GARDENWISE

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MESSAGE FROM THE DIRECTOR

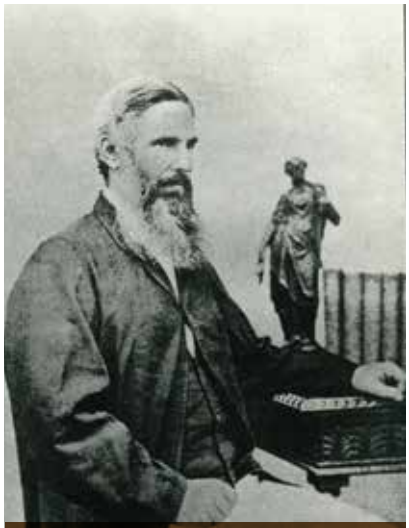
As anticipated in my last message, a lot has been happening at SBG, much of it connected with heritage and especially our UNESCO World Heritage inscription bid, for which the draft documents destined for UNESCO's purview in 2014 will soon be available for public scrutiny and feedback (via SBG's soon-to-be launched, revamped website). Unseen by most, research into SBG's history has been continuing apace and appropriately this issue of *Gardenwise* has two items with an historic flavour (pp. 2 and 24). Out in the Gardens two of our most significant heritage buildings have been restored and decorated in a more pleasing style: Ridley and Holttum halls. The former now includes reinstated short-term overnight accommodation for up to three visiting scientists or exchange personnel, whilst the latter is being fitted out with the museum presentation on SBG's living heritage. I say 'living heritage' because the exhibition will act as an introduction to the many heritage features on site which have been part of SBG's ongoing development as a botanic and pleasure garden since the 1860s. Beside Holttum Hall a new building is taking shape, courtesy of City Developments Ltd (CDL), the new gallery's donors. CDL is celebrating their 50th anniversary, and coincidentally the first exhibition in the new building will focus on 50 years of greening Singapore, in which SBG played a significant role. A series of subsequent exhibitions is already planned and beyond these I hope we will occasionally be able to showcase botanical art therein, like that published here by the talented Waiwai Hove and Jean Kinloch Smith.

Rare plants feature in this issue and remind us that the first purpose of botanic gardens nowadays is the conservation of biological diversity and its promotion through public education. Thus, most of the remaining articles have a conservation theme, be it *Hoya, Vanilla,* Brunei's forests, *Aphanamixis* in our Rainforest or invasive ginger relatives. Invasive species have given botanic gardens a bad reputation in the past, because they were often introduced for botanical interest and then escaped over the wall so to speak from our botanical detention camps. So, we need to be vigilant when using non-natives in our gardens and streetscapes, and the botanic garden does well when it warns its partners who request plants of these potential dangers. Invasive species are amongst the most serious conservation issues, second only to man's inexorable destruction of natural habitats.

SBG's motto of 'connecting plants and people' is borne out by the Gardens' remembering of former long-serving staff (p. 23): Mohd Noor bin Jumaat started working here when your Director was but three years old! Clearly, we have all still got a long way to go.

Nigel P. Taylor

WHAT DO WE KNOW ABOUT LAWRENCE NIVEN, THE MAN WHO FIRST DEVELOPED SBG?



One of the only known images of Lawrence Niven, first published by W. Makepeace, *Gardens Bulletin, Straits Settlements* 2(6): 177 (1920).

Lawrence Niven's grave in the churchyard at Low Coylton, South Ayrshire, Scotland. *(Photo credit: F. Burford)*

The Singapore Botanic Gardens (SBG) dates from the last months of 1859. Its acquisition was facilitated by the British colonial government and the *towkay* Hoo Ah Kay (better known as 'Whampoa'), who gifted 23 hectares of land to an Agri-Horticultural Society, comprising parcels belonging to various former owners, as detailed in Henry Burkill's first history of SBG published in the *Gardens Bulletin* in 1918. The following year (1860), the Society obtained the services of one Lawrence Niven, the manager of a local nutmeg plantation, who subsequently developed the Botanic Gardens over the next 15 years and did so greatly to the satisfaction of both the government and the Society, as frequently remarked upon in their annual reports. This much was already known about Niven when I arrived as the newly appointed Director of SBG in September 2011, and began reading Bonnie Tinsley's admirable *Gardens of Perpetual Summer: The Singapore Botanic Gardens* (2009). Thus, it is clear to anyone who studies SBG's history that Niven was almost certainly responsible for the classic English style landscape design that the Gardens celebrates today and which is one of the principal assets that could favour its inscription as a UNESCO World Heritage Site. So who was this Lawrence Niven, and what more can be fathomed about his life and times?

The following notes derive from diverse sources of information drawn to my attention through the kindness of various people, whom I acknowledge here. Bonnie Tinsley shared with me a genealogy of the Niven family sent to her a long while ago by Dr Charles Nelson (formerly of the National Botanic Gardens, Glasnevin, Dublin). This enabled my sister, Frances Burford, who lives in Southwest Scotland (whence Niven came), and more especially her friend, Carol Metcalfe, to uncover the details of his family, as well as his last resting place, for he is buried in his native Scotland and the grave survives. Richard Hale (former CEO of HSBC in Singapore and NParks Board member for a number of years) drew my attention to a key mention of Niven in the Straits Times from 1857, whilst Google found for me a fascinating document on the internet entitled *Nevin Genealogica* (apparently MacNevin, MacNiven, Nevin and Niven are all variations of the same name, dating from at least 600 AD and derived from the Gaelic *naomh* or *naomhan*, meaning saint or holy person).

SBG's Niven was born at Barony, Lanark, Scotland on 8 January 1826 and christened Laurence. His name is spelled thus, with a 'u', and so written on his tombstone, but most references to him in Singapore write his name as Lawrence with a 'w'. He was one of 11 children born to Laurence Ninian Niven of Barony (b. 8 May 1788) who married Agnes Lang (b. 18 October 1789) from Renfrew. In 1841 Laurence Ninian and Agnes Niven were living at the Estate of Auchindarroch in Lochgoilhead (or Lochgilphead) with six of their children, Laurence (our Lawrence) being one of them. That they were living at a garden estate reflects the fact that the family were gardeners by trade, other members holding senior positions at the botanic gardens of Glasnevin and Hull, so it seems that young Lawrence began to learn his trade at home. The 'English Landscape' style of garden design would still have been familiar at this time to influence Niven. This style, which idealised nature and often featured lakes and gently rolling lawns, avoided formality and symmetry in its translation of natural landscapes into gardenscapes. The main exponents of this style included Charles Bridgeman and 'Capability' Brown, both 18th century garden designers of famous estates such as the Royal Gardens at Kew. The *Nevin Genealogica* tells us that Lawrence served an apprenticeship as a gardener at Rossdhue, Luss, Lochlomond, the estate of the Colquhons family and that subsequently he worked in Singapore for 30 years prior to his death, which suggests he arrived here in 1846 aged 20.

Nothing is known of his life in Singapore until 27 December 1855, when it is reliably recorded that Lawrence married Jane Newbold, daughter of the noted Colonel Newbold, a retired Indian Army Officer who explored and wrote a history of the Malay states. The Nivens had at least two

Lawrence and James Parker Niven's graves side by side; the headstone of the latter has fallen. Churchyard at Low Coylton, South Ayrshire, Scotland. *(Photo credit: F. Burford)*

View of the churchyard at Low Coylton, South Ayrshire, Scotland. *(Photo credit: F. Burford)*

sons, the first also christened Lawrence, born 11 April 1858. Lawrence senior's elder brother, James Parker Niven (b. 17 October 1820) was also in Singapore, where he was in business with Alexander McAlister of McAlister & Co. So did Lawrence follow his elder brother to Singapore? His younger sister, Margaret Parker Niven (b. 9 June 1829), was also in Singapore and married Sir Ernest Woodford Birch KCMG, who later worked for Sir Cecil Clementi Smith, Singapore's Colonial Governor in the late 1880s. It seems the Niven family were well connected.

It has already been mentioned that, when Lawrence began work at SBG, he was managing a local nutmeg plantation. Certainly nutmeg was being cultivated around the land given to SBG, so one is tempted to imagine that it was on one of these adjacent estates. However, from an official notice published in the *Straits Times* on 19 May 1857, we learn that Mr Niven was in charge of C.R. Prinsep's estate, located between Orchard Road and the 'Brass-bassar' [Bras Basah] canal, which was at that time in a swampy state and 'injurious to the health of the inhabitants of the neighbourhood'. From this notice we gather that Niven worked for Prinsep, whose nutmeg estate a decade earlier had been amongst the most productive on the island. Today the area in question to the east of Orchard Road includes Prinsep Street and Niven Road, and the latter it seems was a Prinsep estate road most likely developed by Niven and subsequently named after him.

So how did Niven come to work at the Botanic Gardens when he already had an important role managing Prinsep's estate? We do not know for sure, but a likely explanation is that, as reported in the Rev. Reith's *Handbook to Singapore* (1892), the nutmeg crop was in severe decline from 1857 to 1860 due to disease, and thus Niven may have seen the need to seek alternative employment lest he be made redundant. As we know, he was also recently married with a young family to provide for.

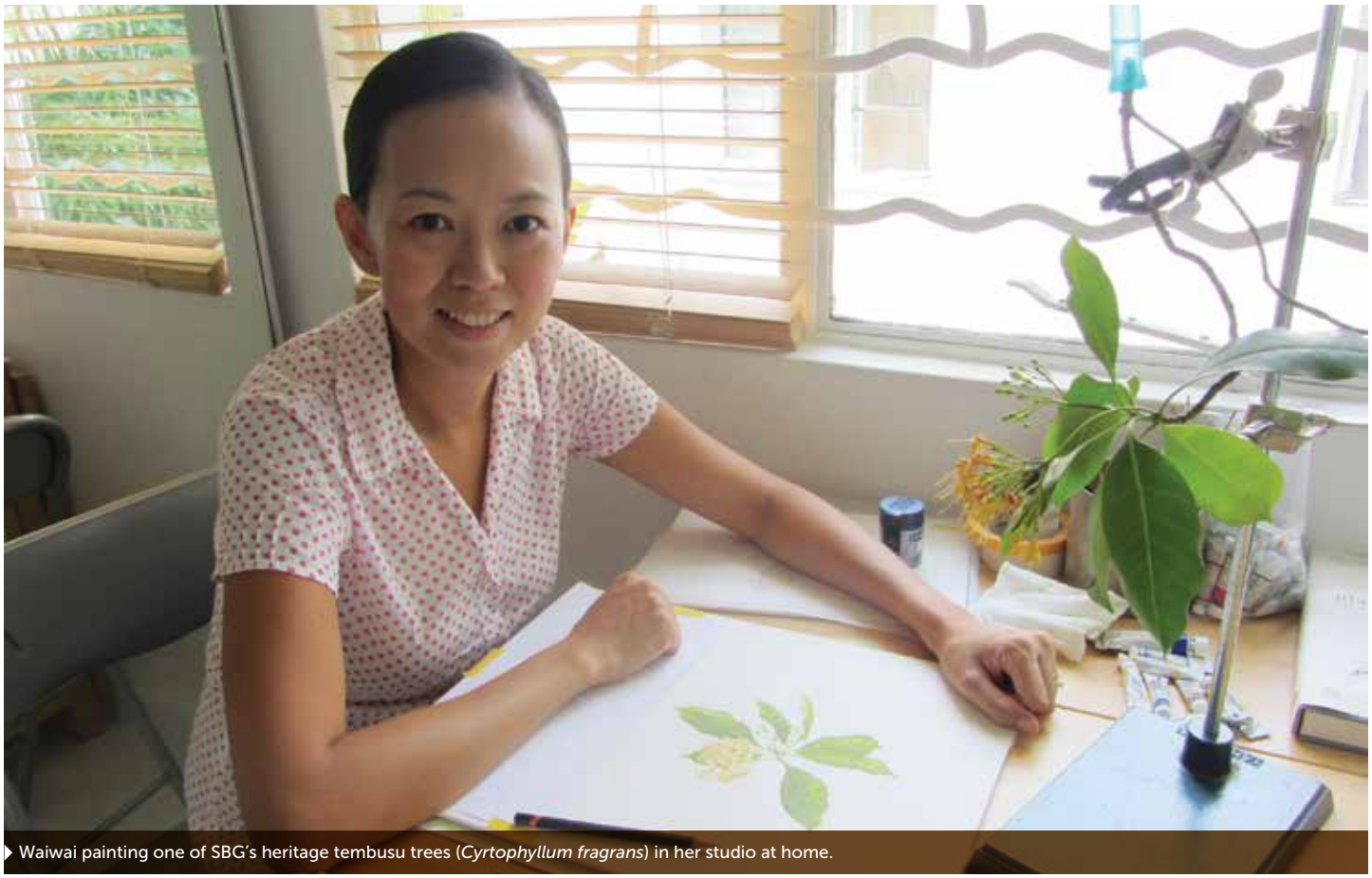
His duties at SBG evidently became more onerous as time went on, so that during the 1860s the government, which had been contributing to his salary at SBG since 1866, agreed to increase their payments from 1869. So pleased was the Agri-Horticultural Society with Niven's work that they generously built him a substantial plantation style house in the Gardens (constructed in 1867–68), though with borrowed money. This is what we know today as Burkill Hall. By 1874, however, it was clear that the Society was unable to repay the loan for the house and petitioned the colonial government to settle it for them and take over responsibility for the Gardens as a whole. Thus it was this debt that ultimately resulted in the government converting SBG from a 'pleasure garden' into a typical colonial botanic garden with scientific collections and trials of potential economic crops. To achieve this, they first had to appoint a botanically trained Superintendent as Niven's superior (Niven's role had been styled as 'Manager', though his famous portrait has him erroneously captioned as Superintendent).

Given Niven's achievements, his subordination under the younger man now appointed by the government, James Murton, who had trained at Kew Gardens, would have been a difficult situation to accept, but, as Henry Burkill's history tells us, Niven had already decided to take leave when Murton was *en route* to take up his role in 1875. Niven was taken ill and travelled back to Scotland in 1876 with another son, James, who tells us via the *Nevin Genealogica* that his father promptly died only four days after his arrival at Coylton, Ayrshire, where he is buried. This was only half the tragedy that befell the family, for only a fortnight later his formerly Singapore-based brother, James Parker Niven, also died and they are buried side by side in the hamlet's cemetery. The tombstones record their deaths as 21 August and 6 September 1876, respectively.

So now we know a little more about the man that can be credited with clearing much of SBG of the secondary *belukar* growth that preceded his pleasure garden, who created the ever popular band parade area in 1860/61 (now embellished by the 1930 Bandstand), laid out the curving roads and paths including Main Gate Road (1864), and excavated Swan Lake (1866), the oldest ornamental water body in Singapore. Like many of the early garden managers at Kew, the Royal Gardens at the hub of the British Empire's botanical network, Niven was a Scot (as was William Aiton, Kew's first Curator). Sadly, for these men who grew up closer to the North Pole than the Equator, the tropical environment was a severe test of their health, and both Niven and Murton's successor, Nathaniel Cantley (another Scot from Thurso in the far north), died relatively young. Niven was 50 years old at his demise, having spent 30 years in Singapore. His legacy lives on.

Nigel P. Taylor
Director SBG

ARTIST WAIWAI HOVE SHARES MORE OF HER BOTANICAL PAINTINGS



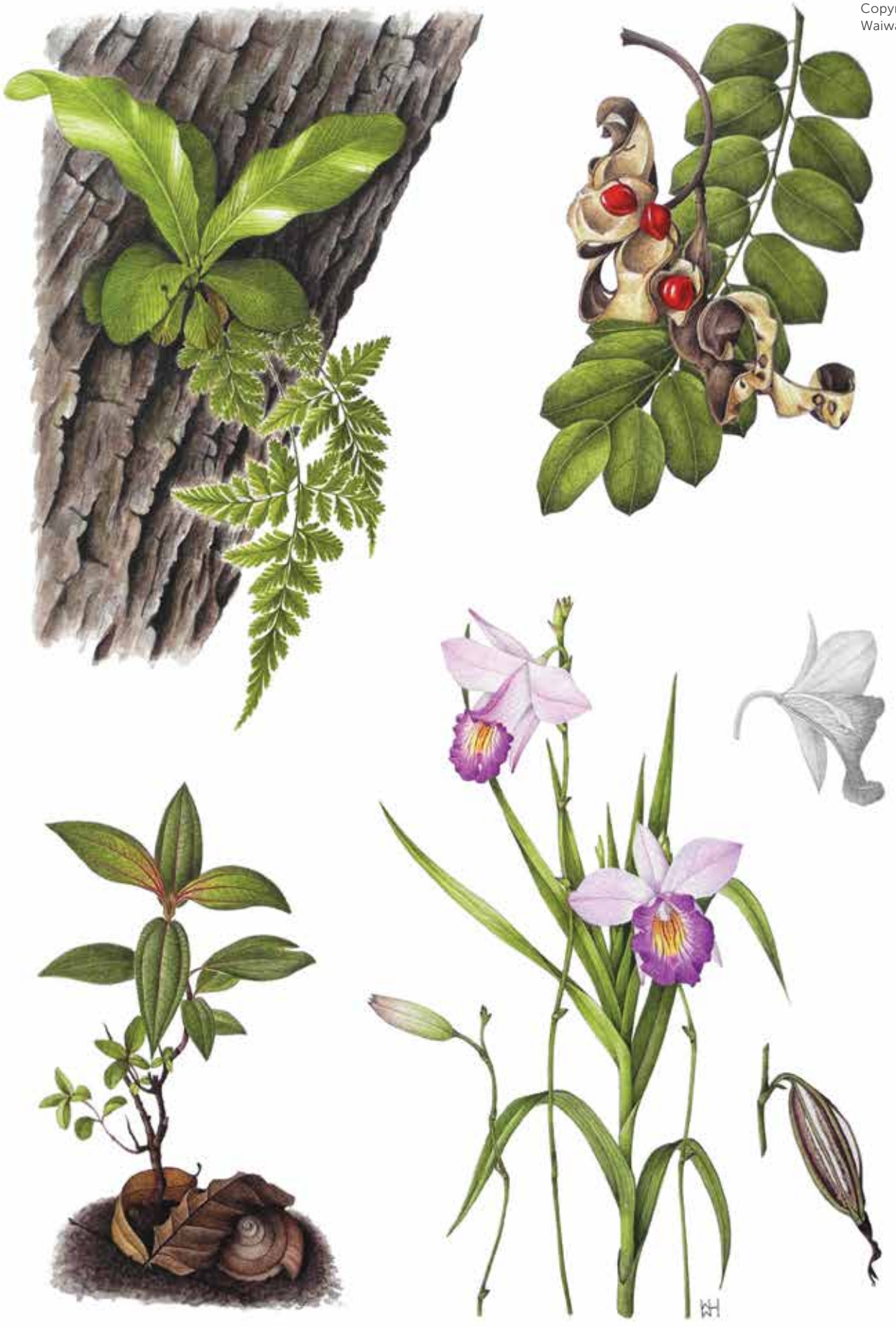
Waiwai painting one of SBG's heritage tembusu trees (*Cyrtophyllum fragrans*) in her studio at home.

The previous issue of *Gardenwise* (Feb 2013) featured botanical artist Waiwai Hove and shared some of her beautiful artwork with readers. In recent months, Waiwai completed her diploma course in botanical painting, and has begun focusing her attention on capturing some of SBG's most cherished living legacies through her watercolours.

Waiwai is skilled in many forms of art, but she particularly loves botanical painting as it allows her to combine her natural talent and attention to detail with her love of plants. She cultivated her skill in this art form through a 27-month-long diploma programme offered by the UK-based Society of Botanical Artists (SBA). Over the course of the programme, Waiwai was required to illustrate and paint various botanical subjects, and then submit her artwork by post to the UK for artistic and technical assessment. Her final grade was weighted heavily on three portfolio pieces, which were required to feature a fruit or vegetable, a botanical study and a mixed study. For her vegetable subject, Waiwai selected the regionally-popular culinary ingredient 'petai', also known as 'stinky beans' for their strong and pervasive odour. For her other two portfolio pieces, Waiwai painted a hibiscus hybrid and a composition of *Anthurium* cultivars, the blue pea vine, and a creeping sword fern. Waiwai received her Diploma in April of this year, and for her exceptional coursework, she graduated with Distinction and received SBA's Award of Excellence for achieving the highest marks in the history of the course!

Due to her artistic skill and botanical accuracy, SBG has recently commissioned Waiwai to create a series of paintings depicting many of the heritage trees in the Gardens. The series is aimed for completion in 2015, when we hope that the public may have the opportunity to view the entire collection. In the meantime, Waiwai shares two of her course paintings and her three final diploma pieces with readers of *Gardenwise*.

Ada Davis
Communications and Community Engagement



Top, left: *Asplenium nidus* (bird's nest fern) and *Davallia denticulata* (rabbit's next fern)
Top, right: *Adenanthera pavonina* (saga tree)
Bottom, left: *Melastoma malabathricum* (Singapore rhododendron)
Bottom, right: *Arundina graminifolia* (bamboo orchid)

Painting from photographs:
Dendrobium hybrid
Phalaenopsis 'Fuller's Sunset'
Vanda Miss Joaquim
Oncidium 'Goldiana' (golden shower)

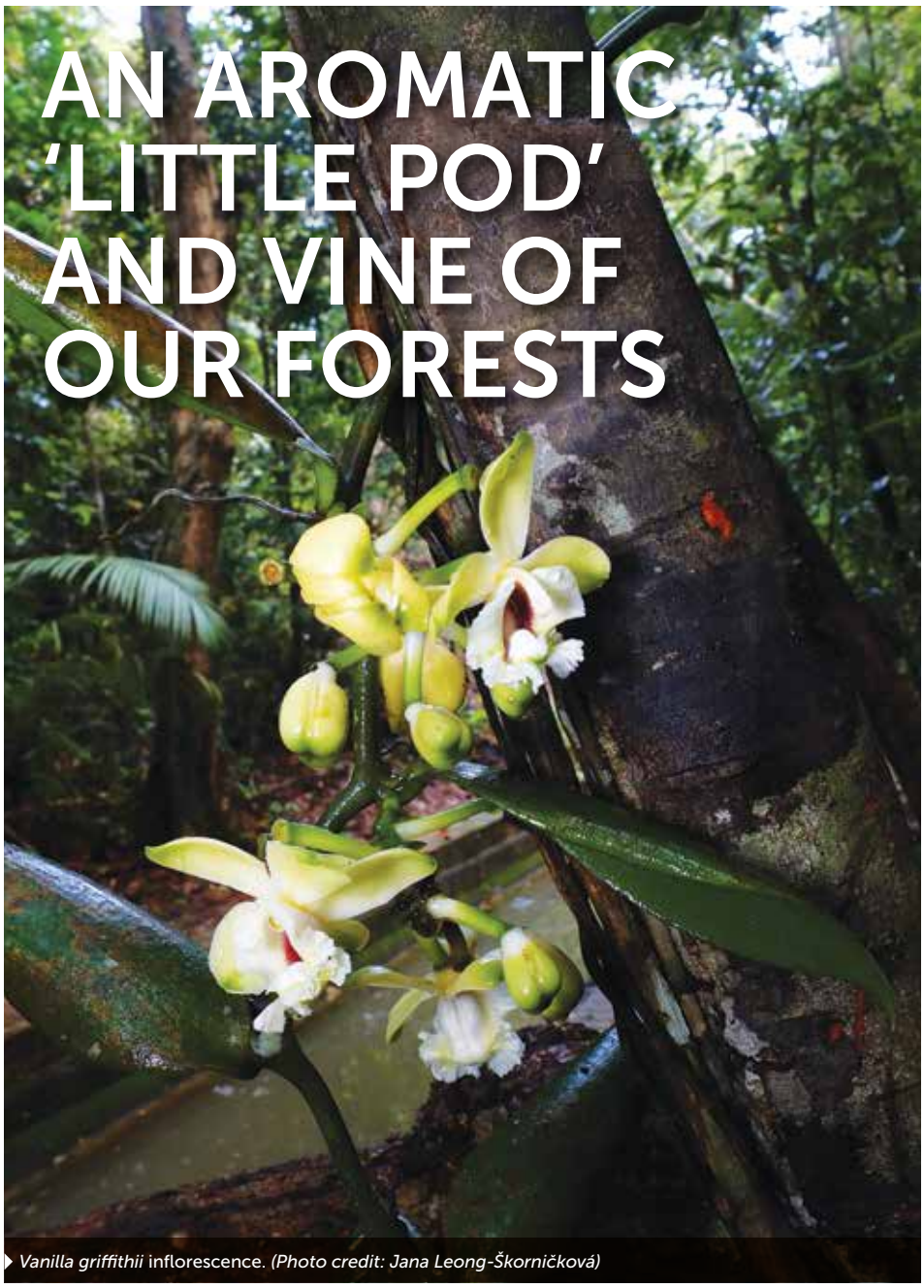
Due to her artistic skill and botanical accuracy, SBG has recently commissioned Waiwai to create a series of paintings depicting many of the heritage trees in the Gardens.

Mixed Study:
Anthurium andraeanum cultivars ('Flamingo Flower')
Clitoria ternatea (blue pea vine)
Nephrolepis acutifolia (creeping sword fern)

Study of fruit or vegetable:
Parkia speciosa (petai)

Botanical Study:
Hibiscus x *archeri* (Archer's hibiscus)

AN AROMATIC 'LITTLE POD' AND VINE OF OUR FORESTS



Vanilla griffithii inflorescence. *(Photo credit: Jana Leong-Škorničková)*

Vanilla—a word as kind to the tongue as its aroma is to the nostrils and taste buds. One of the world's favourite spices, it is used in confectionery for flavouring cakes, chocolates, ice creams and soft drinks, and also as a fragrance in the perfume industry. However, the fact that it originates from an orchid of the genus *Vanilla* does not appear to be common knowledge. That some of these orchids climb into the canopy of tropical trees and can reach over 100 m in length may also come as a surprise to some. Here we report on this most delicious of orchid genera, and introduce Singapore's very own representative, *Vanilla griffithii*.

Sources of vanillin

Vanilla is the second most expensive spice in the world, after saffron. It became so valuable at the turn of this century that it was known as 'Green Gold', its trade shrouded in secrecy and infected with piracy.

The source of the flavour is an aromatic essence, vanillin, which crystalises on the outside of the fruit (a seed pod which is known commercially as a vanilla 'bean'), after a series of curing and drying processes. The natural essence of vanilla is most frequently obtained from *Vanilla planifolia,* a species which is indigenous to the tropical forests of Mexico and was brought to Europe by the Spaniards who discovered the Aztecs using it to flavour chocolate. This species accounts for about 95% of the vanilla production worldwide due to its high vanillin content.

There are two other species of minor commercial usage, namely a hybrid from Tahiti, *Vanilla* x *tahitensis* (*V. planifolia* x *V. odorata*) and *V. pompona* from tropical America. These two species also yield the essence but to a lesser extent, although *V.* x *tahitensis* is reputed to have a fruity flavour and finer scent than *V. planifolia* and is often preferred in cosmetic products. *V. abundiflora* from Borneo and *V. gardneri* from Brazil are also reported to yield an inferior essence, and are not used commercially. There are no other reported species that yield substantial quantities of vanillin.

Vanilla planifolia is now cultivated in tropical regions outside of its country of origin. The top producers of vanilla nowadays are mainly from Madagascar and Indonesia. Tonka beans (from *Dipteryx* species) and synthetic vanillin processed from eugenol (clove oil), guaiacol (an organic compound derived from *Guaiacum*) or lignin (a constituent of wood resulting as a by-product of the pulp industry) are alternatives. Global demand for natural vanilla outstrips supply, driving the purchase price up. Although synthetic vanillin costs only about one percent of its price and about 97% of vanilla extracts on the market are synthetic, natural vanillin is considered far superior, probably due to the presence of subsidiary substances. Some commercial vanillas are blends of both natural and synthetic vanillin.

Classification of *Vanilla*

In orchid classification, *Vanilla* belongs to the subtribe Vanillinae in the tribe Vanilleae of the subfamily Vanillioideae, one of five from the orchid family, Orchidaceae. While most members of the Vanillioideae are leafy autotrophic species (meaning they are photosynthetic and therefore able

Vanilla is the second most expensive spice in the world, after saffron. It became so valuable at the turn of this century that it was known as 'Green Gold', its trade shrouded in secrecy and infected with piracy.

The flowers of *Vanilla griffithii*. *(Photo credit: Craig Williams)*

to make their own food), others such as *Galeola nudifolia*, a Singaporean native with pale yellow flowers that smell of rotting bananas, are leafless and mycotrophic (relying on a fungus to obtain its nutrients).

The genus *Vanilla*

This genus makes up about half the number of species in Vanillioideae. The name *Vanilla* is derived from the Spanish *vainilla* which means 'little pod', an allusion to the bean-like fruit of *Vanilla planifolia*. The genus is pantropical with more than a hundred species worldwide, and is most diverse in tropical America, with about half the number of species occurring there. It is also found in Africa, the Indian Ocean islands, Malesia and the Pacific Islands. The species are thermophilous (warmth loving), occurring in subtropical and tropical regions, from low altitudes to higher elevations with savanna-like vegetation, or in dry forest valleys between mountains or mid elevation rainforests, but are never found in montane forest.

Most *Vanilla* species have a monopodial habit (meaning that the stems grow upwards from a single main axis), and are hemi-epiphytic vines, starting off life as terrestrials with climbing stems and rooted into the ground. They then scramble up shrubs and trees, bearing a single climbing root at each node, opposite a leaf. Once established, a vine may become independent of the terrestrial roots and wholly epiphytic, climbing to well-illuminated spots but rarely reaching the upper canopy.

The leaves of most species are thick and fleshy, but some are reduced to small scales, giving the vine the appearance of a leafless succulent stem. Its inflorescence is a raceme, which arises from the leaf

Side view of a *Vanilla planifolia* flower, in cultivation at SBG. This species is the most common source of commercially-produced vanilla. *(Photo credit: Paul K. F. Leong)*

axil and bears several flowers. When fully opened, the flowers are large, with sepals and petals wide-spreading and resupinate (twisting during development to end with the lip pointing downwards). The flowers of most species are ephemeral, each lasting for about a day. Unlike most orchids, the pollen is granular and not formed into hard pollinia. The fruit is a fleshy and cylindrical bean-like capsule. While most orchids have miniscule dust-like seeds, those of *Vanilla* are relatively large, hard and brittle (the genus *Pseudovanilla* is closely related and is of similar habit to *Vanilla*, but differs in having fruits that are capsules with winged seeds).

Vanilla griffithii

The only species of *Vanilla* that occurs in Singapore is *V. griffithii*. This species is distributed from Peninsular Thailand south to Peninsular Malaysia, Singapore, Sumatra, and Borneo. It is a lowland species found up to an elevation of about 300 m, climbing on trees in fairly open spaces near the edges of forests. In Singapore, *V. griffithii* is found near water bodies such as those in the Nee Soon Swamp Forest and the Central Catchment Nature Reserve. It also occurs in surrounding islands of Singapore, including Pulau Ubin, Pulau Pawai and Pulau Senang. Historical records also show collections from sites such as Seletar, Mandai, Thomson Road and Changi forests. Today, *V. griffithii* is classified as Vulnerable in *The Singapore Red Data Book* (2008), meaning that it is facing a high risk of extinction in the wild in Singapore.

The flowers of *Vanilla griffithii* are large, about 5 cm in diameter, and in contrast to the rather plain flowers of culinary *Vanilla*, are elegant and alluring. The creamy white buds open one or two at a time to reveal elliptic sepals and petals with a delicate greenish tinge at the tips. The tips of the petals are obtuse and those of the sepals broadly acute. The outsides of the petals are keeled. The column extends about 1.5 cm, curving slightly downwards at its apex towards the lip, which is joined to the column, near the base. The lip itself is greenish-white, flamboyant and elaborate, with a biparted midlobe. Just inside the biparted margin is a chevron-shaped tuft of fine white hairs. The flower distinctly ages yellow towards the end of the day and then begins to close up. Records show that the flowering period of this species is between March and May, peaking in April. There is another less defined flowering period around September.

H.N. Ridley, the first Director of the Singapore Botanic Gardens, mentioned that *Vanilla griffithii* is one of the few *Vanilla* species that is autogamous (self-pollinating). Herbarium collections indeed display specimens with high fruit sets, consistent with a spontaneous self-pollinating species. However, its flower is highly scented with a lingering bouquet, puzzling for an orchid that relies on self-pollination. Orchids are infamous for deceit pollination, sometimes proffering pseudocopulatory strategies (with flower parts simulating the female insect) or having flower parts equipped with elaborate trap mechanisms, often offering no reward to their pollinators. They may, however, produce other rewards for pollinators, such as oil, pollen, stigmatic exudates or fragrance. For instance, the pollinators of some American *Vanilla* species are euglossine bees, the males of which are known to collect fragrance compounds from flowers either as a precursor to their own sex pheromones or to be used as part of their courtship display. Although there are no euglossine bees in this region, there may be bees with similar behaviour. Therefore, in addition to the ability of *Vanilla griffithii* to self-pollinate, it is possible that the scent and elaborate lip of the flower colludes to a scheming design to lure pollinators to aid in cross-pollination as well. Ridley also mentioned that its fruit is sweet and edible; thus, the seeds may be dispersed by animals. Unfortunately, studies of the pollination and dispersal mechanisms of Asian *Vanilla* species are lacking, so little more is known.

Conservation

Astonishingly, most *Vanilla planifolia* plants in cultivation are known to have originated from plants that can be traced back to cuttings from a specimen grown by the Marquis de Blandford in the 19th century (Pridgeon et al. 2003, *Genera Orchidacearum: Vol. 3*), leaving the industry on precarious genetic foundations and emphasising the economic significance of conserving its wild relatives. Due to the Vulnerable status of *V. griffithii* in Singapore, and the few existing *ex situ* specimens, conservation efforts are critical if Singapore's own vanilla is to survive in the wild in the future.

Paul Leong
Herbarium

Craig Williams
Horticulture, Exhibitions and Events

SBG STAFF COLLECT A SPECIMEN OF *VANILLA GRIFFITHII*

Propping up the scaffold while Craig attempts to reach the *Vanilla* flowers. *(Photo credit: Jana Leong-Škorničková)*

Taking a cutting. *(Photo credit: Jana Leong-Škorničková)*

Barely reaching the plant with the long pole pruner. *(Photo credit: Jana Leong-Škorničková)*

It was at a forest trail between the MacRitchie and Upper Peirce reservoirs that a recent significant encounter with this rarely seen species occurred. In fairly open secondary forest, the sharp eyes of Nigel Taylor, Director of the Singapore Botanic Gardens (SBG), picked out some intriguing spots of colour amidst the tangle of vegetation. There, next to a canal, was *Vanilla griffithii*, snaking 7 or 8 m up a *Rhodamnia cinerea*, its velumen-covered roots clasping the tree. The top 2 m of the orchid were draped across a tree branch, hanging freely and bearing flowers. Although a rather common lowland species of this region, flowering specimens of *V. griffithii* are rarely encountered, and thus the Singapore Herbarium had no spirit collections of the flowers (the easiest form in which to examine the species). A few days later, armed only with an extendable pole pruner, a group of four SBG staff set out to rectify this.

The trail leading down to the canal was littered with empty ration packs, perhaps symbolic of the rather messy manoeuvre awaiting the group in its collection of the prized flowering material. When it became clear that using the pole pruner alone was a bit like a small child straining in vain for sweets on the top shelf, there was clearly some head scratching to be done!

Determined not to return to SBG empty-handed, the troops rallied. After a brief flirtation with felling the tree our prize was dangling from, we looked to the forest for help. Some reconnaissance of the vicinity yielded building materials in the form of fallen branches, and a very rudimentary scaffold quickly took shape. While the interlocking structure, braced at its base by two botanists turned Atlas impersonators, may not have passed a health and safety inspection, it put the flowers just within reach, spurring the mission on! The enemy's artillery, in the form of pot shots from disgruntled fire ants whose ascent up the tree was suddenly interrupted by digits of *ang mo* meat clasping the trunk, hardly registered to the determined climber. Such was the anticipation of the spoils of war and the concentration required to avoid teetering on tip-toes and tumbling into the canal!

The first few thrusts with the pole pruner fell short of their mark. Then a well aimed lunge and a victorious snip became a heart-in-mouth moment as the blooms suddenly plummeted and slipped into the watery grip of the canal. Thankfully the waxy prize floated unscathed, and quickly filled the air with a seductively sweet scent that would have perfumers taking notes. Close examination of the flowering material revealed inflorescences which arose from axillary nodes and measuring 4–5 cm long. Each had about 10 flowering buds, subtended by green floral bracts.

Fortunately, the plant encountered not only supplied a fine herbarium specimen but also had sufficient flowering material for us to take several meters of cuttings for conservation and also leave enough to allow it to reproduce in the wild. Sections of various lengths were potted with the basal ends in a mix of sphagnum and coconut husk, intended to give an airy moist environment that would encourage rooting. They were placed in a mist house, in light shade to approximate the conditions of their origin and misted at half-hourly intervals. Although arguably unnecessary for the survival of such succulent plants, high humidity generally helps to promote new root growth in tropical orchids, which is the most important factor in getting them established and growing well.

The first clone to leave the nursery had an impressive spread of ghostly white roots, spreading laterally through the top 5 cm of sphagnum. Its destination was the edge of the 'Fantastic Forest' in the Jacob Ballas Children's Garden, where it will grow next door to its Mexican culinary cousin *Vanilla planifolia*. There, children will learn that their forefathers may have used *V. griffithii*; Ridley reported that the sticky, irritant milky juice of its leaves was used locally as a hair conditioner, and it has also been recorded that the flowers, pulped in water, may have been applied as medicine to the bodies of those gripped by violent fever. Hopefully, one day visitors to the Children's Garden will be able to learn about Singapore's own *Vanilla*, and try the sweet and edible fruits for themselves.

Craig Williams
Horticulture, Exhibitions and Events

Paul Leong
Herbarium

50 Years of Greening Singapore

Singapore's Garden City journey began in 1963, when the then Prime Minister Lee Kuan Yew planted a mempat tree (*Cratoxylum formosum*), signifying the start of the greening campaign. Through the dedication and commitment of its pioneers and the community, the city's landscape has transformed to one where greenery is a major feature.

Over the decades, flowering species have been introduced to make our streetscape more vibrant. The pervasive green network of nature reserves, parks, park connectors, tree-lined roads and other natural areas has made living in the city more pleasant. Efforts to conserve natural heritage have seen four areas gazetted as nature reserves and an increase in wildlife.

As Singapore continues to urbanise, the support of the community is essential as we evolve into a City in a Garden.

To commemorate this significant milestone, we invite you to join us in the events and activities lined up, such as:

Playsets of Yesteryears

From now to December, you will be able to view a roving exhibition of past playsets at the following locations:

- Bishan-Ang Mo Kio Park (mid-August to mid-October)
- Singapore Botanic Gardens (November to December)

iRememberParks

Contribute your stories and memories of Singapore's parks and gardens. You can write your stories or memories on postcards available at major parks or via **www.nparks.gov.sg/50years**.

Commemorative NETS FlashPay card

You can purchase limited edition commemorative "Heritage Trees" NETS FlashPay cards from TransitLink offices at S$5 a card.

Commemorative Stamps with Seeds

Get your special set of four biodegradable Commemorative Stamps with seeds. Titled "Our City in a Garden", the beautifully illustrated stamps comprise 1st Local, S$0.50, S$0.80 and S$1.10. The 1st Local stamp is affixed with seeds of *Portulaca grandiflora* (commonly known as moss-rose) for planting. The stamps can be purchased from all post offices and the Singapore Philatelic Museum.

Visit **www.nparks.gov.sg/50years** for more activities, updates and information, and find us on **www.facebook.com/nparksbuzz**.

NATIONAL PARKS
LET'S MAKE SINGAPORE OUR GARDEN

TIGER ORCHIDS PLANTED ALONG SINGAPORE'S ROADSIDES FLOWER FOR THE FIRST TIME

A lizard perches on the inflorescence of a planted tiger orchid (*Grammatophyllum speciosum*). Presumed to be Nationally Extinct in Singapore, this species is targeted for reintroduction by SBG's orchid conservation programme.

The beautiful *Grammatophyllum speciosum*, also known as the tiger orchid, is the largest of all orchid species in the world. Some flowering plants have been reported to weigh nearly two tonnes and bear several thousand flowers! Although Singapore is a small country, it is one of the homes of this magnificent species. Unfortunately though, it is extremely rare, if not already extinct in the wild in Singapore. For this reason, *G. speciosum* has been targeted as a reintroduction species by SBG's orchid conservation programme.

Grammatophyllum speciosum is a lovely sight, even without flowers. The stems are about 3 m or more in length and 5 cm in diameter, and when old, they have many ridges and become yellowish in colour. The leaves are thin, long and narrow, usually about 50 to 60 cm long and 3 cm wide (or sometimes larger). The inflorescence can measure up to 2 m or more in length, with many spectacular flowers. Flowers are about 10 cm wide, and pale yellow with large dull orange-brown spots. The common name derives from these markings, which are thought to resemble tiger stripes. The flowers emit a lovely fragrance, and each blooming period usually lasts up to two months.

The fruit is a capsule, and can be as large as a starfruit, containing up to several million seeds. The seeds are light and balloon-like, consisting of up to 95% air, making them easily distributed by the wind. Like other orchid species, *Grammatophyllum speciosum* seeds require mycorrhizal fungi to stimulate germination and provide nutrients during their early seedling stage. In their study *Variation in mycorrhizal specificity for* in vitro *symbiotic seed germination of* Grammatophyllum speciosum *Blume*, Salifah et al. (2011) researched the specificity of this relationship, isolating a total of 31 different species of fungi from the roots of *G. speciosum*, *G. stapeliiflorum* and *G. scriptum*, and inoculating them onto *G. speciosum* seeds. The experiment revealed that seeds of *G. speciosum* can be successfully germinated when inoculated with fungal symbionts from other orchid species. Furthermore, the most favourable relationships, in terms of germination, were found to be with members of the genera *Fusarium* and *Trichoderma*, fungi commonly found in the soil and present in the environment. These results suggest that *G. speciosum* is a generalist in its association with fungal symbionts, and despite the rarity of the species in the wild,

This specimen planted along Holland Road produced 12 long sprays of flowers.

A flowering tiger orchid, planted on a rain tree along Clementi Avenue 4.

A tiger orchid planted on the ground along Napier Road produced beautiful flowers.

For the past 15 years, SBG and NParks staff have worked on an orchid conservation programme which is aimed at propagating and reintroducing native orchid species into natural, semi-natural and urban environments.

suitable fungi are still present in Singapore to foster the germination of its seeds.

According to the 2008 Red Data Book, the tiger orchid, along with most of the other 226 orchid species native to Singapore, is presumed to be Nationally Extinct, mainly due to habitat loss. It is not known when the last time this species was spotted in its natural environment; the Singapore Herbarium does not have a specimen collected from the wild in Singapore. There are three specimens collected by former SBG Director Henry Ridley (in 1891, 1892 and 1893), but they were taken from plants cultivated in the Gardens. While it is possible that these plants may have been collected locally from the wild and cultivated here, Ridley did not specify this on the specimens. In fact, the only record that this plant is native to Singapore is from Ridley's *Flora of the Malay Peninsula*, in which he mentioned sightings in Toas, Pulau Ubin and Bukit Timah.

Outside of Singapore, *Grammatophyllum speciosum* is distributed in Myanmar, Thailand, Laos, Sumatra, Java, Borneo, the Philippines, and throughout Peninsular Malaysia, where it is often found on trees near streams in the lowlands. It is an epiphyte usually found growing on the branches or stumps of large trees in exposed areas in lowland tropical rainforests, although it can also grow as a terrestrial.

Grammatophyllum speciosum and the orchid conservation programme

For the past 15 years, SBG and NParks staff have worked on an orchid conservation programme which is aimed at propagating and reintroducing native orchid species into natural, semi-natural and urban environments. In addition to *Grammatophyllum speciosum*, we have planted a wide range of orchid species in a variety of planting sites, and we monitor their growth and survival rates following planting. So far, we have successfully reintroduced individuals from 18 species. The programme also aims to experiment with landscaping using native orchids, and investigate which species are suitable for specific environmental conditions.

The programme's work with *Grammatophyllum speciosum* began in 1999. Since then, tiger orchid seedlings have been planted in many areas, including the Singapore Botanic Gardens, Upper Peirce Reservoir, Pulau Ubin, Bukit Batok Nature Park, Pasir Ris Park, East Coast Park, West Coast Park, Labrador Park, and the Orchard Boulevard, Holland Road and East Coast Parkway areas. Our work with the species has been largely successful. When planted on trees as an epiphyte, we have observed a survival rate of 80–90%, except in very sunny and windy locations. In addition, we have found that seedlings planted on the ground as terrestrials generally survive better than those attached to trees because water is more readily available and water stress is reduced. Results from our planting experiments show that species which have mechanisms to reduce water stress tend to have a higher survival rate after planting. These mechanisms include the presence of 1) large pseudobulbs (as in the case of *G. speciosum*) and 2) thick and leathery leaves.

In February 2013, in a massive blooming event, many of the tiger orchids reintroduced through the programme flowered along Singapore's roadsides for the first time. One individual, planted as a small seedling in 1999, produced a long spray bearing more than 50 flowers. A large specimen, planted in 2009 on the ground along Holland Road, carried 12 sprays of showy flowers, and was a sight to behold! The success of the roadside plantings suggests that this majestic native species is tolerant of drought, disturbance and air pollution, and is therefore a good candidate for planting in disturbed and landscaped areas. Further experiments will be carried out to test other uses of this species in the landscape.

Several fruits formed on a *G. speciosum* planted at East Coa

This seed capsule formed on a specimen planted along East Coast Parkway.

st Park.

This *G. speciosum* flowered beautifully at East Coast Park.

Our reintroduction efforts have been largely successful to date. In addition to the tiger orchid, a number of other reintroduced orchid species flowered during this past year, including *Bulbophyllum medusae, Bulbophyllum vaginatum, Coelogyne rochussenii, Cymbidium bicolor* ssp. *pubescens*, *Cymbidium finlaysonianum* and *Phalaenopsis cornu-cervi*. Several of these plants have gone on to produce seed capsules. This is an indication that their pollinators, most often insects, are present in the environment. It is our wish that once these seeds are mature, the wind will disperse them into the right environment for germination and subsequent growth. If that happens, then we have initiated self-perpetuating populations of some of our native orchids, and may see natural populations take root again in the future!

Yam Tim Wing, Peter Ang & Felicia Tay
Orchid Breeding and Conservation Biotechnology Laboratory

A flowering tiger orchid planted on the roof of the Green Pavilion at SBG.

HOYA WALLICHII: CONFUSED, EXTINCT, AND REDISCOVERED!

Hoya wallichii in full flower.

The strategic location of Singapore at the tip of the Malay Peninsula made it an important trading port as well as a centre for botanical exploration of the region in the early 19th century. It was in the forests of Singapore that many botanists coming from the West made their first collections of Southeast Asian plants. Singapore was also the preferred base from which to venture within the region.

Nathaniel Wallich, a Danish botanist and the Superintendent of the Calcutta Botanic Garden for more than 30 years, contributed much to the establishment of Singapore as a centre for botanical exploration. In 1822 he travelled to Penang and Singapore in order to recuperate from an infection that he picked up during an expedition to the Himalayas. While in Singapore, he suggested to Sir Stamford Raffles that he establish a botanic garden on the island. Three and a half years later, the first botanic garden in Singapore was founded, establishing the nation-island as a centre for the study of the regional flora.

Wallich, a formidable plant collector, amassed thousands of living and dried plant specimens during his trips around the region. In his career, he managed to bring together a collection of more than 8,000 species, totalling over 200,000 specimens!

Of the specimens collected in Singapore by Wallich, one is of particular interest to *Hoya* enthusiasts. Identified by the Scottish botanist Robert Wight as a new genus containing a single species, *Physostelma wallichii* received a very brief description in 1838. It was considered similar to *Hoya*, as its flowers had broad bell-shaped corollas and a peculiar corona (the central part of the flower) common in the genus. The identity of the species was soon overlooked though, as the German botanist Karl Ludwig von Blume considered it to be the same *Hoya campanulata* that he himself had described earlier, in 1826. Since then its identity has been uncertain for botanists, collectors and amateur growers.

Upon examining the original herbarium specimens studied by Wight at the Royal Botanic Gardens, Kew, and also those present at the Singapore Botanic Gardens herbarium, we confirmed that the species is indeed different from *Hoya campanulata,* and also from *Hoya danumensis*, a species from Borneo with which it had also often been confused. The realisation that they are separate species was bittersweet, though; because the plant had not been identified since 1894, when it was recorded from the Sarimbun area of Singapore, the species would be considered extinct worldwide, following the rules of the IUCN (International Union for Conservation of Nature). Fortunately, just before proceeding to announce the sad news, the plant was rediscovered alive and well in two very distant places: in Brunei and in Johor, Malaysia.

After looking at the plant in habitat and at fresh flowers, it was finally possible to understand why it has been so rarely collected, and also why Robert Wight considered it peculiar enough to separate it from *Hoya*. The plant is a very easily overlooked creeper with thin papery leaves,

The habitat of *Hoya wallichii* in Johor, sandstone boulders covered by leaf litter and moss. The plant can be easily overlooked if not in flower.

Hoya danumensis (top), *Hoya wallichii* (centre right) and *Hoya campanulata* (bottom).

Hoya wallichii in its native habitat in Brunei

sometimes producing delicate climbing stems. It is a lowland species that requires high temperatures throughout the year and grows in very bright forest gaps where it receives enough sunlight to thrive. In its habitat in Johor, it was observed colonising sandstone boulders covered by leaf litter and moss. Contrastingly, in Brunei it roots directly in the forest floor and displays a more rampant growth, climbing on several small trees up to about 3 m. It produces single white bell-shaped flowers about 4 cm across (rather huge for the genus), with a dull red central structure (the corona) that superficially appears to be made of five tiny red beans. Both the habit and the flowers are very different from those of the few *Hoya* species that were known to science back in 1838, which were almost entirely climbing lianas with fleshy leaves and star-shaped flowers.

Despite its strange looks, *Hoya wallichii* can now undoubtedly be labelled a *Hoya*, thanks to advances in taxonomic and phylogenetic research since Wight's time. The confusion with *Hoya campanulata* by early botanists is understandable, given that they only had dried and pressed herbarium specimens to study. In their dried states, the bell-shaped flowers look identical. At the time, it was also not realised that *Hoya wallichii* only has one flower open at a time while *Hoya campanulata* can have full umbels of more that 20 flowers. Moreover, single bell-shaped flowers are not confined to just *Hoya wallichii*. *Hoya wongii* from Brunei and *Hoya mappigera* from Peninsular Malaysia and southern Thailand share this characteristic, although they have coronas with a different form, as they are likely to attract different pollinators.

Among *Hoya* species with single bell-shaped corollas, only *Hoya mappigera* is currently in cultivation. Hopefully *Hoya wallichii* will one day be rediscovered in Singapore, or it will be possible to reintroduce it back to its 'lost home'.

Michele Rodda
Herbarium

Jacqueline Henrot
Brunei endemics project,
Brunei National Herbarium

Hopefully Hoya wallichii *will one day be rediscovered in Singapore, or it will be possible to reintroduce it back to its 'lost home'.*

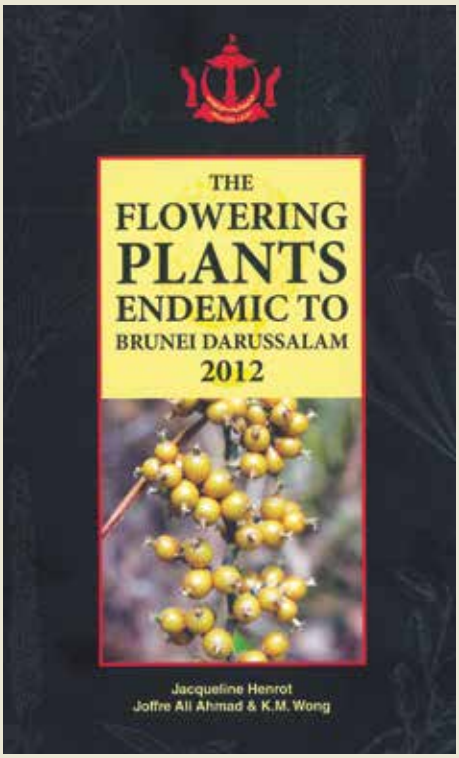
BRUNEI'S ENDEMIC FLOWERING PLANTS: *A CONSERVATION FOCUS BEGINS*

Loxocarpus taeniophyllus, a very narrowly distributed species of the Gesneriaceae and only known from Brunei. *(Photo courtesy of Forestry Department, Brunei Darussalam)*

The forests of Brunei Darussalam include some of the finest examples of vegetation types specially developing in a biologically diverse region of insular Southeast Asia that coincides with the botanical province known as Malesia. Although the Brunei area may be regarded as contiguous with the general forested landscape beyond its borders and species are distributed according to ecological and other landscape influences, not national boundaries, there is a significant and growing list of species that seem to occur nowhere else. As time passes and biological exploration both within and around the Brunei area progresses, the significance of such 'endemic' species increases.

Plant species are sometimes uniquely and narrowly adapted. Advancing botanical knowledge reveals that low frequencies of rare plants and plants narrowly restricted by their association with special environmental features contribute to the level of endemism of an area or region. In the tropics, rare frequencies seem to be a hallmark of the intensely rich lowland forests and narrow occurrences are frequently the case with plants specially adapting to patchy or restricted landscape features harbouring distinctive environments.

Some years ago, Jacqueline Henrot (now a Guest Researcher at the Herbarium of the Naturalis Biodiversity Centre, the Netherlands) and Joffre Haji Ali Ahmad of the Brunei National Herbarium began a systematic screening of plants that could be specially restricted to Brunei. This effort was supported by the collaboration with many specialists of different plant families and scouring the botanical literature for updated accounts and verifications of taxonomic status and distribution. It became an international ASEAN-supported project through a grant from the Korea Forest Service.



Now just published as *The Flowering Plants Endemic to Brunei Darussalam 2012*, this endemic Brunei plants list is fully expected to change in the future, as more discovery adds further entries and some names are removed if the plants are subsequently found elsewhere. There is also interest in making this more interactive in a way through producing a web-supported version, as the scientific findings on Bornean—and Bruneian—plants are hardly expected to stand still. The likely 'anthropogenic endemics', i.e., taxa that have become restricted to Brunei Darussalam because of loss of habitat elsewhere, have not been considered in this present list, even if the taxa are fairly certainly restricted to the 'Brunei area' (Brunei and immediately adjacent localities), although a list is likewise being built up because of its obvious conservation context.

A collector ascends a *Porterandia* tree for specimens. Of the four species known in Brunei, only *P. bruneiensis* is endemic there. *(Photo credit: K.M. Wong)*

Calamus temburongii, a rattan endemic to Brunei's Temburong forests. *(Photo credit: J. Henrot)*

For now, the book presents an enumeration of 65 species of flowering plants that are endemic to, or known only to occur in, Brunei Darussalam. Not surprisingly, most taxa are found among smaller plants in the Begoniaceae (15 taxa), Araceae (8 taxa), Gesneriaceae (7 taxa), Orchidaceae (5 taxa), Zingiberaceae (5 taxa), and palms (Arecaceae: 5 taxa). It appears that many large flowering plants have better dispersal than small ones. But there are other reasons, such as recent evolution, that restrict plant distribution and beg investigation. A slender bamboo, *Temburongia simplex*, is the sole representative of this unusual genus wholly restricted to Brunei's Temburong valley.

Among woody plant groups, especially the large and poorly documented plant families and genera, even more examples are to be expected, although in their case the slightly broader 'Brunei area' may be more relevant. A larger conservation context for this would also seem to develop out of the purely Brunei plant list.

In this first specialised consideration of the subject, the criteria for endemic plant assessment and their conservation significance are discussed. Concern for continuing serious degradation of rain forests in the region includes consideration for how Brunei Darussalam could continue to serve as a critical refuge for such Bornean plants. Many of the flowering plants endemic to Brunei Darussalam are very rare or under collected: 15 are known from a single collection only and 83% are known from three sites or less. In terms of their conservation, 55 of the endemics have all or at least a single population in a protected forest: this stresses the importance of protected forests for their conservation. Ten of the endemics have no population in a protected area and can be considered as potentially threatened.

For now, the Brunei Ministry of Industry and Primary Resources has declared the intention (*Brunei Times*, 5 July 2013) to examine how some production forest reserves, where logging would be allowed, could be re-classified as conservation forests. The fundamental philosophy has been reiterated: 'We intend to enjoy the benefits of our pristine forests and biological resources for the longest time possible'. Earlier, as results of the endemic plant study helped indicate the potential vulnerability factor, the Minister also took a direct interest in plans for extending protected area boundaries in Brunei's Teraja area in order to better capture rare plant populations.

Wong Khoon Meng
Herbarium

The enigmatic sender bamboo *Temburongia simplex*, named for the Temburong valley to where it is restricted, is the sole representative of its genus. Among other unusual characters, the stem nodes develop a curious thick, annular rim. *(Photo credit: K.M. Wong)*

The aroid *Homalomena terajaensis*, in which upper leaf surfaces and petioles are distinctly velvety, is known to occur only in a small area in the inner Belait district. *(Photo credit: J. Henrot)*

DOCUMENTING BRUNEI'S BIODIVERSITY

Brunei Darussalam, the oil-rich sultanate of Southeast Asia, is also an integral portion of the immensely special biodiversity belt stretching across the northwestern flank of the iconic island of Borneo. Recently, the sultanate and NParks signed an MoU to spearhead the exploration and discovery of Brunei's plant wealth.

NParks Deputy CEO Dr Leong Chee Chiew and Brunei Forestry Director Awang Haji Saidin bin Salleh at the signing ceremony. *(Photo courtesy of Forestry Department, Brunei Darussalam)*

The collaboration will bring exploration and discovery to a higher plane in Brunei's rainforest paradise. *(Photo credit: K.M. Wong)*

The Botanical Survey of Brunei Darussalam—the thrust of a Memorandum of Understanding (MoU) between Brunei Darussalam (represented by the Forestry Department, Ministry of Industry and Primary Resources, MIPR) and the National Parks Board, Singapore (NParks)—was highlighted on 29 May 2013 at the Empire Hotel and Country Club, on the occasion of the State visit of Singapore President Tony Tan Keng Yam and Mrs Tan. The MoU signing by Forestry Director Awang Haji Saidin bin Salleh and NParks Deputy CEO Dr Leong Chee Chiew was witnessed by the Guest-of-Honour, Brunei Darussalam's Minister of Industry and Primary Resources, Pehin Orang Kaya Seri Utama Dato Seri Setia Awang Haji Yahya bin Begawan Mudim Dato Paduka Haji Bakar. Singapore's High Commissioner to Brunei Darussalam, Mr Jaya Ratnam, attended the ceremony together with MIPR Permanent Secretary Hajah Normah Suria Hayati binti Pehin Jamil and other dignitaries and senior officials of both countries.

The duration of the MoU is five years, focusing on botanical research collaboration to conduct a planned and systematic study of the rich flora in Brunei, estimated at some 5,000 plant species. Apart from that, NParks and the Brunei Forestry Department will jointly conduct training in herbarium curation techniques, plant identification and databasing, as well as build up relevant botanical references and other resources. The MoU programme complements the ongoing close research partnership between the Singapore Herbarium (SING) and the Brunei National Herbarium (BRUN), which Singapore Botanic Gardens Principal Researcher Dr Wong Khoon Meng and Brunei Forestry Officer Awang Joffre bin Haji Ali Ahmad jointly coordinate.

Low Yee Wen
Herbarium

Melastoma beccarianum, a commonly encountered Borneo endemic, with distinctive tufts of bristly scales covering the young fruit. *(Photo credit: K.M. Wong)*

Peculiar fruits of *Hydnocarpus polypetala* (Achariaceae), a tree species that occurs throughout Borneo and also Sumatra. *(Photo credit: Y.W. Low)*

A TRIBUTE TO TWO LONG-SERVING HERBARIUM STAFF MEMBERS — MOHD NOOR BIN JUMAAT AND ROHANA BINTE MOHAMMED SHARI

Noor in park ranger uniform holding on a woody climber at Bukit Timah Nature Reserve around 1970's. *(Photo credit: Ali Ibrahim)*

Noor meticulously sorting in-coming materials for chemical preservation in the preparation room of the Singapore Herbarium in late March 2013. *(Photo credit: Y.W. Low)*

Rohana performing data entry into BRAHMS. *(Photo courtesy of SBG Library Archives)*

Rohana curating herbarium specimens of Zingiberaceae in the Singapore Herbarium in late March 2013. *(Photo credit: Y.W. Low)*

The many staff members who have come through the Singapore Herbarium (SING) have been pivotal in supporting its research work and development. SING, a special research collection and indispensable archive of the plant wealth of the Southeast Asian region, has been built up over generations of scientific and curatorial effort. In April of this year, two long-serving staff members retired. During their time with the Singapore Botanic Gardens (SBG), Noor and Rohana were most connected with SING, where they had many assignments and responsibilities that helped in the growth of this special facility.

Mohd Noor bin Jumaat was 18 when he became employed as a labourer for SBG in 1959, and not long after that he was redesignated as a plant collector attached to SING. The Director of the Botanic Gardens at that time was H.M. Burkill (1957–1969), son of former Director and distinguished botanist I.H. Burkill. In the same year, Noor participated in a collecting trip to Fraser's Hill, Pahang, together with Mohd Shah to assist in a trip led by H.M. Burkill. In his time at SBG, Noor also collected with Dr E.A. Heaslett, Dr R. Hill and Dr T.C. Whitmore. His duties, apart from assisting in the collection of specimens for SING, which also complement the taxonomic studies of SBG's resident botanists, included providing curatorial support and cataloguing of herbarium specimens. However, in 1968, Noor's position was again redesignated, this time, as a park ranger attached to the Bukit Timah Nature Reserve. In 1993, he was transferred back to SING, where he worked until his retirement in April 2013. While he was a park ranger, his plant collector post was filled by Samsuri bin Ahmad, but Noor still actively participated in the day-to-day chores of the Herbarium. This rather unique arrangement was largely due to the fact that the Bukit Timah Nature Reserve then was under the jurisdiction of the Director of the Botanic Gardens. As a park ranger in the Reserve, Noor had a hut ("Noor Hut") and a bridge ("Noor Bridge") informally named for him. Noor is happily married to Zuliah bte Daud, and they have been blessed with two sons and two daughters, five grandchildren, and two great-grandchildren.

Rohana binte Mohammed Shari joined the Parks and Recreation Department (the predecessor of the National Parks Board) in 1970 as a daily-rated assistant based in the Alexandra nursery at Tiong Bahru Park. Later, she was transferred to the Ministry of National Development, and served in the same position. It was in 1972 that she was informed of a position available at SING, for which she applied and was offered employment in the same year. The Keeper of SING then was Dr Chang Kiaw Lan, a mycologist trained under the distinguished Prof. E.J.H. Corner, a former Assistant Director of the Botanic Gardens (1929–1945). At the time when Rohana joined SING, there was already a team of dedicated staff led by Dr Chang to manage the immense collections. The team included a Herbarium Assistant (Mohd Shah bin Mohd Nur), four mounters, and three plant collectors (Haji Sidek bin Kiah, Haji Samsuri bin Ahmad, and Ahmad bin Shukor). Upon joining, Rohana was assigned to manage data documentation using the herbarium card index system, the system used for storing and retrieving information for the entire SING collection before the Botanical Research and Herbarium Management System (BRAHMS) was introduced in the mid-1980's. When SING adopted BRAHMS in early 2000 to manage the data for some 650,000 sheets of herbarium specimens, Rohana was one of the pioneers involved. Apart from that, she helped in cataloguing Teruya's collections and in the laborious accounting of the entire SING collection that required a physical count of all herbarium sheets. Through her familiarity with all this work, Rohana became something of an expert in deciphering colonial-era botanists' handwriting styles. Rohana has been married to Suhood bin Sulaiman for 34 years and they have a son and a daughter.

We wish both Noor and Rohana the very best in their retirement!

Low Yee Wen
Herbarium

ARROWS OF DEFIANCE

Plant House stairs. *(Photo credit: David Lim)*

There exists near the Plant House a small flight of stairs made of hand-made red bricks that are not of the quality that is otherwise expected of SBG's hard landscape. A hint as to why these steps have not been renewed may be found in the irregularly-shaped arrows which mark some of the bricks. We have seen such arrows before, as surveyors have used them over the years to mark key survey points. However, unlike the clean and well-shaped arrows of surveyors, these makeshift arrows are shaped irregularly. What makes these arrows and bricks so special? An event back in 1995 sheds some light on these stairs and arrows.

Pim Sanderson, at one time a consultant working for SBG, recalls an event in August 1995, upon the 50th anniversary of the cessation of hostilities during WW2. During a visit to the Gardens, eight elderly Australian former Prisoners of War (PoWs) requested to be taken to the Plant House. There they became excited as they pointed out the steps and the bricks from which they are made, explaining that they had been required to make both while PoWs during the Japanese occupation. The bricks, at least many of them, bear the telltale arrow marks that are associated with being government property. As the 'property' of their jailers, the prisoners who left these marks may have done so in an act of subtle defiance of the Japanese occupiers.

By leaving these symbols, the PoWs potentially put their lives at great risk. Their captors were presumably not aware of the meaning of these markings, but if they had found out, a severe punishment would have been a distinct possibility. The steps and the markings on them are a reminder of how those brave men signified defiance at a time of great hardship. Thanks to Pim Sanderson's prompt action in briefing SBG's Director, this interesting piece of WW2 history will be preserved, and can now be interpreted.

Nigel P. Taylor
Director SBG

Lahiru Wijedasa
Horticulture, Exhibitions and Events

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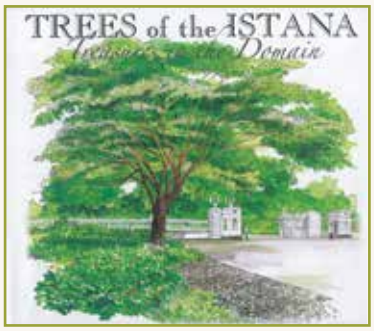
Plant House stairs. Note the irregular shapes of the arrows.

Close-up of arrows imprinted by PoWs.

By leaving these symbols, the PoWs potentially put their lives at great risk. ... The steps and the markings on them are a reminder of how those brave men signified defiance at a time of great hardship.

NEW IN THE LIBRARY SHOP



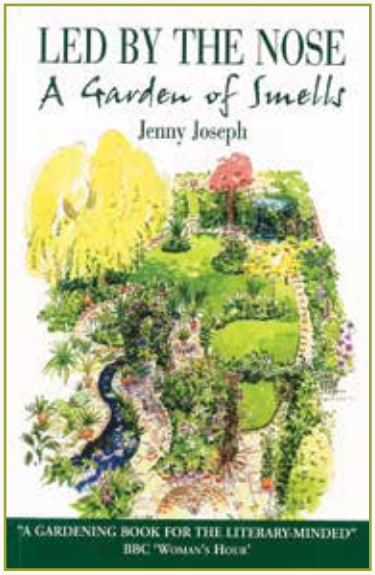
Trees of the Istana: Treasures in the Domain
By Wong Tuan Wah, Koh Soon Kiong, Dr Duncan Sutherland, Aileen T. Lau
Price: S$51.40

If you have not stepped foot onto the grounds of the Istana during the occasional open house on official public holidays, then this is a good book for you to experience the grandeur of the grounds. The Istana sits on 101 acres of land and is well trimmed, with Japanese and Queen Victoria gardens, a Swan Pond and of course, the majestic trees which are the basis for this book.

Commissioned by former President S. R. Nathan, *Trees of the Istana: Treasures in the Domain* provides a glimpse of how the trees planted at the Istana also reflect the changing times of the past custodians who managed and carefully tended the grounds. The wide variety of trees includes giants like the *khaya, jelutong* and *kapok*, and also fruit trees like durian, jackfruit, mango and even avocado.

With more than 400 illustrations including photographs, botanical drawings and watercolour paintings, this book showcases and details the history of more than 70 tree species of the Istana.

Year Published: 2011
ISBN: 978-981-08-7481-0



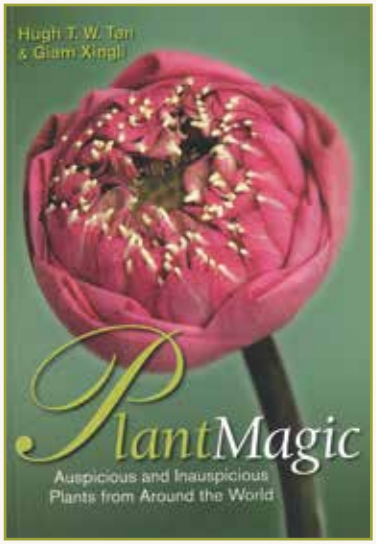
Led by the nose: A Garden of Smells
By Jenny Joseph
Price: S$27.00

This little book is a delight to read as the author's descriptions vividly help to create a very visual impact in the reader's mind. Think of a warm summer sunshine afternoon in a lush green garden filled with blooming flowers and dewy fruits. Enchanting, isn't it?

Unlike gardeners who prefer a more structured plan to their gardens, the author tackles her planting with a laidback attitude. She might not like the taste of a particular vegetable but still grows it, because it is a wonderful surprise when she stumbles upon the new shoots in her garden. She likens it to a planned party when an uninvited guest turns up; you can't help but to receive him or her anyway.

The author enjoys planting her garden according to seasonal plant smells. In the book, she includes the months in which different plants produce their most pleasant scents in her English garden, and from which parts they are emitted (such as the leaves, stems, flowers or fruits). The book might not include very practical plant lists for our local tropical weather, but do give it a read, even if it's just for the visuals.

Year Published: 2002
ISBN: 978-0-285-63695-8



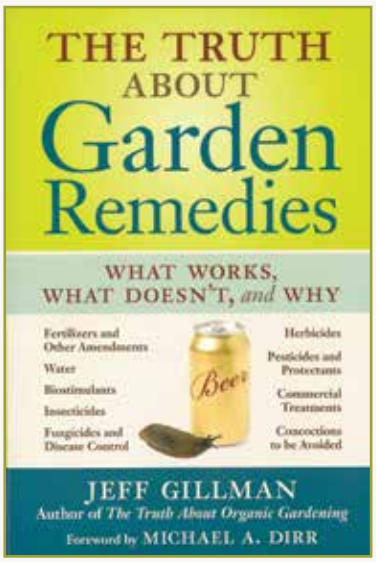
Plant Magic: Auspicious and Inauspicious Plants from Around the World
By Hugh T.W. Tan & Giam Xingli
Price: S$35.00

Plants play a huge role in our lives, both directly and indirectly. We depend upon them for the air we breathe, for food, medicine and even household products. However, as integral components of human cultures, they also feature in traditions, superstitions and religious beliefs. In *Plant Magic: Auspicious and Inauspicious Plants from Around the World,* the authors take a closer look at this side of people's relationship with plants.

The book features more than 120 plants, detailing the scientific and common names for each, their natural distributions, key features, growing tips and of course, associated folklore, beliefs, uses and other interesting facts. The content of the book ranges from details of our local superstitions, such as those associated with the banana (*Musa* spp.), to the use of plants like the Mandarin orange (*Citrus reticulata*) during festive occasions. It also highlights interesting-looking plants, such as the woolly fern (*Cibotium barometz*), which is thought to resemble an upside-down sheep, and features perennial favourites such as the rose (*Rosa* spp.), a commonly-held symbol of love.

Plant Magic: Auspicious and Inauspicious Plants from Around the World is worth a read if you're interested in folklore. And if you're trying to impress your new mother-in-law or your would-be girlfriend, then this is your guide to giving the right flowers, because in some cultures, if you give chrysanthemums at a first meeting, you can forget about having a second one!

Year published: 2008
ISBN-13: 978-981-261-427-8



The Truth about Garden Remedies: What Works, What Doesn't and Why
By Jeff Gillman
Price: S$25.20

Ever watched MythBusters, the television show where the hosts challenge urban myths by actually testing them out? Well, this is the *book* version of it, for plants. In *The Truth about Garden Remedies: What Works, What Doesn't and Why*, the author explores the tricks, myths and little known secrets associated with garden maintenance. He investigates these claims critically, conducting mini experiments and literature research to either support them or debunk them as myths.

The Truth about Garden Remedies: What Works, What Doesn't and Why is well balanced, with research and information provided to explain the author's conclusions. For each remedy, an introduction is given, along with an explanation of the practice of the remedy and the theory behind why it should work. This is followed by the 'real story' detailing the author's research results, and lastly a summary of what the investigation means to the reader. For example, the author sets out to determine if beer is a good fertiliser, and reveals that it's better consumed by the gardener than the plant.

So drink up and cheers!

Year published: 2008
ISBN: 978-0-88192-912-6

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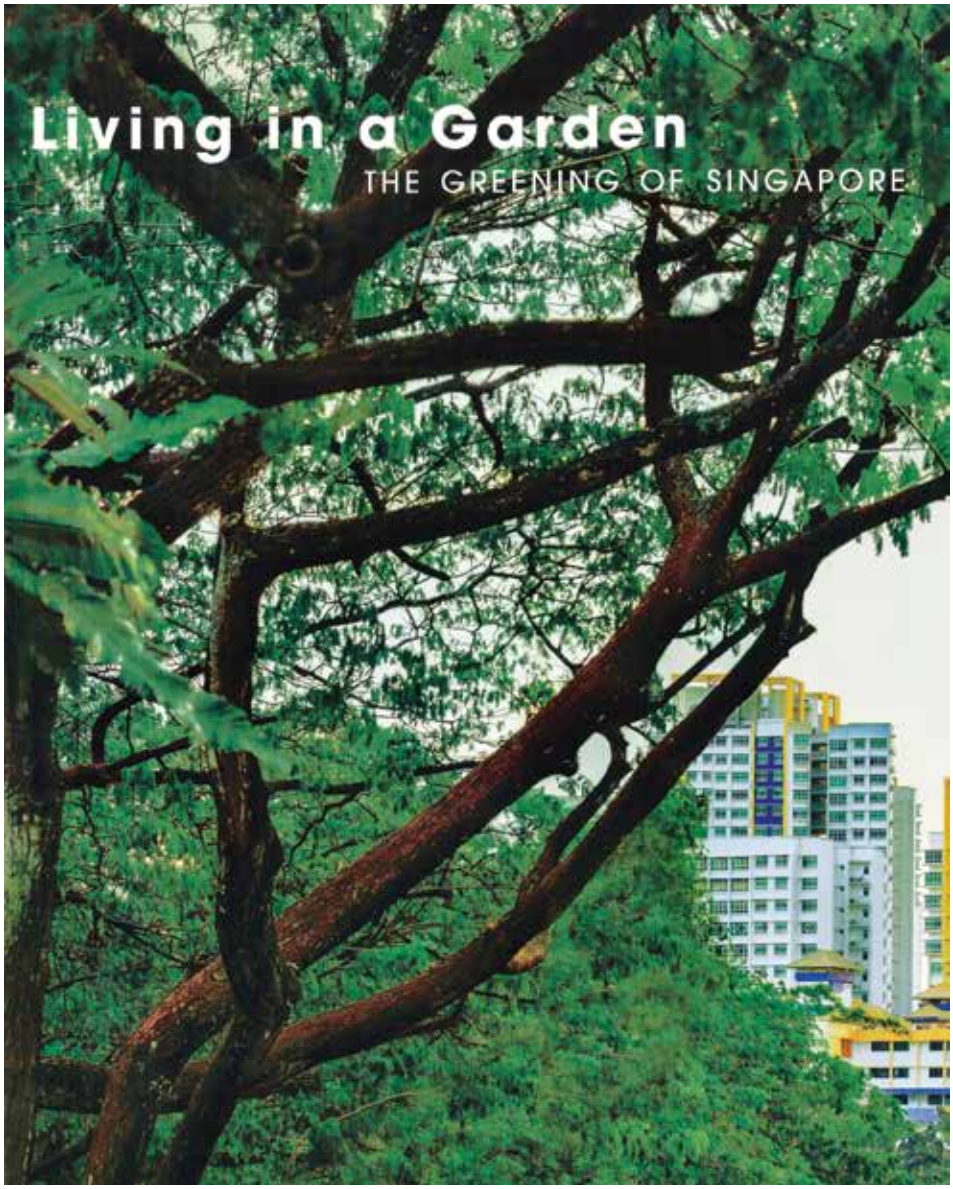
Soh Qiu Xian
Library

LIVING IN A GARDEN: THE GREENING OF SINGAPORE

Through various historical and current photos, readers will get to see how our parks and gardens have evolved over the years, from just grass and a swing or two to lush green spaces with amenities for everyone.



Fifty years ago, the then Prime Minister Lee Kuan Yew planted a mempat tree (*Cratoxylum formosum*) at Farrer Circus. Thus began the campaign to transform Singapore into a city-state filled with extensive greenery. The journey and the experiences of the people who contributed to the project are documented in a beautifully illustrated 200-page book recently launched by the National Parks Board, *Living in a Garden: The greening of Singapore*.

Written by Timothy Auger and published by Editions Didier Millet (EDM), the book includes snippets of information of the plants that were chosen for Singapore's initial roadside plantings, some of the colourful shrubs and trees that fill our streets today, as well as anecdotes of the people who helped research, cultivate and maintain the greenery. Through various historical and current photos, readers will get to see how our parks and gardens have evolved over the years, from just grass and a swing or two to lush green spaces with amenities for everyone.

With a prominent role in the campaign to transform the nation into first a Garden City, and now, a City in a Garden, *Living in a Garden: The greening of Singapore* has a section which features the much-loved Singapore Botanic Gardens. The book highlights the Gardens' role as a leader in research, education, and the effort to reestablish Singapore's native biodiversity, and also offers a glimpse into the areas managed by the Gardens, some less

familiar, and others better known, such as the Singapore Herbarium and the National Orchid Garden.

In *Living in a Garden: The greening of Singapore*, readers will also get a glimpse of Singapore's fauna, both rare species and others that are more commonly seen. Despite being heavily developed, Singapore is home to a variety of wildlife, some endemic, some named after the country, and some that have come to be a part of our everyday lives.

The book shares how the government and the community, both individual and corporate, have come together to help continue the greening effort. The hope is that more people will come forward and contribute to the project, and help Singapore transform into a City in a Garden.

For more insights into how a highly urbanised city-state managed to develop into a country filled with rich biodiversity and an extensive network of greenery, grab a copy of *Living in a Garden: The greening of Singapore* (S$29.90) today from major bookstores and retail stores at Singapore Botanic Gardens—the Library Shop and Garden Shop. The e-version is also available for download from Booktique.sg at S$12.90.

Year Published: 2013
ISBN: 978-981-4385-24-4

Ng Li-San
Communications and Community Engagement

COSTUS LUCANUSIANUS: INVASION!

African spiral flag is often cultivated for its attractive flowers.

Costus lucanusianus, also known as African spiral flag, is no doubt a splendid ornamental spiral ginger (Costaceae). It has nearly vertical leafy stems that reach 2–3 m in height, spirally arranged leaves, and forms vigorous clumps. While the showy flowers last only a day, the large globular inflorescence appearing at the top of stems can produce more than 100 flowers over each blooming period, one or a few at a time.

Costus lucanusianus is widely distributed in the forested areas of tropical Africa, from Guinea to western Ethiopia and south to Congo. This species was described in 1889 by Josias Braun-Blanquet and Karl Moritz Schuman. In the Niger Delta, it is also known as monkey sugar cane. It grows from lowlands to about 1000 m above sea level and likes places with permanent or at least seasonal humidity. In its region of origin, it is a plant of many uses. Young shoots are cooked and eaten as a vegetable, but it is also important for various religious rituals and ceremonies. Local people also use it for treating a range of ailments. Stem decoctions and stem sap are used to treat cough, sore throats and bronchitis, but also venereal diseases, jaundice and to prevent miscarriages. Mixed with water, the pulped stems act as a strong diuretic. Rhizome pulp, when mixed with water, is used to treat diarrhoea, and is also applied directly to abscesses and ulcers. The slightly acidic juice from the leaves is applied as eye drops to control filariasis (a parasitic disease caused by thread-like roundworms) and as nose drops. When rubbed on the forehead, the leaf juice is also believed to calm insanity. The rhizomes contain steroidal sapogenins and diosgenin, which are extensively used in the pharmaceutical industry.

Costus lucanusianus has been used in tropical horticulture for years, particularly in Africa and South America, as it grows well and is free flowering with minimal care all year around, as long as the soil is humid. It propagates very well from rhizome and stem cuttings, and also from seeds. In addition, it can form plantlets on the inflorescence, a feature known as vivipary.

When a plant with such vigour and reproductive ability escapes from cultivation into non-native habitat, it can spread fast and may take over native flora. This has been reported numerous times from various countries and continents, and invasive plants are recognised as a major threat to biodiversity. A well known example is *Heracleum mantegazzianum* (giant hogweed), a noxious weed native to the Caucasus region, first introduced in the 19th century to England as an ornamental, from where it spread to many parts of Europe and also to the United States and Canada.

Not many species from the ginger order have been reported to be invasive, but *Hedychium gardnerianum*, a native of the Himalayas, managed to wreak a havoc in

Costus lucanusianus thrives in a variety of conditions and can form large thick patches in full sun (left) as well as in the shady undergrowth of forests (right).

The rings of 'hair' around the stems, located at the tops of the leaf-sheaths, make this weedy ginger easily recognisable, even when it is not flowering.

Hawaii (where it is known as kahili ginger), New Zealand and the Azores, earning it a place in the top 100 most invasive species in the Global Invasive Species Database maintained by the IUCN Invasive Species Specialist Group. While *Costus lucanusianus* has not been reported to be invasive from any country so far, it is becoming increasingly evident that Singapore might get the unwanted first prize in this matter.

It is not clear when exactly *Costus lucanusianus* was introduced to Singapore as an ornamental plant, but it was at least 15 years ago. Due to its high tolerance and low maintenance requirements, it has been used in streetscapes as well as planted in home gardens. What is very clear is that in some locations, it has become established to an extent that regaining control of its growth may be a challenge. Several areas in Dairy Farm Nature Park are covered in dense patches, some spanning up to a thousand square metres in area. Hindhede Nature Park is also affected, and clumps can already be found on the outer parts of Bukit Timah Nature Reserve. The patches are so dense that not a single plant can grow between dense shoots. Every old stem which falls on the ground produces new plants from each node, and to make matters worse, the small black seeds with white arils, which each flowering stem produces by the hundreds or even thousands, seem to be effectively dispersed by ants.

There are certainly similarities between the previously mentioned *Hedychium gardnerianum* and *Costus lucanusianus*, such as rapid rhizome growth and very effective seed-set and dispersal. In Singapore, native plant reintroduction programmes will likely not be effective against *C. lucanusianus* in the affected areas; rather, close monitoring combined with an active management approach is needed to control this weedy spiral ginger, before it is too late.

When a plant with such vigour and reproductive ability escapes from cultivation into non-native habitat, it can spread fast and may take over native flora.

Jana Leong-Škorničková
Herbarium

All photos by Jana Leong-Škorničková

A PRINCE OF A PLANT

The holotype specimen for *Erycibe princii* Choisy in Geneva. © Conservatoire et Jardin botaniques de la Ville de Genève. With compliments of the Herbarium of the Conservatoire botanique de la Ville de Genève.

Having a species (or genus) named in your honour is, in a way, a form of immortality—these names will be included in indices such as the *Index Kewensis* (IK), the *Australian Plant Names Index* (APNI), and the *International Plant Names Index* (IPNI), which are likely to exist as long as there are scientists around to use them. So if not for eternity, then at least these names might persist for centuries. Thus, today we find scientific names that honour legions of botanists (and other historical persons) long departed. For example, *Burmannia, burmannii,* and *burmaniana* all commemorate the Burmans, father and son, Dutch botanists of the 18th century who wrote some of the earliest works on Malesian (and South African) plants. But who has ever heard of Jan or Nicolaas Laurens Burman today? Despite their importance to taxonomy, their names are forgotten by all but a few botanists with a historical bent, those who want to know where such scientific names come from and then follow the clues in the botanical literature back to the source. Faring a bit better are names for historical persons: a layman might guess correctly that *Captaincookia* honours Captain James Cook, the famed explorer of the Pacific Ocean. However, the great majority of scientific names honouring people are not so immediately recognisable. This article traces the origin for one such name, with a Singapore connection.

Erycibe princii was named by the Swiss botanist J.D. Choisy in 1834, and the species was stated to originate in Singapore. Choisy adopted the name *Erycibe princii* from a catalogue prepared by Nathaniel Wallich, who listed specimens from Singapore given to him by someone named Prince, under catalogue number 1335. And that leads to the question, who is this Prince that he rated having a plant named after him?

Clues are few and scattered through historical sources about Singapore's early years. It turns out that the Prince mentioned by Wallich was not a royal prince, but rather a civil servant. John Prince was appointed Resident Councillor for Singapore, about 1826–1828, following the return of Raffles to England in 1823. Prince had previously served in Sumatra at Bencoolen and he must have had an interest in botany and plants, as evidenced by his giving of specimens to Wallich, botanist for the East India Company (EIC) in Calcutta. Prince evidently collected the type specimen of this *Erycibe* in Singapore and gave it to Wallich, who incorporated Prince's specimens (along with many thousands of others) into the enormous herbarium he amassed for the EIC. The Prince specimens were later distributed by Wallich when he took the EIC herbarium to London and organised it, along with a catalogue of the entire collection. In this way, Choisy, in Geneva, received the Prince specimens Wallich sent him from London.

Prince's specimens appear as Wallich Catalogue 1335 with a brief entry reading:

Erycibe Princii Wall.
Singapore, don. Prince

We don't know what John Prince looked like; no portrait of him has been traced [if any readers of this article know of such an image, the author would be grateful to know about it]. So the type specimen label for *Erycibe princii* Choisy, and the entry in Wallich's Catalogue at #1335, are the only ghostly traces of his existence, save for brief mentions in some history books. Sadly, Prince's name has slipped into obscurity even in the taxonomic world: today the name *E. princii* is considered a synonym of an older botanical name, *E. tomentella* Blume (published in 1825, before Choisy's 1834 name). Still, *Erycibe princii* will appear in IK, IPNI, and similar scientific name indices, providing John Prince an ephemeral toe-hold in the history of botany and plant exploration.

George Staples
Herbarium

BOTANICAL RESEARCH FELLOWS IN THE GARDENS 2012–2013

The Singapore Herbarium (SING) began in 1875 and to date houses over 650,000 specimens, among them important collections known as Type specimens. The names of species are first given from these specimens, making them highly important reference tools for researchers. Works are on-going via funding provided in part by the Mellon Foundation (see *The Global Plants Initiative & the Singapore Herbarium,* featured in the Feb 2013 issue of *Gardenwise*) to scan these valuable specimens at high resolution. The bulk of the material at SING will be available online within a year.

On a competitive basis, the Gardens offers several Research Fellowship grants per year. In addition, one grant from the H.M. Burkill Research Fellowship is given. These grants are awarded to botanists to do research at SING. The 2012–2013 SBG Research Fellows and their achievements are presented below.

Photo credit: Jana Leong-Škorničková

Dr Vinita Gowda, Post-Doctoral Fellow at the Smithsonian Institution's National Museum of Natural History, and the third recipient of SBG's Burkill Fellowship (2 Apr–31 Jul 2012), targeted her research to investigate pollination and dispersal biology of native gingers from Singapore, in collaboration with Dr Jana Leong-Škorničková. Together they worked to uncover the dispersal mechanisms of native Singapore gingers, for instance looking at if gingers are visited by generalist or specialist pollinators and if they are pollen-limited (highly specialised pollinators could imply a more fragile relationship between pollinator and plant population). These questions are pertinent because they are directly linked to efficient conservation strategies. Both manipulative pollination studies as well as camera traps were utilised to provide deeper insights into the reproductive lives of Singapore's critically endangered ginger species.

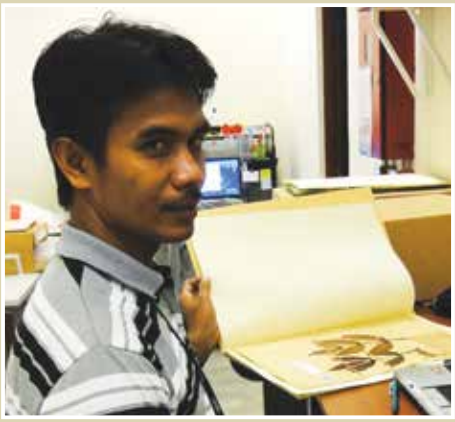
Ms Rani Asmarayani, a PhD candidate from the University of Missouri at Saint Louis, USA, works on the Asian pipers (wild peppers). As one of our SBG Research Fellows (21 Jun–19 Jul 2012), she studied SING's *Piper* specimens from Malesia (the main part of the Indo-Australian archipelago region), with emphasis on the Malay Peninsula. More than 494 specimens were studied and 143 specimens were given name updates. Field trips to Dairy Farm Estate, Admiralty Park, Bukit Timah Nature Reserve, Nee Soon, and MacRitchie Reservoir, accompanied by Lua Hock Keong from the National Parks Board, resulted in 22 *Piper* specimens collected and an account of the forest and cultivated *Piper* spp. of Singapore Island.

Photo credit: Marlina Ardiyani

Dr Marlina Ardiyani, a Curator at the Herbarium Bogoriense, Indonesia's national herbarium, spent time as an SBG Research Fellow (13 Sep–3 Oct 2012), working on a taxonomic revision of *Haplochorema* and related ginger genera. In her work, she utilised the Asian Zingiberaceae Information Center (AZIC) resources housed at SING, and also helped us to confirm specimen identifications. Publication of her studies is underway.

Photo credit: Henk Jaap Beentje

Dr Henk Jaap Beentje from the Royal Botanic Gardens, Kew, was an SBG Research Fellow (1–8 Nov 2012) who studied Pandanaceae (screwpine) specimens at SING, specifically for the *Flora of Peninsular Malaysia*. Henk annotated a total of 453 specimens, and with his name updates, SING now has a comprehensively-curated Pandanaceae collection. Henk also presented a talk on the *Palms of Madagascar* as part of the SBG speaker series.



Mr Deden Girmansyah of the Herbarium Bogoriense, Indonesia, was at SBG (1–21 December 2012) to research *Begonia*, making use of the Type collection at SING, which has over 60 *Begonia* types from Sabah, Sarawak and Kalimantan, and SBG's Library of Botany and Horticulture. Deden was able to confirm two undescribed species of *Begonia*, planned for publication in about a year's time.

Dr Caroline Pannell from the University of Oxford visited SBG (17–23 Jan 2013) as a Research Fellow to finalise a taxonomic treatment of two plant families, Salicaceae and Achariaceae, begun in 2011. The Singapore material was an essential source of information for verification of Type information and for completing the description and mapping of species, helping also to provide an indication of conservation needs in Singapore and Peninsular Malaysia. Caroline annotated 965 specimens lodged at SING during her time with us.

Professor Xia Nianhe from the South China Botanical Garden visited SBG (14–23 Feb 2013) to carry out research on bamboos, specifically tackling the Southeast Asian genera *Bambusa*, *Dendrocalamus*, *Gigantochloa.* He collaborates with our Principal Researcher Dr K.M. Wong in a broad assessment of woody bamboo classification in Southeast and East Asia using molecular phylogenetic tools. He was able to study morphological variation in bamboos within insular Southeast Asia, including the region from Borneo to New Guinea, and also helped us to identify specimens at SING.

Dr Andrew Henderson, who hails from the Institute of Systematic Botany, The New York Botanical Garden, USA, was an SBG Research Fellow (4–31 Mar 2013) to work on a revision of *Calamus* rattans (mostly climbing palms). SING is an extremely important resource for rattan research, with a very large representation of palm material, and a rich collection of specimen material and literature contributed by past SBG scientists such as H.N. Ridley, E.J.H. Corner and C.X. Furtado. Andrew annotated 855 palm specimens and also presented *The Palm Flora of Vietnam* as part of the SBG speaker series.

Serena Lee
Herbarium

All photos by Serena Lee unless otherwise stated

TEMPTING BUT INEDIBLE– *APHANAMIXIS POLYSTACHYA*

The enticing but ripe fruits that are said to be poisonous, and striking orange-red arillate seeds. *(Photo credit: Koh Sin Lan)*

Recently, a few trees along the fence and path of our Rainforest bloomed and produced some very striking fruits. Known as *Aphanamixis polystachya*, these trees are an endangered native of Singapore. The species name '*polystachya*' means many-spiked, in reference to its inflorescence. *Aphanamixis polystachya* is commonly known in Malay as *kasai paya* (marsh *kasai*) and belongs to the family Meliaceae (the *Lansium* or langsat family).

This is a large tree that can grow to a height of 20–30 m, and is usually found in undisturbed mixed dipterocarp and coastal forests up to 700 m in altitude, although as a pre-disturbance remnant, it is also normally present in secondary forests as well. This particular species can be found wild in all but the driest parts of India through the Malay Peninsula, and in the Philippines.

The compound leaves can be odd or even-pinnate, about 30–60 cm long. *Kasai paya* has tiny, globose pale yellow flowers (each about 5 mm in diameter) that are borne on long panicles in the leaf axils and are sweetly aromatic. The trees can usually be seen flowering between May and September, although the more striking feature of this tree is its fruit. The fruit is a thick round capsule c. 2.5 cm in diameter, and ripens orangey-red. The inside of the capsule resembles a mini durian—a very tempting sight indeed, but here is where the resemblance ends. Although very little is known, Burkill recorded that the whole fruit is inedible and said to be poisonous.

There are many uses for the different parts of the *kasai paya*, but mostly they are medicinal. Oil can be extracted from the seeds through heating, bruising, or boiling; both this oil and the bark are used for treating rheumatism (the oil is also widely used as a biodiesel and has even been reported to be of fair quality for soap making). The leaf and fruit extracts are said to have insecticidal properties. Studies have revealed that the extracts of the bark, leaves and roots also show anti-tumour activity. Apart from the medicinal uses of this tree, the timber, which is red in colour, hard and heavy, is suitable for house construction, furniture and decorative works.

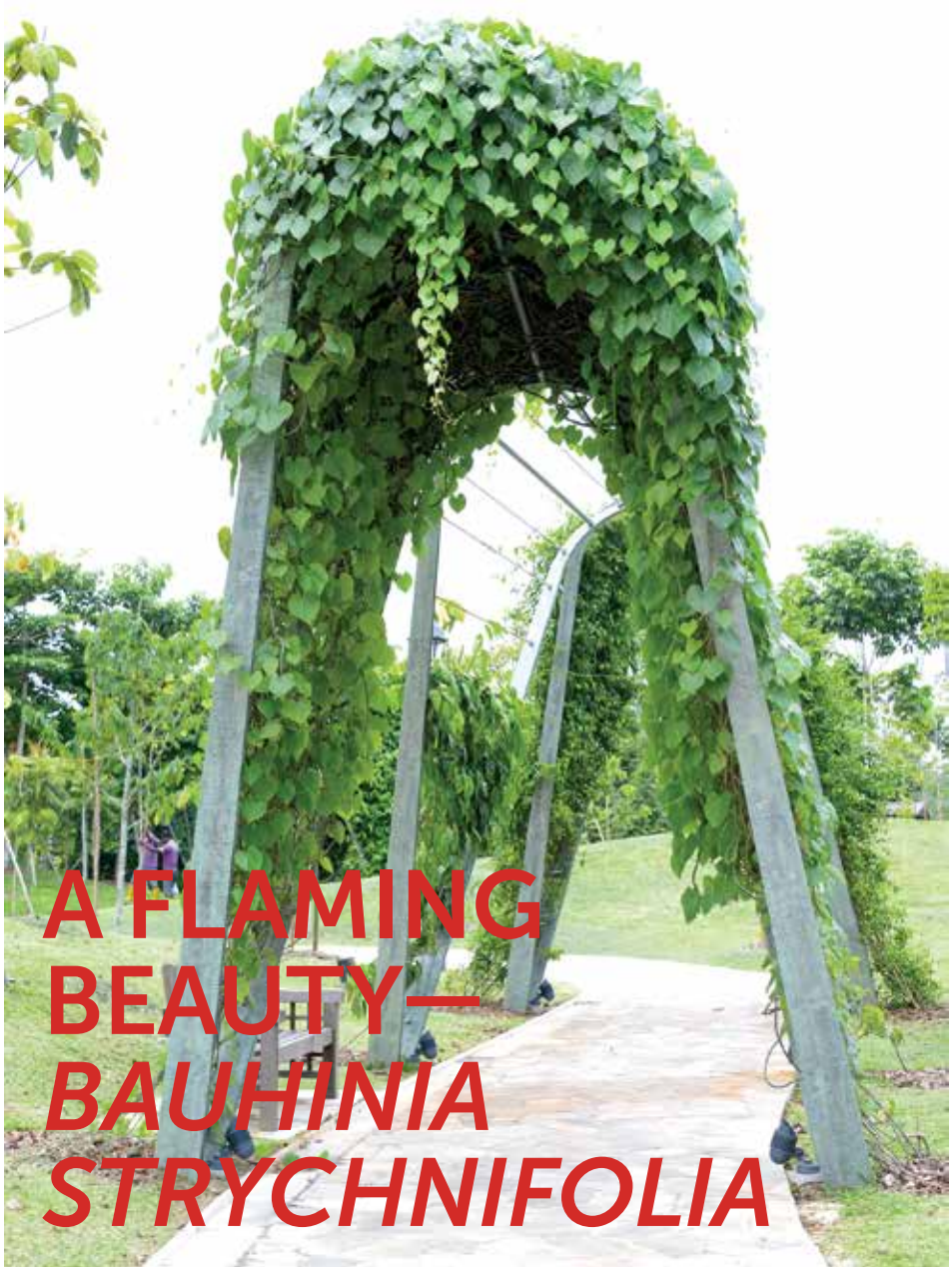
Aphanamixis polystachya has a good form and can be a good shade tree. Therefore, it can be grown in gardens and parks or even as street trees. For those who are curious about how this tree looks up-close, head over to the Gardens' Rainforest to see our collection of *Aphanamixis polystachya* in person.

Close-up of the tiny globose flowers of *Aphanamixis polystachya*. *(Photo credit: Koh Sin Lan)*

Bunches of ripe *Aphanamixis* fruits with some split capsules. *(Photo credit: Koh Sin Lan)*

A small *Aphanamixis polystachya* tree in the Gardens. *(Photo credit: Koh Sin Lan)*

Nura Abdul Karim, Siti Amalina Norazman & Lee Yi Qi
Horticulture, Exhibitions and Events



A FLAMING BEAUTY— *BAUHINIA STRYCHNIFOLIA*

A trellis covered by a lush and vigorously growing *Bauhinia strychnifolia*. *(Photo credit: David Lim)*

Exiting from the Botanic Gardens MRT Station, passing through the old ornate 1987 Botanic Gardens' Vanda Gate and making your way through the newly developed Trellis Garden, you may have been welcomed recently by a stunning flaming fuchsia-red beauty amongst the metallic trellises. That beauty is a vine native to the dry lowland forests of northern Thailand which are well known for their burning summer and monsoon seasons. This tendrilled vine is known botanically as *Bauhinia strychnifolia*, or *khà-yăn* to the Thais.

The vernacular name means hard-working, an appropriate name given that this plant presents its eye-catching flowers through the heat of the Thai summer, while its floral competitors succumb to the summer heat and frequent fires. As an adaptation to the monsoonal climate and droughts, the vine grows rapidly. This makes the climber an easy plant to care for, with lovely green foliage and even lovelier inflorescences.

A member of the legume family, *Bauhinia strychnifolia* does not have the characteristically bi-lobed leaves typical of other *Bauhinia* species. Instead, its leaves are entire, ovate-oblong in shape with 3 to 5 distinctive veins arising from the leaf base. This unique structure, reminiscent of the leaves of the poisonous genus *Strychnos* (the source of strychnine), gives it its specific epithet *strychnifolia*. Both surfaces of the leaves and the petioles are glabrous. This climber has an attractive racemose inflorescence that is narrow, elongated and densely-flowered, and can grow up to one metre in length. The whole inflorescence is reddish in colour. The flowers do not open like typical *Bauhinia* flowers but rather are tubular-looking and set on a short-toothed, pubescent, cupped-shaped reddish calyx. The flower comprises 5 conspicuous fuchsia-red petals, with 3 fertile stamens that are slightly longer than the petals, and 7 staminodes (infertile stamens). This vine bears flattened, woody pods that are covered with soft brown hairs. Each pod usually contains 8 to 9 seeds.

Close-up of *B. strychnifolia*'s flowers, with a vibrant glossy pinkish calyx and deep red petals. *(Photo credit: David Lim)*

Close-up of the lovely pinkish-white young leaves of *Bauhinia strychnifolia* and its tendrils.

In addition to its flowers, this vine's foliage is quite appealing; its mature leaves are green and its young leaves are a charming pinkish-white. In the wild, this resplendent vine is like a living green drape with some splashes of pinkish-white and spikes of deep fuchsia-red.

The bark of *Bauhinia strychnifolia* is rich in tannin and supposedly has strong anti-bacterial properties. Indigenous people in Thailand produce an ointment made from a combination of the bark, wood, and herbs, which is applied to open wounds to prevent infection and is also used for treating strains, bruises and insect bites.

At present, this vine is not commonly found in the nurseries, but maybe someday we will be able to enjoy this striking vine in tropical gardens around the world. By growing it in the Singapore Botanic Gardens, we have taken a step towards introducing this beauty to the world. The next time you visit the Gardens, do try finding this hidden floral treasure amongst the many other lovely climbers in the Trellis Garden.

Nura Abdul Karim, Siti Amalina Norazman & Lee Yi Qi
Horticulture, Exhibitions and Events

THE GREEN AMBASSADORS OF JACOB BALLAS CHILDREN'S GARDEN

The new Green Ambassador Proficiency Badge, designed by Girl Guides Singapore. *(Photo credit: Girl Guides Singapore)*

Girl Guides in action, demonstrating their knowledge about the Malayan cherry tree (*Muntingia calabura*) during a guided tour with a family. *(Photo credit: Yvonne Chong)*

SBG's Education Branch has recently collaborated with Girl Guides Singapore (GGS) to introduce the Green Ambassador Proficiency Badge, with students aged 14 to 15 years old trained to be 'Green Ambassadors' of Jacob Ballas Children's Garden (JBCG). The objective of this partnership is to provide opportunities for young teenagers to gain knowledge and an appreciation of plant life. At the same time, it is an opportunity to increase confidence and improve communication and leadership abilities, essential 21st century skills in Singapore, as emphasised by the Ministry of Education.

Prior to being awarded with the Green Ambassador Proficiency Badge, students are required to go through an intensive 14-hour training programme (conducted over seven sessions) together with a theory and a practical assessment. During this training programme, students are taught about JBCG as well as basic plant knowledge, with topics entitled *Looking at Plants*, *Flowers at Work*, *Fruits and Vegetables* and *Plants and their Uses*. The training is conducted as indoor theory lessons followed by outdoor guided tours. Students also participate in shadowing sessions, which allows them the opportunity to understudy their trainers, experiencing how guided tours are carried out and crowd control is exercised with actual school groups.

Girl Guides exploring JBCG and learning from trainers (Mr Bian Tan, Mdm Nashita Mustafa, Mdm Salina Jailani) about plants during the Green Ambassador training sessions. *(Photo credit: Winnie Wong)*

Since the establishment of this partnership in March 2012, two rounds of training programmes have been successfully carried out. A total of 27 Girl Guides from six secondary schools (Changkat Changi Secondary School, Bedok View Secondary School, CHIJ Secondary (Toa Payoh), Jurongville Secondary School, Ping Yi Secondary School, and Edgefield Secondary School) have been trained.

To qualify as 'Green Ambassadors', students are required to serve as nature guides at JBCG, spreading important environmental messages and inculcating interest in nature among the young. During school holiday periods in September 2012 and March 2013, the 27 trained Girl Guides reached out to 500 young children and their families while giving guided tours at JBCG. Many positive comments were received from parents at the end of each guided tour. One mother commented, "The Girl Guides are patient and friendly with a good sense of humour and high level of confidence" while one father mentioned that "My children were able to understand the content and learn through exploring and playing."

To support the values of the Green Ambassador programme and learn about the nature found at JBCG, come and attend one of the tours provided by the Girl Guides during the upcoming September 2013 school holiday.

Winnie Wong & Yvonne Chong
Education Branch

LEARNING ABOUT DRAGONFLIES

Education officer Muhammad Taufiq demonstrating how to handle a dragonfly with care.

In this article, Shereen Tan provides a first-hand account as the guide of a new tour offered by the Jacob Ballas Children's Garden, and the inspiration that led to it.

Stepping onto the floating platform over the pond at Jacob Ballas Children's Garden, I was greeted by an amazing display of flying beauties that took my breath away. Fond memories from my childhood stirred in my mind as I recollected a triumphant moment of catching a winged beauty with a handmade insect net made by my mother out of an old badminton racket. That was my very first encounter with dragonflies, some of the most ancient flying insects in the world.

I began to wonder how many children or even adults walk past the pond at Jacob Ballas Children's Garden and yearn to know about the beautiful dragonflies and damselflies that can be found there. I wondered if future generations would grow up to tell of adventures in nature, like those I had. Inspired by these thoughts and precious memories, a new tour was developed.

The inaugural dragonfly-themed guided tour *Let's Learn about Dragonflies* was conducted on 4 June 2013, to introduce these magnificent flyers to visitors of the Jacob Ballas Children's Garden.

Our participants (five parents and 24 children) were given a basic introduction to dragonflies and damselflies and their life cycle before heading out for a field study at the pond. We also observed the exuviae of dragonflies and damselflies after watching a video of an ornate coraltail (*Ceriagrion cerinorubellum*).

Children were eager to find dragonflies and damselflies at the floating platform.

Children in action catching dragonflies!

One young participant and her mummy sharing a bonding session as they learned about dragonflies.

A young participant learned the proper way to handle a dragonfly as he held an immature male common parasol (*Neurothemis fluctuans*) between his fingers.

Our guide for the day, Shereen Tan, identifying and observing dragonflies in a container with the children.

Dark clouds did not dampen the spirit of exploration in the children as we proceeded to the highlight of the day—catching dragonflies and damselflies for observation. Participants were taught how to catch the insects using nets and the correct way to handle them. Some children were afraid to hold them, but soon overcame their fears when they learned that dragonflies and damselflies do not bite or sting. The field study allowed the children to observe their flight habits and how they engage in territorial fights. The children's interest was piqued as they were encouraged to observe, ask questions and find their own answers instead of relying on the guides for their learning.

Of course, the children learned more than just a lesson on dragonflies and damselflies as they took turns sharing and helping each other find the insects. As the children waited for opportune moments to catch the perching creatures, they also learned first-hand that patience is a virtue.

Triumphantly, the children took their captive specimens back to the classroom to identify and examine them with magnifying glasses. By then, the children were able to identify the differences in appearance between a dragonfly and a damselfly.

The main catch of the day included the following species commonly found at Jacob Ballas Children's Garden: *Pseudagrion microcephalum* (blue sprite), *Ceriagrion cerinorubellum* (ornate coraltail), *Brachydiplax chalybea* (blue dasher), and *Neurothemis fluctuans* (common parasol).

By the end of the programme, the participants were excited to release their new friends back to their homes. We bid them farewell as the children were left to reflect on an important takeaway message on the importance of protecting the habitat of dragonflies and damselflies.

We hope that the children and parent participants learned to appreciate these flying beauties and will share their adventures and new knowledge of dragonflies and damselflies with their friends and loved ones.

Shereen Tan & Yvonne Chong
Education Branch

All photos by Winnie Wong

KEY VISITORS TO THE GARDENS
(JANUARY-JUNE 2013)

Prime Minister and Minister of Defense and Security of the Democratic Republic of Timor-Leste, His Excellency Kay Rala Xanana Gusmão seen together with Dr Nigel Taylor, Director of Singapore Botanic Gardens during the orchid naming ceremony on 3 June 2013.

Bindi Irwin with family during their orchid naming ceremony on 12 April 2013.

Mr Marcus **AGIUS** & spouse	Group Chairman, Barclays Bank, UK
Dr Russell **BARAT**	Kings Park and Botanic Garden, Australia
Ms Deborah **BISA**	Northern Territory Herbarium, Australia
Mr David **BRAGDON** & spouse	Director of Long-Term Planning and Sustainability for New York City, New York, USA
Ms Janet **GAGUL**	Port Moresby University, Papua New Guinea
His Excellency Kay Rala Xanana **GUSMÃO**	Prime Minister and Minister of Defense and Security of the Democratic Republic of Timor-Leste
Prof J. Casey **HAMMOND**	Singapore University of Technology and Design, Republic of Singapore
Mr Stewart **HENCHIE**	Consultant, Penang Botanic Gardens, Penang, Malaysia
Dr Andrew **HENDERSON**	New York Botanical Garden, USA
Mr **IMIN** Kamin	Forest Research Institute Malaysia, Malaysia
Ms Bindi **IRWIN** & family	Australia Zoo Wildlife Warrior, Australia
Mr Attachai **KANTACHUMPOO**	University of Tokyo - Atmosphere and Ocean Research Institute, Japan
Mr Sergey **KAPKOV**	Moscow Government Minister and Head of the Department of Culture, Moscow City Government, Moscow, Russia
Ms **KOONG** Pai Ching	Deputy Chief of Mission and Acting Minister-Counsellor of the Republic of Singapore to France; Alternate Permanent Delegate of the Republic of Singapore to UNESCO
Mr Ilya N. **KUZMIN**	Head of Investment Division, Department for External Economic and International Relations, Moscow City Government, Moscow, Russia
Ms **LIAW** Lin Ji	Universiti Brunei Darussalam, Negara Brunei Darussalam
Mr Øystein **LOFTHUS**	University of Oslo, Norway
Ms Magdalena **MAIKAS**	The Natural History Museum, UK
Datuk Sam **MANNAN**	Director, Sabah Forestry Department, Sabah, Malaysia
Haji **MOHAMED AKBAR** Bin Mustapha	Director of Recreation, Tourism and International Affairs Department, Municipal Council of Penang Island, Penang, Malaysia
Dato' Haji **MUHAMMAD YUSOFF** Bin Wazir	Deputy State Secretary, Penang, Malaysia
Mr **NORSIDI** Mohd Kamdi	Sabah Forestry Department, Sabah, Malaysia
Dr Caroline **PANNELL**	University of Oxford, UK
Dato' **PATAHIYAH** Bte Ismail	President, Municipal Council of Penang Island, Penang, Malaysia
Dr Axel Dalberg **POULSEN**	Oslo Botanical Garden, Norway
Ms Marie **ROBERT**	Sabah Forestry Department, Sabah, Malaysia
Ms Daphne **ROBERT**	Sabah Forestry Department, Sabah, Malaysia
Mr Barnabas **SEYLER**	University of Hawaii, USA
Ms Ana Rita **SIMÕES**	The Natural History Museum, UK
Dr Eiji **SUZUKI**	Kagoshima University, Japan
His Excellency Andrew **TOH**	Non-Resident Ambassador and Permanent Delegate of the Republic of Singapore to UNESCO
Mr **TOMY WINATA** & delegates	Artha Graha Peduli Foundation, Jakarta and Tambling Tiger Forest Reserve, Sumatra, Indonesia
Prof **XIA** Nianhe	South China Botanical Garden, China

THE COLONY ARTIST, MRS JEAN KINLOCH SMITH

In March of 1952, the Singapore Art Society exhibited the works of a much-travelled group of Anglo-American women artists. Among those women and leader of the group was Mrs Jean Kinloch Smith. Since childhood, Jean dabbled in all types of paint. Trained at St Martins School of Art in London and the Dublin Schools of Art, Jean also exhibited her artworks in England, South Africa (Cape Town), and Malta. She followed her husband, an employee of the Cable and Wireless Company, to Singapore in 1947. She also accompanied him on numerous trips to Africa, including Zanzibar, and to Greece and other parts of the Mediterranean, and of course she captured in water colours and oil paints scenes from all of these places.

Her six years in Singapore resulted in numerous paintings, mostly of orchids and other flowering plants, many of which were commissioned by friends, but also hundreds of others for exhibitions. Singapore Botanic Gardens is fortunate to have 100 of these water-coloured sketches, donated by Mrs Kinloch Smith. Following her arrival in Singapore, one day each week, Jean came to the Gardens to paint flowers. Although she did not claim to be a botanist, she did botanic painting for many years (particularly during her time in South Africa), and her work was described by M.R. Henderson, former Curator of the Herbarium at Singapore Botanic Gardens, to be "as good as any botanic artist working anywhere". Her paintings are technically correct, accurately drawn and faithfully coloured.

Because of her generosity, an orchid produced at the Gardens was named after her. At the time, the hybrid was named the *Vanda* Jean Kinloch Smith, but due to recent reclassification, it is today identified as *Papilionanda* Jean Kinloch Smith. The blue-flowered hybrid is a cross between *Papilionanthe* Josephine (formerly known as *Vanda* Miss Joaquim 'Josephine') and *Vanda coerulea*.

Jean Kinloch Smith's botanical drawings, painted with artistry and remarkable accuracy, attracted a lot of attention during her first Singapore exhibition, held in Robinson in 1949. A talented and energetic artist and part-time children's centre worker, Jean left Singapore in 1953 to settle in England, after more than 20 years of wandering. She died in 1984 in Somerset at the age of 92.

Christina Soh
Library