Gesneriaceae and appeared to have taken a particular interest in the family. Ruth Kiew also brought her expertise on the family to SBG when she was Keeper of the Herbarium (1997–2005). As a result of the contributions of these researchers, as well as more recent collecting efforts in Laos, Vietnam and Malesia, the Herbarium at SBG has large collections of Gesneriaceae from the region. In the coming years these collections will be well utilised in a renewed Gesneriaceae research programme focusing on taxonomic work in Thailand, Vietnam and Peninsular Malaysia. 🌿

David Middleton
Herbarium

ARGUABLY some of the most exciting discoveries in Asian Gesneriaceae in recent years have arisen through a combination of molecular and traditional taxonomic work. The relationships of plants collected in Thailand and Vietnam, which could not be assigned to genera based on morphology, have recently been investigated through DNA sequencing. The new genera *Somrانيا*, named after the Thai botanist Somran Suddee, and *Billolivia*, named after the Edinburgh-based botanists Bill Burt and Olive Hilliard, were the result. Other new genera of Gesneriaceae have been described from Asia in recent years (*Litostigma*, *Tribounia*) but what marks out *Somrانيا* and *Billolivia* is that these two genera were not established to accommodate known species for which we realised their placements were incorrect. Instead they were described to accommodate brand new diversity that did not fit into known lines of evolution in the family. *Somrانيا* has three species from southern Thailand and *Billolivia* has five species from the Annamite Mountains of Vietnam, all eight species previously unknown.

THE REDISCOVERY OF A PRESUMED NATIONALLY EXTINCT *AESCHYNANTHUS*



► *Aeschynanthus pulcher* in habitat, in Nee Soon Freshwater Swamp. (Photo credit: Ang Wee Foong)

DESPITE covering only around 87 hectares, Nee Soon Freshwater Swamp forest, the last remnant of its kind in Singapore, is home to over 700 plant species. It provides habitat for 16% of Singapore's fauna, some of which rely on it exclusively. The swamp forest is also one of the most inhospitable and impenetrable places in Singapore, a natural treasure trove that acts as its own fortress. During periods of heavy rain, only small islands formed by the root mats of trees appear to offer distant and often unfruitful stepping stones between a confusion of tributaries and patches of boggy sludge, the depth of which are unfathomable until you stop sinking! If this were not enough to put off a visitor, dense stands of the palm *Eleiodoxa conferta* guard over the wetter areas, their arching petioles heavily armed by whorls of spines, each nearly 8 cm long, preventing passage to all but the most determined. Little wonder that despite repeated botanical exploration, from time to time, Nee Soon Freshwater Swamp still yields surprises – such as the recent finding of a presumed-to-be nationally extinct *Aeschynanthus*.

Aeschynanthus is a genus of gesneriads consisting of around 160 species. They are distributed from India and Sri Lanka through Southern China and Southeast Asia to New Guinea and the Solomon Islands. They are epiphytic in habit, although some species may also be lithophytic (rock dwellers), found on banks or climbing from the bases of trees. They are commonly known as lipstick plants, after the appearance of the developing flower buds.

In April 2013, on an expedition into Nee Soon Freshwater Swamp, an *Aeschynanthus* caught the attention of NParks staff. It was rooted in the ground at the base of a large tree, with multiple growths snaking up the trunk, anchoring themselves at the nodes with short adventitious roots. Far out of



Close-up of the flowers of *Aeschynanthus pulcher*. (Photo credit: Craig Williams)

our reach, the stems that had grown to the end of their support trailed back down towards the ground, and some had started to flower.

At first, the plant was assumed to be *Aeschynanthus wallichii*, a known resident of Nee Soon that is classified as Critically Endangered in Singapore. With its *ex-situ* conservation in mind, we took a few cuttings from the shorter stems for propagation in the Gardens' nursery. They grew well, and in April this year they began to produce some very striking flower clusters (actually pair-flowered cymes) of ruby red blooms. On close inspection of the flowers, we discovered that they were rather hairy beauties, with both the long calyx and corolla of each flower densely puberulent. The white throat of the otherwise scarlet corolla and the pair of slightly exerted anthers give the flowers the slightly comedic look of a bucktoothed singer!

In fact, the choice of 'lipstick' colour (one shared with many other species in the same genus), zygomorphic flowers and positioning of the pollen on protandrous anthers are clues to the flowers' intended suitors. There are records of three species of spiderhunters (relatives of sunbirds) from the genus *Arachnothera* visiting *Aeschynanthus* species in Peninsular Malaysia, no doubt attracted by their flowers to the weak nectar within. Sunbirds would also seem to fit the bill. When a bird pushes its beak into a flower to obtain the nectar, the pollen on the exerted anthers

would brush off onto its head, potentially to be deposited onto the protruding stigma of the next flower it visits, provided the new flower is in the later female phase when the stamens have withered and the style has elongated to place the stigma into the spot the anthers were. Parallel traits of bird pollination by humming birds have evolved in their new-world cousins in the genus *Columnnea*, another group of trailing, bird-enticing gesneriads with many showy red-flowered species.

It is fortuitous that Gesneriaceae expert David Middleton has recently joined the Gardens' research team, as he was quick to recognise that our specimens are in fact *Aeschynanthus pulcher*, a species which is classified in the 2008 Singapore Red Data Book (under its synonym *A. parvifolius*) as Presumed Nationally Extinct. However, David's investigation into the collections of native *Aeschynanthus* lodged in the Herbarium has revealed that this species has in fact been collected twice from Nee Soon over the last few years. The species now appears to be restricted to the swamp forest, although in the 19th and early 20th centuries it was much more widespread in Singapore. The species may still occur on Bukit Timah, where it was collected up until the 1970s.

Despite its rarity in the wild in Singapore, *Aeschynanthus pulcher* is a hardy plant in cultivation, and its slight succulence (an adaptation to the epiphytic habit) and willingness to bloom in bright shade make it a popular houseplant. A specimen



The stems of the *Aeschynanthus pulcher* encountered in Nee Soon were snaking up the supporting tree trunk. (Photo credit: Ang Wee Foong)

of this species from an earlier collection has thrived on a rough concrete wall in one part of the Gardens, where many other plants have failed. This suggests that perhaps it has future potential to serve Singapore's spidercatchers and bring a touch of glamour to some of our streetscapes. 🌿

Craig Williams

Horticulture, Exhibitions and Events

BATS IN THE BAMBOO



► A bamboo bat sheltering inside an internode at SBG. The vertical slit is less than 10 mm across.

IN many large cities, botanic gardens play a role as a haven not just for plants and people, but also for wildlife. The Singapore Botanic Gardens (SBG) is no exception, as it provides a home for many species of bird, reptile, amphibian and mammal. Of all the mammals in the Gardens, the most secretive are the various species of bat which, by day, remain largely hidden from sight.

In the north of the Gardens, near Bukit Timah Road, lies SBG's bamboo collection. On weekends and public holidays, families of picnickers and the occasional courting couple congregate beneath the thick clumps of bamboo. But it is not only people who appreciate the cool, dry shelter such plants provide – an unusual type of bat is

attracted to similar haunts, namely bamboo bats (*Tylonycteris* spp.).

There are more than 1,200 species of bat worldwide, at least 330 of which can be found in Southeast Asia. Singapore hosts around 25 species, including nine representatives of the bat family



► A bamboo bat from Bukit Brown, captured and released unharmed during vertebrate surveys in 2005, shown next to a Singapore Dollar coin for scale.

Vespertilionidae, or 'evening bats', and it is to this family that the genus *Tylonycteris* belongs. The genus comprises three species, of which two occur in Singapore – *T. robustula* (the greater bamboo bat) and the slightly smaller *T. pachypus* (the lesser bamboo bat), which is listed as rare in Singapore (Baker and Lim, 2008, *Wild Animals of Singapore*). It is difficult to separate the two species based on normal visible characteristics such as fur colour, which can be highly variable. Capture and measurement of forearm length and other dimensions is usually required.

Different species of bat range in size, from the smallest weighing just 2.5 grams (Kitti's hog-nosed bat from Burma and Thailand), to the huge flying foxes which can weigh over 1.5 kilograms and have wingspans in excess of 1.5 metres! Bamboo bats are amongst the smallest of all bats in the world.

Bats are almost exclusively nocturnal, although some species may be seen on the wing in the late afternoon. By day they roost not just in caves (or their man-made equivalents, such as the undersides of flyovers or inside road culverts) but also underneath the leaves of palms, amongst clumps of dead leaves, inside hollow trees or even inside bamboo.

Bamboos are grasses, and are characterised by having hollow stems divided into

BAMBOOS AND SBG

The Singapore Botanic Gardens (SBG) has a long association with the study of bamboos. Four out of six species of naturally occurring *Dendrocalamus* bamboo in the Malay Peninsula were in fact described by Ridley, the first Director. The *Dendrocalamus pendulus* bamboo reported to have bats in 1908 was itself only published as a new species three years before, in 1905! Another SBG Director, R.E. Holttum, laid firm foundations for the classification of Southeast Asian bamboos with his detailed 'Bamboos of the Malay Peninsula' published in 1958 in the *Gardens' Bulletin Singapore*. Among many others, *Gigantochloa ridleyi* was an interesting bamboo named by Holttum in Ridley's honour; the living clump from which the type or key reference specimen was collected still survives in SBG today! It had never flowered, falling into the

most well-known pattern of bamboo phenology: a prolonged period in the vegetative state, in some cases with a final burst of grand flowering that spells the end of life. Holttum himself was honoured several times, including with the endemic Malayan genus *Holttumochloa* named by K.M. Wong, who continues working on bamboo systematics at the SBG Herbarium. The emerging perspective from Wong's research group is that ancient and ongoing hybridisation has produced many types historically selected for not flowering (and hence surviving) for long periods, that have become heirloom among Southeast Asia's many societies. *Gigantochloa ridleyi* ("Ridley's giant grass") could be one such ancient enduring clone.

Wong Khoon Meng



SBG's Bamboo Collection is situated in the Bukit Timah Core, in the north of the Gardens.

▶ *Bambusa vulgaris* cv. *Vittata* (left) and *Gigantochloa scortechinii* (right).

During Ridley's time as Director of SBG (1888–1912), bamboo bats were found roosting in a clump of *Dendrocalamus pendulus* which had died after flowering. In his paper 'Bats in a Bamboo' (published in 1908 in the *Journal of the Straits Branch of the Royal Asiatic Society*), Ridley wrote that a garden worker had discovered the bats when cutting down the plant. The worker brought him a piece of the hollow stem, which contained within it 23 bats – four adults and 19 juveniles. Upon inspection, only one possible entrance was identified, a crack which had allowed the development of a small triangular-shaped opening only a quarter of an inch wide.

In their article 'Roost site selection among flat-headed bats (*Tylonycteris* spp.)', published in the *Journal of Zoology* in 1970, Medway and Marshall documented

how bamboo bats in Thailand occupy the stems of the bamboo *Gigantochloa scortechinii*, the narrow vertical slits in the culm having been made by a species of beetle, namely *Lasiochila goryi*. Lekagul and McNeely (in *Mammals of Thailand*, published in 1977) describe how bamboo bats return to their roosting chamber "without any visible break in flight", meaning they fly through these narrow entrances without missing a beat! According to the literature, these bats, the adults of which weigh just 9 grams, can squeeze through slits as narrow as 5 mm because of their uniquely flattened skulls, so they are also known as 'flat-headed bats'. To effectively grip the smooth inside of the bamboo, these bats have also evolved fleshy pads on their thumbs and feet and thus have yet another name, 'club-footed bats'.

Bats play a variety of important ecological roles which include seed dispersal, pollination and insect control. Bamboo bats are insectivorous and feed mainly on small, flying insects. Known bat roosts should be protected and kept free of undue disturbance. The bat specimens collected by Ridley at SBG over a hundred years ago were determined to be *T. pachypus* and this species can still be found roosting at SBG today. The continued presence of a colony of bamboo bats at SBG is a testament to the care and awareness of the Gardens' staff. 🌿

Nick Baker

NParks Volunteer and Nature Warden
Former chairman Vertebrate Study Group,
Nature Society (Singapore)

All photos by Nick Baker

compartments (or internodes) by solid nodes. Older stems, or culms, of bamboo may die gradually as a result of fungal growth or insect attack. These processes create small, vertical slits which provide access to the internode for small vertebrates and invertebrates. Bamboo bats have apparently evolved to make use of this unique niche, and are known to roost in SBG's bamboos.

ICONIC TREES AND CLIMBERS OF YEARS GONE BY



► The woody climber, *Morinda umbellata*, growing on the Heritage tembusu tree in Palm Valley. (Photo credit: Dennis Sng)

VISITORS to the Gardens today are amazed by the size of the *Morinda umbellata* climber that grows on the Heritage tembusu tree in Palm Valley. This woody climber stretches from the ground level all the way to the top canopy (about 35 m high) of this large tree. Woody climbers climb up parts of trees or surrounding trees to reach the upper canopy where they can receive adequate sunlight. In the case of this climber, the distance from the lowest branch of the tree is about 4 m above the ground, too far for it to have reached as a young climber without any surrounding trees. It is likely that this particular climber would have started life when the tree was much younger and had lower branches. The tembusu is one of the largest in Singapore and likely well over 200 years old. Thus, it is possible that the climber itself is of nearly the same impressive age.

But did you know that the Heritage *Terminalia subspathulata* tree at the junction of Liane Road and Lower Ring Road once had a similar climber? This climber was *Spatholobus gyrocarpus*. The immense size of this plant suggests it was of great age even when it was photographed many years ago, in 1925. Not only did it reach the top canopy of the *Terminalia subspathulata*, but it crossed over the road from the canopy of this tree to the canopy of a large *Shorea leprosula* tree on the adjacent lawn. This *Shorea leprosula* was quite a large majestic tree and appears at the top of Maranta Avenue in one of the most iconic photos taken in the Gardens.

But what happened to the climber and the *Shorea leprosula*? An entry by then Director H.N. Ridley in the annual report of 1909 sheds some light:

“Three valuable trees were killed by lightning during the year, the storms being unusually severe. One of these was the fine *Shorea leprosula* near the band-stand. This tree was 150 feet tall and 10 feet 3 inches girth at 4 feet from the ground, and was one of the show plants of the Gardens. It was connected with an adjoining *Terminalia subspathulata* by a liana of *Spatholobus*. The portion of this connecting the two



► The woody climber, *Spatholobus gyrocarpus*, growing on the Heritage *Terminalia subspatulata* in 1925. Note the branch on the right at the top of the picture. This branch is no longer there, and is now merely an iconic cavity. It is possible that this major branch was lost in the lightning strike in the 1980s. (Courtesy of Singapore Botanic Gardens Archives)

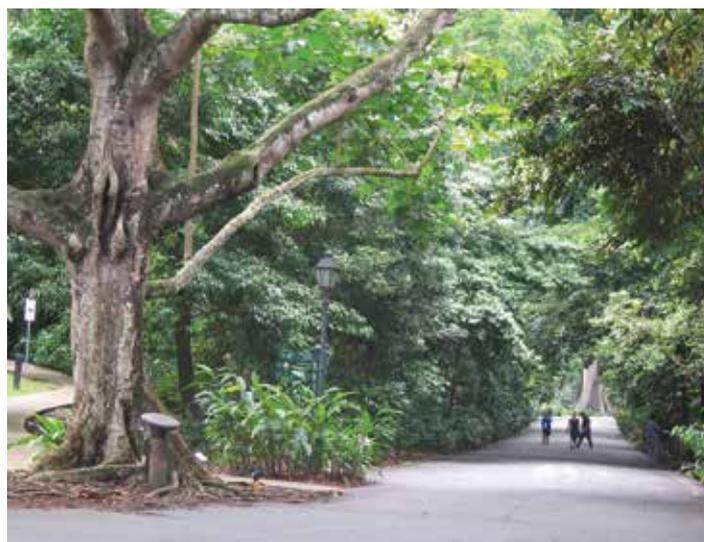


► Photo of the *Terminalia subspatulata* today, taken at the same angle as the 1925 photograph of the tree. Note that the large lower branch in the older photo is no longer there. (Photo credit: Dennis Sng)



► Photograph taken sometime in the 1800s from the current location of the National Orchid Garden's main entrance, looking up Maranta Avenue (the Rain Forest is on the left). The main tree trunk visible at the end of Maranta Avenue is the *Shorea leprosula* (near the centre of the image). If you look closely at the canopy of the tree, you can see the twining woody stem of the *Spatholobus* on the crown of the *Shorea*. (Courtesy of Singapore Botanic Gardens Archives)

trees was killed as well. The *Terminalia* though touched by the lightning was unhurt. The *Shorea* slowly died apparently from shock and was felled some months later..."



► Photograph of Maranta Avenue today. Note that the tree at the end of the avenue today is the Heritage *Ceiba pentandra*, not the *Shorea leprosula* lost many years ago. (Photo credit: Ada Davis)

Interestingly, the Heritage *Terminalia subspatulata* was struck by lightning again in the 1980s. J.F. Maxwell, who was a botanist in the Gardens' Herbarium at the time and had inspected the tree following the lightning strike, recounted that the main trunk had died back, but it was decided to let the tree regenerate. It is hard to



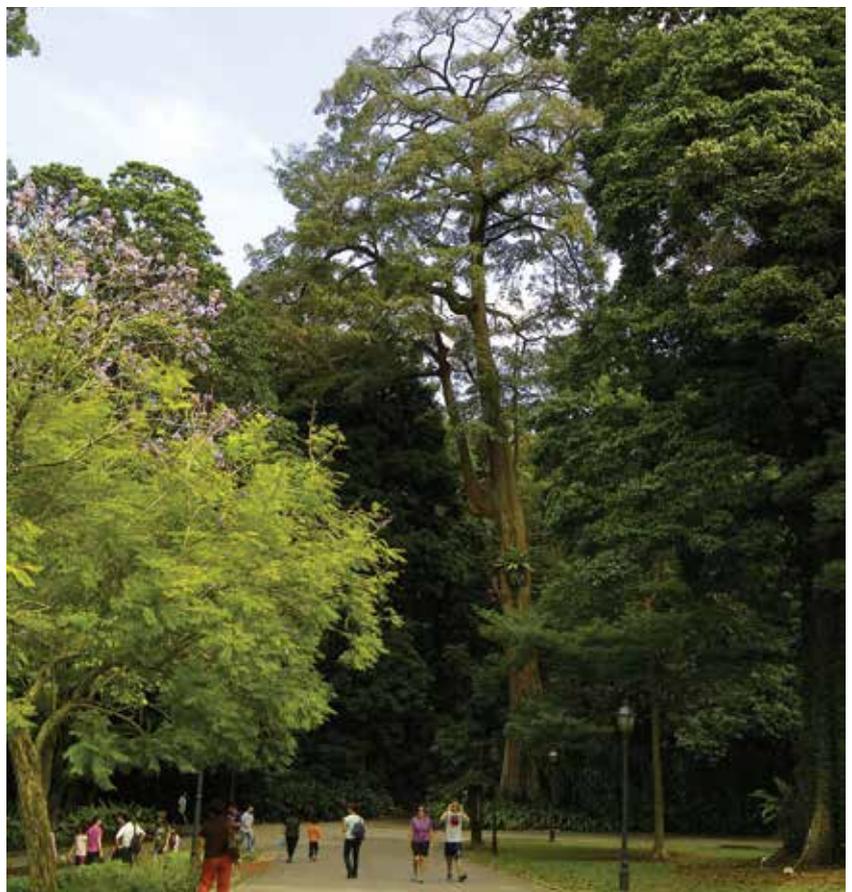
► Postcard showing the Heritage *Terminalia subspathulata* (near the centre of the image), with the *Spatholobus gyrocarpus* climber connecting it to the *Shorea leprosula* on the left. The road in between is Maranta Avenue. Note the large lower branch on the *Terminalia subspathulata*, which is only a stump today. (Courtesy of Singapore Botanic Gardens Archives)

► Photo of the *Terminalia subspathulata* today, taken at the same angle as the postcard of the tree. (Photo credit: Dennis Sng)

imagine to what extent the canopy that we see today comes from this new growth, but its survival calls attention to the regenerative capacity of tropical trees. Despite being affected by lightning in the past, it shows no signs of damage today.

Today, over 120 of the Gardens' significant trees, including this *Terminalia*, are protected from lightning strikes by conductors which have been mounted onto them. Lightning strikes are discharges of electric energy which occur when opposite charges meet, and this is where an unprotected tree would sustain the most damage if it were struck. A lightning conductor diverts this energy away from the tree by providing an alternate pathway for it to travel. Lightning conductors are scattered on trees across the Gardens, and not only do they provide protection to the trees that they are installed on, but to surrounding trees as well. 🌿

Lahiru S. Wijedasa
Horticulture, Events and Exhibitions



► The *Terminalia subspathulata* today. The large lower branch in the 1925 photograph is no longer there, while only half of the branch just above it remains today. The smaller tree to the right of the *Terminalia* is a *Koompassia malaccensis*, and stands in a position near where the *Shorea leprosula* once stood. (Photo credit: Dr Nigel Taylor)

STAFF FROM NPARKS TEAM UP TO OBTAIN AN 'OVERLOOKED' *BULBOPHYLLUM* ORCHID



► The natural habitat of the specimen has a generally flat terrain and thick leaf litter. The vegetation consists of trees interspersed with sparse undergrowth of shrubs, climbers and tree saplings growing in dappled light afforded by the gaps in the canopy. Most of the trees within the plot are around 30–60 cm in diameter and have an average height of around 27 m. (Photo credit: Yam Tim Wing)

ON a field trip to Nee Soon Freshwater Swamp in October 2013, we (staff from Singapore Botanic Gardens, SBG) spotted an epiphytic orchid climbing on the trunk of a *Rhodamnia cinerea* tree. It was growing around 8 m above the ground, climbing up towards the tree canopy with some lower bits dangling free. Using a long pole pruner, we strained to snip off a portion of the dangling parts to aid us in a positive identification, but couldn't quite reach them. We suspected it to be a species belonging to the section *Stenochilus* of the genus *Bulbophyllum*, possibly either

B. macranthum or *B. praetervisum*, both of which are classified as Critically Endangered in Singapore. Even more exciting, looking up the tree, we could make out that the orchid was bearing an immature seed pod. We decided to return another day with a skilled tree climber to obtain specimens from the orchid. So on 19 February 2014, we enlisted the help of Clayton Lee from NParks' Streetscape Division to help scale the tree.

THE CLIMB

The *Rhodamnia cinerea* tree supporting the orchid was about 12 m tall with a trunk diameter of 35 cm. Before attempting to climb the tree, we conducted a thorough ground-based assessment in order to identify a sound anchorage point for the installation of the climbing equipment. The orchid was growing from the mid-trunk upwards, at a height of about 8–10 m above the ground, and so we knew that a sturdy branch would be needed for the anchorage.

Although the largest branch was just 0.2 m in girth (less than the 0.45 m girth desired for a good anchorage), we attempted the climb because this species is known to have a rather hardwood. To be safe, the climber conducted a pre-climb weight test in order to ensure that the anchor point was sound. Two rope configurations were considered for the climb – a Double Rope Technique (DRT)



► A flower of the specimen obtained from Nee Soon. (Photo credit: Yam Tim Wing)



► Clayton preparing for the climb. (Photo credit: Paul Leong)



► Clayton performing a Double Rope Technique. (Photo credit: Yam Tim Wing)



► Clayton using just a lanyard to perform a free climb. (Photo credit: Chang Chee Linn)

and a Single Rope Technique (SRT). In tree climbing, the decision to use one technique over another is an individual one, based on the expertise and opinion of the climber. In this case, the DRT was selected because it reduces the load on the anchorage branch, an advantage given the small size of the branch. The DRT configuration also allows ease of manoeuvre, facilitates easy transportation of tools, and most importantly, will not cause any permanent injury to the branch cambium (although the SRT may cause damage, it is sometimes selected for its advantage of quick and easy climbing). The DRT also allows the climber to easily re-crotch the climbing rope to a higher branch if needed, for example to photograph higher parts of the plant.

Unfortunately, ground-based visual assessment has its limitations. In this case, the foliage of an adjacent larger tree (*Elaeocarpus ferrugineus*), which itself was covered in vines, obscured the climber's vision from the ground. After ascending to the anchorage point, the climber realised that the chosen point was on the upper side of a decayed branch! Recognising that the branch could snap imminently, the climber quickly switched his technique to a free climb; using a 3.5 m adjustable lanyard he ascended to a sturdier branch higher up the tree, where he was able to re-crotch the climbing rope.

The climber's scare was worth it in the end, because he was greeted with a surprising sight up there – the orchid was in bloom and its many flowers and flower buds were swarmed by pollinators (*Bactrocera* fruit flies)! This was quite exciting – given the height at which the orchid was growing and the foliage obscuring it, we had no hint of this activity from the ground below. We were able to obtain our specimens,

and the presence of the flowers allowed us to positively identify our quarry as *Bulbophyllum praetervisum*.

SPECIES DESCRIPTION

Bulbophyllum praetervisum is a rhizomatous orchid. The rhizomes are grey-green in colour, creeping and branching, up to 11 cm long, and produce pseudobulbs at intervals. The rhizomes are covered in persistent bracts that decay into a tattering network of hair-like fringes. The pseudobulbs are about 3 cm long, ovoid in shape and usually twisted in appearance. The leaves are thick and leathery, arise singly from a pseudobulb and reach a mature size of about 29 cm long and 5.5 cm wide. The non-resupinate flowers, which appear upside down, are about 3.8 cm long and 3 cm wide, and generally cream in colour with dark purple spotting of varying sizes. The lip, column and inner margin of the lateral sepals are yellow and the apex of the lateral sepals is blackish-purple. The petals fold backwards with age. The lip is hinged and swivels readily (typical of species in the genus *Bulbophyllum*), hastate in shape so that it appears like a trowel, but the apex is sharply recurved (arching downwards and backwards). The column is two-winged with a triangular tooth on each wing. The flowers, which last for only a day, emit a spicy fragrance to attract pollinators.

POLLINATION

Ong Poh Teck of the Forest Research Institute of Malaysia recently described the pollination of *Bulbophyllum praetervisum* in his article 'The pollination of two *Bulbophyllum* species', which was published in *The Orchid Review* in 2013. The flowers of this species attract male *Bactrocera* fruit flies with their spicy odour. The fly probes the flower, and when it lands on the

slippery vertical lateral sepals (which are strategically curved towards the column), it slips downwards along the curved slide towards the lip and column. Instinctively, it clutches the hinged lip, which swiftly propels the fly onto the column of the flower and dislodges the pollinia from the anther onto the abdomen of the fly. Alternatively, the fly might slide right onto the column, by-passing the lip. Either way, it needs to clutch the lip in order to extricate itself from the column. Once free, it is able to fly away and deposit the pollinia on the next flower that it visits. Sometimes, the fly is not able to escape from the column and dies trapped in the wilting flower!

AN ANOMALY

Bulbophyllum praetervisum is often confused with the closely related *B. macranthum*, such that even when in flower, knowledge of the differentiating characters in the lip and column of the flower structure is needed to tell them apart. Without the flowers, the plants are vegetatively similar. Thus, in early literature and herbarium specimen determinations, both species were commonly recognised as *B. macranthum*. In Volume 54 of *Gardens' Bulletin Singapore* (2002), Jaap Vermeulen described *B. praetervisum* as a separate species, its name meaning 'the overlooked *Bulbophyllum*', in reference to the anomaly.

Two of the salient features that differentiate the two species are:

- *B. praetervisum* has a triangular acute tooth on each wing of the column, while the column wings in *B. macranthum* lack teeth
- The proximal end (nearest the hinge) of the lower surface of the lip of *B. praetervisum* is nearly straight



► Habit of *Bulbophyllum praetervisum*. (Photo credit: Clayton Lee)

with only the tip recurved, while that of *B. macranthum* is curved gradually throughout the entire length

Vermeulen mentioned that while *B. macranthum* is almost restricted to lowland conditions, *B. praetervisum* can be found in higher altitudes as well, as it has been collected at an altitude of 1500 m in Sabah. Outside of Singapore, *B. praetervisum* can also be found in Peninsular Malaysia, Brunei and Sarawak. We suspect that it might possibly be found in other areas of the region, where it is yet to be distinguished from *B. macranthum*. Surprisingly, until now, we did not have a wild-collected *B. praetervisum* from Singapore lodged as a specimen in SBG's Herbarium.

EX-SITU CULTIVATION OF COLLECTED SPECIMENS

We were very fortunate to have obtained a healthy and mature seed capsule from our climb at Nee Soon Freshwater Swamp. The seeds have since been sown on Knudson C medium and we are glad to report that they are viable and have germinated successfully in SBG's orchid breeding laboratory. Several cuttings were also collected for propagation in the nursery. These were planted on fern bark, and new shoots started to emerge two months later. *Bulbophyllum praetervisum* is quite a free-flowering orchid species. Hopefully our propagation efforts will be successful, and in the future we will be able to introduce seedlings back into the forest. 🌿

Paul Leong
Herbarium

Clayton Lee
NParks' Streetscape Division

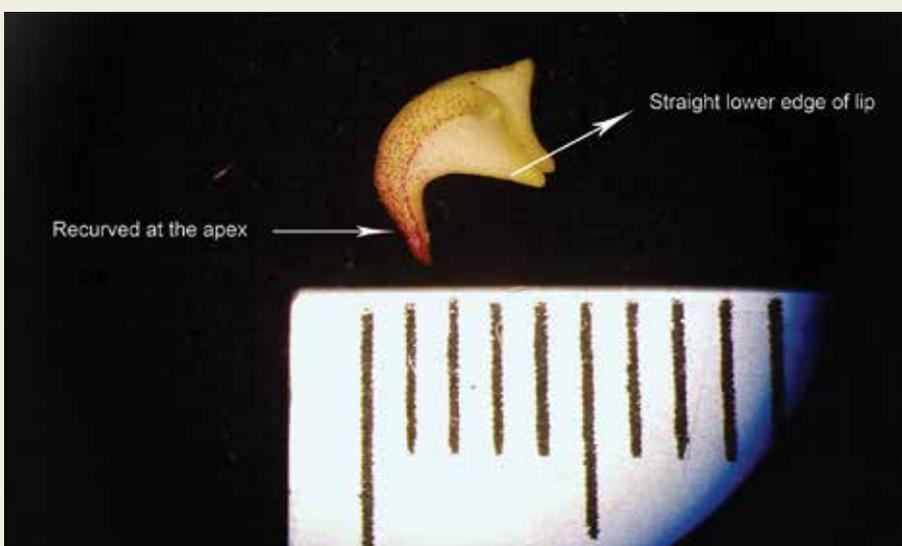
Yam Tim Wing
Orchid Breeding and Conservation Biotechnology Laboratory



► Pollinators hovering around a flower. (Photo credit: Clayton Lee)



► Side view of the flower. (Photo credit: Jana Leong-Škorničková)



► View of lip showing the straight lower edge and the recurved apex. (Photo credit: Paul Leong)

REACHING OUT TO SRI LANKA...



Dr Nigel Taylor with Mr Palipana at the Gardens. (Photo credit: Dr Nura Abdul Karim)

THE Singapore Botanic Gardens (SBG) has long been known for its wonderful and diverse collection of tropical flora and well-managed landscape, besides being a hub of research and education of botanical sciences. It was therefore not surprising that recently, the Vice Chancellor of the University of Peradeniya, Sri Lanka, on the advice of the Director of the Royal Botanic Gardens, Peradeniya, decided to send their Curator, Mr D.M.S.K.W.B Palipana, to do a month's attachment with the Gardens' Horticulture, Exhibitions and Events (HEE) branch.

As part of our continued efforts to conduct specialised training to staff of botanical institutions around the world, Mr Palipana was accepted to do a month of attachment in the Gardens from 31 March to 1 May. During his attachment, he shadowed different HEE staff and was assigned to the various cores of the Gardens' grounds, including the National Orchid Garden, where he learnt and observed daily horticulture and arboriculture activities, display and nursery maintenance, and management of our diverse living collections. Mr Palipana was particularly impressed with the safety standards practised in our horticulture and arboriculture work.

During his stay, Mr Palipana had the opportunity to observe the preparation and execution of transplanting mature trees and palms in our property. The transplanting of mature trees is something that has not been adopted widely in Sri Lanka, and he

was very excited to witness this procedure. He mentioned that the arboriculture skills and standards in Sri Lanka are not as advanced as ours, and he was keen to learn more. Following this feedback, with the assistance of staff from the Centre for Urban Greenery and Ecology (CUGE), arrangements were made for him to sit in as an observer for one module of the International Society of Arboriculture (ISA) certification course that happened to be conducted during his stay. He was most grateful to CUGE and SBG for giving him the opportunity to learn about tree risk assessments.

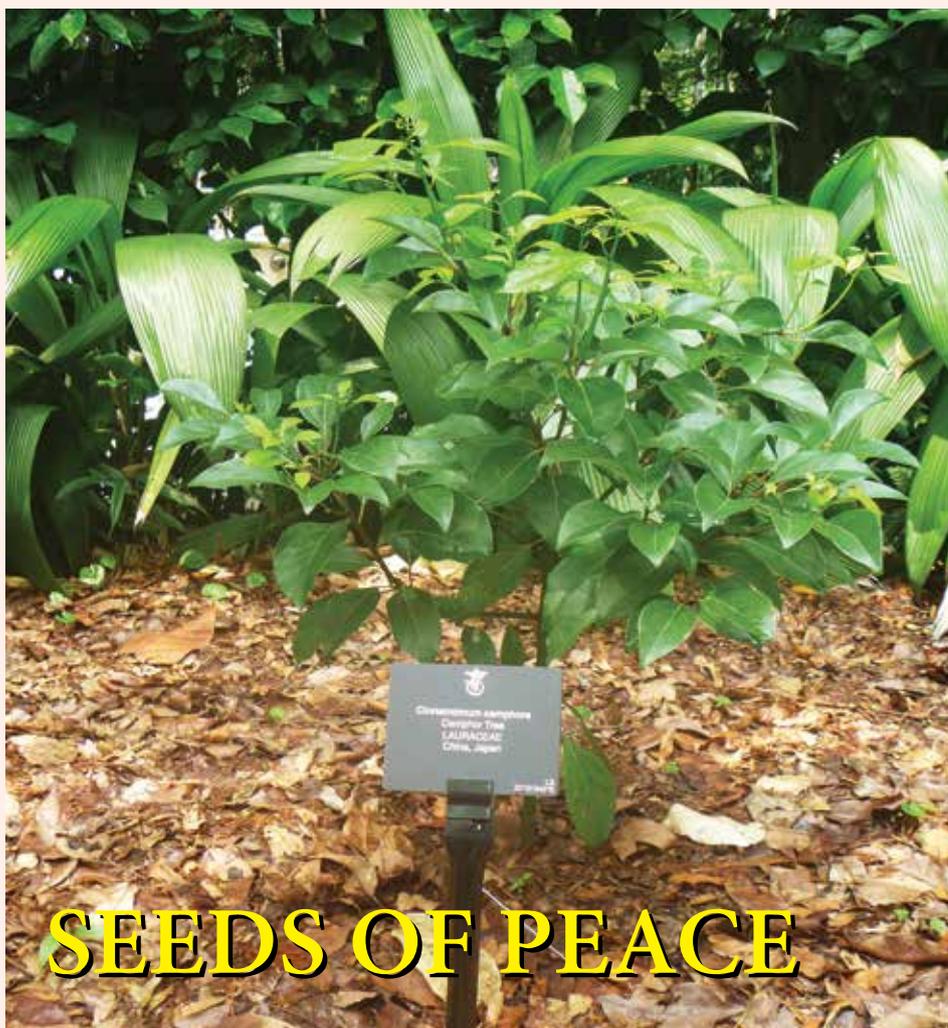
During his stay, Mr Palipana also gave a short presentation to staff from HEE on the University of Peradeniya's garden, its collections and the general work carried out by his team there. His presentation was well received.

Mr Palipana was keen to share his experience here at SBG with his colleagues in Peradeniya. We hope that he will be able to incorporate the knowledge he gained here to enhance his and his team's work. We wish him success and hope that both our institutions will continue the good relations forged into the future. 🌿

Nura Abdul Karim
Horticulture, Exhibitions and Events



Mr Palipana inspecting potted orchids in the National Orchid Garden. (Photo credit: David Lim)



SEEDS OF PEACE

► The progeny from the camphor tree that survived the A-bomb that was recently planted in the Gardens. (Photo credit: Dr Nura Abdul Karim)

IN commemoration of Earth Day on 22 April 2014, the Gardens planted, without much fan-fare, a healthy young sapling of *Cinnamomum camphora*, better known as the camphor tree, opposite the National Orchid Garden entrance along the path leading to the Tyersall Gate. In another part of Singapore, its sibling was planted during a more intimate but official ceremony on the grounds of Tembusu College, National University of Singapore. These are no ordinary camphor saplings though – they are progenies from one of a few trees that miraculously survived the catastrophic atomic bombing of Hiroshima, Japan on 6 August 1945. Although badly battered, the mother tree still exists and is found growing at the northeast corner of Hiroshima Castle.

One might ask how the offspring of an A-bomb survivor came to Singapore's shores. The story begins with a global initiative to engage individuals and organisations to strive for a greener planet, to live free from nuclear threats, to honour the victims of wars past and present and to create peace gardens in their countries and communities. This initiative came under the banner of Green Legacy Hiroshima (GLH) and was started through collaborative efforts of staff of the United Nations Institute for Training and Research (UNITAR), the Asian Network of Trust Hiroshima (ANT-Hiroshima) and a group of other dedicated partners and individuals. As a symbol of peace and friendship, GLH

distributes worldwide the seeds of trees that survived the World War II atomic bombing. Currently, Singapore is among 21 countries, ranging from Afghanistan, Australia, Japan and Russia to the United States, which have partnered in the GLH initiative.

In May 2012, the Rector of Tembusu College, Professor Tommy Koh, and one of the Fellows at the College, Dr Margaret Tan, approached the Singapore Botanic Gardens to help bring in these symbolic seeds and to advise the College on which species would be best suited to Singapore. Seeds from a few different species were being distributed by the GLH founders, Ms Nassrine Azimi and Ms Tomoko Watanabe, but not all



► From left to right: Professor Tommy Koh, Rector of Tembusu College; Associate Professor Gregory Clancey, Master of Tembusu College; six of the Tembusu College students who nurtured the camphor saplings; Dr Nigel Taylor, Director of Singapore Botanic Gardens; and Professor Shin-ichi Uye, GLH representative. (Photo credit: Dr Margaret Tan)

would flourish in our hot, humid weather. Through consultation with the Gardens, it was decided that the camphor had the best chance to survive in Singapore. So in June 2012, a packet of seeds was dispatched by the Hiroshima Botanical Garden to our Gardens. Through active collaboration between a small group of dedicated Tembusu College students, led by Dr Tan, and staff of the Singapore Botanic Gardens, the seeds were lovingly nurtured in the Gardens' nursery. They soon germinated and grew into six healthy saplings. While in the Gardens, the students had the opportunity to learn basic nursery skills, and also helped in propagating salvaged native plants and weeding of invasive plants in our Rain Forest.

The saplings recently planted at Tembusu College and in the Gardens are poignant symbols of teamwork, collaboration and friendship. These offspring from an A-bomb survivor are quiet ambassadors of a message of peace and the promotion of an environmentally friendly world without nuclear weapons. 🌿

Nura Abdul Karim
Horticulture, Exhibitions and Events

Reference
Green Legacy Hiroshima Website:
www.unitar.org/greenlegacyhiroshima

ALPINIA OXYMITRA VERSUS ALPINIA OXYPHYLLA: WHICH IS WHICH?



► Detail of *Alpinia oxymitra* flowers.

► *Alpinia oxymitra* flowers regularly in the Ginger Garden.

OCCASIONAL confusion arises among horticulturists over two species of *Alpinia* – *Alpinia oxymitra* and *Alpinia oxyphylla* – due to similarities in their habit and names. Both species have somewhat arching leafy shoots which end in dense pyramid-like upright inflorescences, and narrowly ovate and somewhat leathery leaves. So which species is which?

ALPINIA OXYMITRA

The naming history of *Alpinia oxymitra* is somewhat complicated. H.N. Ridley, the Gardens' first Director, was the first to notice and describe this unusual *Alpinia* in 1899, from material which was originally collected in Kedah, northern Peninsular

Malaysia, and cultivated at Singapore Botanic Gardens. He named it *Alpinia comosa* and remarked that it is a most aberrant plant due to the presence of conical cup-shaped bracts which fall off as the flowers open, the large flat staminodes and the very curious long, narrow fruits.

Unfortunately though, Ridley was not aware that the name *Alpinia comosa* had already been taken for another species by someone else, and therefore could not be used.

A few years later, in 1902, a German botanist based at the Berlin Herbarium, Karl Schumann, described *Alpinia oxymitra* based on herbarium material collected from Southeastern Thailand. This was the first name legitimately given to this species and from then on, had to be used. However, four years later, in 1906, this species was described again, by French botanist F. Gagnepain, based on material from Vietnam, Cambodia and Laos. Gagnepain proposed to name it *Alpinia macrocarpa*, but as the species had already been given a legitimate name, *A. oxymitra*, his name is treated as a synonym of this.



► Close-up of *Alpinia oxyphylla* flowers.

► *Alpinia oxyphylla* in full bloom at the South China Botanic Garden, Guangzhou.

Alpinia oxymitra is a common species occurring from northernmost Peninsular Malaysia throughout Thailand, Cambodia and Laos, and extending to Vietnam. Its inflorescence is composed of wax-like white or light yellowish flowers, which are rather firm to the touch. One of the prominent characters of this species is its lateral staminodes, which have dark red patches at the base and end in two or three lobes. Fruits of this species are also unmistakable – while most *Alpinia* species have round fruits, those of *A. oxymitra* are elongated with numerous prominent ribs, and turn orange as they ripen. *Alpinia oxymitra* grows well in Singapore's climate. This clump-forming species may reach over 2 m in height and flowers most years, usually after the dry season.

There are only sparse records of the uses of *Alpinia oxymitra*, from Thailand, where this ginger is reported to be eaten as a vegetable and is used for curing diarrhoea and to relieve flatulence.

ALPINIA OXYPHYLLA

F.A.W. Miquel described *Alpinia oxyphylla* in 1861, from mountains in South China; it is known to occur in Fujian, Guangdong, Guangxi, Hainan and Yunnan provinces. While *A. oxyphylla* is similar in habit to *A. oxymitra*, the flowers of *A. oxyphylla* are pure white with a few pink lines on the labellum, and are more delicate compared to those of *A. oxymitra*. *A. oxyphylla* has



► The long and prominently ribbed fruits of *Alpinia oxymitra* are unmistakable.

almost negligible lateral staminodes, which appear like two small white teeth at the base of the labellum, and the fruits are round. Although *A. oxyphylla* can be grown in Singapore, it is a challenge to convince this species to flower and fruit here, as it requires a pronounced period of cold weather.

Alpinia oxyphylla, known commonly as sharp-leaf galangal, has been used extensively for centuries in traditional East Asian medicine and therefore it is



► The fruits of *Alpinia oxyphylla* are round.

widely cultivated. Its fruits, often sold by the common English name of black cardamom (or *yi zhi* in Chinese, *yakuchi* in Japanese, or *ikji* in Korean), are used for treating indigestion, diarrhoea, urinary incontinence, inflammatory conditions and even cancer. 🌿

Jana Leong-Škorničková
Herbarium

All photos by Jana Leong-Škorničková



RARE AND ENDEMIC PLANTS OF THE MALAY PENINSULA

Map showing the phylogeographical range of Malasia (highlighted in green).

MALESIA is a well-defined phylogeographical region located in Southeast Asia, famed for its diversity of flora and fauna. Botanists have estimated flora diversity for the region at 42,000 species, and many more are yet to be discovered and described. The significance of the region was first highlighted in 1857 by Swiss botanist and explorer Heinrich Zollinger. However, it was not until around the 1950s that the importance of Malasia was greatly amplified by Cornelis van Steenis, former Professor of Tropical Botany at the Royal Tropical Institute in Amsterdam and also former Director of the National Herbarium of The Netherlands.

Van Steenis initiated the documentation of Malesian flora – Flora Malesiana. He proposed four ‘contact zones’, represented by three clearly defined floristic ‘demarcation knots’, or major changes in the flora at the generic level; the fourth boundary (also the easternmost boundary) was not satisfactorily resolved. The three principal demarcation knots were (i) at the Isthmus of Kra (southern Thailand), (ii) between Taiwan and the Philippines archipelago, and (iii) between Australia and New Guinea. The fourth demarcation knot was poorly resolved (due to insufficient data), but it has been roughly identified to be around the Solomon Islands (excluding the Santa Cruz Islands) and Vanuatu. Initially, van Steenis proposed the region as ‘Malaysia’, an anglicised version of Zollinger’s Latin term ‘Malesia’. However, as the nation of Malaysia was formalised in 1963, the region name was reverted to Malasia to avoid confusion.

MAINGAYA MALAYANA

Maingaya is a monotypic genus with a sole species recognised, *Maingaya malayana*. This species is endemic to Peninsular Malaysia and belongs to the witch-hazel family, or Hamamelidaceae. The genus commemorates Dr Alexander C. Maingay, a medical graduate who was at one time employed as a warden at a prison in Malacca, and who collected the first specimen of *Maingaya malayana* from Penang Hill, Penang. The specific epithet ‘malayana’ denotes the origin of the species, which is Malaya, or the Malay Peninsula. The species was described in 1873 in the *Transactions of the Linnean Society of London* by Professor Daniel Oliver of the Royal Botanic Gardens, Kew, and was based on Maingay’s Malayan Herbarium deposited in the Herbarium at Kew.

Maingaya malayana is a medium sized tree that produces attractive pom-pom-like flowers that are cream-coloured. These compact flowers have ribbon-like petals, and are mildly scented. The species is extremely rare, and so far it has only been recorded from three localities in Peninsular Malaysia, namely Penang Hill (Penang), Gunung Bubu (Perak) and Berembun Forest Reserve (Negeri Sembilan). *Maingaya malayana* is also known to be cultivated in a few private gardens, at the Forest Research Institute Malaysia (FRIM; Kuala Lumpur, Malaysia), the Rimba Ilmu Botanic Garden (Kuala Lumpur, Malaysia) and the Royal Botanic Gardens, Kew (London, United Kingdom). Specimens have also been planted on Penang Hill to reinforce the population there. *Maingaya malayana* is highly ornamental, and has

Geographically, Malasia includes the Malay Peninsula and eight major island groups: Sumatra, Java, Borneo, the Philippines, Celebes (Sulawesi), the Lesser Sunda Islands, the Moluccas (Maluku) and New Guinea. The conventional extent of Malasia is based largely on plate tectonics, and the region is divided into three subunits – the Sunda Shelf, Wallacea and the Sahul Shelf. According to this approach, the Sunda Shelf includes the Malay Peninsula, Sumatra, Java and Borneo; Wallacea comprises the Philippines, Celebes, Java, the Lesser Sunda Islands and the Moluccas; and within Malasia, the Sahul Shelf includes only New Guinea. However, current research on the biogeography of Malesian plants has indicated that the islands on the Sunda Shelf form a distinct floristic unit, with the exception of Java. On the contrary, Java forms a close affinity with the flora of some of the Wallacean islands, namely the Philippines and the Lesser Sunda Islands. Finally, according to this research, a third distinct floristic unit is formed by Celebes, the Moluccas and New Guinea.

Today, the mega-diverse region of Malasia belongs to seven nations – Singapore, Brunei, Indonesia, Malaysia, Papua New Guinea, the Philippines and Timor Leste. A study conducted by van Welzen, Ferry Slik and Janne Alahuhta in 2005, based on taxonomic revisions completed so far for Flora Malesiana, has proven that 70% of the plants recorded are endemic (restricted) to Malasia. This article marks the beginning of a series aimed at highlighting the diverse and extraordinary wild plants of Malasia.

great potential in the horticulture and landscaping industries. It is categorised as Vulnerable in the IUCN Red List of Threatened Species, based on an assessment conducted in 1998 by FRIM.

JOHANNESTEIJSMANNIA PERAKENSIS

Johannesteijsmannia belongs to the palm family, Arecaceae (also known as Palmae), and its members are popularly known as Joey palms. The genus comprises four majestic understory palm species of the rainforest, namely *J. altifrons*, *J. lanceolata*, *J. magnifica* and *J. perakensis*, and it commemorates the famous Dutch botanist Johannes Elias Teijsmann. Teijsmann arrived at Java in 1830 as the gardener of the Governor-General of the Dutch East Indies, Johannes van den Bosch. The following year, he was promoted to Curator



► Gregarious flowering of a specimen of *Maingaya malayana* cultivated at the Rimba Ilmu Botanic Garden in Kuala Lumpur, Malaysia.

of the Buitenzorg Botanical Gardens (now the Bogor Botanical Gardens), a position he kept until his retirement in 1869. Teijsmann was a prolific plant collector, and even after his retirement, he accumulated an enormous amount of specimens which still exist in major herbaria around the world today. *Johannesteijsmannia* is endemic to Malesia, and three of the species, namely *J. lanceolata*, *J. magnifica* and *J. perakensis*, are restricted to Peninsular Malaysia. *J. altifrons* has a much wider distribution, and occurs in Peninsular Malaysia, Sumatra, and Borneo (Sarawak).

In Peninsular Malaysia, the most commonly used vernacular names for *Johannesteijsmannia* are *daun payung* or *pokok payung* in the Malay language, which literally translate to 'umbrella leaf' or 'umbrella tree'. This denotes the importance of these plants to indigenous communities – *Johannesteijsmannia* leaves are commonly used as thatching for traditional houses, huts and temporary shelters. The leaf shape and arrangement of the palm



► Traditional house of a Peninsular Malaysian indigenous group in Selangor. (Reproduced with kind permission from the Singapore Botanic Gardens)



► Close-up of the pom-pom-like flowers of *Maingaya malayana*.

are in fact interesting ecological adaptations worth highlighting. The large trullate (or diamond-shaped) leaves, arranged spirally on the trunk, form a funnel-like trap that guides rainforest litter and rain towards the trunk of the palm. Hence, in the wild these palms are nearly always seen with substantial organic material accumulated at the base.

Of late, *Johannesteijsmannia* palms have been garnering significant attention among landscape architects in Malaysia and Singapore, which has resulted in them being widely used for landscaping. *J. altifrons*, *J. lanceolata* and *J. magnifica* are more commonly utilised, while *J. perakensis* is less common in cultivation as the species is extremely rare and has only been recorded from a handful of localities in Perak and Kedah. *J. perakensis* is extremely easy to distinguish from the rest of the species, as it is the only one that forms a distinctive trunk upon maturity. All *Johannesteijsmannia* palms are threatened in the wild, due to habitat loss and perhaps also over exploitation of seed harvesting and removal of adult specimens for the ornamental plant trade. Recent conservation assessments conducted by FRIM have classified *J. altifrons* as Vulnerable, and *J. lanceolata*, *J. magnifica*, and *J. perakensis* as Endangered, based on the IUCN Red List Categories and Criteria. 🌿

Low Yee Wen
Herbarium

All photos by Low Yee Wen unless otherwise stated



► *Johannesteijsmannia perakensis* cultivated in the Singapore Botanic Gardens. This specimen was planted in 1925.

PUBLICATION OF NEW PLANT NAMES

WE take it for granted that plants have names. Under the international rules we use for naming plants, each species has a unique botanical name, generally called the Latin name of a plant. Sometimes a plant doesn't have a name because it was previously unknown to science and it is then a taxonomist's job to give it one (see *Gardenwise* 32 (2009) for an article on how taxonomists invent these names). In this article, I want to explain the process of how a new name is published.

The Latin name of a plant does not formally exist until it is published in a manner that satisfies all of the requirements in the *International Code of Nomenclature for Algae, Fungi, and Plants* (the *Code*). The system we use is considered to have started in 1753 with the publication of Linnaeus's *Species Plantarum*. Names published before then simply do not count. Well over one million plant names have since been published (although only around a third of these are recognised as good species today), so even though the rules may sound complicated a lot of people have happily worked a way through them in order to publish their new species.

A useful analogy for the process is to think of a name having to negotiate an obstacle course. The name has to clear three hurdles in order to be adopted; if it fails at any one of the three then the name cannot be used.

The first hurdle is Effective Publication. Between 1753 and 2011, publication was only effected by distribution of printed matter such as books, journals and magazines. From the beginning of 2012, electronic publication, with safeguards, also became an allowable form of Effective

Publication. Handwritten notes, labels on plants, publication in seed catalogues and the like are not considered Effective Publication after 1 January 1953.

The second hurdle is Valid Publication. There is a complicated set of rules to decide if a name is validly published but, simplified, the name of a new species must satisfy three main points: it must consist only of the name of the genus and the species' epithet (i.e. the 'binomial' we are familiar with), it must be accompanied by either a description of the plant being newly named or a short summary (called a diagnosis) of how the new species differentiates from other species (between 1935 and 2011 this had to be written in Latin but as of 2012 this can be in Latin or English), and a type specimen must be designated for the new species and the institution where it is deposited must be clearly mentioned (see *Gardenwise* 38 (2012)).

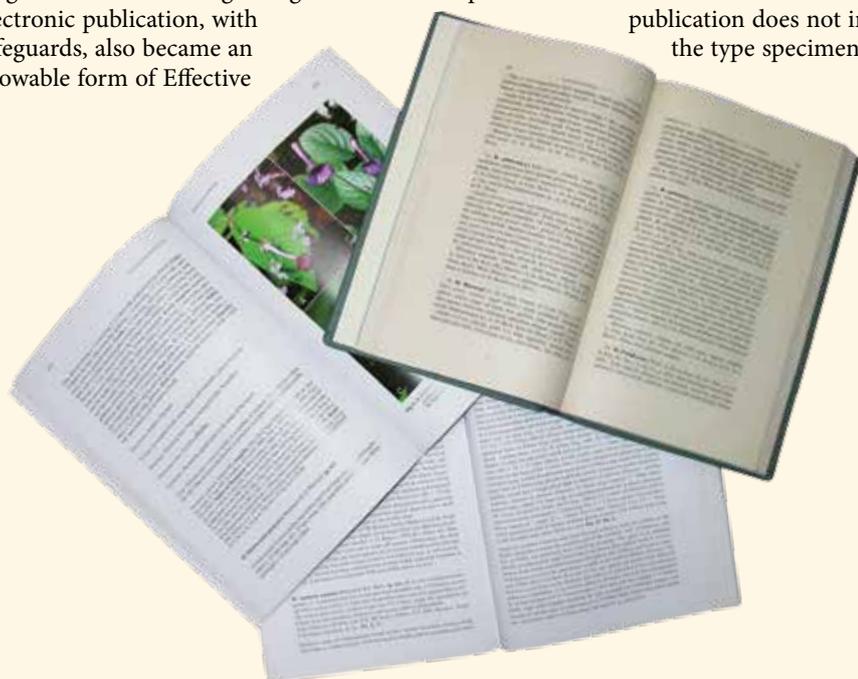
The third hurdle is that the name must be Legitimate. It must be ensured that the newly-adopted name has never been validly published before, and that the new publication does not include the type specimen

of an older name. If the name has been used before, the new name is illegitimate and cannot be used; in this event the taxonomist must start all over again and do his or her homework first! If it contains the type specimen of an older name, then it is said to be superfluous and in this case is also considered illegitimate. If the type specimen of the older name is of the same species as the newer concept, then the correct name for the 'new' species is actually that older name; nothing more need be done, as the species already has a name and is not new at all! If the author intended a different species altogether then yet another new name must be coined (the superfluous name can't be reused) and all steps must be gone through again. This may seem obvious in an era when we have so much data available at the click of a mouse, but in the past it may have been years after publication before other researchers learnt of a new name, or on which specimens it was based. Duplication of names was not uncommon, but today it is much less of an issue.

The rules are similar for the publication of new names for families, genera, subspecies, varieties etc. However, they are different when we want to move a species from one genus to another or change the rank from say species to subspecies. While the Effective Publication hurdle is the same, when it comes to the publication's validity, it's a little different because a name is always inextricably linked to the first time it was ever published, under whatever name that was. This original name travels with it to wherever it lands and under today's rules, a name in a different genus is not considered validly published if that original name and its publication details are not also listed. This new name, called a new combination because it is not a new species, must still be Legitimate as described above.

Effective. Valid. Legitimate. It sounds like a neat marketing slogan. Taxonomy can be exciting and those of us who are practitioners feel it needs little or no promoting. But the rules of the *Code*... they do need a little marketing to make them exciting! 🌿

David Middleton
Herbarium



BOTANICAL RESEARCH FELLOWS IN THE GARDENS 2013–2014

THE Singapore Botanic Gardens (SBG) Fellowship began in 2004 and the Burkill Fellowship in 2010. Since then, sixty-eight recipients have been awarded fellowships. The Fellowships are designed to allow seasoned researchers, early career botanists and Asian-based PhD students to come to Singapore to make use of the 750,000 specimens held at the Singapore Herbarium (SING). Our expectations of the Fellows depend on their respective career stages, but for all of them, we expect the studies pursued under our Fellowships to lead to scholarly publications, and that the more experienced researchers will accurately name and curate our collections. Deadlines for submission of SBG Fellowship applications are 31 March and 30 September. The 2013–2014 Research Fellows and their achievements are presented below.



Dr Deng Yuan Fei, a Professor at the South China Botanical Garden, was at SING (16–31 July 2013) to work on systematics of the genus *Peristrophe* (Acanthaceae).

Peristrophe is a small genus consisting of about 40 species that are distributed in tropical regions of Asia and Africa. His main objectives were to carry out a general sorting and identification of “indet.” (indeterminate) Acanthaceae material at SING, to investigate patterns of variation in morphological characters within *Peristrophe*, and to evaluate their taxonomic and diagnostic value. A comprehensive taxonomic revision of *Peristrophe* will be the final result, and this will directly benefit regional floras, e.g. Flora Malesiana.



Dr David J. Middleton, a Gesneriaceae systematist from the Royal Botanic Garden, Edinburgh, was here on a short stint (1–24 Sept 2013) to study the

herbarium collections of Gesneriaceae and Lauraceae for accounts of both families for the Flora of Thailand. While at SING, he determined Lauraceae, Apocynaceae and mostly Gesneriaceae. David also gave a talk in the SBG Speaker Series entitled *The ‘African’ Violet family (Gesneriaceae) in Southeast Asia*. Dr Middleton now works at the Singapore Botanic Gardens and is the current Keeper of SING Herbarium and Head of Research and Conservation.



Dr David M. Johnson and Dr Nancy A. Murray is a husband and wife team working towards a worldwide monograph of *Xylopia* by

2015. The SING collection, notably rich in specimens from the Malesian area, is of key importance in clarifying the taxonomic status of the widespread *Xylopia malayana* and its relatives, and for the completion of Annonaceae treatments involving the following genera: *Annona*, *Dasoclema*, *Disepalum*, *Fissistigma*, *Friesodielsia*, *Meiogyne*, *Melodorum*, *Mitrella*, *Popowia*, *Pyramidanthe*, *Sphaerocoryne*, *Trivalvaria* and *Xylopia*. While here (19 Jan–10 Feb 2014), they managed to squeeze in a workshop on *Genera of Commonly found Annonaceae* for SBG staff. Dr Johnson also presented *The Evolution and Geography of the genus Xylopia in the Annonaceae* for the SBG Speaker’s Series.



Ms Ana Rita Simões was here as a PhD candidate based at the Natural History Museum in London and registered at the University of Reading, where she has conducted a

project in plant systematics and evolution focusing on a complicated group in the family Convolvulaceae. Ana is the fourth recipient of the Burkill Fellowship (15 Jun–26 Aug 2013). Most of her fieldwork and herbaria visits were in collaboration with the Singapore Botanic Gardens, and with Dr George Staples who closely co-supervised all of the work. With the results of her molecular phylogenetic study of the tribe Merremieae, Ana came here to work on a taxonomic revision and description of a new genus for the family. She was awarded her PhD in September 2013.



Dr Stuart Lindsay, from the Royal Botanic Garden, Edinburgh is a tropical botanist. Stuart has been working on *The Ferns of Thailand, Laos and Cambodia* (Lindsay

& Middleton, 2012 onwards: <http://rbg-web2.rbge.org.uk/thaiferns/>) project, conducted at the Royal Botanic Garden, Edinburgh, in collaboration with the Forest Herbarium Bangkok, Queen Sirikit Botanic Garden in Chiang Mai and the Museum Nationale d’Histoire Naturelle in Paris. It is a project to provide an online information system and multi-access key to the ferns of Thailand, Laos and Cambodia. Many of the species included are also found in neighbouring countries, including (Peninsular) Malaysia and Singapore. His work at SING (2–24 Sept 2013) will allow access to our collections via the online database/key. While at SING, he verified determinations of Thai, Lao and Cambodian material. Dr Lindsay now works at Gardens by the Bay.



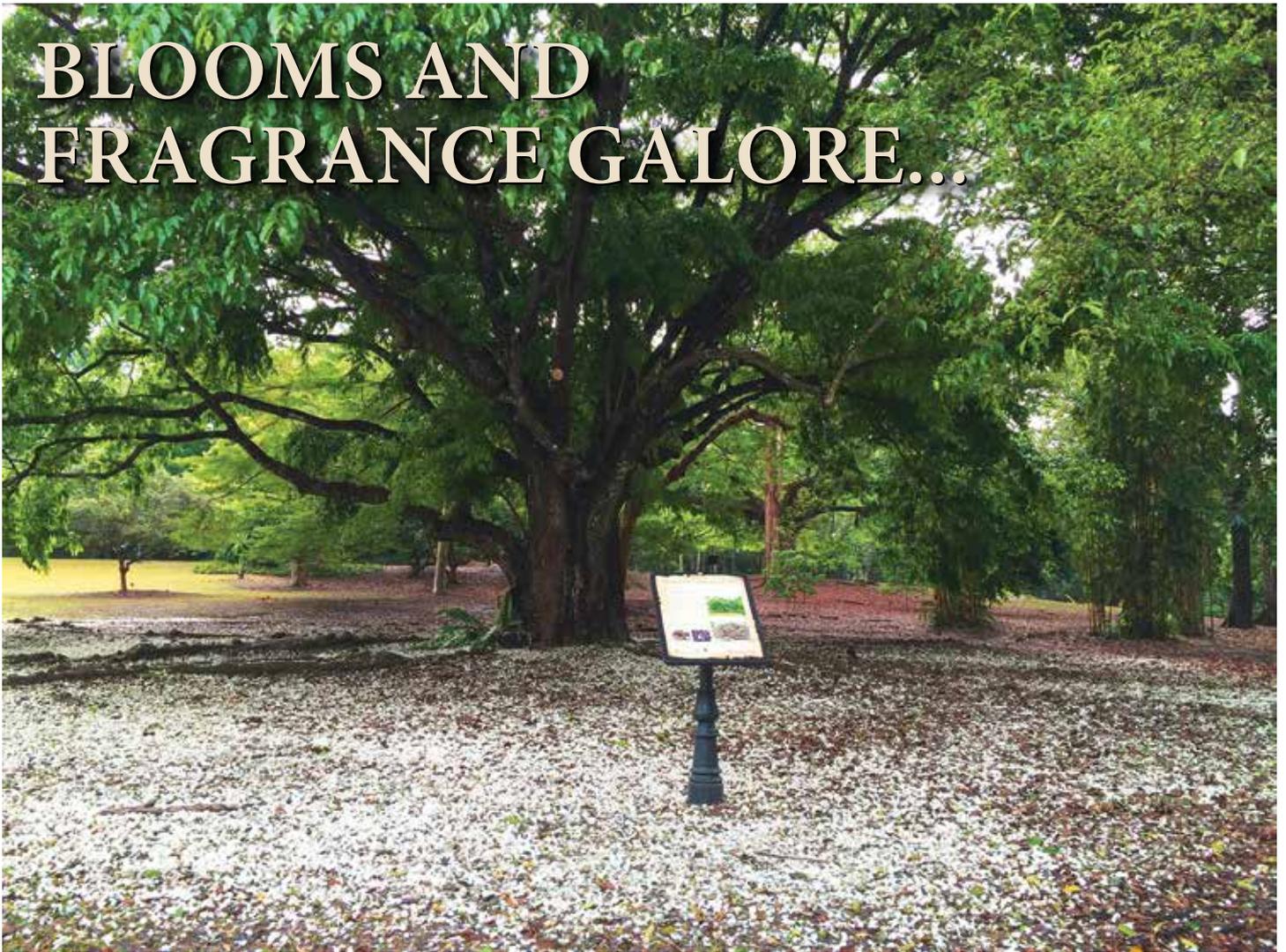
Ms Bai Lin is a PhD candidate from the South China Botanical Garden. Her dissertation is entitled *Taxonomic study of Zingiber in China*. Bai Lin’s main aim

while here (27 Feb–27 Mar) was to study herbarium collections at SING. She worked closely with her external supervisor Dr Jana Leong-Škorničková, our ginger specialist, in comparing and discussing the overlap of *Zingiber* species between China and the Indochinese floristic region in order to establish potential synonymies. Discussion also involved recent results from molecular data from other geographical regions. (Photo credit: Bai Lin). 🌿

Serena Lee
Herbarium

All photos by Serena Lee unless otherwise stated

BLOOMS AND FRAGRANCE GALORE...



► A lovely carpet of fragrant flower petals produced by the stately monkey pot tree delighted photographers. (Photo credit: Dr Nura Abdul Karim)

THE prolonged dry weather which affected Singapore from the middle of January until the middle of March resulted in the recording of the driest month since 1869 and a new record for the lowest average daily relative humidity of 74.5% (the previous record of 74.6% was set in June 2013; *The Straits Times*, 4 March 2014). A few days of torrential downpour finally broke the dry spell and triggered a fantastic natural phenomenon. Many street trees awakened from the drought and almost overnight burst into full bloom in celebration of the rain. Not to be outdone, many of the Gardens' trees and shrubs also came out in massive flowering displays. Even species that normally do not bloom en masse decided to so, and in all their splendid colours they were truly a sight to behold after two months of brown lawns and defoliating trees!

This was an opportune time to stroll through the Gardens, with added ambience provided by the sight of beautifully coloured flowers and a gamut of fragrances wafting through the air. During this time, the aseasional tropics went against the norm, and the Gardens exhibited spring-like scenes more common to temperate and Mediterranean climes, with many of its plants covered almost completely in flowers.

LECYTHIS PISONIS (MONKEY POT TREE OR SAPUCAIA)
A stately old tree near Swan Lake, thriving at the Gardens since 1926, is one such plant. This Heritage Tree suddenly burst into full bloom on the vast expanse of Lawn E. This tree has exhibited



► Close-up of the unique flowers of the monkey pot tree. (Photo credit: Dr Nura Abdul Karim)

sporadic flowering through the years, but this time, bunches of beautiful purplish-white flowers covered nearly every inch of its crown. As the flowers senesced, they created a lovely carpet of white petals around the tree's base, producing a romantic scene to the delight of many visitors, photographers and wedding couples.

This rather large, wide-spreading, densely-crowned tree with elegant horizontal branching, from the family Lecythidaceae, is known as a monkey pot tree or sapucaia. It is about 20 m in height and has leaves that are simple, long and petiolate with a wavy margin. The flowers are attractive and exude a wonderfully intoxicating fragrance – a cross somewhere between jasmine and vanilla. The flowers are arranged in loose racemes and are fleshy and purplish-white in colour. The six-petalled flowers have a central boss of golden stamens and are attractive to bees. The flowers bruise easily, oxidising to a bluish-green colour, and the gentle fragrance changes as the flowers wither to give off a strong sour-sweetish scent.

The fruit is an interesting, large woody capsule, which opens by a lid and looks very much like a pot. Monkeys in South America are known to put their hands into the pots to get to the delicious oil-rich seeds, hence the common name. The nutty seeds are oval in shape, with many ridges and grooves on the surface, and have white sweet arils attached. Research has shown that the endosperm is loaded with oil. The nuts are edible, and can be eaten either raw or cooked. When raw, the nuts taste similar to fresh young coconut flesh or macadamia nuts.

Until recently, our tree was incorrectly named *Lecythis ollaria* (although staff suspected this name was applied rather loosely), a rather narrowly distributed species from northernmost South America. Literature states that *L. ollaria* has small pots, about 8 cm in diameter, whereas the pots produced by our tree are larger, approximately double that in diameter. Gardens' staff set out to verify the identity of our tree, and what ensued was a lot of detective work across two institutions – SBG and the Royal Botanic Gardens, Kew.

The Gardens shipped a voucher specimen to Professor Sir Ghilleen Prance, the lead specialist of the family Lecythidaceae and former Director of the Royal Botanic Gardens, Kew. He identified our monkey pot tree as *Lecythis pisonis*. Our Director, Dr Nigel Taylor, who was at Kew recently, made further checks into the history of our tree in Kew's Archives. He thoroughly inspected their records, and in the Outward Books (which detail the plant materials Kew has dispatched to various botanical gardens over the years), he found a reference pertaining to a shipment of *L. ollaria* and *L. pisonis* to Singapore in a Wardian case in August 1926. Notes in the Kew Herbarium Index state that *L. ollaria* had been historically misapplied to *L. pisonis*, and in fact, both names as

used in the Outward Book likely referred to the same species. On cross-referencing this consignment to the details in the Inward Books (the documented list of plant materials brought into Kew from around the world), Dr Taylor found that our *L. pisonis* parent material was received by Kew from Rio de Janeiro, Department of Agriculture on 19 September 1924. Our own Gardens' index card of plants confirmed that a shipment of *Lecythis* was received from Kew back in September 1926 and this previously-misidentified tree was planted in December 1926. In 1926, the Rio Department of Agriculture included the famous Jardim Botânico, the likely source of the seeds sent to Kew.

Thanks to Professor Prance, we finally have the proper identification of our tree, and as a result of the investigative efforts of Dr Taylor, we now know its history. It originated from Rio de Janeiro, Brazil, where this particular species is native and widespread.

VALLARIS GLABRA (KESIDANG OR BREAD FLOWER)

Joining the monkey pot in recently producing massive amounts of blooms is a well-known tropical vine from Southeast Asia, *Vallisneria spiralis*. This vine belongs to the Apocynaceae, or frangipani family. It has been gracing a shelter overlooking the Eco-Lake for over 10 years. The local

vernacular name for this vine is kesidang, and in the west it is known as bread flower.

The kesidang flower is the state flower of Malacca, Malaysia. It is an apt choice as its flowers have long been considered symbolic of the grace, charm and beauty of traditional Malay culture. In olden times, *Vallisneria spiralis* was a popular flowering vine and grown in many stately home gardens, but is now quite a rarity in cultivation. The flowers give off a most pleasant scent that to some is akin to fresh fragrant pandan leaves (*Pandanus amaryllifolius*), while others associate it with the smell of freshly cooked fragrant rice or even rice crusts! The smell of cooked rice has given the plant another popular vernacular name – *kerak nasi*, which literally means 'rice crust' in Malay. Many westerners associate the smell with freshly baked bread, and hence, it is also known as bread flower.

In the past, the fragrant kesidang flowers, like those of bunga tanjung (*Mimusops elengi*) and bunga melur (*Jasminum sambac*), were coveted by Malay ladies, Nyonyas (Straits Chinese ladies) and Chitty ladies (Straits Indians). They would place the flowers in their *sanggul* (bun-up hair) to perfume themselves. At Malay engagement and wedding celebrations, kesidang flowers are one of a few obligatory flowers used in the making of *bunga rampai*. To make this traditional



► The lovely large clusters of kesidang flowers release a captivating pandan-like fragrance. (Photo credit: Dr Nura Abdul Karim)

potpourri, fresh petals of kesidang, rose (*Rosa* spp.), jasmine (*Jasminum sambac*), kenanga (*Cananga odorata*) and chempaka (*Magnolia champaca* or *Magnolia × alba*), along with thinly sliced fragrant pandan leaves (*Pandanus amaryllifolius*), are mixed with a few drops of rose water. This special potpourri is then attractively packaged and placed at the wedding dais and given away as tokens of appreciation to guests. These perfumed flowers are also placed on banquet tables or strung up in garlands and hung on festive arches for decoration. The flowers permeate the air and act as a fantastic natural air freshener.

Vallis glabra is an evergreen, woody climber that can grow to heights of 2 to 3 m. It is suitable for draping pergolas and trellises, but can also be pruned into a bush or hedge or even grown in a container. This vine needs full sun to flower well. It is a relatively easy plant to care for and grow, as it is very hardy and able to tolerate a wide range of conditions. The delicate and fragrant bisexual flowers occur in dense terminal clusters near the branch tips. The flowers are rather conspicuous and cup-shaped, with five pointed and slightly overlapping petals. The outer edge of each petal is curled inward to form a sharp point in the middle. The flowers open in the early morning and the fragrance is at its strongest in the evening. The flowers attract pollinators like butterflies, moths and bees. The fruits are paired follicles that split open into two halves when mature to release the seeds.

OCHNA INTEGERRIMA (VIETNAMESE MICKEY MOUSE PLANT)

Another spectacular flowering display was seen on a group of small trees grown as a hedge next to the historical Ridley Hall and at the VIP Orchid Display in the National Orchid Garden. These plants are *Ochna*

integerrima, and not to be outdone by the flowering plants around them, the recent weather triggered their production of glorious bright yellow blooms.

Ochna integerrima (also known by its synonym *O. harmandii*) belongs to the obscure family Ochnaceae, and has a wide distribution, ranging from Pakistan, India and South China through Indochina and Malaysia. In the nursery trade, it is commonly known as the Vietnamese Mickey Mouse plant. This species is related to the commonly found *O. kirkii* (known as the Mickey Mouse plant) which hails from southeastern Africa.

Ochna integerrima is a small tree or shrub that can grow up to 2 to 7 m in height.

It thrives in full sun. Its inflorescence is a corymb about 4 cm in length, which occurs on short branchlets. Each of its spectacular flowers is approximately 3 cm in diameter. The flowers have a faint sweet scent that nicely complements their bright cheery yellow petals. This tree's drought tolerance was proven during the prolonged dry spell, and sensational mass flowering events of *Ochna integerrima*, like the one we recently observed, definitely seem to be encouraged by water stress. The fruits of this species are shiny small black berries that are held on bright red sepals.

Reportedly, the roots of *Ochna integerrima* can be used as a cathartic for treating worms, and as a medicine for treating lymphatic disorders. It is grown in



Close-up of a branch of the Vietnamese Mickey Mouse plant with massive clusters of cheery bright yellow flowers. (Photo credit: Dr Nura Abdul Karim)

The Vietnamese Mickey Mouse tree located near Ridley Hall. (Photo credit: Dr Nura Abdul Karim)



► The Heritage *Alangium ridleyi*. (Photo credit: Mohammad Shairazi bin Idris)

Vietnam as a decorative ornamental which, when in full bloom, is said to bring luck to the grower. It is also one of many species used in bonsai in China and Indochina.

ALANGIUM RIDLEYI (MENTULANG DAUN LEBAR)

Last but not least of our recently notable flowering specimens is a Heritage Tree located off of Dell Lane on Lawn H. This species, *Alangium ridleyi*, is commonly known by the Malay vernacular name of mentulang daun lebar, and is often classified in its own family, Alangiaceae.

Our Heritage Tree was first noticed in the Singapore Botanic Gardens by Henry Nicholas Ridley, the first Director of the Gardens. He was certain the species was unknown to science, and so when the tree flowered in 1892, he immediately

dispatched a voucher specimen to his counterpart, Sir George King (the Superintendent at the Royal Botanic Garden, Calcutta), to help verify the tree's identification. The species was later described and named by Dr King as *Alangium ridleyi*, in honour of Ridley.

Sadly, this Heritage Tree is believed to be the last survivor of this species in Singapore. Even during Ridley's time, the species was a rarity and had only been observed on the Gardens' premises. Outside of Singapore, *Alangium ridleyi* can be found growing in Indochina, the Malay Peninsula, Borneo and Sumatra. It is mainly found in undisturbed mixed dipterocarp forests or as a pre-disturbance remnant in secondary forests. It thrives along rivers, and on hillsides and ridges.



► Close-up of the flowers of *Alangium ridleyi*. (Photo credit: Paul Leong)

Alangium ridleyi can grow up to about 30 m tall and has thick simple, alternate leaves with prominent veins. Our Heritage mentulang daun lebar is not a very spectacular looking tree, and it is often passed by without even a glance. Its recent mass flowering, however, brought it some attention. Although the creamy-coloured flowers were inconspicuous, they produced a scent that permeated the air and stopped visitors in their tracks. Curious visitors would have had to look closely though for the source of the alluringly delicious fragrance (similar to sweet mango pudding) – small panicles bearing three to four flowers each on the high branches of the tree.

The flowers of *Alangium ridleyi* are about 3 cm long and have long, narrow, thick petals that curve downward, exposing the stamens as they open. As the flowers age, the scent becomes more like ripe mangoes – a surprise given that this species does not belong to the mango family. The fruit is a lovely fleshy drupe about 3 cm long, which turns from green to red and finally purplish when mature. The seeds have white arils and have been noted to be edible.

The Gardens' staff (and no doubt our visitors!) breathed a collective sigh of relief when the downpours broke this year's long dry spell, and the spectacular colours and wonderful fragrances that resulted from the mass flowering of our trees and shrubs delighted our senses. True to the old saying, every dark cloud does indeed have a silver lining! 🌿

Nura Abdul Karim
Horticulture, Exhibitions and Events

COMMEMORATING 50 YEARS OF GREENING SINGAPORE



► The Gardens' Education staff helping children to create their very own pebble art. (Photo credit: Steffi Loe)



► A satisfied child with her pine cone owl creations. (Photo credit: Goh Mei Yi)



► Children designing and colouring their very own orchid hybrid. (Photo credit: Steffi Loe)

IN 1963, the then Prime Minister Lee Kuan Yew set into motion a campaign to transform Singapore into a Garden City, when he planted a mempat tree (*Cratoxylum formosum*) at Farrer Circus. To commemorate 50 Years of Greening Singapore, at the end of last year, the Singapore Botanic Gardens held a series of nature-related talks, craft activities, movie screenings and musical performances.

Over 1,100 visitors attended the event, which was held from 30 November to 15 December on the gently rolling landscape of Lawn E, near the iconic \$5 tembusu tree – the Gardens' Heritage Tree which is not only immortalised in the national currency but in the hearts and minds of the nation.

CRAFT ACTIVITIES AND GAMES FOR THE FAMILY

A variety of craft activities was offered to children and their families. These projects aimed to engage imagination and creativity through the production of unique creations from natural materials, such as pebble art, pine cone owls, origami hats and nature mobiles. Participants also had a chance to showcase their artistic skills by taking part in a competition to colour printed images of some of the Gardens' iconic landmarks, including the \$5 tembusu tree. Families were also invited to play a carbon footprinting game, which taught about carbon footprints and the many small things that we can do to reduce our footprints.

TALKS, TOURS AND DEMONSTRATIONS

Gardens' staff presented a series of engaging nature-related talks to educate and stimulate public interest in a diverse range of topics, including on-going botanical research, the art of nature photography and the fauna of the Gardens. Participants interested in hands-on activities were treated to fascinating demonstrations of creating floral arrangements. Would-be gardeners were also given advice on how to care for foliage plants in their homes. Of course, a visit to the Gardens would not have been complete without a stroll through its verdant landscape, and visitors were treated to guided walks which focused on the rich history of the Gardens' Heritage Trees.



► Visitors listening to live music at the Bandstand, illuminated by the light of a false full moon. (Photo credit: Grace Lee)

MOVIE SCREENING AND BAND PERFORMANCES

After a full day of talks, tours, demonstrations and craft activities, the evening brought our visitors a chance to unwind. Under the soft light of the stars and the cooler dusk air, they were invited to lounge and picnic on the lawn while enjoying a movie screening against the backdrop of Swan Lake. From there, a short walk down a path illuminated by fairy lights led them to the Bandstand where they, like visitors from decades past, were treated to the melodic tunes of a live band or choir.

It was under the ethereal light of a false moon, erected above the Bandstand, with the voices of a performing choir permeating the cool night breeze, where the event drew to an end, bringing Singaporeans closer to the living heritage of the Gardens. 🌿

Steffi Loe
Education Branch

THE FLORA OF MYANMAR INSTITUTIONAL CONSORTIUM



► Founding meeting of the Flora of Myanmar Institutional Consortium in Yangon. Sitting are: (right) Dr Hubert Kurzweil, signing on behalf of the Singapore Botanic Gardens; (left) Dr Tetsuo Koyama, CEO of Makino Botanical Gardens, Japan. Standing are (from left to right): Mr Zaw Win Myint, Director of the Forest Research Institute, Myanmar; Mr Win Naing Thaw, Director of the Nature and Wildlife Conservation Division of the Myanmar Forest Department; Dr Suyanee Vessabutr, Director, Queen Sirikit Botanic Garden, Chiang Mai, Thailand.

SITUATED at the crossroads of Indochinese, Malesian and Himalayan floras, the plant life of Myanmar is very rich but poorly known as a consequence of the political situation in the country. It is now generally accepted that ecological conservation, and sustainable use and development of economic plants are vital in our time and age, although the importance of a comprehensive plant inventory as the basis for achieving such goals is much less understood. It is with this in mind that the Myanmar Forest Department and the Makino Botanical Garden, Japan have agreed to consolidate their bilateral team by expanding it into an international consortium of several institutions, namely by adding to their efforts the Singapore Botanic Gardens, the Queen Sirikit Botanic Garden (Chiang Mai, Thailand), the Kunming Institute of Botany of the Chinese Academy of Sciences, and the Smithsonian Institution (Washington DC, USA). The main goals of this consortium are research, floristic inventory work and capacity building within Myanmar, aiming at the eventual publication of a Flora of Myanmar. Among the major objectives is also the upgrading of the herbarium of Myanmar's Forest Research Institute in Yezin, near the capital city Naypyitaw in the central part of the country. All of this comes at a time of rapid liberalisation and democratisation of Myanmar, which is seen as a good opportunity for foreign institutions to get involved.

The Flora of Myanmar Institutional Consortium (FoMIC) was founded during a meeting at the Sedona Hotel in Yangon on 29 March 2013. The meeting was attended by about 30 delegates from various Myanmar institutions (Ministry of

Environmental Conservation and Forestry, Department of Agricultural Research, Yangon University, Myanmar Floriculturist Association) and all foreign institutions that are mentioned above. Many of the foreign delegates gave brief presentations

to introduce their home institutions and research programmes. The Singapore Botanic Gardens (SBG) was represented by Dr Hubert Kurzweil, the contact person for the Gardens.

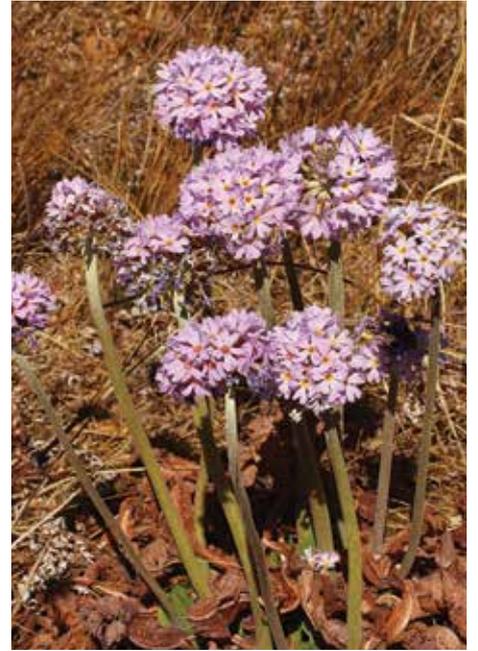
Regular meetings are conducted to discuss various issues of the consortium. The next meeting is scheduled to be held on 26 and 27 September 2014, here at the Singapore Botanic Gardens.

The first activity of the consortium was to organise a joint field expedition to Natma Taung National Park in southern Chin State in February and March 2014. Gazetted in 1994 because of its extraordinarily rich diversity of flora and fauna, the park includes Natma Taung (Mt Victoria), the highest mountain in that part of Myanmar (3,053 m). The park is made up of mountainous terrain ranging between 1,500 m and more than 3,000 m in altitude, and harbours mainly montane forest and subalpine meadow. Until recently, large tracts of the park were not open to foreign visitors, and some remote zones are still inaccessible. The summit is easily reached from the Park Headquarters at Kampetlet via an unpaved road by four-wheel drive vehicle, which can also be used to access the more remote areas of the park. Even in ideal weather conditions, reaching the furthest areas of the park requires more than two full days to drive from the Park Headquarters. During the rainy season, the road conditions are unpredictable, as fallen trees often block the jeep track and bridges may not be present to cross rivers. However, new roads in the park are under construction, and bridges are being repaired or reconstructed, which will help to bring more of the park within reach of researchers and tourists in the future.

The vegetation of Natma Taung is greatly varied. Below 1,000 m, before reaching the Park Headquarters at Kampetlet, the forest is mainly composed of *Dipterocarpus tuberculatus*. Further inside the park, the steep slopes are covered in evergreen forest dominated by Clusiaceae, Guttiferae and Lauraceae, or in semi-deciduous oak forest. Mass blooming of *Bauhinia* (Caesalpiniaceae), *Erythrina* (Fabaceae) and *Firmiana* (Sterculiaceae) can be quite spectacular. While ascending Mt Victoria,



► Hills in Kachin State, northern Myanmar.



► *Primula denticulata* (Primulaceae).



► Waterfalls in Natma Taung National Park in Chin State, Myanmar.



► *Rhododendron arizelum* (Ericaceae).



► Pressing specimens in the courtyard of our school-camp in Matupi, Natma Taung National Park.



► *Musa* sp., likely *M. sanguinea* (Musaceae).



► *Agapetes* sp. (Ericaceae).



► *Duabanga grandiflora* (Lythraceae).



► *Amomum dealbatum* (Zingiberaceae).



► *Luisia thailandica* (Orchidaceae).



► *Dendrobium nobile* (Orchidaceae).

the vegetation dramatically shifts towards pine forest dominated by *Pinus kesiya* and near the top becomes rhododendron forest, dominated by stands of *Rhododendron arboreum*. Subalpine meadows extend to the summit of the mountain and are rich in species endemic to the area, such as *Potentilla montisvictoriae* (Ranunculaceae) and *Roscoea australis* (Zingiberaceae), and display mass bloomings of *Anemone obtusiloba*, *Primula denticulata* and *Gentiana sino-ornata*. Trees are draped in epiphytic mosses, ferns and orchids. Epiphytic Zingiberaceae (*Globba*, *Hedychium*), Gesneriaceae (*Aeschynanthus*), Apocynaceae (*Hoya*) and Ericaceae (*Agapetes*) are also locally abundant.

The aim of the expedition was to collect plant specimens on Mt Victoria and in two remote locations near the townships of Mindat and Matupi. Visiting such remote areas meant that no running water or reliable electricity was available, and all supplies excluding food had to be carried from Yangon. Near Mindat we camped near the edge of the *Rhododendron* forest, while in Matupi we were able to occupy a local school building. Luckily our trip coincided with Myanmar's school holidays! Without electricity, the drying of herbarium specimens had to be modified; usually specimens are dried in the field using an electric heater shortly after collection, but this time all specimens were pressed between sheets of newspaper, tied in bundles and temporarily preserved in an alcohol solution.

Our SBG representative on the expedition was Dr Michele Rodda. The fieldwork in February and March was in the middle of the dry season, and although seasonal herbs such as Liliaceae and Zingiberaceae were dormant, many trees and shrubs were in bloom. During the expedition more than 1,000 collections were made, most in up to seven duplicates. These will be distributed to the herbaria of the consortium members and will be valuable additions to the knowledge of the flora of Myanmar. One set of duplicates will also be sent to the Singapore Herbarium. 🌿

Michele Rodda and Hubert Kurzweil
Herbarium

Photos by Michele Rodda, Hubert Kurzweil and Saw Lwin

THE 5TH INTERNATIONAL ORCHID CONSERVATION CONGRESS (IOCC) IN RÉUNION ISLAND AND POST-CONFERENCE TOUR TO MADAGASCAR



▮ The theme of the 5th IOCC was *Orchid Conservation – making the links*.

SPONSORED by the Orchid Specialist Group of the International Union for Conservation of Nature (IUCN), the International Orchid Conservation Congress is one of the most important international events to focus on orchid conservation. It provides a global forum for members of the scientific community to share their knowledge, experience and research in orchid conservation. The 5th IOCC, held in Réunion Island from 2 to 6 December 2013, continues on from previous successful congresses held in Perth (Australia) in 2001, Sarasota (USA) in 2004, San José (Costa Rica) in 2007 and Hluboká (Czech Republic) in 2010.

The Orchidaceae is the largest flowering plant family in the world and many species rely on a complex set of ecological interactions for their survival. For example, orchid seeds cannot germinate in the absence of a mycorrhizal fungus, and many species are pollinated by specific insects and other pollinators. The effects of habitat degradation, climate change and other issues on these ecological interactions are varied and present great challenges to the conservation of orchids. Hence, the theme of the 5th IOCC was *Orchid Conservation – making the links*. More than one hundred experts from around the world attended

the Congress with the aim of making significant progress towards conserving the orchids of the world.

The organisers of the Congress believe that this is a time for a synthesised approach, in which various lines of investigation should be examined with the goal of defining gaps in current conservation efforts and identifying future initiatives. Eleven sessions were held, each contributing to the theme of the Congress: biogeography, biological



▮ *Vanilla madagascariensis*.

invasions, conservation genetics, habitat restoration/translocations, mycorrhizas for conservation, pollination for conservation, propagation technology, taxonomy, vanilla conservation, population dynamics and phylogenetic relationships.

Field trips were also offered during the Congress, and I chose to attend a tour entitled *Ex situ conservation of Vanilla*. The trip started with a visit to the vanilla collection maintained by CIRAD (Centre de Coopération Internationale



▮ Succulent plants at the Conservatoire Botanique National de Mascarin.



► Traveller's palms along the Pangalanes Canal.

en Recherche Agronomique pour le Développement) at Saint Pierre. CIRAD has one of the largest *Vanilla* collections in the world, with about thirty species and hybrids from the Americas, Africa and around the Indian Ocean, and provides for the *ex situ* conservation and distribution of plant material to researchers worldwide. In the afternoon, we visited the Conservatoire Botanique National de Mascarin, one of France's eight Conservatoires Botaniques Nationaux. Its primary mission is to

manage and monitor native species in their natural habitats. The garden contains about 4,000 plant species endemic to the Mascarene Islands (which include Madagascar, Mauritius, Rodrigues and Réunion).

After a most intellectually stimulating conference, some of the Congress participants, including myself, attended a post-conference tour to study the native orchids of Madagascar. This trip, held

9–20 December, gave us an opportunity to discover Madagascar's rich biodiversity. The tour was led by Jean-Michel Hervouet, a member of the French Orchid Society. Jean-Michel has been to Madagascar more than 10 times and is an expert in Madagascan orchids.

Although December is not the best flowering season for orchids in Madagascar, we managed to see more than 30 native species in bloom during the



► *Angraecum filicornu*.



► A green chameleon.



► *Cynorkis flexuosa*.



► *Cymbidiella falcigera*.



► Ring-tailed lemurs.



► *Aerangis ellisii*.



► *Bulbophyllum baronii*.

trip. We visited a number of places on the tour, including the Pangalanes Canal, the Vohibola Reserve, the Palmarium Reserve, the Andasibe and Analamazoatra Reserves, Ranomafana National Park and Isalo National Park.

On the first day, we took the Pangalanes Canal (a long waterway stretched along the east coast of Madagascar, partly natural and partly artificial), heading to Akan'ny Nofy. After settling down in our hotel, we visited the Andranokoditra Village and nearby Vohibola Reserve, where we saw several interesting lemurs and orchids. After breakfast the following day, we visited the Palmarium. In the two hours

that we strolled this 40 ha reserve, we saw several rare but people-friendly lemurs, rare birds, palms, carnivorous plants and many orchids, including *Angraecum filicornu*, *A. ochraceum*, *Cymbidiella falcigera*, *C. flabellata*, *Cynorkis fastigiata*, *Microcoelia aphylla*, *Oeceoclades pulchra* and *Vanilla planifolia*. In the afternoon, we took a boat to Manambato and arrived at Andasibe Reserve in late afternoon.

The next day we visited both the Andasibe and Analamazoatra Reserves. The reserves are well-known tropical humid forests, and we saw plenty of ferns, medicinal plants, rare trees and three species of orchid – *Angraecum rhynchoglossum*, *Bulbophyllum*

occultum and *B. rubiginosum*. The fauna was also interesting, and besides the very attractive Indri lemurs, we saw many birds, frogs, chameleons and other reptiles.

Next, we took the road to the capital city, Antananarivo, and from there we travelled to the high plateaus, passing through many beautiful paddy fields, cascades, brick houses and markets selling fruits and vegetables. After a few stops, we arrived at Antsirabe, a city located right inside an old volcanic crater at an altitude of 1500 m. We visited the forest in the area and saw several orchids and many other native Madagascan plants.

The following day, we travelled past Ambositra before finally arriving at the Andohariana cascade, where we climbed up the rocky Mont Ibity to look for orchids and succulent plants. There, we saw *Angraecum magdalenae*, *A. rutenbergianum*, *Bulbophyllum baronii*, *Cynorkis flexuosa* and *Polystachya henrici*. Afterward, we searched for orchids at Ankazomivady (at an altitude of 1721 m), and found *Aerangis ellisii*, *Angraecum*



► *Cynorkis lindleyana*.

sororium and *Cynorkis lindleyana* growing on the rocks.

Our next stop was Ranomafana National Park, where we spent the entire next day trekking. We were rewarded with sightings of many lemurs and quite a few flowering orchid species. At an altitude of 1020 m, near the trails around Belvédère, we



► *Bulbophyllum multiflorum*.

discovered *Bulbophyllum longiflorum*, *B. multiflorum* and an unknown, possibly new species of *Didymoplexis*. At the St Andranofady trail, we saw *Bulbophyllum aubrevillei*, *B. imerinense* and *B. multiflorum*. We then continued on our journey, making short stops at the cities of Fianarantsoa and Ambalavao (famous for its “antemoro” paper and silk), and at Anja,

where we discovered *Angraecum calceolus*, *Cynorkis gibbosa*, *Oeceoclades calcarata* (fruiting) and *Sobennikoffia humbertiana*.

The entire next day was dedicated to exploring Isalo National Park, where we saw many interesting habitats, including natural springs, strange rock formations, humid forested areas and caves, and an



► Isalo National Park.



► Isalo National Park with rosy periwinkle (*Catharanthus roseus*) in bloom.

amazing flora, including *Pachypodium* species and aloes. We also saw a number of orchids, including *Cynorkis uniflora*, *Habenaria bathiei* and *Jumellea*, which were unfortunately not in bloom, although we did find fruiting a *Eulophia* and *Nervilia simplex*. The park is also rich in endemic fauna such as birds, butterflies, lizards and a few lemurs, including Sifakas.

The next day, we moved on to the National Park of Zombitse, where we had our first glimpse of baobabs. After lunch, we crossed the Tropic of Capricorn and saw the impressive wide-open high plateaus where many majestic palms grow naturally, finally arriving at the city of Tuléar in the evening. On the final day of our trip, we visited Tuléar's Antsokay Arboretum. Created by the Swiss amateur botanist Hermann Petignat in 1980, the beautiful 40 ha arboretum is home to many endangered native plants.

The IOCC gave me an opportunity to share Singapore's experience in orchid conservation and re-introduction, and to learn about the latest advances in orchid conservation research. The Congress attracted many distinguished speakers from around the world, and the lecture program was excellent. It also enabled plenty of opportunities for interaction with international researchers. The Congress was very well-organised, and the post-conference tour was remarkable. Overall, it was a very fruitful and memorable experience. 🌿

Yam Tim Wing
*Orchid Breeding and Conservation
Biotechnology Laboratory*

All photos by Yam Tim Wing



► A baobab (*Adansonia* sp., possibly *A. za*) at the National Park of Zombitse.



► Post-conference tour members at Tuléar's Antsokay Arboretum.

KEY VISITORS TO THE GARDENS

January-June 2014



► His Majesty the Yang di-Pertuan Agong Tuanku Abdul Halim Mu'adzam Shah and Her Majesty Raja Permaisuri Agong Tuanku Hajah Haminah at the orchid naming ceremony, with the First Lady of Singapore, Mrs Mary Tan.



► His Excellency Issoufou Mahamadou, the President of the Republic of Niger, during his visit in January 2014.

- Mr Abdulhameed Ali Almarzouqi**
Director of Infrastructure and Asset Management,
Department of Municipal Affairs, United Arab
Emirates
- Dr Fuad Alansari**
University of Bahrain
- Ms Rani Asmarayani**
University of Missouri-Saint Louis, USA
- Ms Bai Lin**
South China Botanical Garden, People's Republic
of China
- Dr Hamady Bocoum**
President, ICOMOS, Senegal
- Ms Irina Bokova**
Director-General of UNESCO
- Mr Pasakorn Boonchalee**
Khon Kaen University, Thailand
- Dr Pranom Chantaranonthai**
Khon Kaen University, Thailand
- Mdm Vivian Coser Sette**
Wife of Senator Ricardo Ferraço, Brazil
- Dr Nicholas Cuff**
Northern Territory Herbarium Darwin, Australia
- Richard Deverell**
Director, Royal Botanic Gardens, Kew, UK
- Dr Dale Dixon**
National Herbarium of New South Wales,
Australia
- His Excellency Recep Tayyip Erdoğan & Mrs Emine Erdoğan**
Prime Minister of the Republic of Turkey &
Spouse, Turkey
- Dr David G. Frodin**
Royal Botanic Garden, Kew, UK
- Ms Christin Furtwängler**
First Secretary and Head, Cultural and Press
Section, Embassy of the Federal Republic of
Germany
- Elizabeth Gilfillan**
Past President, Friends of the Ballarat Botanical
Garden, Victoria, Australia
- Prof Huang Hongwen**
Director, South China Botanical Garden, People's
Republic of China
- His Excellency Issoufou Mahamadou**
President of the Republic of Niger
- Dr Ebrahim Janahi**
President, University of Bahrain
- Dr Shikha Jain**
Ministry of Culture, India
- Dr David Johnson**
Ohio Wesleyan University, USA

- Dr Chaothip Kanthachote**
Khon Kaen University, Thailand
- Professor Davut Kavranoğlu**
Deputy Minister, Ministry of Science, Industry
and Technology, Turkey
- Dr Ruth Kiew**
Forest Research Institute Malaysia, Malaysia
- Tony Kirkham**
Head, Arboretum, Royal Botanic Gardens, Kew,
UK
- Dr Gauri Krishnan**
Centre Director, Heritage Institutions, Indian
Heritage Centre, India
- Dr Stuart Lindsay**
Gardens by the Bay, Singapore
- Dr Tatyana Livshultz**
The Academy of Natural Sciences of Drexel
University, USA
- Ms Luong Thien Tam**
University of Science, Socialist Republic of
Vietnam
- Mr Dominik Malek**
Charge d'Affaires a.i. Embassy of the Republic of
Poland
- Ms Helena B. Mathisen**
University of Oslo, Norway
- Dr Bill McDonald**
Queensland Herbarium, Australia
- Mdm Maimunah Mohd Sharif**
Municipal Council of Seberang Perai, Penang &
UNESCO delegate, Malaysia
- Mr John Mood**
Lyon Arboretum, USA
- His Excellency Mr Antonio A. Morales**
Ambassador Extraordinary and Plenipotentiary,
Embassy of the Republic of the Philippines
- Michael Murphy**
Director of Development, Royal Botanic Gardens,
Kew, UK
- Dr Nancy Murray**
Ohio Wesleyan University, USA
- Dr Weerachai Na Nakorn**
The Crown Property Bureau, Thailand
- Ms Sakuntala Ninkaew**
Khon Kaen University, Thailand
- Dr Ong Jin Yao**
National Taiwan University, People's Republic of
China
- D. M. S. K. W. B. Palipana**
Curator, garden of University of Peradeniya, Sri
Lanka
- Mr Jorge Pérez & Spouse**
Mayor of Medellín & First Lady, Colombia

- Dr Axel Poulsen**
University of Oslo, Norway
- Mr Safarov Vugar**
Head of Regional Executive Power of Nakhchivan
City, Azerbaijan
- His Excellency Mr H. Taner Seben**
Ambassador Extraordinary and Plenipotentiary,
Embassy of the Republic of Turkey
- Dr Shirley Sherwood, OBE**
The Shirley Sherwood Gallery of Botanical Art,
Royal Botanic Gardens, Kew, UK
- Dr Paul Smith**
Head, Millennium Seed Bank, Royal Botanic
Gardens, Kew, UK
- Mrs Suh Ki Ae**
Spouse of Ambassador Extraordinary and
Plenipotentiary, His Excellency Mr Suh Chung-ha,
Embassy of the Republic of Korea
- Mr Phanom Sutthisaksopon**
Khon Kaen University, Thailand
- Dr Boguslaw Szymgin**
President, ICOMOS, Poland
- His Excellency Mr Haruhisa Takeuchi**
Ambassador Extraordinary and Plenipotentiary,
Embassy of Japan
- Datuk Seri Ahmad Phesal Talib**
Mayor of Kuala Lumpur, Malaysia
- Dr Tony Tan Keng Yam & Mrs Mary Tan**
President of the Republic of Singapore &
First Lady
- Mr Woranart Thammarong**
Khon Kaen University, Thailand
- His Excellency Thongsing Thammayong**
Prime Minister of the Lao People's Democratic
Republic
- H.E. Mr Tran Hai Hau**
Ambassador Extraordinary and Plenipotentiary,
Embassy of the Socialist Republic of Vietnam
- His Majesty the Yang di-Pertuan Agong Tuanku Abdul Halim Mu'adzam Shah & Her Majesty Raja Permaisuri Agong Tuanku Hajah Haminah**
Supreme Head of State & Royal Consort, Malaysia
- His Excellency Mahmadsaid Ubaydulloyev**
Mayor of Dushanbe, Republic of Tajikistan
- Dr Max van Balgooy**
Naturalis Biodiversity Center, The Netherlands
- Mrs Monica Villegas Tomlin**
Honorary Consul, Consulate of the Republic of
Colombia
- Catherine Werner**
Director, Sustainability, Office of the Mayor, Saint
Louis, Missouri, USA

JURAIMI BIN SAMSURI, 'THE GARDENS' FORMER RESIDENT ARTIST

JURAIMI BIN SAMSURI was the resident artist of the Singapore Botanic Gardens from 1942 to 1961. Juraimi was born locally and educated at the Tanglin Besar Malay School and Victoria School. Although he had no specialised training, Juraimi was a skilled artist and mastered the art of line drawing as well as watercolour painting.



► Juraimi painting at his desk.

Juraimi was first employed by the Gardens in 1942 to print labels, but because of his talent in drawing, he was quickly re-appointed as the Gardens' resident artist. Even during the Japanese occupation, Juraimi continued to work, painting delicate watercolours of sweet potato varieties and other vegetables. During his career, Juraimi produced many illustrations for prominent botanists, and his work is featured in several publications, including *Gardening in the Lowlands of Malaya* by R.E. Holttum (1953), *Pot Plant Culture* by R.E. Holttum (1951), *Common Malay Plants* by H.B. Gilliland (1958) and *Common Malayan Wildflowers* by M.R. Henderson (1961). All of the line drawings in the 11 volumes of *Malayan Garden Plants* (published between 1949 and 1959 by the Singapore Botanic Gardens) were produced by Juraimi, and his illustrations are also found in gardening articles that appear in *The MAHA Magazine* (Malayan Agri-Horticultural Association).

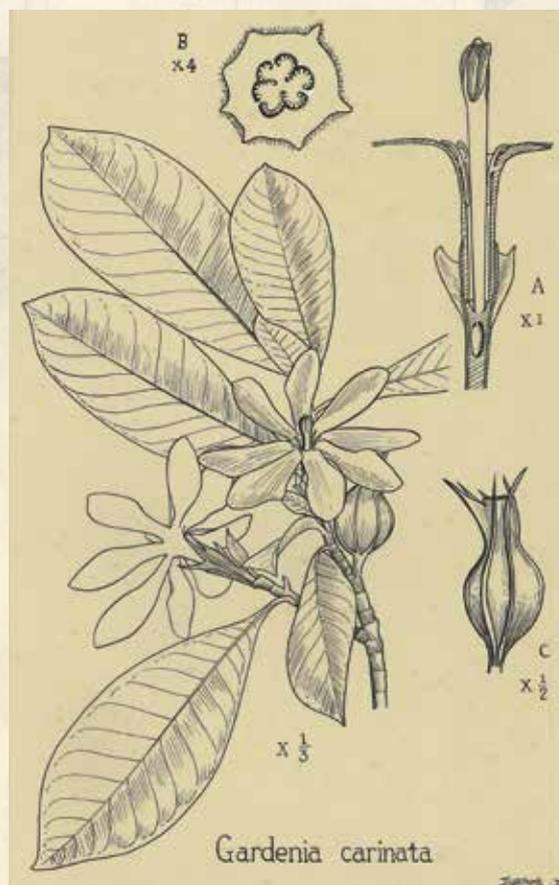
The Gardens' Archives contains approximately 200 watercolours and technical drawings produced by Juraimi, as well as a collection of his drawings in metal engravings on wooden blocks, which were used in the printing of the *Gardens' Bulletin* and *Malayan Garden Plants*. The illustrations contained in these collections are of outstanding technical and artistic merit.

Juraimi died prematurely in 1971, at the age of 48. 🌿

Christina Soh
Library



► A painting of *Uvaria purpurea* by Juraimi.



► A line drawing of *Gardenia carinata* by Juraimi.



► A metal engraving of a drawing by Juraimi, used in the printing of the *Gardens' Bulletin*.