

Gardenwise

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(Photo credit: Lim Yaohui)

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Visitors enjoy a movie screening at the Gardens, one of a series of events held to mark the opening of the new Heritage Museum and CDL Green Gallery. (Photo credit: Grace Lee Khee Shiang)

MESSAGE FROM THE DIRECTOR



BY the time you are reading this, Singapore Botanic Gardens' World Heritage bid dossier will have been submitted to UNESCO. It has been an interesting journey, during which we have learnt a lot more about the Gardens' rich history, a major milestone being the opening of our Heritage Museum at Holttum Hall in November (pp. 21-23). That our learning process is ongoing is made clear in this issue, in which we continue to highlight some of the interesting outcomes of our historical and other research, including that of our partners at the National Heritage Board (see Daniel Tham's fascinating piece) and various non-governmental stakeholders. What comes next in the World Heritage (WH) process? In June 2014, the annual meeting of the WH Committee, comprising elected representatives of 21 member states, will take place in Doha, Qatar, where Singapore will strive to further raise awareness of the significance of our bid. Later in the year, SBG expects to receive heritage experts appointed by UNESCO on a visit to evaluate the site in relation to our draft Management Plan, which was submitted with the dossier. After this, it is a matter of waiting for 2015 and the WH Committee's deliberations at the meeting which follows in Berlin. We keep our fingers crossed.

So, besides Daniel's piece, which includes the earliest known image of SBG and describes what might be labelled an 1871 forerunner of the modern Singapore Garden Festival (!), we have various articles on the Gardens' rich plant heritage. Among these are our iconic, ancient tembusu trees that may tell a story of what happened at the site prior to 1859, when we believe it was used for the cultivation of gambier (*Uncaria gambir*)—a valuable source of tannin, but a major destroyer of forest, causing the soil to become impoverished and giving the Gardens a difficult start.

It may even be that SBG's land was formerly cultivated by the famous Chinese *towkay*, Seah Eu Chin, the 'Gambier King', whose plantations are said to have stretched from the area of River Valley Road to as far away as Bukit Timah. Two of the ancient tembusus were recently protected by high

quality fencing, designed to both ensure that their delicate root zones do not get compacted by many visitors' feet, and to set off these grand old veterans in a stylish sanctuary. I was much pleased by the feedback received from visitors as they passed by the fence under construction and offered their support for our efforts to protect these trees for future generations. Saving our trees is really something people see value in.

As in previous issues, we carry reports demonstrating that Gardens' staff were active at international meetings in 2013, not least the Flora Malesiana Symposium (Bogor, Indonesia, August) and the Global Botanic Gardens Congress (Dunedin, New Zealand, October). The first of these benefitted from the participation of a substantial number of SBG's botanical and horticultural experts, while the second

was preceded by a regional training course in which SBG's Dr Nura Abdul Karim was a tutor. At home we continue to be very active and, dare I say, expansionist, in public education programming across all age groups, including storytelling on the 3 Rs—Reduce, Reuse and Recycle. Sustainability is something that all botanic gardens around the world should preach and practice, so it is particularly apt that on 30 November, Singapore's Prime Minister, Lee Hsien Loong, inaugurated SBG's CDL Green Gallery, the first 'zero-energy' gallery in Singapore. This building features cutting edge materials and construction methodology, such as Hempcrete-walled modular units and a photo-voltaic roof. I am not in any doubt that the Botanic Gardens was the right place to launch such a building, teaching us as it does the importance of utilising natural resources in the most sustainable way. It also gives us a valuable temporary exhibition space. There will be more on this in our next issue.

Education and capacity-building are fundamental activities for a well-established institution such as SBG, especially since Singapore is surrounded by nations that may need help in developing their own gardens. Thus, we recently played host a second time to staff from the Pha Tad Ke botanic gardens in Laos (see p. 24) and we will be receiving senior staff from Sri Lankan and Omani gardens later this year, for horticultural management and public education programme training, respectively. I see this activity as an important measure of our usefulness to the global botanic gardens network.

Lastly, I would like to sincerely thank all of our supporters and stakeholders that gave up their time to give us feedback on our UNESCO dossier (Nomination Document and Management Plan) during our public consultation, from August to December, and to the many staff that helped guide the innumerable heritage tours for the diverse groups we have engaged with over the past year. These activities, together with abundant media coverage, have helped raise SBG's profile and acquaint Singaporeans and foreign tourists about our history and ongoing relevance. 🌿

Nigel P. Taylor



► An inflorescence of *Marsdenia maingayi*.
(Photo credit: C.K. Yeo)



► Fallen corollas of *Marsdenia maingayi* gathered from the forest floor.
(Photo credit: W.F. Ang)



► *Marsdenia maingayi* flowering gregariously at the forest margin of MacRitchie Reservoir Park.
(Photo credit: Y.S. Yeoh)

MARSDENIA MAINGAYI (APOCYNACEAE)—LOST AND FOUND IN SINGAPORE

IN 1885, Richmond W. Hullett, schoolmaster of the Raffles Institution of Singapore and avid naturalist, collected a robust climber that was covering trees on the edge of the forest in Changi. The flowers were presumed to be large and impressive, as Hullett described them in his field notes to be as big as a wine glass. This Changi specimen, now preserved at the Singapore Herbarium (SING) is today known as *Marsdenia maingayi* (it was formerly described as *Stephanotis maingayi* in the family Asclepiadaceae, but is now classified in the family Apocynaceae under subfamily Asclepiadoideae). The species was first collected in Melaka (Malacca), Peninsular Malaysia on 23 June (either 1865 or 1866) by Alexander C. Maingay, a prison warden based there, who was also an avid naturalist and a prolific plant collector.



Close-up view of *Marsdenia maingayi* flowers. (Photo credit: W.F. Ang)



A dark-coloured skipper, *Quedara monteithi monteithi* was observed visiting *Marsdenia maingayi* flowers. Note the dark-coloured nectar on the corolla lobes. (Photo credit: W.F. Ang)

DID YOU KNOW?

The genus *Marsdenia* consists of about 200 species of twining woody climbers and sub-shrubs distributed worldwide in warm tropical and subtropical regions. It was described in 1810 by the eminent botanist Robert Brown, who dedicated the genus to the First Secretary of the British Admiralty, William Marsden (1754–1836), who was the authority on Sumatran history and an avid promoter of botany.

Marsdenia maingayi has not been seen in Singapore since 1885. Henry N. Ridley, the pioneer and extraordinary botanical explorer of Malaya (Peninsular Malaysia and Singapore) and also Director of the Singapore Botanic Gardens (1888–1912), reported in his *magnum opus* in 1923, *The flora of the Malay Peninsula* (Volume 2), that he had never seen any living specimens during his botanical forays in Malaya, nor herbarium specimens of the species collected in Malaya. He further expressed that perhaps the climber had become extinct. The species was formally classified as Presumed Nationally Extinct in Singapore in 2008, as it had not been sighted in Singapore for more than a century, since Hullett's discovery in Changi.

THE DISCOVERY AT MACRITCHIE RESERVOIR PARK

In July 2012, Ms Yeoh Yi Shuen, a keen young naturalist and regular visitor to MacRitchie Reservoir Park, discovered an unidentified vigorous woody climber flowering just beside a jogging trail at the forest margin of the Park. The climber had been previously undetected, as it was growing high up in the tree canopy at about 8–10 meters above the ground. However, a recent tree fall had brought down parts of the climber closer to the ground, and it subsequently flowered. Ms Yeoh was curious about the identity of the climber, so a flowering voucher was collected and forwarded to SING for identification. The mysterious MacRitchie

climber was eventually matched with the Hullett specimen that is preserved at SING. The size of an individual flower is not as big as a wine glass, but perhaps Hullett could have been referring to the impressive inflorescence in his description.

Further in-depth investigations of herbarium collections preserved in three major herbaria that have the best representation of Malayan flora, namely, the Herbarium of the Royal Botanic Gardens, Kew (K), the Herbarium of the Forest Research Institute Malaysia, Kepong (KEP), and SING reveals that *Marsdenia maingayi* is an elusive woody climber in the rainforest canopy and endemic to Malaya. At present, the climber has only been recorded five times, four records from Peninsular Malaysia, and only once from Singapore.

Upon learning of the rarity of the climber, a team was formed for a second visit to the site in August 2012 to properly document the finding, as well as to make a good herbarium specimen to be preserved at SING. While we were there, the flowers of the climber were visited by a dark-coloured skipper, *Quedara monteithi monteithi*. We also observed a dark-coloured liquid produced by the flowers, possibly nectar as the liquid was sweet to taste. For the six months following the end of the flowering period, regular observations of the plant were carried out by Ms Yeoh, for possible collection of fruiting materials for herbarium specimens as well as for

propagation, but the plant failed to produce any mature fruits.

Apart from *in situ* conservation in the vicinity of MacRitchie Reservoir Park, *ex situ* conservation attention for the species has also been initiated by the National Parks Board, as this is the only living specimen of the species known to exist in Singapore. As this species has high ornamental value, given its large showy and mildly fragrant flowers that change from white to yellow-orange as they mature, it could possibly be introduced to Singapore's streetscapes in the future. As we now know that the species is no longer extinct in Singapore, a recommendation has been proposed by Yeoh and colleagues (2013) to revise the status of the species in Singapore to Critically Endangered, as the MacRitchie specimen is the only mature individual known to exist, not only in Singapore, but throughout Malaya. 🌿

Low Yee Wen
Herbarium

Yeoh Yi Shuen
NUS High School of Mathematics and Science

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Office of the Chief Science and Technology Officer, Ministry of Home Affairs

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Yeoh, Y.S., Yeo, C.K., Ang, W.F. & Low, Y.W. (2013) *Marsdenia maingayi* (Apocynaceae: Asclepiadoideae), a rare rainforest woody climber rediscovered in Singapore. *Gardens' Bulletin Singapore* 65(2).

A ROYAL VISIT TO THE GARDENS



©The National Archives UK, Colonial Office Photographic Collection.

ON 15 March 1871, King Chulalongkorn made history as the first Siamese King to visit Singapore. It was also the first trip abroad for the 18 year old king, who was welcomed upon arrival by Singapore's first Siamese Consul Tan Kim Ching, and later by the acting Governor of the Straits Settlements, Colonel A.E.H. Anson. For the duration of his eight day study trip, the King visited numerous public buildings, including Singapore Institution (later renamed Raffles Institution), Tanglin Barracks and St Andrew's Cathedral, and met local personalities like Hoo Ah Kay, the Chinese businessman popularly known as Whampoa¹.

While the King's subsequent visits to Singapore have been well photographed, surviving images of his 1871 visit are extremely rare, one of them being an albumen print of the King's visit to the Flower Show at the Gardens on 18 March 1871. The first Flower Show at the Gardens had taken place on 27 July 1861, organised by the Singapore Agri-Horticultural Society to encourage local cultivation ("The Establishment of the Botanic Gardens, Singapore", published in August 1918 in

The Gardens' Bulletin, Straits Settlements). Despite a heavy rain shortly before the opening of the 1871 Flower Show, the event went ahead as planned and was "very largely attended"²—the King made his arrival at 4 pm, accompanied by Mrs Anson, and "promenaded through the building"³ while a band from the 19th Madras Native Infantry played from the adjacent bandstand, a structure that preceded the Gardens' current Bandstand built in 1930.

Immediately after, the King and Mrs Anson stepped outside to pose for a group photograph before proceeding for a more thorough inspection of the exhibition, where it was reported that "His Majesty was much pleased with the display of the flowers and rare tropical plants"³ (the display included collections of caladiums and orchids, including a *Dendrobium macrophyllum* in full bloom). The photographer was identified by *The Singapore Daily Times* as Mr Sachtler, referring presumably to either August Sachtler or his brother Hermann, whose photography studio Sachtler & Co. was among the earliest to be established in Singapore⁴.

Reproduced here, the photograph features the King in the centre foreground, wearing a Western jacket, knickerbockers-styled *chongkrabaen* and white hose, while

IN 1871



holding a white hat⁵. Joining him is his similarly dressed entourage standing amidst a large turnout of guests, with the bandstand behind them on the left and the exhibition building on the right, both decorated with flags. To the King's left is Colonel Anson, and to his right possibly Mrs Anson. Further research is needed to identify the rest of the guests, but Lawrence Niven, the Manager of the Gardens responsible for its English-style landscaping, may be spotted at the first row, seventh from the left⁶. On Niven's left is Dr Robert Little, Singapore's first coroner and member of the Legislative Council, while the gentleman standing with a lady and child toward the right side of the photograph resembles Sir Peter Benson Maxwell, Chief Justice of the Straits Settlements. His presence may be explained by the contribution by Lady Maxwell of a collection of flowers in pots.

A notable absentee in the photograph is Whampoa, whose famous residential garden the King visited the following afternoon. While his attendance at the show has not been documented, it is hard to imagine his absence at an event for which he contributed "two fine lots, one of ornamental plants, trained to resemble animals, urns, etc., and the other of flowers in pots, both of which received honourable mention"³. Whampoa was also a founding committee member of the Singapore Agri-Horticultural Society, which operated the Gardens until 1874 when that responsibility was transferred to the colonial government. Another significant contributor to the Flower Show that day was Robert Carr Woods, the first editor of *The Straits Times*, whose collection of caladiums was given honourable mention. Following the visit to the Gardens, the King concluded his evening by attending an amateur theatre

performance at the Town Hall (present-day Victoria Memorial Hall). The front of that building was graced the following year with a bronze elephant, presented by the King in commemoration of his visit (the bronze elephant has since been moved to the front of the Old Parliament Building, presently known as the Arts House). Together with that monument, this photograph remains a significant historical document of the time when Singapore first played host to a Siamese monarch, and the role of the Gardens in contributing to that end. 🌿

Daniel Tham

Assistant Curator

National Museum of Singapore

¹ The King's itinerary in Singapore was documented in part in local newspapers such as *The Singapore Daily Times*, and in greater detail in the Siamese records, namely *Catmai het sadet praphat tang prathet nai rachakan thi 5 sadet mueang Singapore lae mueang Betavia khrang raek lae sadet praphat India* ("The story of the first visit to foreign countries during the Fifth Reign, to Singapore, Batavia and to India") first published in 1917. I have relied largely on translations by Kannikar Sartraproong in *A True Hero: King Chulalongkorn of Siam's visit to Singapore and Java in 1871*, Institute of Asian Studies, Chulalongkorn University, 2008.

² *The Singapore Daily Times*, 29 Mar 1871.

³ *The Singapore Daily Times*, 20 Mar 1871.

⁴ Sachtler & Co. was founded in 1863. According to John Falconer in *A Vision of the Past: A History of Early Photography in Singapore and Malaya*, Times Editions, 1987, Hermann Sachtler left Singapore in 1872 and August Sachtler in 1873. I am inclined to identify August Sachtler as the photographer considering greater documentation of his photographic activity in Singapore. The same Mr Sachtler was recorded to have taken "a very successful photograph" of the subsequent Flower Show at the Gardens on 3 January 1872 (*Straits Times Overland Journal*, 4 January 1872).

⁵ The hybridised style of Siamese royalty during the 19th century is discussed in greater length in Maurizio Peleggi's *Lord of Things: The Fashioning of the Siamese Monarchy's Modern Image*, University of Hawaii Press, 2002. The *chongkrabaen* was a traditional Siamese wrap-around cloth worn like trousers.

⁶ I owe this identification to Dr Nigel Taylor, Director of the Singapore Botanical Gardens, and Ryan Lee, Head of Events and Projects, Singapore Botanical Gardens.

THE MALAYAN TEMBUSU: AN OLD NAME RETURNS



► A leafy sprig of tembusu padang with axillary clusters of creamy yellowish blooms. The main flowering is around mid-year, and another smaller bout takes place near year's end. (Photo credit: Ang Wee Foong)

SPEAK the Malay name 'tembusu' to anyone in Singapore or Peninsular Malaysia and, almost certainly, listeners will form a mental picture of the grand tembusu that is one of the Singapore Botanic Gardens' lofty Heritage Trees. Yet that vernacular name refers to more than a single species around the region. If you thought that, perhaps, scientific names are more specific and stable, think again, for recently even its specific scientific name has, again, changed... Our most familiar Malayan tembusu is now *Cyrtophyllum fragrans*, and no more a *Fagraea*.

Of all the well-known Malay plant names that have lasted through recorded history in the Malay archipelago, and perhaps especially in the Indonesian-Malaysian realm, tembusu strikes a familiar chord. Although more than one species have been grouped under the common name of tembusu, one, *Fagraea fragrans*, which the scientific literature has known for nearly two centuries, has become the most familiar.

This could be for several good reasons.

First, this species is common in the lowlands of Sumatra, Peninsular Malaysia, Singapore, and parts of Java, and also in Borneo, where a great deal of historical settlement and botanical documentation had focused. Also, the timber of this species is well known for its hardness and durability; posts made from it last a long time and tembusu chopping blocks for heavy domestic use are almost legendary throughout the region, often even passed down through generations. In a number of documents, the vernacular nomenclature turns out to be quite specific, because there is clear recognition for this species as tembusu padang (alluding to its occurrence in open, exposed conditions—*padang* in Malay equates to open spaces).

The name *Fagraea fragrans* was first published by the famed botanist William Roxburgh (revered as the father of Indian botany) in 1824, although he had intended to name this species a decade before. This was the name inherited through the centuries and used in such classic botanical works as C.L. Blume's *Museum botanicum Lugduno-Batavum* (1850), Sir Joseph Hooker's *The Flora of British India* (1883), Captain George Aherne's *Timber*



► The small fruits ripen orange-red after several months and are likely dispersed by birds and bats. Ridley remarked, "it is difficult to say whether the tree is more beautiful when covered with flowers or fruits." (Photo credit: Ang Wee Foong)

Tree Species of the Philippine Islands (1901), E.D. Merrill's *Bibliographic Enumeration of Bornean Plants* (1921), E.J.H. Corner's *Wayside Trees of Malaya* (1940), and even in rather recent works up to the beginning of the new millennium.

Through all this time, many other species in the Indian, Southeast Asian and Southwest Pacific regions had been given names in the genus *Fagraea*. The earliest species of *Fagraea* was *F. ceilanica* (from the island



Close-up view of freshly opened flowers with their characteristically prolonged stamen filaments and styles. The flowers last several days, sustaining a perfumed aura around the tree. (Photo credit: Ang Wee Foong)

of Ceylon, today's Sri Lanka) named by the Swedish botanist Carl Peter Thunberg (pupil of the master botanist Linnaeus, originator of our current binomial system of species names) in 1782. Then from around the mid-19th century until almost a hundred years later, from the Swiss botanist Heinrich Zollinger until the Dutch professor C.G.G.J. van Steenis, the botanical region known as Malesia (comprising the Malay Peninsula including Singapore, Borneo, Sumatra, Java, the Philippines, Sulawesi, New Guinea and adjacent islands) became better recognised. It was in accounting for the species documented in *Fagraea* for the Malesian region that various distinct groups within this alliance became more clearly identified. There are perhaps a hundred or so species in this alliance throughout the region, many little-known and poorly documented and rather a lot of confused interpretations, especially as the specimens available for scientific interpretation were not always of the best condition.

The different 'groups' of *Fagraea* were perhaps rather neatly summarised as 'sections' of the genus and as part of the Loganiaceae family, until investigations by Professor Lena Struwe's team in the 1990s, using molecular tools, demonstrated that the alliance had more to do with the gentian family (Gentianaceae) than with the logania family. And more recently still, experiments using molecular evidence and concentrating on the *Fagraea* groupings have revealed that, compared with other well-defined Gentianaceae genera, these different 'groups' of the traditional *Fagraea* should be recognised as individual and distinct genera. This was because such phylogenetic experiments, through assessing relationships in terms of molecular characteristics defined by DNA



The coarse, reticulately and sinuously ridged and fissured bark of a well-grown tembusu padang tree is distinctive. (Photo credit: Ang Wee Foong)



The tembusu padang is a strong tree but rather slow-growing. The existence of tall stately specimens such as this bespeak a prolonged development sustained by relative site stability. (Photo credit: Y.W. Low)

base sequences, could identify the most related forms in the way the sequences 'clustered' together. When the clusters were found to be statistically supported, suggesting acceptability, the immediate problem became: *What should these distinct 'groupings' or genera be called?*

One of the ideal conditions for recognising such a 'cluster' as a natural genus is that there would be clear morphological or other characters defining it. Because the particular cluster which includes the tembusu padang has axillary inflorescences (in which the flower clusters develop between the leaf stalk and the branch bearing it) rather than terminal ones (i.e., at the tip of a branch), as well as a different growth structure (referable as Aubréville's tree architecture) compared to the other clusters, it is a well-defined cluster or genus. The other condition for obtaining a genus identity to represent such a well-defined cluster is that, if available, this name should be the earliest validly published name by the rules of biological nomenclature set by the International Association for Plant Taxonomy. This turns out to be *Cyrtophyllum*, a name first published in 1825 by the Prussian-born Dutch botanist Caspar Georg Carl Reinwardt, the Professor of Natural Philosophy at the University of Leiden and also the founder of the Botanical Garden at Bogor.

Henry Ridley (later Sir Henry), the first Director of the Singapore Botanic Gardens, had recognised this and used the name *Cyrtophyllum fragrans* as early as 1893. Later, in 1918, he wrote "It would probably be best to keep up the genus *Cyrtophyllum* for the Tembusu trees which differ so much from the epiphytic true *Fagraeas* with their fleshy leaves and flowers, and included stamens, from the tall trees with their leaves and flowers and long projecting stamens. The genus *Cyrtophyllum* would thus contain *C. fragrans*..., *C. giganteum*..., *C. wallichii*..., *C. caudatum*..." Later, in his *Flora of the Malay Peninsula* (1923), he adopted *Cyrtophyllum* as his considered name for this group of species.

Thus, *Cyrtophyllum* is one of several distinct natural lineages among the *Fagraea* complex, and the correct genus to which five species (one just described in 2012) of Southeast Asian trees should be assigned, including the widespread *F. fragrans*, our tembusu padang. This genus occurs in Bengal, Burma, Thailand, Indo-China, Andaman Islands, the Malay Peninsula, Sumatra, Java, Borneo, Mindoro, Balabac, Palawan, Celebes and northwestern New Guinea, mostly in lowland forests. The name combination, *Cyrtophyllum fragrans*, in which the Swiss botanist Augustin



► A botanical painting of the tembusu padang in the second volume of Blume's great work *Rumphia*, published in 1838 using the name *Fagraea peregrina*, unaware that this was the same as an earlier published name, *Fagraea fragrans*. (Courtesy Singapore Botanic Gardens Archives)

Pyrame de Candolle matched Roxburgh's species epithet with the genus name *Cyrtophyllum*, was published by his son Alphonse de Candolle in 1845 following his death in 1841, to continue his encyclopaedic work, *Prodromus Systematis Naturalis Regni Vegetabilis* ('A Guide to the Natural Classification of the Plant Kingdom').

This apparently simple name change may not be that simple, after all. But it

recognises the first correctly identified natural lineage, which name is now applied to our grand tembusu. Thus the heritage behind the name of a Heritage Tree! 🌿

Wong Khoon Meng
Herbarium



► The great Palm Valley tembusu catching the morning sun. (Photo credit: Lim Yaohui)

HOW OLD ARE THE SINGAPORE BOTANIC GARDENS' GREAT TEMBUSUS?

THE great E.J.H. Corner, in his classic *Wayside Trees of Malaya*, draws attention to the Tanglin District's tembusus, whose up-to-date scientific name is *Cyrtophyllum fragrans* (synonym *Fagraea fragrans*). This tree is truly common in the Tanglin area, whether native or planted, and the Botanic Gardens (SBG) and its environs are notable for having many fine specimens, including two famous Heritage Trees—the '\$5 tree' on Lawn E and the gigantic example which towers above the east side of Palm Valley. The species seems to be slow growing, which naturally raises the question of *How old are these great specimens?* Determining the age of trees in the perhumid tropics is generally difficult, as recently discussed by Francis Ng, who advocates an interesting and novel method based on estimated rates of wood decay (*Journal of Tropical Forest Science* 25: 437–441, 2013). As he notes in his introduction to the subject, in the constantly humid tropics where growth is more or less continuous over each year, trees do not make wood with annual growth rings, so other methods of estimating age have to be employed.

In the case of SBG's tembusus, we have tried a different approach to determining their age. Former SBG Director, Henry Burkill, stated that the Temenggong (later the Sultan of Johore), whose estate was immediately west of the Gardens, planted

up the approach to his Tyersall Istana with tembusus in 1862 (in *A Note Relating to the History of the Dell in the Gardens*, published in 1927 in *The Gardens' Bulletin*). This route corresponds to Tyersall Avenue¹, part of which was formerly known as

Garden Road and entered the Botanic Gardens at the Tyersall Gate (close to where the Ginger Garden drop off is today). In 2006, approximately 10 hectares of former Tyersall Istana land was allocated to SBG, thereby incorporating the remains of the Temenggong's tembusu avenue within the Gardens. Realising that here we have a series of tembusus of known planting date, we decided to survey the surviving specimens, measuring their girth, where feasible, at breast height in the hope of obtaining an average girth for the species at approximately 150 years of age. Our survey initially identified 18 trees, but two of these are much smaller than the remainder and are out of alignment, indicating that they are not part of the original avenue. A third specimen is clearly part of the avenue, but has a divided trunk from ground level so it cannot be compared with the remaining 15, which



► 1910 postcard image of Temenggong's avenue of tembusus in the background, as viewed from within SBG across Swan Lake, where cattle can be seen being used to cut the grass. (Courtesy of Singapore Botanic Gardens' Archives)

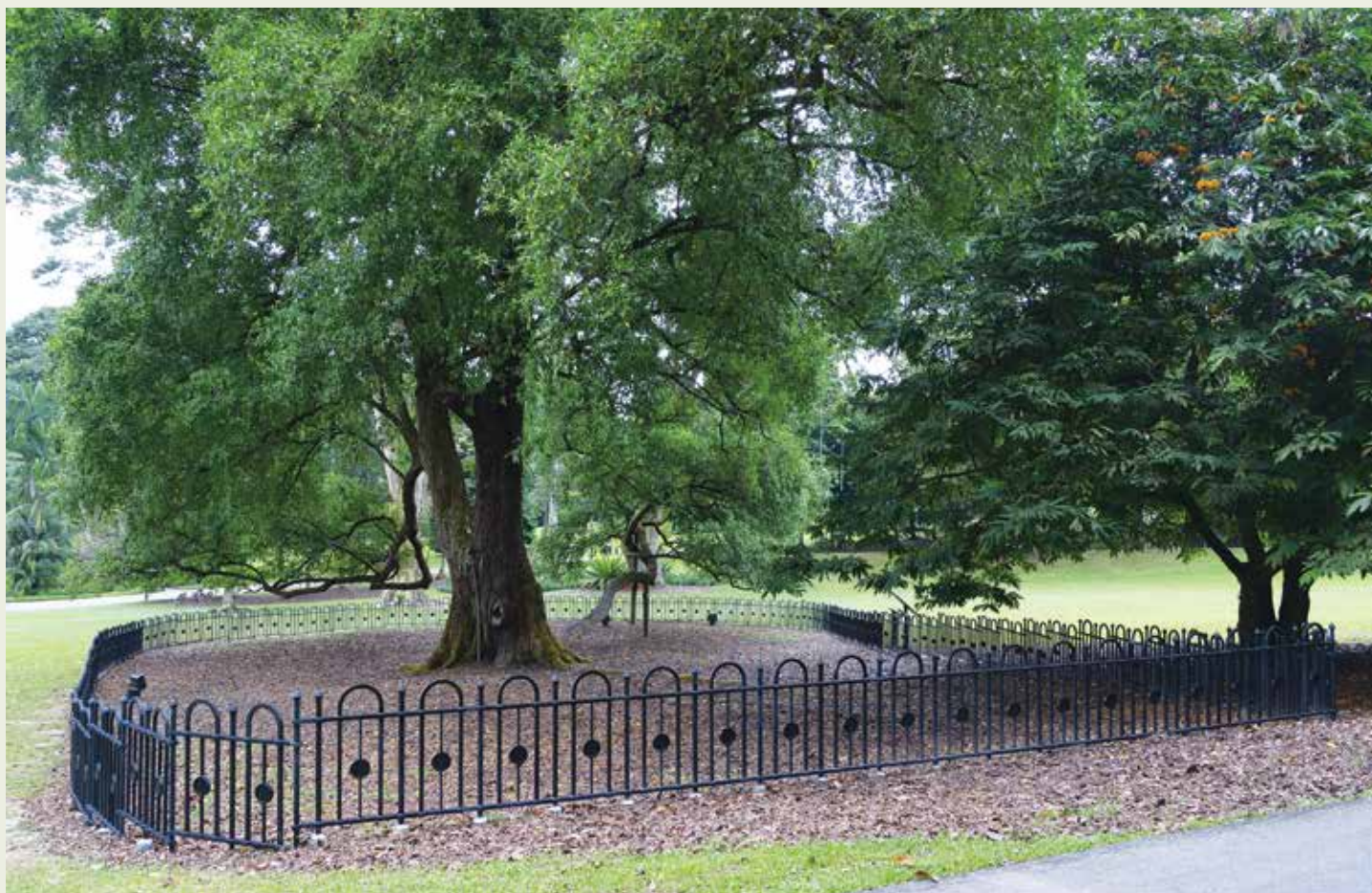


► The \$5 tembusu on Lawn E.

are single-trunked, though some are branched low down.

The 15 trees that we measured have girths varying from 2.34 to 4.80 metres, with those falling in between having girths of 2.73, 2.90, 3.00 (×2), 3.03, 3.05, 3.11, 3.83, 4.05, 4.09, 4.30, 4.35 and 4.73 metres. Clearly, with such a wide range of variation, it would be desirable to have more specimens available for the survey, but alas these are the only trees that survive from what was formerly an extensive avenue planted with tembusus spaced approximately 15 metres apart on either side of the road. Nevertheless, the computed average girth for the 15 trees is 3.55 metres. The trees along this avenue, with approximately 150 years of growth (from planting size, which we assume was small), are roughly the same age as the Botanic Gardens (1859), yet SBG has various other tembusus that are larger than the largest measured in the Temenggong's avenue.

The largest of SBG's tembusu specimens is the Heritage Tree in Palm Valley, with a girth of 6.5 metres, measured at breast height, where the trunk is undivided and roughly circular, meaning that the measurement is as reliable as could be and not affected by the emergence of branches



► The \$5 tembusu with its newly erected decorative fence, intended to protect its root zone from soil compaction caused by the feet of many visitors.
(Photo credit: David Lim)

low down. If the calculated average of 3.55 metres at 150 years (about 0.024 metres of growth per year on average) is extrapolated for this specimen, its age comes out at approximately 275 years. The \$5 tree on Lawn E has a slightly smaller girth at 6.0 metres, but unlike the previous specimen, this measurement is affected by the emergence of branches low on the trunk and the overall stature of the tree is not as great as the Palm Valley giant, suggesting that it may be rather younger, yet nevertheless older than the Gardens' 1859 foundation. A third tembusu on Lawn H measures 5.0 metres in girth, so it is also most likely older than SBG's foundation. Even if we take the largest girth measured for those tembusus along the Temenggong's avenue, 4.8 metres (in its 150 years of growth, this would equate to an average of about 0.032 metres per year), rather than the average, these three huge trees are older than SBG and the Palm Valley example would have a minimum age of more than 200 years.

Whether this somewhat pseudo-scientific approach to estimating tree age is valid, we will leave for others to decide, but it may give us a means a little better than outright speculation in the absence of known planting dates for the Heritage

Tree specimens. In arriving at these figures we would like to acknowledge the help of SBG's arboricultural team in measuring the Temenggong's tembusus and evaluating their condition, as we intend to preserve the remaining trees in the avenue as long as possible for posterity. Both of the Heritage tembusu trees have recently been fenced off to protect their root zones from the excessive trampling and soil compaction caused by the attentions of visitors. We hope that this measure of protection will help to preserve the trees for future generations.

As conclusion to this brief study we might speculate on another relevant question, related to a number of tembusus found in various parts of SBG's Central and Bukit Timah Cores, that of *Why are these tembusus of roughly similar girth and therefore presumed similar age?* Using our pseudo-scientific age estimation method outlined above, these trees, with girths ranging from 3.15 to 4.7 metres, have suggested ages of between 130 and 195 years, the midpoint being a date slightly older than SBG's foundation. From maps drawn up in the 1830s–40s by Coleman and Thompson, respectively, we understand that the lands subsequently allocated for SBG's development, 1859–1879, were likely former gambier plantations. These would have been

abandoned as the soil became exhausted, since gambier was a very 'hungry' crop, and thus the primary vegetation was replaced by a secondary one, low in diversity of species and known as '*belukar*'. Here we might speculate that the tembusus mentioned above were the products of regeneration following the abandonment of the plantations, and it is this that explains their roughly similar age, size and abundance. This suspicion is validated by an observation made by Ridley in his 1889 Annual Report (Botanic Gardens and Forest Department), in which he wrote that "many young Tembusu trees are coming up among the lalang and fern" in the Military Reserve, as the Economic Gardens were known at the time. 🌿

Nigel P. Taylor
Director SBG

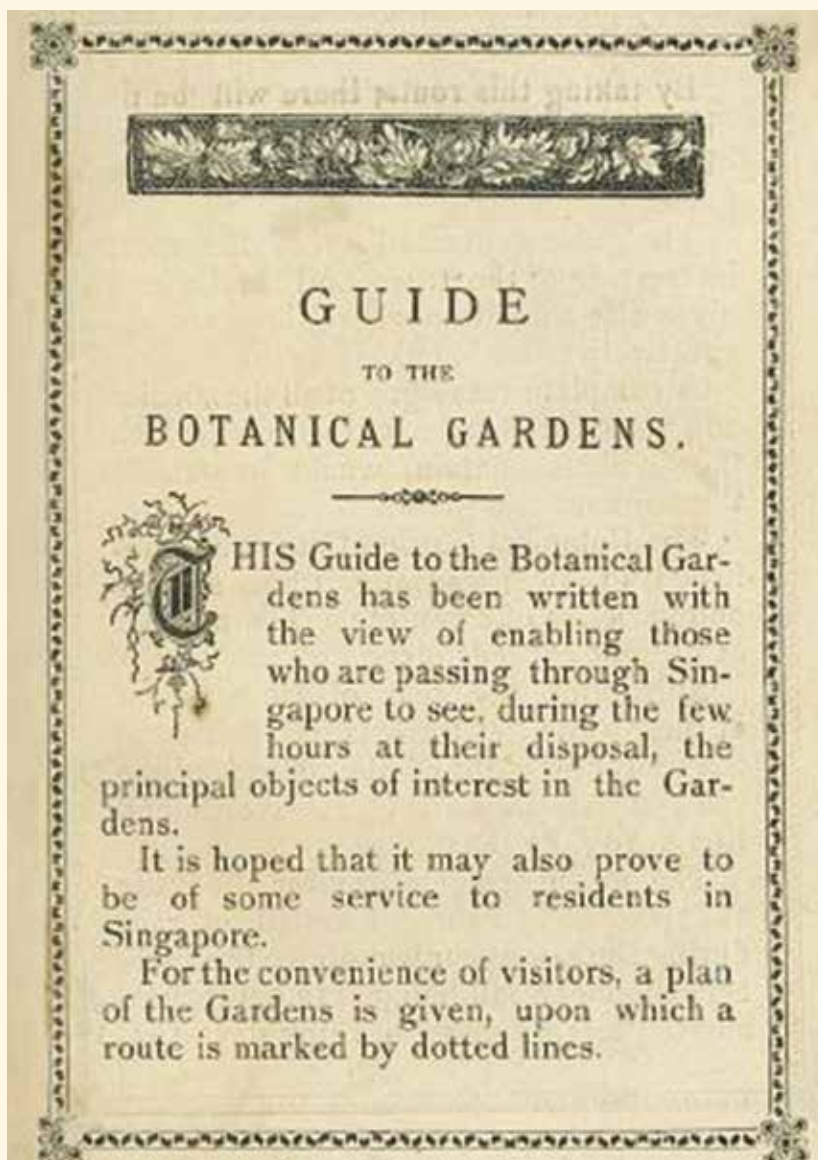
Elango Velautham
Arboriculture, Plant Records and Plant Resource Centre

¹ The route of Tyersall Ave currently in existence will be re-aligned further to the west when SBG's Learning Forest begins development on approximately 10 hectares of former Tyersall Istana land in 2014.

THE \$5 DOLLAR TEMBUSU TREE—FINALLY WE KNOW HOW OLD YOU ARE!

THE tembusu tree that adorns the Singapore \$5 note is probably the most famous and iconic tree on the island. With a rich cultural history that goes back generations, many Singaporeans remember climbing its lower branches when they were children, seeking romance underneath it as young adults, and years later bringing their own children to play beneath this very tree.

While its size, with a girth of 6.0 m, testifies to its great age, the absence of any historic record of this tree—written or photographic—up until the 1960s is puzzling. Contributing to this mystery was its perceived absence from one of the first guides to the Gardens, published in 1889. This guide was created by Walter Fox, the Assistant Superintendent of the Gardens (1879–1903) during the tenures of Nathaniel Cantley and H.N. Ridley, with the following intention:



► The aim of the 1889 guide, as outlined by Walter Fox in its introduction.

In this guide, Fox listed significant plants to be found on each lawn and described in brief a route by which people could explore the Gardens. A notable absence from the guide was the ‘\$5’ tembusu tree. This led us to believe that the guide and lawn lists might have only included plants that were intentionally planted, and not those that had been retained when the earlier secondary forest was cleared.

The low branching nature of the \$5 tembusu tree suggests that it most likely grew among the low canopy secondary growth that sprawled the site prior to the establishment of the Gardens in 1859. Hence, the absence of this tree from Fox’s guide seemed to have been explained.

Furthermore, from a note on the history of the Gardens, written by former Director I.H. Burkill in 1918, we knew that:

“In 1913 names were given to the important roads, that they might be cited in Police regulations, and they were labelled: since when the whole of the Gardens has been divided into areas which, in the Botanic Garden, are denoted by letters, and, in the Economic Garden, by numbers.”

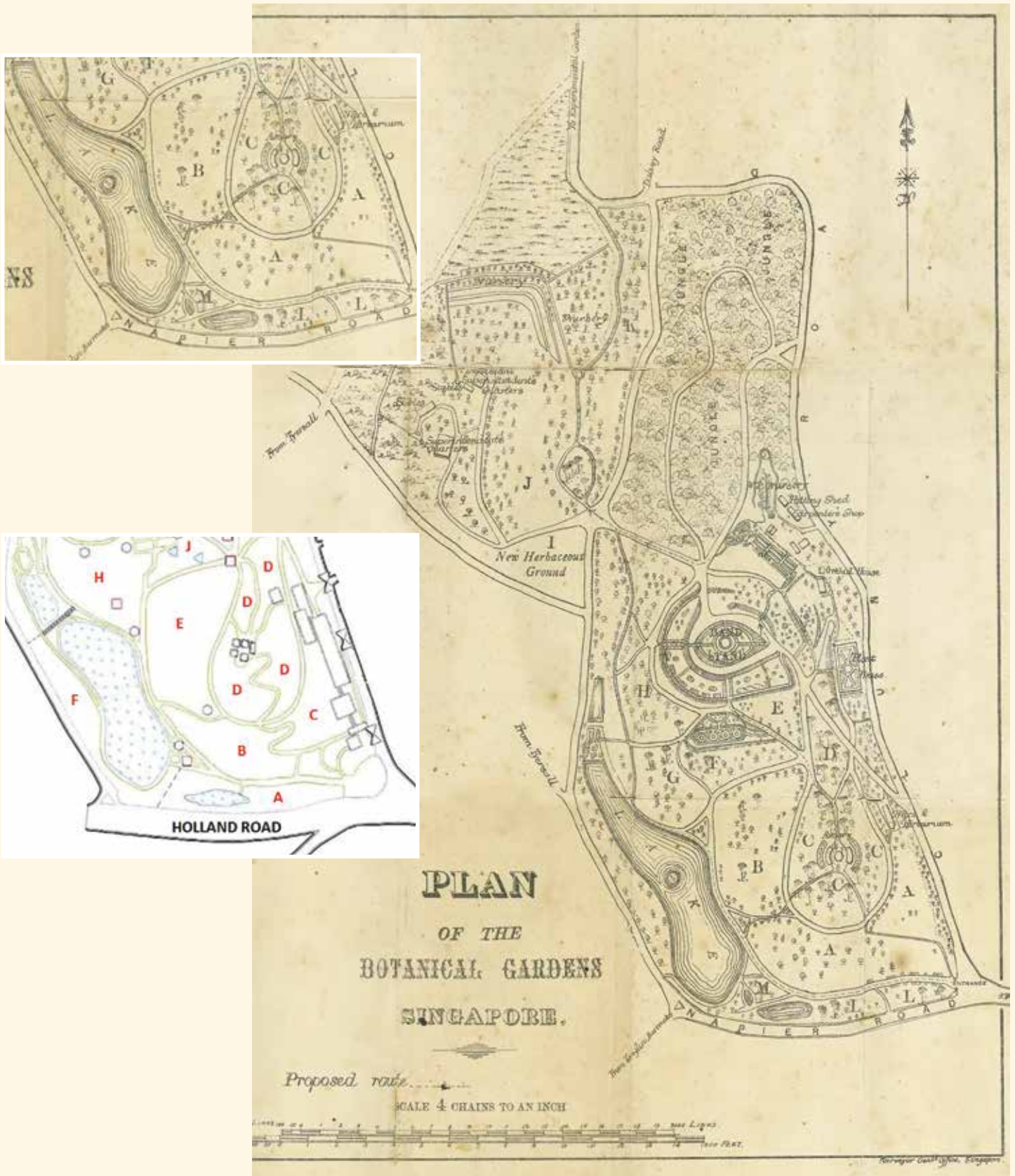
We had assumed that these lawn codes had not changed from the beginning of the Gardens, and had believed them to be the same as those in use today. However, all this was about to change.

In the SBG Archives, there are two maps dating to 1889 that are believed to be the maps that Fox refers to in his guide. One of the maps had no lawn codes, and we had believed that the other map was the same. But after many years, a closer look at the second map revealed something different.

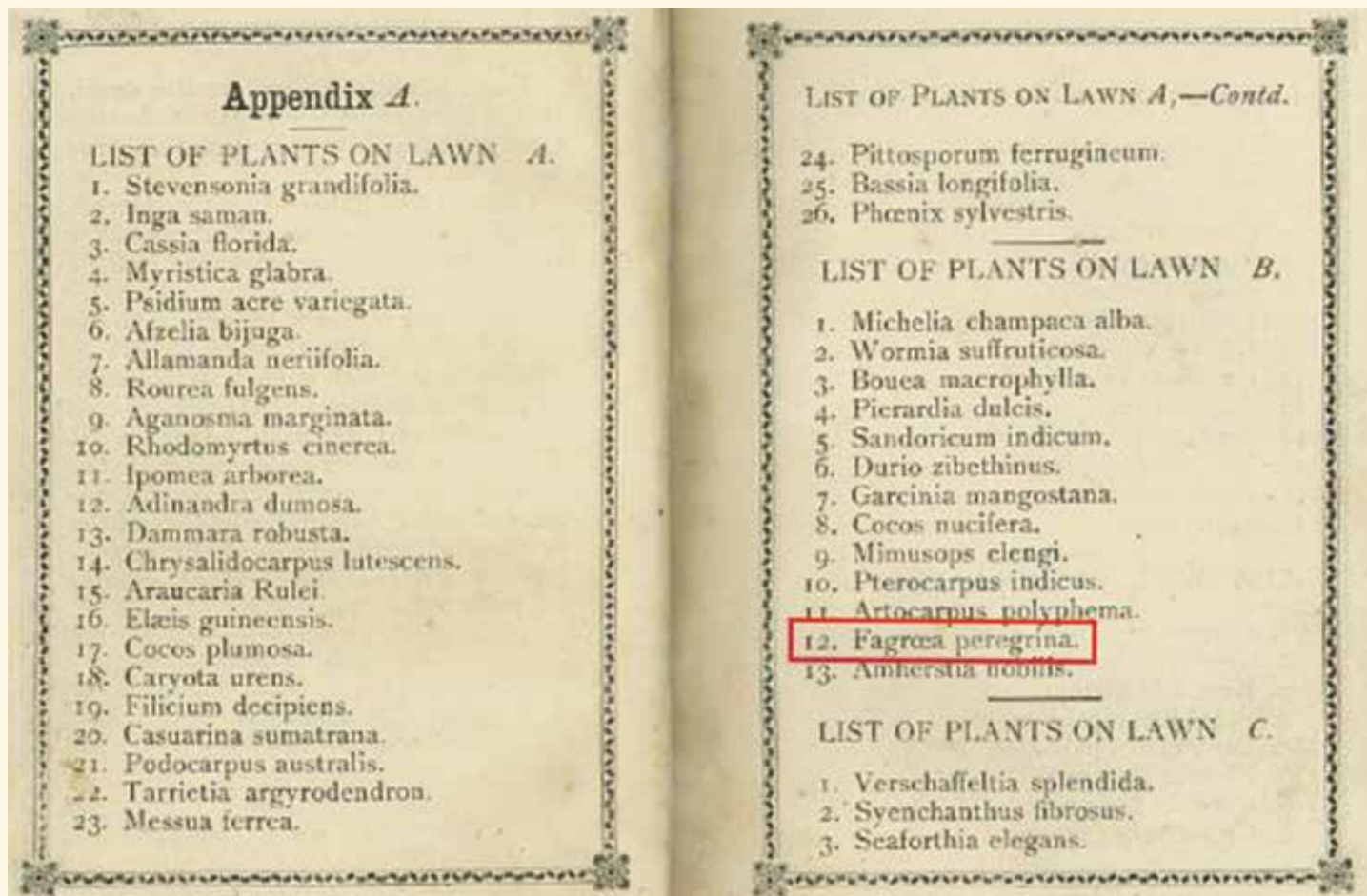
Not only did we find that it had a route with arrows marked out which referred to the very same route that Fox had described in his guide, but the lawn codes were different from those of today! According to the lawn codes on this map, and Fox’s list of plants, not only was the \$5 tembusu tree listed as being found in its current location, but Fox had this to say about the tree (note that *Fagraea peregrina* is a synonym of *F. fragrans*; both

“ If it were asked what trees were distinctive of Singapore, we would point to the Tembusu trees of Tanglin for specimens as fine cannot be found on any part of the mainland. ”

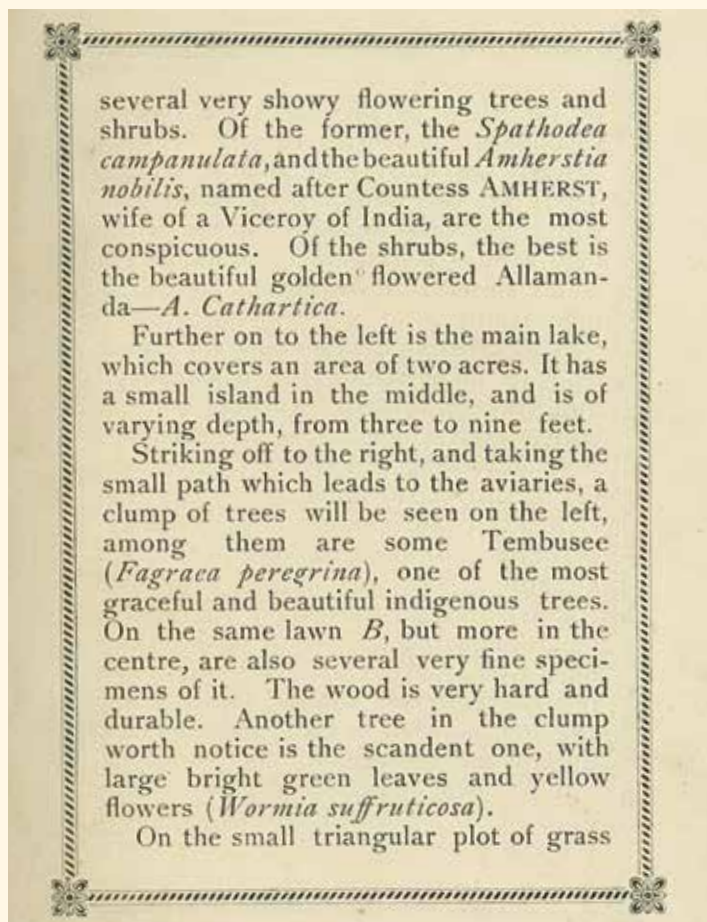
E. J. H. Corner, *Wayside trees of Malaya* (1940)



► 1889 map and close-up of Tanglin core in 1889 (inset, top) and 2013 (inset, bottom). Note that the lawn codes marked out by Fox in 1889 differ from those in use today. Also note the arrowed route marked out in dashed lines by Fox, which corresponds to his suggested route and his descriptions of plants.



► List of plants on the lawns. Note that *Fagraea peregrina* is a synonym of *F. fragrans* (and is today known as *Cyrtophyllum fragrans*).



► A description of the route by Fox, which leads visitors past today's \$5 tree on Lawn E.

are today considered synonyms of the new name *Cyrtophyllum fragrans*):

“... a clump of trees will be seen on the left, among them are found some Tembusee (*Fagraea peregrina*), one of the most graceful and beautiful indigenous trees. On the same lawn B, but more in the centre, are also several very fine specimens of it. The wood is very hard and durable.”

At the same time as our discovery regarding the 1889 map which accompanies Fox's guide, we also happened to find an amazing photo taken in the 1880s from the location of the *Ficus kurzii* Heritage Tree looking towards the location of the \$5 tembusu tree today. The \$5 tree can be seen in the middle of the photograph, and from it we can see that the tree's large size and low branching nature was evident as early as the 1880s. This is the oldest known photograph of the \$5 tree.

We now have both written and photographic evidence to show that our \$5 Heritage Tree is in fact, as we always believed, older than the Gardens itself! 🌿

Lahiru S. Wijedasa
Horticulture, Events and Exhibitions



► Photograph of the \$5 tree taken in the 1880s from the location of the Heritage *Ficus kurzii*, which also existed at the time and is on site today. (Photo by G.R. Lambert and Co., Courtesy of Singapore Botanic Gardens Archives)



► The \$5 tembusu tree in the 1880s (inset) and today.

NATIVE HOYA FLOWER FOR THE FIRST TIME AT SBG



► The inflorescence of *Hoya caudata*. The flowers usually remain open for one or two days only.

AMONG the extensive collections of plants cultivated at the Singapore Botanic Gardens, some are particularly special. These include the research living collections. Plants which form the collections were gathered in the wild in Singapore and overseas, and are representative of SBG's current research focus. Moreover, they are a way to safeguard rare plants *ex situ*.

The most recently established research collection, started in 2011, includes members of Apocynaceae-Asclepiadoideae, in particular of the genera *Hoya* and *Dischidia*. These plants originate from throughout the distribution range of these genera, mostly tropical East Asia, but some of them have come from as far as Fiji and the Solomon Islands, and there are also a few plants collected in Singapore. Once the plants bloom they are photographed and a herbarium specimen is prepared and deposited in the Singapore Herbarium for future reference.

Among the twelve *Hoya* species historically recorded in Singapore, only seven can still be found in the wild (Rodda & Ang, published in *Nature in Singapore* in 2012). Of these, only one, *Hoya verticillata*, is considered to be common and can be easily spotted growing on roadside trees as well as in parks and nature reserves. The remaining six species are either Endangered or Critically Endangered. All seven native *Hoya* species are represented in one or more of SBG's research living collections, and are from various parts of the island and from offshore islands. *Hoya coronaria* and

Hoya caudata are the two rarest species. *H. coronaria* was confirmed as still existing in Singapore in 2006 by Yap ("Hoya coronaria is alive in Singapore—a confirmation", published in *Nature Watch*), but from only one known location in the Central Catchment Nature Reserve. *H. caudata* was recorded for the first time in 2012 in a restricted area of Nee Soon Swamp Forest.

Hoya coronaria usually grows as a large terrestrial climber, clambering on forest trees. When the vine grows in deep shade the leaves are dark green and no flowers are produced. Upon reaching the canopy the vine is exposed to full sun and produces long dangling stems with light green to yellow leaves, which eventually will bear large white or yellow flowers. The only known population in Singapore occurs in a rather shady area and the plants do not yet reach the top of the canopy, therefore it may take some years before blooming. On a recent survey of the location, one of the trees that *Hoya coronaria* once climbed on was found to have collapsed, negatively impacting the remaining small population.

Hoya caudata is a smaller epiphytic climber,



► A single bud was noticed on one of the *Hoya coronaria* plants in the research nursery on 24 April 2013. The flower bloomed six days later.



► A *Hoya coronaria* flower fully open.

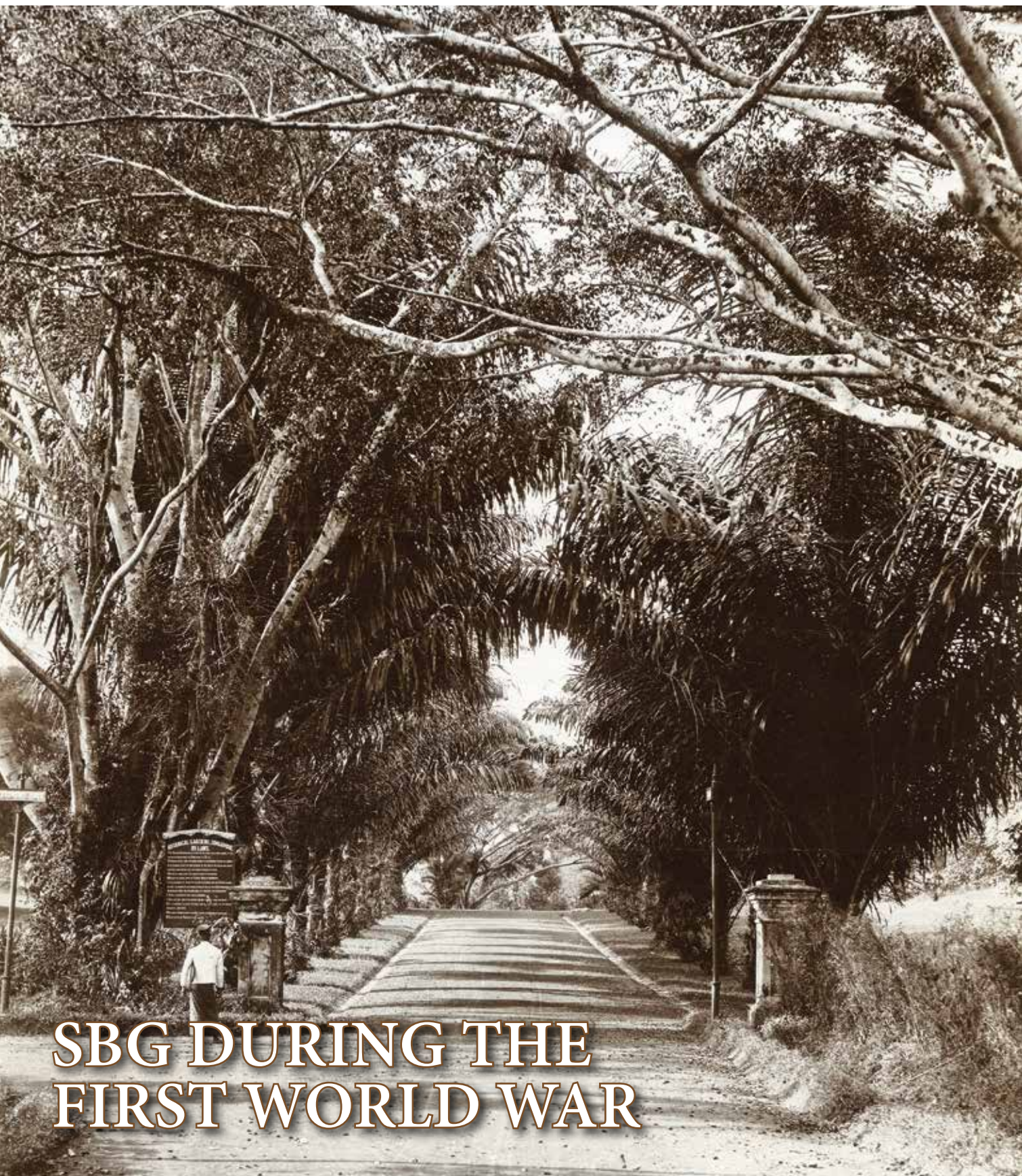


► Side view of a fully-open *Hoya coronaria* flower.

requiring filtered but bright light to bloom. The wild specimens observed in Nee Soon Swamp Forest were all growing on fallen tree branches on the forest floor, a condition not ideal for blooming.

Due to the rarity of the two species, small cuttings have been collected and established at SBG, where the plants have finally bloomed. *Hoya coronaria* and *Hoya caudata*, as well as other less rare *Hoya* species, are being mass-propagated to be reintroduced later to suitable sites in parks and nature reserves, a project in collaboration with the National Biodiversity Centre which will hopefully help these species to become less rare in Singapore. 🌿

Michele Rodda
Herbarium



► Historic image of Tyersall Gate. (Courtesy of Dr Michele Rodda)

THE year 2014 is the 100th anniversary of the start of the First World War (WWI, 1914–1918). Though Singapore was not itself directly involved in the hostilities, it is interesting to reflect on what was happening in the Singapore Botanic Gardens (SBG) during the ensuing four years, when other parts of the British Empire were more heavily impacted. The annual reports of the Director of Gardens, Straits Settlements, who was Henry Burkill during the entire period, make interesting reading and cover what was a time of not insignificant change.

The 1914 Annual Report (published in 1915), under the subheading **Botanic Gardens, Singapore**, states “At the full-moon in each month, except April, up to the outbreak of the war, the band of the King’s Own Light Infantry played in the Gardens by the kind permission of the officers of the Regiment.” Next we are told that extensive road repairs were carried out and two new paths were cut, one of these connecting the Tyersall Gate with the bandstand. The Tyersall Gate was formerly at the sharp bend in Tyersall Avenue, where the present Ginger Garden drop-off is located*. The historic image of the Tyersall Gate published here was clearly taken before the new path was constructed, as later maps show it leaving immediately inside the gate to the right. The report goes on to mention that “Cluny Lake was deepened to three feet and the adjoining swamp filled in.” Cluny Lake was a predecessor of Symphony Lake, in roughly the same position, and it is very interesting that the swamp that was “filled in” has a small surviving remnant to this day at the lowest point of the National Orchid Garden’s nursery, next to Palm Valley Gate. The report then announces the construction of the Gardens’ first and experimental sun rockery on the east-facing slope of Palm Valley, which was planted with *Agave* and *Furcraea*. Next, we hear an all too familiar report of a tall *Araucaria heterophylla* (*‘excelsa’*), which fell in June as a consequence of an attack of “white ants”. Such termites continue to cause the loss of these conifers to this day. Vandalism is seldom perpetrated in SBG today, but in 1914 “some mischievous person set fire to a clump of *Raphia* palms” and during a long drought “a Municipal cooly, burning leaves near the Tyersall gate, carelessly set fire to the Gardens’ fence, destroying among other plants a large *Grammatophyllum* [the tiger orchid]”.

Under the subheading **Economic Garden** we are updated on the progress in 1914 of various experimental crops, besides the extensive planting of rubber, which was being tapped for latex and samples given to “two experimenters” for smoking to cure it. Collections of pineapples and *pisangs* (bananas) were transplanted. Burkill was a noted expert on yams and tells us that *Dioscorea* species and other root crops such as *Amorphophallus* and *Macrostemma* were being grown and studied. Of equal interest is the next entry telling us that “the foreman-gardener by patience raised a stock of the Brazil-nut tree, which can now be sold to the public”. Thus, the list of outputs from SBG in that year included 2,685 pounds (1,218 kg) of smoked rubber latex, 360,000 seeds and 3,000 seedlings of rubber (*Hevea brasiliensis*) sold, and 761 economic plants other than rubber sold. This sounds more like a commercial business than the SBG we know today!



► The remnant of fresh water swamp at the lowest point of the National Orchid Garden’s nursery with the tall common pulai (*Alstonia angustiloba*) Heritage Tree, slender Nibong palm and sago palm (left edge of image). (Photo credit: David Lim)

We will leave further consideration of the 1914 report at this point, save to mention two interesting observations under the subheading **Records and Investigations**. “The damage by rats to the books of the library continues: a variety of traps, and poison have been used against them, and the ventilators have been covered with fine wire netting”. SBG’s modern librarian can be grateful that things have clearly improved over the past century! The second observation relates to what is today a somewhat enigmatic arrow that emerges from the water of Symphony Lake where, at the time in question, there was a nursery ground. The report states that “In December, Mr Frederick Brown of the Greenwich Observatory, was permitted to establish a temporary station for the observation of terrestrial magnetism near to the Cluny Lake. The position is marked by a stone

that the survey under the auspices of the Carnegie Institute, Washington, for which he is working, may be able to return to the exact spot.” When exactly the arrow was added to the stone is not recorded, but from other sources it is known that it points towards Greenwich, London (UK).

The 1915 report contains similar material to the previous and will not be discussed in much detail here, but animal pests of various kinds remained a preoccupation of the Director. The red palm weevil was taking its toll (just as it has more recently in parts of the Mediterranean) and whilst the book-eating rats had been brought under control, the Gardens’ monkeys were helping themselves to tender shoots in the plant houses and destroying sugar cane and pineapples in the Economic Gardens, even attacking the Director’s precious yams. He



► Original stone marker of the place where the Earth's magnetism was measured in the nursery ground in 1914, photographed in 1968, before it became Symphony Lake. This historic image was discovered in SBG's Archives by Librarian Christina Soh.



► The early interpretation of the marker at Symphony Lake.

comments, no doubt correctly, that “with the clearing of the land [a]round the Gardens these animals have come to depend for their food less and less on wild sources and more and more on what is cultivated”. The emphasis on rubber continued, with the tapping and consequent selection of the best being indicated by a green cross on good trees and a red cross marked on “the very bad trees”; presumably the latter were intended for removal. No less than 18,400 seedlings of rubber were sold—clearly, rubber was still booming at the time.

The 1916 report sees the Director complaining about management staff shortages, which had been an issue since 1911 and must have been made worse by the war in the West, where SBG's Assistant Director, Thomas Ford Chipp, was posted as an army major. This meant that a third

of the Gardens was under the direct management of the Director, displacing his own scientific and economic research. Under the subheading of *Collections* (etc.) there is the acquisition of new material of *Spathodea campanulata* from Madagascar with the comment that the existing specimens never set seed in the Straits. One might wonder whether it was this reintroduction of the species which has since become rather invasive in Singapore's forested areas, where it certainly sets seed today. Elsewhere the report flags up the amount of work the Director and senior staff had to get through by way of correspondence, long before the age of email. It states that 1,758 letters were received and 2,121 items dispatched! Mounting of herbarium specimens had to stop when the mounting paper ran out, no doubt because further supplies were difficult to obtain due to the war, but the person

responsible for mounting was redeployed to curating (‘arranging’) the specimens (that may be assumed were already mounted).

Out in the Gardens there was drought in January and February which provoked exceptional amounts of flowering, including *Shorea* species in the Gardens' jungle (the Rainforest). “The mangos on the Lake margin [Swan Lake] produced so much blossom that seven million flowers were estimated to be on one tree ...”; but, the Report continues, “The dry weather also favoured pests”, causing defoliation of *Cassia* trees. More disturbing was the news that two diseased areas appeared in the Gardens' jungle, where “Rather large trees died and then the undergrowth died too”. This had previously occurred during Director Ridley's time and the solution employed by Burkill was the somewhat drastic one of burning the dead wood, then liming (the ground) against the presumed pathogenic fungus, named as *Rosellinia echinata*. Another perhaps somewhat embarrassing admission was that a plant previously referred to as *Acer heterophylla* in the 1914 report had turned out to be the euphorbiaceous *Aleurites cordata*. It was also noted that on seven occasions, naval or military bands performed in the Gardens.

In the *Economic Garden*, “Thieves were worse than any other pest. The thefts of yams recurred so often, always on Saturdays or Sundays, that a watchman had to be detailed to guard against them. ... Two Chinese house-thieves were caught and went to jail.” The report states that several pineapples weighing more than 12 lbs. (about 6 kg!) had been raised; clearly there was temptation at hand. Finally it was reported that one of the largest rubber seed crops had been recorded, with 324,960 seeds sold.

The year 1917 saw the Gardens troubled with both management and labour shortages and demands for pay rises, which were eventually conceded. Other strategies employed to retain the (male) labour included offering work for their wives in the Gardens and also rice allowances. Competition from neighbouring rubber estates was drawing off the labourers, while a fall in the value of rubber hit the Gardens' finances. To make matters worse, whilst the demand for rubber seed continued, the plantation's crop was poor that year and the lack of adequate income meant that the Plant House roof could not be repaired. The year was unusually wet, with 2,773 mm of rainfall and only 98 rainless days. Swan Lake overflowed several times and plants that needed dry weather in February to develop flowers failed to do so, but the pigeon orchid enjoyed the frequent rainstorms and flowered no less than 19 times over the year! Trees in the collections and Rainforest also



► The arrow that arises today from Symphony Lake. (Photo credit: David Lim)



► SBG's former Assistant Director, Thomas Ford Chipp. (Reproduced with the kind permission of the Director and the Board of Trustees, Royal Botanic Gardens, Kew)



► Two huge trees of African mahogany (*Khaya grandifoliola*) that were moved to Lawn Z (the nursery ground at the National Orchid Garden) in 1917 or 1918. (Photo credit: David Lim)

succumbed to lightning strikes, while termites took their toll on *Eucalyptus pulverulenta*.

The **Economic Garden's** entry complains about widespread theft of produce and material being trialled. Sundays were the worst day for losses and necessitated the employment of a guard. A selected rubber tree, amongst three high yielding examples, was taken out of tapping so that it would produce more seed, and from the plantation overall a total of 11,050 seedlings were raised and more than 100,000 rubber seeds sent out. The report also makes the interesting observation that the Cold Storage Company supplied a trial sack of locally made bone meal fertilizer, which increased the yield of yams.

The final report of the WWI years, 1918, included some shocking news, which foreshadowed major change to come over the following decade. It states that, unmentioned in the previous year's report, a proposal had been put forward for the Singapore Housing Commission to build housing over the Economic Garden, signalling its end. "It was most disturbing and among other courses it compelled the transfer to sites in the Botanic Garden of plants which had to be preserved and were likely to outgrow the possibility before plans for a new Economic Garden at a distance could put fresh land into the possession of the department". Today, some of the plants transferred back into the pre-1879 part of SBG can be seen as mature specimens in the orchid nursery behind the National Orchid Garden. These include very large African mahoganies (*Khaya senegalensis*, *K. grandifoliola*), durian, tamarind, *Diospyros blancoi* and *Sterculia foetida*. This section of the report concludes with "Fortunately the proposals for scrapping the Economic Garden have not matured", but we know, of course, that this was premature optimism, for only a couple of years later, the plans for Raffles College were developed and that was the end of the Economic Garden. 🌿

Nigel P. Taylor
Director SBG

* Readers should note that during 2014, the part of Tyersall Avenue south from the Ginger Garden entrance to Holland Road will be expunged and relocated to the west side of the Tyersall extension, so that the latter can be incorporated into the Gardens.

TWO MORE REASONS TO VISIT SINGAPORE BOTANIC GARDENS



► From left to right (in the centre), NParks' Chairman Mrs Christina Ong, Prime Minister Lee Hsien Loong, Minister for National Development Mr Khaw Boon Wan and Managing Director of City Developments Limited (CDL) Mr Kwek Leng Joo, officiating the launch of the SBG Heritage Museum and *Living in a Garden* exhibition at the CDL Green Gallery on 30 November 2013.

THE Singapore Botanic Gardens (SBG) has added two new features to its list of internationally acclaimed attractions. SBG's Heritage Museum and CDL Green Gallery are located next to the Botany Centre in the Tanglin Core of the Gardens, and were officially opened by Prime Minister Lee Hsien Loong on 30 November. They provide an alternative indoor 'edutainment' experience for visitors to the Gardens.

THE SBG HERITAGE MUSEUM

The SBG Heritage Museum presents the story of the Gardens' evolution over the last 154 years. It traces the Gardens' colonial roots and explores the influence and contributions of its earliest managers. Featuring century-old relics and artefacts, the Museum guides visitors to learn about the Gardens' key scientific breakthroughs which helped to shape the early economy of Southeast Asia.



► The exterior of the CDL Green Gallery, Singapore's first zero energy gallery.



► The *Living in a Garden* exhibition at the CDL Green Gallery.

The Museum is located in Holttum Hall, a designated Conserved Building that was formerly used by Director Eric Holttum (1925–1949) as an office and orchid breeding laboratory.

It aims to support the Gardens' nomination bid as Singapore's first UNESCO World Heritage Site by sharing the Gardens' rich heritage with visitors from around the world.

THE CDL GREEN GALLERY AND *LIVING IN A GARDEN* EXHIBITION

Jointly developed by City Developments Limited (CDL) and NParks, the CDL Green Gallery is Singapore's first zero energy building, and is capable of harnessing sufficient solar energy to cover all of its energy consumption. The Gallery is also the first building in Singapore to feature the use of Hempcrete, a lightweight eco-friendly construction material derived from *Cannabis*.

The CDL Green Gallery will showcase botanical related exhibits that will be changed every six to nine months. The first exhibition

HIGHLIGHTS OF THE MUSEUM

THE SBG Heritage Museum is filled with intriguing content and unique artefacts. It is also equipped with tactile exhibits and interactive multimedia displays to deliver a multi-faceted sensory experience. There are a number of highlights that visitors can look forward to at the new attraction.

SBG THROUGH THE YEARS INTERACTIVE MAP

Be intrigued by SBG's evolving landscape over the past century and a half by rotating the dial of this interactive feature. Notice how the main paths have remained largely unchanged over the years despite numerous rounds of upgrading and redevelopment works.



GIFTS FROM A DESCENDANT OF ONE OF SINGAPORE'S PIONEERS

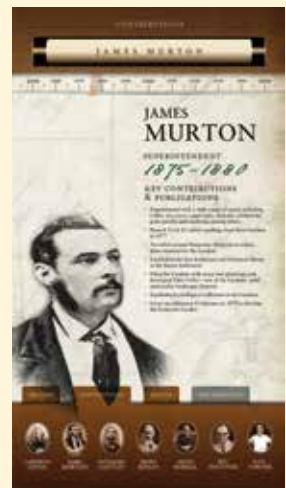
Be charmed by Mdm Hoo Miew Oon's gifts to the Heritage Museum—two 19th century cactus pots, one large pot and one pot stand which belonged to the private garden collection of her great-grandfather, 'Whampoa' Hoo Ah Kay.

Whampoa was an influential Chinese businessman who played a key role in the development of the Gardens in 1859. Fluent in English and a member of the Agri-Horticultural Society, he helped negotiate with the British colonial government for the land on which the Gardens was founded, and also appointed its original designer.



KEY PERSONALITIES INTERACTIVE DISPLAY

Did you know that the first Superintendent of the Gardens, James Murton, established a zoo within the grounds of the Gardens in the 1870s? Be fascinated by interesting and sometimes peculiar facts of SBG's history through an interactive multimedia exhibit featuring notable personalities who shaped the development of the Gardens. There is even a video showing a 94-year-old Eric Holttum delivering a congratulatory note to the Gardens on its 130th anniversary.



in the Gallery is entitled *Living in a Garden*, and tells the story of Singapore's greening journey over the last 50 years.

Visitors will be able to learn about the innovative and systematic greening efforts implemented by Singapore's founding fathers, which earned the nation its reputation of being a Garden City. The exhibition showcases NParks' continued efforts and meticulous planning which have now propelled Singapore to a new stage of transformation, toward becoming a City in a Garden. Visitors will get a chance to take a sneak peek at some of NParks' exciting future plans, and share their vision for the next 50 Years of Greening Singapore through an interactive multimedia display.

The *Living in a Garden* exhibition will be held at the CDL Green Gallery until 30 June 2014. 🌿

Ryan Lee

Events and Projects



► Visitors can create their own vision for the next 50 Years of Greening Singapore and share it with their friends and family

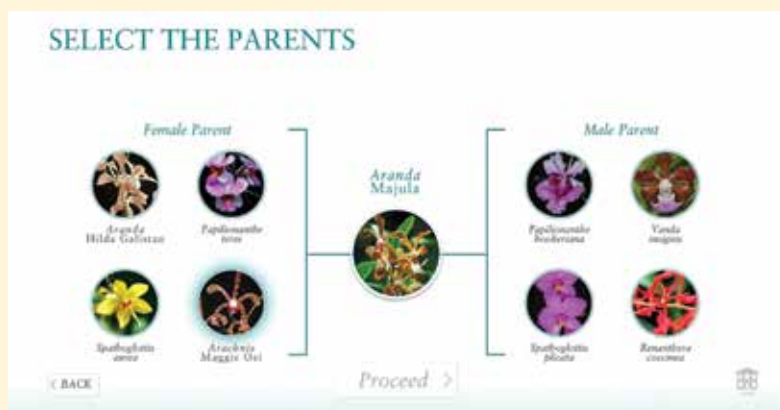
CHANDELIER DE APPAREIL

Be enchanted by the grandeur of a 2.2 m tall chandelier, made from 294 test tubes and 34 conical flasks, along the stairway to the second level of the Museum. This innovative work of art is a reminder that the upper floor of Holtum Hall was once an orchid breeding laboratory that initiated the orchid hybridisation industry in the region.



GUESS THE PARENTS ORCHID HYBRIDISATION GAME

Be challenged to identify the parentage of four orchid hybrids. You might discover your hidden aptitude for orchid breeding!



HERRING-BONE INCISION ON A REAL RUBBER TRUNK

Be amazed by the incision grooves of the legendary herring-bone method of rubber tapping that was invented by Director Henry Ridley. The V-shaped cut allows the bark to be tapped at regular intervals to obtain latex continuously throughout the year. This method revolutionised the latex yield of the region during the rubber boom. 🌿





▮ The Pha Tad Ke staff receiving hands-on training at the nursery. From left to right: Khamphart Tongchan, Somdy Oudomsack and Xaisamone Inthavong. (Photo credit: How Wai Ron)

BEING NEIGHBOURLY—SBG ASSISTS IN CAPACITY BUILDING

IN continuing our efforts to be of assistance in capacity building for the Southeast Asian region's botanical institutions, Singapore Botanic Gardens (SBG) played host to a group of staff from the Pha Tad Ke Botanical Garden (PTK) from Luang Prabang, Lao PDR. Through generous sponsorships from Botanical Gardens Conservation International (BGCI) and a private individual, three PTK staff, Mssrs Somdy Oudomsack, Xaisamone Inthavong and Khamphart Tongchan, were able to come to Singapore for a two-week attachment, from 29 November to 15 December 2013.

While in Singapore, the PTK group was attached to various sections of SBG's Horticulture, Events and Exhibitions Branch. They also did a short stint at NParks' Pasir Panjang Nursery and picked up pointers

on starting a butterfly garden at HortPark. During the attachment, the three staff eagerly enquired and learned about garden planning and landscaping, and display and maintenance of plant collections.

The Pha Tad Ke Botanical Garden is expected to open to the public in three years time. Until then, Somdy, Xiasome and Khampart will be kept busy developing and organising their botanic garden. We hope that the knowledge they gained here can be applied and shared with their counterparts back home. We wish them all the best and hope the training here has been beneficial to PTK's staff. 🌿

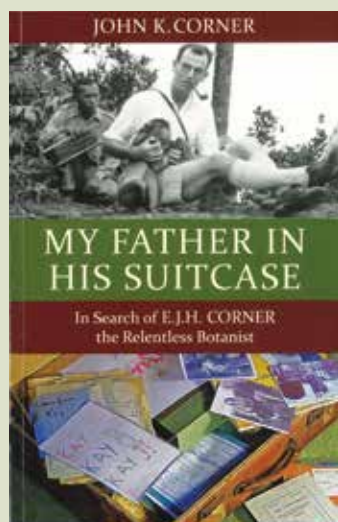
Nura Abdul Karim
Horticulture, Exhibitions and Events

NEW IN THE LIBRARY SHOP

My Father in His Suitcase: In Search of E.J.H. Corner the Relentless Botanist

By John K. Corner

Price: \$38.00



E.J.H. Corner was an acclaimed botanist, notably in figs and fungi, and his studies of seed morphology led him to his Durian Theory on the origin of flowering plants. His published works include *The Life of Plants*, *Boletus of Malaya* and his acclaimed *Wayside Trees of Malaya*. He was also the Assistant Director of the Singapore Botanic Gardens (1929–1945) and later became Professor of Triple Botany at the University of Cambridge.

Interestingly, this biography was written by his son, John K. Corner, and offers a glimpse into the personal life of E.J.H. Corner and the family he left behind in his relentless pursuit of science. Estranged from his father at a young age, John's only source of understanding his father came from the contents of a suitcase left for him. Initially hurt and confused by this gesture, John gradually came to appreciate and understand his father through the letters, drawings and photographs contained within the suitcase.

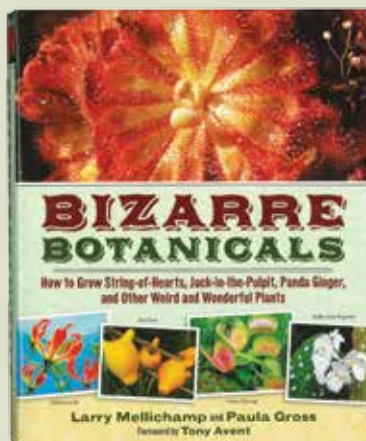
My Father in His Suitcase: In Search of E.J.H. Corner the Relentless Botanist is a poignant read that makes the reader ponder the potential personal costs of the pursuit of science.

Year Published: 2013
ISBN: 978—981-4189-47-7

Bizarre Botanicals: How to grow String-of-hearts, Jack-in-the-pulpit, Panda Ginger and other Other Weird and Wonderful plants

By Larry Mellichamp and Paula Gross

Price: \$49.00



This book's strange title grabbed my attention and I was pulled right into it, and by golly, was it an eye opener for me! From the more commonly seen tropical pitcher plants (*Nepenthes* spp.), staghorn ferns (*Platycerium* spp.) and bird-of-paradise (*Strelitzia reginae*) to the weird looking Jack-in-the-pulpit (*Arisaema* sp.), goldfish plant (*Nematanthus* sp.), fashionista polka-dot begonia (*Begonia maculata* var. *wightii*) and gigantic phallic-looking titan arum (*Amorphophallus titanum*), *Bizarre Botanicals* will grip you right from the start with its intriguing collection of "weird and wonderful" plants.

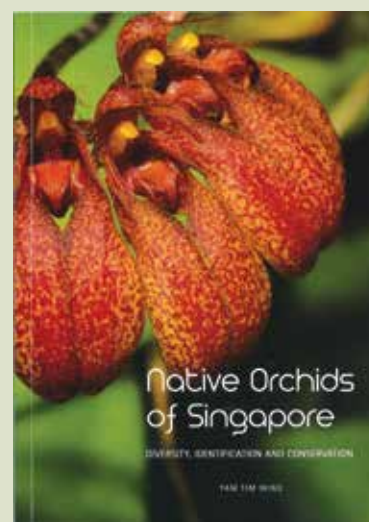
Filled with little known facts, growing tips, riveting descriptions and photographs, *Bizarre Botanicals* seems more like a plant catalogue meant for the Adams Family!

Year Published: 2010
ISBN: 978-1-60469-076-7

Native Orchids of Singapore: Diversity, Identification and Conservation

By Yam Tim Wing

Price: \$8.50



Singapore used to be a nation thriving with native orchids, with more than 220 species. Sadly though, many of these have been lost due to development. To date, there are only five common native orchids left, and the remaining species are classified as Presumed Nationally Extinct, Critically Endangered or Vulnerable.

Determined to introduce our native orchids back into the wild, in parks and gardens, and even along roadways, Principal Researcher and orchid taxonomist at the Singapore Botanic Gardens, Dr Yam Tim Wing, took this task to hand and has been faithfully doing his part to help conserve local native orchids for the past two decades.

Not only does this book chronicle his team's efforts, it serves as a guide to help identify orchids in their natural habitats and also aims to educate the public on the conservation of tropical orchids, especially the epiphytes. Furthermore, it is divided into epiphytic species and terrestrial species, making it an easy reference tool.

With detailed information on a number of orchid species native to Singapore, this is definitely an interesting book for orchid lovers!

Year published: 2013
ISBN: 978-981-07-8078-4

Soh Qiu Xian
Library

MARANTOCHLOA: SHRUBBY BUT NOT SHABBY



THE genus *Marantochloa*, with 18 currently recognised species, is the largest genus of the prayer plant family (Marantaceae) in Africa. The genus is widely distributed, with 17 species occurring on the African mainland, from Sierra Leone to Democratic Republic of the Congo, and one species in Madagascar, growing in subtropic and tropic humid forests up to 1500 m in elevation. While some species are found in primary forests, others thrive in secondary habitats. All but a few species have a fairly wide area of distribution.

As recorded by numerous authors, including Humphrey Morrison Burkill (the former director of Singapore Botanic Gardens who wrote the book *The Useful Plants of West Tropical Africa*), various *Marantochloa* species are heavily used by local people in daily life. The stems are used for making fences, baskets, mats and various traps, and also as binding material in hut building. The leaves are commonly used for thatching, lining baskets or making fans, as food wrappers (for cooking or fermenting), or for making small containers to be used for collecting honey. The threads are made either from petioles or leaf veins and can be used for sewing or making fishing nets. A few species, for example *M. leucantha* or *M. purpurea*, are also widely used as medicinal plants for treating an extensive range of ailments. They are used as antidotes for venomous bites and stings, stomach troubles, painkillers, fungal and bacterial infections of the skin, cough and pulmonary



► *Marantochloa purpurea* is perhaps the most ornamental member of the genus. Described by Henry N. Ridley, the first director of the Singapore Botanic Gardens, this species has a special link to the Gardens where it thrives in various places.

troubles, and for the treatment of epilepsy and madness. In Uganda and Tanzania, a decoction from the root of *M. leucantha* is believed to be an aphrodisiac.

The name *Marantochloa* was first suggested by French botanist Jean Antoine Arthur Gris, but it was officially published by his colleague Adolphe-Théodore Brongniart in 1860. While the first part of the generic name links it to the family Marantaceae, the second part of the name suggests similarity to a grass (*chloa*). Many of the species currently recognised in the genus *Marantochloa* were originally described as members of other genera, particularly *Aetnida*, *Clinogyne*, *Donax* and *Phrynium*.

Marantochloas are evergreen, perennial, mostly branching and shrub-forming plants 0.5–4 m tall. Their foliage is usually dark

to mid-green above and somewhat lighter beneath, but some species, like *Marantochloa mannii*, have leaves flushed with purple beneath. Flowers of all *Marantochloa* species are small, rarely exceeding 2 cm, and can be white, yellow, pink or purple, or a combination of these colours. A close-up examination will reveal their intriguing but beautiful structure, which is common to all Marantaceae and is known for its catapult-like mechanism of releasing pollen onto a visiting pollinator.

Several *Marantochloa* species have gained in popularity in recent years and are becoming increasingly available in nurseries across the tropics. In Singapore, *Marantochloa purpurea* is perhaps the most popular one. This beautiful ornamental shrub has dark green foliage and drooping inflorescences with pink branches that are endowed with dark



► *Marantochloa cuspidata* makes beautiful hedges, usually full of ever-blooming, drooping yellow flowers.

purple and yellow flowers. The Singapore Botanic Gardens has a special connection to this species as it was described in 1887 as *Clinogyne purpurea* by Henry Nicholas Ridley, the Gardens' first director, before it was transferred to the genus *Marantochloa* by Edgar W. B. H. Milne-Redhead.

Ridley's description was based on a specimen collected by Austrian botanist Friedrich Martin Joseph Welwitsch in Angola, and which is now in the herbarium of the British Museum of Natural History.

Other species commonly available are



► Fruits of *Marantochloa leucantha* occur regularly in the Ginger Garden. The pulp of the fruits is said to be edible, but considering the small size of the fruit, the effort hardly seems worthwhile.

Marantochloa mannii and occasionally the yellow-flowered *M. cuspidata*. Marantochloas are great plants for semi-shady to shady and moist corners of a garden, and do not require much to thrive except occasional, but not too heavy, fertilising. They can be easily propagated by cuttings containing a branching node. While most Marantochloas flower freely throughout the year, only *M. leucantha* seems to produce fruits with viable seeds in Singapore's climate. 🌿

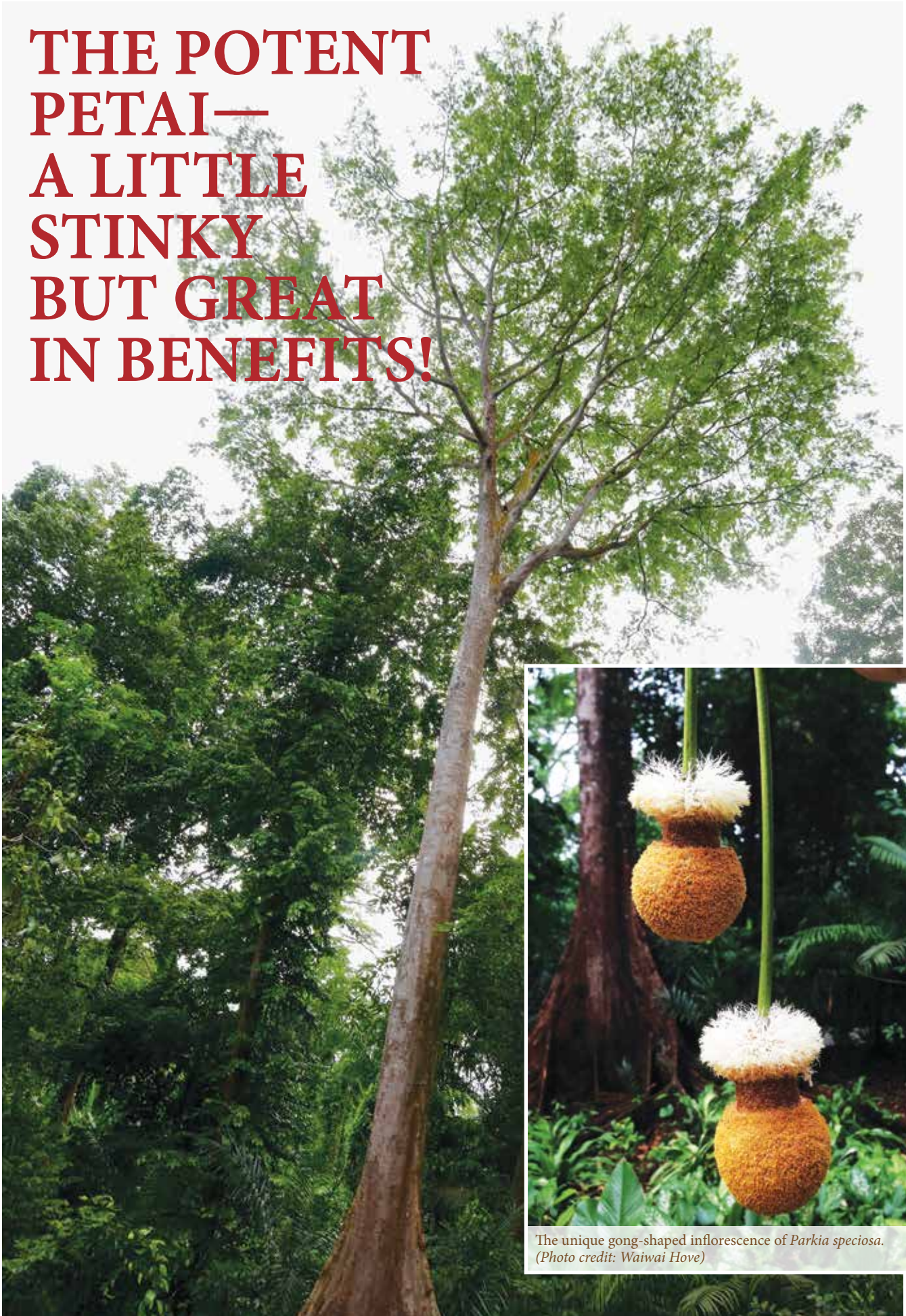
Jana Leong-Škorničková
Herbarium

All photos by Jana Leong-Škorničková



► Visitors to the Singapore Botanic Gardens can look out for six *Marantochloa* species in the Ginger Garden: *M. cordifolia*, *M. cuspidata*, *M. filipes*, *M. leucantha*, *M. mannii* and *M. purpurea*. All of them are planted in the African geographic exhibit as well as other places including Ginger Garden Walk and Maranta Avenue.

THE POTENT PETA— A LITTLE STINKY BUT GREAT IN BENEFITS!



The unique gong-shaped inflorescence of *Parkia speciosa*.
(Photo credit: Waiwai Hove)

► The stately *Parkia speciosa* tree standing tall at Lawn T. (Photo credit: David Lim)

PARKIA speciosa, better known by the vernacular names of petai or stink bean, is a native of Malaysia, Singapore, Brunei, Indonesia and Thailand. It belongs to the legume family and is commonly found in lowland forests. Occasionally it is cultivated, but only rarely outside of its native area. Petai is much revered in Southeast Asian marketplaces, and bunches of the slightly twisted seed pods can often be seen on display and promoted at the front of food stalls to bait buyers. Foreign visitors to these marketplaces may instantly sense that there might be something special about these pods. Nowadays, fresh seeds are also packed in plastic bags and even sold in air-conditioned supermarkets. The pods are commonly gathered from the wild, or sometimes from cultivated trees, and can fetch a good price during periods of scarcity.

The petai is a large tree, reaching up to 30–40 m in height. The tree bears unique pendulous gong-shaped inflorescences that strangely also resemble microphones. The inflorescent head bears numerous small pale creamy-yellow flowers; the basal flowers have sterile staminodes only, the central flowers are male and the apical ones are female. The flowers secrete copious nectar and have a sour-ish smell that attracts bats, the tree's main pollinators. About five to 10 very large, long fruit pods are borne in a loose cluster after flowering. Each pod is half a meter long or so, straight or slightly twisted, and contains up to 18 flat, green seeds.

There is no denying petai is an acquired taste, but it has been an important jungle food source in the region for centuries. The pods and seeds are highly relished native vegetables, despite their strong smell. Fresh young pods and seeds are eaten raw, cooked or fried as a side dish with rice, but they are best consumed when combined with other strongly flavoured foods, such as chilli peppers, dried shrimp paste, garlic and onions, as in *sambal petai*. The pods and seeds have a distinctive taste and a strong smell that could pass as methane gas, but in a delectable sort of way! Once consumed, petai gives a slightly bitter aftertaste and imparts a characteristic lingering scent on the breath of the diners. Hence, there is no escaping from detection once you have eaten petai!

In addition to the pods and seeds, the fresh young leaves and the gong-shaped receptacle of the inflorescence can also be eaten raw as *lalab*, but they are not



► Petai seed pods for sale at a local market in Singapore. (Photo credit: Ada Davis)

used to a great extent. The pods and seeds are rich in proteins. The green seeds are viewed as a useful food, as it is believed that they can alleviate the symptoms of diabetes. The seeds are also considered beneficial in treating liver disease, oedema and inflammation of the kidneys, and are also used as an anthelmintic (an agent that destroys or causes the expulsion of parasitic intestinal worms). The leaves have also been used to treat jaundice. The timber is fairly heavy, but it is not very hard or durable, and is best utilised in the making of boxes and cabinets. Petai trees are useful as shade trees, although their growth is rather slow. Despite petai's popularity (particularly as a food), there are no germplasm collections known to exist in the region, and no breeding programmes have been extensively carried out on *Parkia* species.

An outstanding living specimen can be seen in the National Orchid Garden, at

Lawn T along the path leading to Burkill Hall. Towering 35 m high, and with beautiful high buttresses, this specimen was nominated as a Heritage Tree in 2012. The old tree still bears fruits and flowers, and recently, visitors along the path have been greeted by its intriguing-looking blooms strewn on the ground. On further scrutiny, they may have observed the pendulous inflorescences, along with bunches of twisted pods, dangling like ornaments off the branches on this old beauty. So, the next time that you are in the National Orchid Garden, look for the potent petai along the shaded path, and be enthralled by it and the other Heritage Trees found nearby, such as the *Sindora* and *Alstonia*, and the magnificent understory *Johannesteijsmannia* (joey palm) collection. 🌿

Nura Abdul Karim
Horticulture, Exhibitions and Events

LEARNING ACROSS BORDERS: HERITAGE TOUR OF THE SINGAPORE BOTANIC GARDENS



Students and teachers from Hong Kong with SBG's Director, Dr Nigel Taylor. (Photo credit: Winnie Wong)

WE live in a globalised world where education is no longer confined to the four walls of a classroom. In fact, the phrase 'The world is our classroom' is increasingly becoming a reality for students and educators everywhere. With the aid of technology and the ease of air travel, students are able to experience new cultures and gain knowledge first-hand. Educators are recognising the importance of equipping students with 21st century competencies such as global awareness and cross-cultural skills that will prepare them to become global citizens in our highly connected world.

To cater to shifting education paradigms and demands for quality learning destinations, the Singapore Tourism Board's Education Division has partnered with the Singapore Botanic Gardens' Education Branch as an experiential learning provider to organise Familiarisation (FAM) and Overseas Study Trips (OST) for students and educators around the region. Positioned as a 'must-see' destination for experiential learning, SBG offers visiting students and educators from overseas a cross-cultural

experience, but more importantly, it provides a refuge from the urban landscape of our little island and an impactful lesson of conservation amid rapid modernisation.

Without a doubt, Singapore has many lessons to offer, and the story of SBG is one that is closely intertwined with the history of our nation—from our past as a British colony to our transformation into a City in a Garden—with significant milestones in SBG's history including its contribution

to the 20th century rubber boom in Southeast Asia and its premier work in the field of orchid hybridisation. These historical snapshots provide our students and educators from overseas with a quick peek into Singapore's past and the Gardens' role at the centre of it all. Two such accounts follow, when we hosted students and educators from Korea and Hong Kong.

On 7 June 2013, we hosted six educators from various foreign language schools in Korea. They were guided on the Gardens' Heritage Tour and also our *Conservation of Native Orchids of Singapore* programme, led by Ms Winnie Wong, Assistant Director (Education) and Dr Yam Tim Wing, Principal Researcher (Conservation and Molecular Biology) from the Orchid Breeding and Micropropagation Lab. It was the first time that many of the educators had visited Singapore, let alone a botanic garden

in the tropics. They were impressed with the vast amount of plant collections on display and they asked many questions. Referring to a Piperaceae species planted as a ground cover near the kapok tree leading to Lawn E, one of the educators asked, "Can this plant be eaten? It looks like what we use as a leaf wrap for barbecued meat in Korea." At the National Orchid Garden, a participant asked, "Where may I find the Bae Yong Jun orchid?" (the VIP orchid *Dendrobium* Bae Yong Jun named after the famous Korean film star). Indeed, it is in situations like these that SBG's mission of connecting people and plants manifests itself, despite cultural differences and language barriers.

As the Korean educators traipsed along the Heritage Core of the Gardens, our guides related interesting facts and stories about SBG's heritage, pointing out iconic landmarks like the brick steps leading down to the Plant House, which were made by Australian prisoners of war during the World War II period. Along the way, the educators marvelled at two generations of pará rubber trees (*Hevea brasiliensis*) planted at Lawn C, and the lovely flowers found on the VIP orchids in the National Orchid Garden. Dr Yam also shared about his work on the conservation and reintroduction of native orchids in Singapore, causing them to truly understand the efforts of our researchers to transform Singapore into a City in a Garden. As the tour came to a close, the Korean educators stopped to pose for a photo or two at one of

our heritage tembusu trees as a memento of their journey through time in the Gardens. We are sure that they will have many stories to share of the lessons they learned at SBG.

For a group from Hong Kong, visiting the Gardens was a reward after winning a nation-wide school competition. The competition, organised by the Singapore Tourism Board, focused on the design of an itinerary to visit Singapore. On 22 August 2013, we welcomed seven students and educators from Chai Wan Kok Catholic Primary School and Pui Tak Canossian College, and a group of accompanying journalists from various media publications in Hong Kong. The guide for the day, much to the honour and delight of our foreign visitors, was the Director of the Gardens, Dr Nigel Taylor, who led them on our Heritage Tour.

The young visitors and their chaperones were taken on a stroll down memory lane as Dr Taylor led them on the curving paths of the Gardens, laid out in typical 'English Landscape' style, and past the Bandstand where military bands used to play. Along the way, he pointed out interesting plants such as the double coconut (*Lodoicea maldivica*) which is endangered in the Seychelles, the saga (*Adenanthera pavonina*) which expels small, bright scarlet seeds that were once used to measure precious metal and jewelry, and the majestic kapok (*Ceiba pentandra*) and its massive buttress roots along Lower Ring Road. The students

and educators listened attentively as the journalists furiously scribbled away.

Farther down the road, the group was in for a treat when Dr Taylor brought them to the boardwalk of the six-hectare tract of primary rainforest in the Gardens. The students and educators were amazed by the richness of the flora, and it was a good respite from the sweltering heat of the afternoon sun. The sheer magnificence of a strangler fig (*Ficus kerkhovenii*) was an impressive sight for our foreign visitors, and the occasional sighting of a busy squirrel saw them whipping out their mobile devices for a quick snapshot. For our foreign visitors who live in Hong Kong, a renowned concrete urban jungle, the lush greenery of the Gardens was more than a breath of fresh air; it was also a reminder of the importance of plants in our daily lives.

The partnership of SBG's Education Branch with the Singapore Tourism Board provides a timely opportunity to share our story with the rest of the world, as Singapore submits its bid for SBG to be nominated as the nation's first World Heritage Site. In the future, we will continue to extend our learning beyond borders and fulfil our mission of connecting people and plants. 🌿

Yvonne Chong and Winnie Wong
Education Branch



► Students from Hong Kong with SBG's Director, Dr Nigel Taylor. (Photo credit: Winnie Wong)

CONCEPTUALISING THE REDUCE, REUSE AND RECYCLE MODEL IN OUR YOUNGER LEARNERS THROUGH A CLOSE-UP EXPERIENCE WITH NATURE AND STORYTELLING

REDUCE, reuse and recycle. It is a common mantra chanted in schools and education centres in a bid to educate the younger generation about the three basic elements of conservation. Increasingly, schools have been communicating this message to children as young as the lower primary levels, and preschools are encouraging the Reduce, Reuse and Recycle (3Rs) concept in their school curricula. Many schools are working to affect the day-to-day habits of students in the classroom, and also participate in international campaigns such as Earth Hour and national movements like Clean and Green Week. The demand for this type of education has driven exploration into the start-up of a programme here at Jacob Ballas Children's Garden (JBCG).

The conceptualisation that the Education team has in mind is to creatively bridge the 3Rs with nature, to educate about how humans can utilise plants without producing by-products that can harm the Earth. What better way to teach the 3Rs to our young audience (ranging from Kindergarten 1 to Primary 2, children aged from four to eight years) than through storytelling? JBCG's mascot, Sara the Botanicosaurus, makes a return from the *Storytime with Sara* programme, along with a new character, Rana the frog. In the first half hour of the programme, Rana introduces the 3Rs and how it can be applied to the children's day-to-day habits and activities. The storytelling touches on the economic values of plants

such as coconut and banana, which have many parts that can be utilised by people, including the stems, leaves, flowers and fruits. The programme encourages the use of biodegradable materials instead of industrial products such as polymers and composite metals which may be harmful to the Earth or result in harmful by-products.

A tour around the Jacob Ballas Children's Garden is also included in this programme, and follows the storytelling session in the classroom. This gives the participants an opportunity to be close to nature and learn its importance in sustaining life on Earth. The tour guide discusses the importance of trees in providing shelters and in the

gaseous cycle by ensuring the balanced exchange of carbon dioxide and oxygen needed to support life on Earth. Natural recyclers such as fungi and millipedes are also shown to our young participants. These examples serve to explain that recycling is a mechanism that occurs naturally in flora and fauna. The participants also learn about how trees provide homes for wildlife and the importance of preserving rainforests.

In November 2013, the *Storytime with Sara—Learning about the 3Rs* programme had a special remake just for Clean and Green Week. A half hour craft-making session replaced the tour segment to encourage the young learners to create their own masterpieces from recycled materials and reuse them in a way that could be useful for their homes. Participants were encouraged to take their creative work home, and to continue to add more details using their own collection of recycled materials. 🌿

Muhammad Taufiq and Goh Mei Yi
Education Branch



► Education Officer Muhammad Taufiq showing the young learners a grasshopper. (Photo credit: Goh Mei Yi)



► Children engrossed with a flashcard shown by Education Officer Muhammad Taufiq as they heard the buzzing sound of a cicada in the sensory garden of Jacob Ballas Children's Garden.



► Participants of the special Clean and Green Week session with their creations made from recycled materials.

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Compiled by Ada Davis
Communications and Community Engagement

FIVE NEW BOOKS BY NATURAL HISTORY PUBLICATIONS (BORNEO)



A new series of pictorial guides that was started by Datuk Chan Chew Lun, Managing Director of Natural History Publications (Borneo) in 2011, dealing with various plant families in the Asia-Pacific region and mostly focusing on the orchids. The five titles published so far are briefly introduced here. Two others are currently in the making, namely *A Guide to Orchids of Hong Kong* by Stephan Gale, Abdel Bizid, Leo Liu and Kinson Chan and *A Guide to Fruits of Borneo* by Anthony Lamb, and a few more are planned. The main aim of these semi-scientific pictorial guides is to provide insight into the diversity found in the respective plant group covered, through the illustration and description of selected example species.

The first part of each book consists of introductory chapters which provide background information on the country or geographic area of focus and its vegetation. Informative notes on the plant group in the region, morphology, pollination, habitat ecology, life forms and exploration history are also given. All of the introductory chapters are richly illustrated with magnificent colour photographs and detailed line drawings. In some of the guides, identification keys to the groups of species that are represented in the region are also provided.

The main part of each book comprises treatment of a selection of between 80 and 116 species. Each of these species treatments, generally one per page, consists of a brief text describing the species and also includes notes on habitat ecology and distribution. Most of the page is made up of a colour photo of the plant or its inflorescence plus a flower close-up. Many of the photos were taken of plants in their natural habitat, although a few were taken of plants in cultivation. The beautiful layout and quality of reproduction are of a very high standard, which is typical of the books produced by this publisher. The attractive presentation of the species treatments, with text and photos nicely blended together (rather than being separated in the style common to more formal scientific publications) will surely make these books appeal to a wide readership.

Brief listings of additional available literature, acknowledgements, photographic credits and an index conclude each book. In three of the books (*A Guide to Dendrobium of Borneo*, *A Guide to Orchids of Kinabalu* and *A Guide to Orchids of Myanmar*), a glossary is also provided which explains the technical terms used. All five books end with a preliminary checklist of the species found in the region.

Datuk Chan Chew Lun is thanked for his advice on the preparation of this manuscript. 🌿

Hubert Kurzweil
Herbarium



A Guide to Dendrobium of New Guinea
by André Schuiteman

A Guide to Dendrobium of Borneo
by Jeffrey J. Wood

A Guide to Orchids of Kinabalu
by Jeffrey J. Wood

A Guide to Gingers of Borneo
by Anthony Lamb, Januarius Gobilik, Marlina Ardiyani and Axel Dalberg Poulsen

A Guide to Orchids of Myanmar
by Hubert Kurzweil and Saw Lwin

Published in 2013 and 2014 by Natural History Publications (Borneo), Kota Kinabalu, Sabah. All five titles are approximately A5 size and with soft cover. 128 pp (*A Guide to Dendrobium of New Guinea*), 152 pp (*A Guide to Gingers of Borneo*, *A Guide to Dendrobium of Borneo* and *A Guide to Orchids of Kinabalu*) and 204 pp (*A Guide to Orchids of Myanmar*). The books are available in the Library Shop of the Singapore Botanic Gardens. The first four titles are S\$20.00; the price of *A Guide to Orchids of Myanmar* is not available as yet.



► A group photo of symposium participants. (Courtesy of the FM9 Organising Committee)

9TH INTERNATIONAL FLORA MALESIANA SYMPOSIUM

THREE years have flown by since the last (8th) International Flora Malesiana Symposium was held at Singapore Botanic Gardens (SBG); before we knew it, it was time for the researchers from the region (as well as from further afield, such as Europe, Australia or America) to meet for the 9th International Flora Malesiana Symposium.



► Cibeureum waterfall. (Photo credit: Jana Leong-Škorničková)

The Symposium was held from 27 to 31 August 2013 in Bogor, Indonesia. Subtitled *Contributions of Malesian Flora to the Welfare of People in Asia*, the event attracted 414 specialists from 26 countries. SBG sent a delegation of eight staff, including five from the Research and Conservation Branch (Dr Gillian Khew, Dr Michele Rodda, Dr Wong Khoon Meng, Mr Low Yee Wen and myself) and three from the Horticulture, Exhibitions and Events Branch (Mr Craig Williams, Ms Lai Simin and Mr Lahiru Wijedasa). The team presented in total seven talks and one poster. I also attended, on behalf of Singapore Botanic Gardens, the Flora Malesiana Board Meeting.

While the first part of the morning on the first day was dedicated to the opening ceremony, welcome speeches, group photographs and the keynote lecture, the rest of the day and the entire second day were fully packed with botany. Participants were spoilt for choice as the sessions, running concurrently in four rooms, offered a wide range of subjects. Topics ranged from taxonomy and systematics of various plant groups (including Arecaceae, Begoniaceae, Gesneriaceae, Lauraceae, Orchidaceae, Pandanaceae, Zingiberaceae, pteridophytes, bryophytes and fungi) to biogeography, conservation, ecology, ethnobotany, phylogenetics, and biodiversity informatics.

The 109 posters attracted much attention not only during the designated poster session, but throughout the entire meeting, especially during the lunch and tea breaks.

The third day of the meeting was reserved for the mid-symposium field excursion. Participants had the choice of visiting the Herbarium Bogoriense, Bogor Botanic Gardens or Mount Gede-Pangrango National Park. The tour to Mount Gede-Pangrango with an alfresco packed lunch proved to be a hit among participants, who enjoyed the rich flora while walking through the cool montane forest to the spectacular Cibeureum, Cidendeng and Cikundul waterfalls located at 1625 m in elevation. The tour ended in the afternoon, and tea and local snacks were served in the picturesque Cibodas Botanic Gardens.

The last two days of the symposium returned us to serious botanising, discussions and networking, which continued during the symposium dinner that was spiced up with local music and



► *Hedychium roxburghii* (Zingiberaceae) was in full bloom along the trail to the waterfalls. (Photo credit: Jana Leong-Škorníčková)

dance groups. Participants even had a chance to learn how to play the *angklung*, a traditional bamboo instrument.

I am sure that everyone attending this event would join me in congratulating the organisers, led by the Indonesian Institute of Sciences (LIPI), for delivering such a wonderful and fruitful meeting. 🌿

Jana Leong-Škorníčková
Herbarium

TALKS AND POSTERS PRESENTED BY SBG STAFF

POSTERS

Hoya and *Dischidia* (Apocynaceae—Asclepiadoideae) of Papua New Guinea (Nadhanielle Simonsson Juhonewe, Foreting Juhonewe & **Michele Rodda**)

PRESENTATIONS

Bitten by the bug (**Craig Williams**)

Conservation of Native Zingiberales in Singapore (**Jana Leong-Škorníčková**, **Gillian Khew**, Vinita Gowda, Aung Thame & Koh Teng Seah)

Little known plants on a renowned mountain: the Kinabalu *Timonius* (Rubiaceae) (Chen Junhao, **Wong Khoon Meng** &

Hugh Tan Tiang Wah)

Memecylaceae of Thailand and Peninsular Malaysia—A framework for a Flora Malesiana account (**Lahiru S. Wijedasa**)

On the scent trail: Taxonomic revisions in Malesian *Gardenia* (Rubiaceae) (**Low Yee Wen**)

Pollinator diversity and pollination biology of native gingers of Singapore (Vinita Gowda & **Jana Leong-Škorníčková**)

Reconnecting biodiversity: The Kheam Hock Road Project (**Lai Simin**)

Towards a revision of the genus *Hoya* (Apocynaceae—Asclepiadoideae) (**Michele Rodda**, **Gillian Khew** & Nadhanielle Simonsson Juhonewe)

ASIAN REGIONAL BOTANIC GARDENS TRAINING COURSE, AUCKLAND BOTANIC GARDENS, NEW ZEALAND, 16–20 OCTOBER 2013



Some of the participants and trainers in front of the Logan Campbell Building, Auckland Botanic Gardens. (Photo credit: Suzanne Sharrock)



The Curator Manager of Auckland Botanic Gardens, Mr Jack Hobbs, giving a guided tour. (Photo credit: Nura Abdul Karim)

AUCKLAND Botanic Gardens recently hosted fifteen participants from eight countries who were attending the Asian Regional Botanic Gardens Training Course. The participants came from Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Republic of Korea, Thailand and Vietnam, and they included directors of gardens, chief officers in ministries, botanical researchers, a forester, lecturers and conservationists, and there was even a journalist. The training course was organised through the collaborative effort of the Korea Forest Service, Botanic Gardens Conservation International (BGCI) and Auckland Botanic Gardens. The participants were fortunate to be fully supported by the Korea Forest Service, which also sponsored their attendance in the 5th Global Botanic Gardens Congress. The Congress was held straight after the training course in Dunedin, New Zealand.

The intensive four day training course covered topics on the development of botanic gardens, *ex situ* conservation management, collection data management, horticulture and nursery management, educational outreach as well as international biodiversity policies that are relevant to botanic gardens, such as the Global Strategy for Plant Conservation (GSPC), the Convention on Biological Diversity (CBD) and Access and Benefit Sharing (ABS). The trainers were invited from Australia, Canada, England, New Zealand, Scotland and Singapore. I had the honour to be one of the invited trainers to share on collection data management, data policy development and new technologies that are currently used by botanical institutions to manage living collection data for archival purposes and outreach. During the course, staff from Auckland Botanic Gardens also shared with participants and trainers their efforts in management and conservation of native plants, maintenance of plant collections and nursery practices.

The intention of the course was to build regional capacity and expertise and to network with other professionals from Asia, as new botanic gardens are being developed in many countries in the region, including Cambodia, Indonesia, Laos, Malaysia and Vietnam. The general feedback from the participants at the end of the course was that the training was thorough, intensive and very good. Everyone acknowledged that the course provided opportunities to network and learn from others about the management of botanic gardens, conservation and policies which could be adopted and implemented in their respective countries.

This course is an example of a successful multinational collaboration between botanical institutions, a forestry department and an international non-governmental organisation (NGO) to further the conservation efforts and management of botanical institutions. It is hoped that more of these training courses will be held



Ms Kerry Gillbanks, curator of native plants at Auckland Botanic Gardens, explaining the conservation and management of the threatened native plant collection. (Photo credit: Nura Abdul Karim)



Nursery manager, Mr Wayne Dymond, explaining the nursery set-up and collection management in the Gardens. (Photo credit: Suzanne Sharrock)

in the future to ensure continued sharing of knowledge between regional botanical gardens, both old and new. 🌿

Nura Abdul Karim
Horticulture, Exhibitions and Events

5TH GLOBAL BOTANIC GARDENS CONGRESS IN DUNEDIN, NEW ZEALAND, 20–25 OCTOBER 2013: AN EXCEPTIONAL CONGRESS!

THE 5th Global Botanic Gardens Congress attracted 347 delegates from 45 countries to the city of Dunedin, New Zealand, for a week of presentations, discussions and networking. The Congress was held at the beautifully refurbished Dunedin Centre, which comprises three of the city's most significant heritage buildings.

The Congress was organised by Botanic Gardens Conservation International (BGCI) in partnership with the Dunedin City Council and Dunedin Botanic Garden, and included 17 plenary talks, 12 organised symposia and over 80 contributed papers. It was held alongside the 6th Biennial Botanic Gardens Australia and New Zealand (BGANZ) Congress.

A wide range of issues affecting botanic gardens were discussed through a series of formal presentations and workshops, as well as during informal corridor chats. A dedicated online forum was also organised to discuss the future of botanic gardens, and it drew many participants even before the start of the Congress.

The Congress was opened with a traditional Maori ceremony, during which a Maori blessing 'breathed life' into the meeting. This was followed by a welcome address by the Mayor of Dunedin, who highlighted the important role the Dunedin Botanic Garden has played throughout its 150 year history in providing a place of science, education and recreation for the city. The Dunedin Botanic Garden is located at the northern end of central Dunedin, on New Zealand's South Island. It is New Zealand's oldest garden, established in 1863. Dunedin Botanic Garden holds a diverse collection of plant families and species, both native and exotic, and is definitely amongst the finest temperate gardens of the world. This was evident during the week of the Congress when visitors were greeted by the spectacular displays of blooms in every corner in the immaculately maintained garden.



► The Dunedin Centre, where the Congress was held. (Photo credit: Suzanne Sharrock)

During the opening, the outgoing Chair of BGCI's Board of Directors, Baroness Joan Walmsley, highlighted some of the new projects BGCI is launching, namely the International Plant Sentinel Network to address invasive plant pests and diseases, and the new website for the Ecological Restoration Alliance of Botanic Gardens. BGCI is also reviewing one of its important

resources for the management of botanic gardens, *The Darwin Technical Manual of Botanic Gardens*, which was developed in 1998, and plans to release an updated version in print and online by late 2014.

The participants of the Congress also had a day's excursion around Dunedin, which included visits to the Orokunui

Ecosanctuary to view native flora and fauna, and Taiaroa Head, a headland at the tip of the Otago Peninsula and home to a colony of albatross.

During a closing lecture, the president of the Missouri Botanical Garden, Dr Peter Wyse Jackson, outlined the many successes of botanic gardens in the past and the challenges facing them in the future. The most heartening success that was highlighted is the growth in numbers of botanic gardens, from 798 worldwide in 1983 to 3,116 in 2013. There is now a stronger network of gardens worldwide. It was noted that the emphasis of most botanic gardens has moved from mainly science and research, living collection management and public amenities with limited education roles in the 1980s, to becoming multipurpose botanical centres that serve cities, nations and the world through providing global strategies to conserve threatened plant species and more effective educational outreach. Today, botanic gardens have a heightened importance in expanding plant conservation and environmental awareness through education, and are increasing their participation in the development of international policies regarding biodiversity conservation, sustainability issues and climate change. With the mushrooming of more botanic gardens worldwide, there is a growing need for botanic gardens to work together and share information more effectively and to take new initiatives to become more engaging, accessible and relevant. Botanic gardens need to push boundaries in plant science and develop sustainable and successful methodologies to maintain their existence, so that they do not become 'white elephants' and ineffective in achieving their missions.

In closing the Congress, the incoming chairman of BGCI, Professor Stephen Blackmore, rightly summed up the entire event as "exceptional", and indeed this is definitely the sentiment shared by the participants. The next Global Botanic Garden Congress will be held in Geneva, Switzerland in 2017. 🌿

Nura Abdul Karim
Horticulture, Exhibitions and Events

Nigel P. Taylor
Director SBG



► The opening of the Congress with a traditional Maori welcome and blessing delivered by Dr Huata Holmes. (Photo credit: Nura Abdul Karim)



► Delegates listening to a plenary presentation in the Glenroy Theatre. (Photo credit: Suzanne Sharrock)



► The beautiful grounds of the 150 year old Dunedin Botanic Garden, the oldest botanic garden in New Zealand. (Photo credit: Nura Abdul Karim)

KEY VISITORS TO THE GARDENS

July-December 2013



► His Excellency Sheikh Abdullah Bin Nasser Bin Khalifa Al Thani, Prime Minister and Minister of Interior of the State of Qatar, during his visit on 13 November 2013.

Mr Masahide Adachi Director of CLAIR Singapore
His Excellency Sheikh Abdullah Bin Nasser Bin Khalifa Al Thani Prime Minister and Minister of Interior of the State of Qatar
Dr George Argent Royal Botanic Garden, Edinburgh, UK
His Excellency Joseph Biden & Dr Jill Biden Vice President of the United States of America
Prof Stephen Blackmore & spouse Regius Keeper, Royal Botanic Gardens, Edinburgh, UK
Prof Peter & Mrs Burkill Son of H.M. Burkill, former director of Singapore Botanic Gardens
Mr John K. Corner Son of E.J.H. Corner, former assistant director of Singapore Botanic Gardens
Mr Jean-Jacques de Dardel* UNESCO World Heritage Committee delegate, Switzerland
Mdm Maité Delmas Director of International Relations, Museum National d'Histoire Naturelle, Paris, France
Dr Deng Yunfei South China Botanical Garden, Chinese Academy of Sciences, China
Dr Helena Duistermaat Naturalis Biodiversity Center, The Netherlands
Dr Bryan E. Dutton Western Oregon University, USA
Dr David G. Frodin Royal Botanic Gardens, Kew, UK
Dr Joe Holtum James Cook University, Australia
Dr Mark Hughes Royal Botanic Garden, Edinburgh, UK
Mr Stanety Jeffrey National Research Institute of Papua New Guinea, Papua New Guinea
Mr Foreting Juhonewe National Research Institute of Papua New Guinea, Papua New Guinea
Ms Nadhaniel S. Juhonewe National Research Institute of Papua New Guinea, Papua New Guinea
Mr Khaw Boon Wan Minister for National Development of the Republic of Singapore
Mr Tony Kirkham Head of Arboretum, Royal Botanic Gardens, Kew, UK
Mr Desmond Lee Minister of State, Ministry of National Development, Republic of Singapore
His Excellency Lee Hsien Loong Prime Minister of the Republic of Singapore
Ms Lin Shu-Fen Legislator, the Legislative Yuan of the Republic of China



► *Dendrobium* Joe and Jill Biden, named after His Excellency Joseph R Biden, Vice President of the United States of America, and Dr Jill Biden.

Dr Stuart Lindsay Royal Botanic Garden, Edinburgh, UK
Dr Liu Yea-Chen National Chiayi University, Taiwan
Ms Siya Malilen* UNESCO World Heritage Committee delegate, Cambodia
Dr Bruce Maslin Department of Environment and Conservation, Australia
Dr David J. Middleton Royal Botanic Garden, Edinburgh, UK
Mr Michael Murphy CEO, Kew Foundation, Royal Botanic Gardens, Kew, UK
Her Excellency Hazel Francis Ngubeni South African High Commissioner to the Republic of Singapore
Mrs Tazuko Okada Wife of former Deputy Prime Minister of Japan, Mr Katsuya Okada
Dr Sara Oldfield Secretary General of Botanic Gardens Conservation International
Mr Maurizio Quagliuolo* HERITY International General Secretary, Italy
Mr Kishore Rao* Director of UNESCO's World Heritage Centre
Mr Anek Sihamat* UNESCO World Heritage Committee delegate, Thailand
Ms Vipavadee Sihamat* UNESCO World Heritage Committee delegate, Thailand
Mr Siyonn Sophearith* UNESCO World Heritage Committee delegate, Cambodia
Dr Pramote Stienrut Director, The Institute of Thai Traditional Medicine, Thailand
Ms Orawan Theanphong Chulalongkorn University, Thailand
His Excellency Tsakhia Elbegdorj President of Mongolia
Mr Wang Jian Counsellor, Personnel Department, Ministry of Foreign Affairs of the People's Republic of China
Dr Gothamie Weerakoon The Field Museum, USA
Mr Michael Hermann Mathias Worbs and Ms Elza Geb Rodrigues Queiroz Worbs German Ambassador and Permanent Delegate to UNESCO, Germany
Ms Tsehay Eshetie Workneh* UNESCO World Heritage Committee delegate, Ethiopia
Mr Yao Tze Leong Forest Research Institute Malaysia, Malaysia

* Visited the Gardens at the end of June and included here because he/she was omitted from the January-June 2013 list of Key Visitors to the Gardens, which appeared in the previous issue of *Gardenwise*

A ZOO IN THE GARDENS

IN 1869, Sir Harry St George Ord, the then Governor of the Straits Settlements, suggested the formation of a zoo in the Singapore Botanic Gardens as an additional and educational attraction, like the Economic Gardens. It was also at that time that the government agreed to give a grant to the Gardens, on the condition that the Society would exhibit the living economic plants. At the time, the Gardens' animals included only a small collection of birds, but Sir Harry also offered to present some animals for the zoo.



► The Monkey House in 1903.

The zoo commenced in 1875 when James Murton came on board. William Krohn was employed to build up the collection of animals and Mr H. Capel was hired to take care of them. Murton's work was much dominated by the rapid growth of the zoo and the developed parts of the Gardens became dotted with enclosures for animals. The government continued to financially maintain the collection, and gifts of animals poured in.

The gifts included a two-horned rhinoceros, a sloth bear, two sambar deer, two orang-utans, one emu, one great kangaroo, three red kangaroos, a bush-tailed wallaby, a parrot, an eagle, black swans and a fine pair of white swans. In 1876, the King of Siam and Mr Hargreaves each gifted a leopard, and the Sultan of Terengganu donated a tiger. There were also numerous gifts of smaller animals.

An enclosure with a house and a wallow were made for the rhinoceros near Napier Road by the foot of Swan Lake, and an enclosure was

prepared adjacent to Garden Road for the deer. The kangaroos and the emu paddocks were fenced adjoining Cluny Road near the office gate. The carnivores were given a house at the northeast side of Bandstand Hill, where the Orchid House was, and the Aviary was on the east side of the Hill.

The annual budget, although quite sufficient for the upkeep of the zoo, was inadequate for the construction of suitable houses for the various animals. In 1877, a wealthy Chinese merchant by the name of Cheang Hong Lim donated a sum of \$2,000 for the erection of a Monkey House. This ornamental iron structure, an octagonal building with a dome top, was erected near where the Herbarium stood at the time, and a small collection of monkeys were placed inside.

The expense of feeding and housing the animals came up to about 100 to 150 GBP per year when the collection was at its largest, and the uncontrolled growth of the zoo became a problem. In 1878 it was

decided to dispose of the large animals, and most were sent to the Calcutta Zoological Gardens, but birds, monkeys and other smaller animals were kept. The deer were also retained as they were inexpensive to feed. However, in 1903, an order was received to abolish the zoo, and the remaining animals were gradually disposed of. The Monkey House was removed in 1913 to provide a shelter for visitors in the Gardens.

To a large number of visitors at the time, the zoological collection was very attractive, and due to its popularity, its removal was a disappointment for many. However, although visitor attendance was reduced for a while, the visitation of scientific researchers increased, as by then, the Gardens had become established as a scientific institution. 🌿

Christina Soh
Library