

Gardenwise

THE MAGAZINE OF THE SINGAPORE BOTANIC GARDENS VOLUME 45, AUG 2015 ISSN 0129-1688



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Singapore's first UNESCO
World Heritage Site



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A historic postcard showing Tanglin Gate as it was in the 1920s or 1930s. (Courtesy of Michele Rodda)

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Opposite page

Visitors came by the thousands to the Gardens in celebration of Singapore's Golden Jubilee. This aerial view shows multitudes gathered around Shaw Foundation Symphony Stage on 7 August to enjoy a range of performances. (Courtesy of NParks)



TWO years ago, in my introduction to the August 2013 issue of this magazine, was the first mention of the Republic of Singapore's intention to seek the inscription of the Botanic Gardens as a cultural site under UNESCO's World Heritage Convention. Writing two years later, this has just been achieved and the journey this has entailed is reported in this issue. Amidst the well-justified celebrations it is important that we thank the many players and supporters who have made this possible. Various organs of Government were involved, especially the National Parks Board and Urban Redevelopment Authority (Ministry of National Development), the Ministry for Culture, Community & Youth, including the statutory National Heritage and Preservation of Sites & Monuments Boards, and the Ministry of Foreign Affairs. Besides the governmental part of this 'UNESCO Family', there has been huge support from non-governmental bodies and the Singaporean public, encompassing people from many walks of life and not least the Gardens' many users. We thank you all heartily for what has been a huge community effort in gaining Singapore the award of its first UNESCO World Heritage Site. Some of the many official visitors in connection with the UNESCO bid are listed here for the period January to June 2015.

Heritage will remain an important component of *Gardenwise* content, be it the Gardens' history or the natural heritage of Singapore and the region. Thus, having published her 'A ginger for Singapore' in the last issue, Dr Jana (as she is popularly called) has gone on to identify yet more plants unique to Singapore – see '*Hanguana* in Singapore demystified!' in this issue. While focusing on remarkable plants, we can now reveal a secret that has been kept under wraps for a while, that is until a fence could be placed around it to symbolically protect what we believe to be the world's oldest and likely largest specimen orchid: 'An old tiger caged'. Elsewhere we reveal some early photographs of the Gardens, which our Dr Michele Rodda has been collecting over the years.

This has been a significant year for Singapore, which celebrates its Golden Jubilee. Sadly, this year was also marked by the passing of Mr Lee Kuan Yew. The Gardens was selected as one of the nation's sites where members of the community could come and pay tribute to Singapore's first Prime Minister. Our site was tastefully decorated with orchids by Simon Tan and his supporting team of horticulturists. In July, Simon and his team put on another grand display, this time of heritage orchids in conjunction with the opening of an exhibition of botanical art in the CDL Green Gallery. A first for Singapore, if not also for Southeast Asia as a whole, is the exhibition of work from 36 of the world's most acclaimed botanical artists. This show features 55 paintings from Dr Shirley

Sherwood's immense private collection, and a small selection is reproduced in this issue to whet your appetite – go to see the exhibition before it closes on 1 November! This show at Botany Centre was part of the month long run-up to the big celebrations for Singapore's Golden Jubilee year and UNESCO success held over the long weekend of 7–10 August, when the Gardens were thronged with more than 123,000 enthusiastic supporters and graced by no other than the Prime Minister himself, on Friday 7 August.

As can be seen from the pages of *Gardenwise*, the Gardens is ever hosting visiting scientists whether as part of collaborative research or for training purposes. The Gardens is also a place of inspiration for writers of prose and poetry and we are pleased to be part of the National Art Council's Writer-in-the-Gardens Residency Programme, which has already delivered a wonderful children's book, entitled *Micah and Grandma at the Singapore Botanic Gardens*, written by Chan Wai Han and beautifully illustrated by Cheng Puay Koon (Ethos Books, ISBN 978-981-09-1841-5).

The Singapore Botanic Gardens will remain a key player in the Singaporean culture of the next 50 years. Make sure you visit us regularly! 🌿

Nigel P. Taylor

THE UNESCO JOURNEY



► The Gardens became Singapore's first UNESCO World Heritage Site in July 2015, after more than three years of studying its heritage.

It all began before September 2011, when I arrived in Singapore as the newly appointed director of the Botanic Gardens. Back in 2010, a study was conducted to determine whether any of the Republic's historic assets had what UNESCO's World Heritage Convention calls Outstanding Universal Value (OUV). A shortlist of possible sites was drawn up, but then, at least, only the Singapore Botanic Gardens was thought to be a strong contender.

Later, in 2012, Singapore's government took the decision to sign up with the World Heritage Convention and in December of that year submitted the required Tentative List of property that it would subsequently consider proposing for inscription. Thirteen months later, in January 2014, a dossier comprising the Nomination Document and draft Management Plan for the Gardens was formally submitted to the World Heritage Centre in Paris, kicking off a process that would only be concluded in July 2015.

Those are the bare facts describing the key stages of the inscription process, but as one might expect there is a big back story that needs to be told. No one doubted that the Singapore Botanic Gardens had a rich history, but what was that history and how did it shape up in terms of the aforementioned concept of OUV? Answering that question was made a lot easier by the fact that in 2009, upon the Gardens' 150th anniversary, a book celebrating its history had been published, namely Bonnie Tinsley's admirable *Gardens of Perpetual Summer*. However, this has to be seen as a second hand source of information, so it was necessary to go back to the primary sources held in both the Gardens' and other organisations' archives, in Singapore and even abroad.

The single most important information source on the Gardens' history is its annual reports, which began with those of the Gardens' founding Agri-Horticultural Society (1860–1874), continuing from 1875 until the 1970s under the auspices of first the British colonial government and subsequently the Republic of Singapore. From 1875 until the 1960s, these reports were rather detailed and intended to brief the director and staff of the Royal Botanic Gardens at Kew, the mother ship of all the British colonial garden outposts, which by 1900 was a network including more than 100 entities throughout the Empire. Besides these documents there is a quite huge miscellany of contemporary newspaper reports and images as well as maps in both Singapore's and the UK's national archives. Critical too were the personal anecdotes that various generations of Singapore residents could impart about how the Gardens was used in former times. Experts in matters outside the present writer's area of competency were also consulted; for example, authorities in buildings' history, since the Gardens has an unusual range of built structures representing more than a century of architectural development.



► UNESCO stakeholder committee meeting in session. (Photo credit: Mohd Azmi Shahbudin)

Gathering this information was one significant piece of work, but then it had to be organised according to the format of UNESCO's Nomination Document. Filling that out became the job of the National Heritage Board's appointed consultants, Chris Blandford Associates (CBA), who as it happened had completed the same process for the Royal Botanic Gardens, Kew in the run up to its inscription on the World Heritage List in 2003. CBA also crafted the draft Site Management Plan, which would be submitted to UNESCO HQ (Paris) as part of the dossier.

But information gathering and document assembly is only one aspect of the process.

The other key element concerns people – that is, anyone who might be termed a stakeholder in the process. Engaging such stakeholders as well as raising awareness of the bid to inscribe the site was a big investment of time and reminded us that whilst dealing with UNESCO is the province of national governments, the World Heritage Convention is for the man in the street and noting especially the 'E' of UNESCO, which stands for 'Educational'.

From March 2013 the Gardens' team as well as staff from the National Heritage Board began meeting with specialist interest groups in order to brief them

on the process and importantly to seek their help in assembling any information that would support the bid, but was lacking in the Gardens' archives. Our neighbours at the site, both Tanglin residents' representatives and the National University's Law Faculty, were also briefed and all were quick to lend their support to the bid.

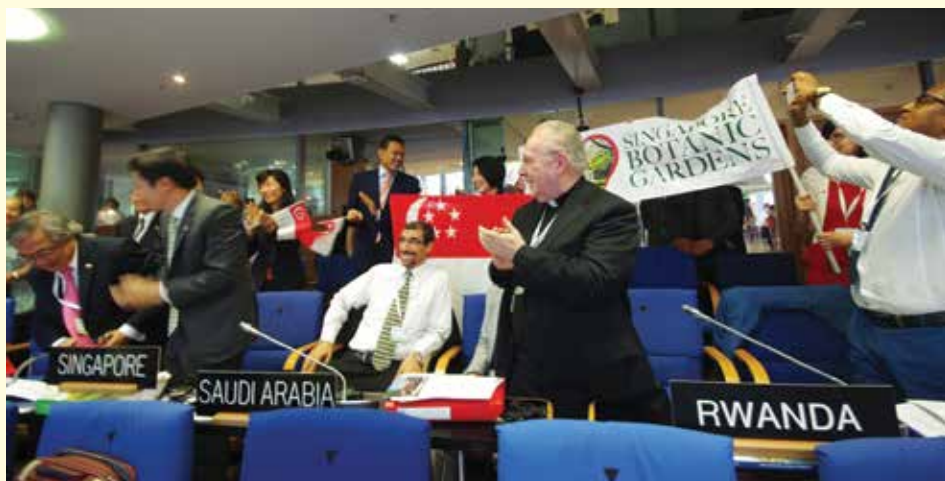
Later in 2013, with the help of the Ministries for Culture and Foreign Affairs, we began a series of carefully orchestrated awareness-raising sessions for international experts and country representatives, especially those connected with UNESCO's 21-member



► In 2014, at the annual World Heritage Committee meeting in Doha, the Gardens publicly named an orchid in honour of UNESCO.



► The meeting of the 2015 World Heritage Committee in Bonn. (Photo credit: Nigel P. Taylor)



► In Bonn, the Singapore delegation cheers after the Gardens' inscription. (Photo credit: Cassandra Lew)

World Heritage Committee (WHC), such as the ambassadors that often head their country's delegations to the annual meeting of the WHC. These key individuals were given bespoke tours of the Botanic Gardens to highlight its rich history and emphasise its authenticity and integrity as a well-preserved site, the tours intensifying during 2014 and early 2015. We also attended the 2013 WHC meeting in Phnom Penh (Cambodia) and mounted an exhibition there to raise awareness amongst the more than 1,000 delegates that frequent such meetings. This was

repeated in 2014 at the next annual meeting in Doha (Qatar) where to our great surprise we were allowed to publicly name an orchid after UNESCO itself, and this stunning hybrid was received by none other than Dr Irina Bokova, Director General of UNESCO, and in front of the plenary session of the conference!

The next big milestone came in September 2014 when over three days the Gardens hosted a visit by Stuart Read, the expert appointed by the International Committee on Monuments

and Sites (ICOMOS), which is the expert body that serves UNESCO in assessing cultural properties such as ours. Mr Read's mission, which was conducted in some secrecy (as is a requirement), was to evaluate the Gardens' ability to manage its OUV (as set out in our draft Management Plan), determine whether there were sufficient resources at the Gardens' disposal (manpower, funding, etc.) and, crucially, whether there were adequate statutory and other controls in place to ensure that both the proposed site and its surroundings would not be subject to inappropriate developments or changes in land use. This involved meetings with the Urban Redevelopment Authority (URA), Singapore's planners. Mr Read also met with the members of the stakeholder committee that we had convened in December 2013 to endorse our Management Plan and oversee its progress via six-monthly meetings. As the three days drew to a close Mr Read sat down with the Gardens' team and went through a long list of queries – it was a bit like being back at school and having to answer exam questions!

A month after this a letter arrived from ICOMOS HQ requesting more information and clarifications. A response to this was crafted and sent, then an offer of a Skype interview was made and we assembled at the Ministry of Foreign Affairs HQ for a late night link-up with experts in South Africa, Argentina and Paris. This was a great opportunity to answer queries from those assessing our bid, who do not have the opportunity to visit the site itself and see things for themselves. Prior to this a second letter of clarification was received with a generous deadline for our reply set at 28 February 2015. After two months of internal discussions our final response, running to 11 pages (!), was sent to Paris and at that point there was little more we could do, since the decision was now out of our hands. Much of what we had had to clarify concerned the chosen boundaries for the site, which is 49 hectares of the Gardens' total area of 74 hectares, the significance of the site to the early development of the rubber industry and lastly our 'Comparative Analysis' of the Gardens with other similar sites, whether already inscribed or not. This last point was a tricky one, because in the publicly accessible dossier we had been careful to avoid making too overtly critical comparisons with the gardens of other countries. ICOMOS, however, wanted greater detail and the more private dialogue which then ensued allowed such comparisons to be made without the risk of offending others.



Foreign delegates congratulate Singapore. (Photo credit: Cassandra Lew)

As May 2015 approached we awaited news of the recommendation that ICOMOS would make to the WHC, but already knew that we had not been rejected. When it came through it was a recommendation to 'inscribe' and thereafter we could relax, because to my knowledge the WHC has always ratified such recommendations. That left only one thing to do, to attend the 2015 meeting of the WHC in Bonn (Germany). There, on 4 July, the Gardens was inscribed and all 21 members of the WHC requested air time to comment favourably on our bid. It is hard to describe the feeling of pride that their kind words engendered and one thing was very clear, the investment of time we had made in showing so many of the key players around the Gardens had paid off handsomely. The delegate from Finland, after his tour, had told me that besides the day he got married and the birth of his child, visiting

the Gardens had been the next best day of his life!

But this is not the end of the story, because now Singapore has a new responsibility to look after the Gardens with great care and especially to educate its many visitors about its heritage values. For Singapore we now have officially recognised the world's best surviving example of a colonial botanic garden and the first garden to be inscribed under the World Heritage Convention as such in the tropics*.

Nigel P. Taylor
Director SBG

* The Jardim Botânico, Rio de Janeiro, Brazil, is within a much larger inscribed site of the Carioca landscape



Staff and visitors celebrate in Singapore at the moment of the Gardens' inscription. (Photo credit: Chung Cui Yi)

ODE TO THE SINGAPORE SOUL

You were born in anguish.
Premature Third World child
You needed hard truths
To sharpen your spirit.

Forsaken fifty years ago
Innocent of dangers
Waiting to haunt your soul
You needed a strong anchor.

A man, a mentor, a monument
Whose moment of pain
Fired ferocious fights against
factions
Rose to the brave challenge of
raising you.

Searing your being.
Winding your will to survive
Flexing you to rise against all odds.
Compelling you to change crises
into calmness.

Although English was inherited,
Singlish ("my one, your one") and
Melodious mother tongues
Bonded you as you grew up amid
many voices.

Some million trees became
Your public gardens to enjoy.
UNESCO World Heritage Site
You got in your Jubilee Year.

He cared for you little red dot.
And for your beating heart
He carried the red box.
He died in your Jubilee Year.

But truly he built a home and a
garden for you.
His name was not Ozymandias.
It is Lee Kuan Yew.
Look upon his works and rejoice.

Anne Pakir
(9 August 2015)

Ms Anne Pakir is an associate professor in the Department of English Language and Literature and also the Director of the International Relations Office at NUS. She is also a member of the Gardens' UNESCO Site Management Stakeholder Committee and has written this poem in celebration of Singapore's Golden Jubilee, and dedicates it to the memory of Lee Kuan Yew.

THE SINGAPORE BOTANIC GARD CELEBRATES SINGAPORE'S GOLD

DURING the National Day weekend from 7 to 9 August, the Gardens hosted a three-day carnival in celebration of SG50. The Gardens has been instrumental in Singapore's development, and the occasion also celebrated its inscription as Singapore's first UNESCO World Heritage Site. Highlights of the carnival were a range of food and activities, including traditional games and crafts, movie screenings and a series of concerts and other performances. The event was immensely popular and the Gardens received more than 123,000 visits over the weekend!

The photographs shown here capture just a handful of the scenes that played out over the weekend. On 7 August, Prime Minister Lee Hsien Loong (centre) unveiled the Gardens UNESCO World Heritage Site plaque, during the People's Variety Show. This series of multi-cultural performances (top left) were put on in the tradition of the 'Aneka Ragam Ra'ayat' event in August 1959 that was officially opened by founding Prime Minister Mr Lee Kuan Yew. Unfortunately heavy rain poured down throughout the day, but event-goers made the best of it (bottom left, *photo credit: Juliana Tan*). The day was an opportunity for Singaporeans to demonstrate their national pride (bottom right, *photo credit: Andrew JK Tan*; centre right). Over the three-day weekend, visitors were treated to demonstrations of botanical painting by artist Waiwai Hove (top right), along with a host of activities such as movie screenings at the Bandstand (far top right, *photo credit: Suliadi Pochong*) and evening performances at Shaw Foundation Symphony Stage (far bottom right, *photo credit: Juliana Tan*). (All photos courtesy of NParks unless otherwise stated) 🌿

Ada Davis

Communications and Community Engagement



ENS EN JUBILEE



AN OLD TIGER CAGED



► Dated 1860s–1870s, this is the earliest known image showing the tiger orchid planted by Niven in 1861. (Photo obtained from the Metropolitan Museum of Art, www.metmuseum.org; artist unknown, gifted to the Metropolitan Museum of Art by Matthew Dontzin in 1985)

A little-known fact about the Singapore Botanic Gardens' living collections is that they include what we believe to be the world's oldest, and likely largest, species orchid. Everyone knows that the Gardens is home to many officially recognised Heritage Trees, some dating from before its 1859 foundation, but who was aware until now that the oldest *recorded* planting is an herbaceous plant, namely a tiger orchid, dating from 1861? According to Henry Burkill's *Illustrated Guide to the Gardens* (1927), in that year Lawrence Niven, the man who designed the Gardens in the style of the English Landscape Movement, planted a tiger orchid (*Grammatophyllum speciosum*) at what is now the junction of Main Gate and Office Gate Roads. Burkill arrived as director of the Gardens in 1912 and soon became its first historian. He undoubtedly knew some of the staff involved in the Gardens' early history, such as Walter Fox (the head gardener appointed in 1879), who published an earlier visitors' guide in 1889, which mentions the tiger orchid. Besides this, we have a number of early photographs that show Niven's plant in the exact position recorded by Burkill – a few of these are reproduced here. That an orchid could survive for 154 years is by any standards remarkable, but from its extraordinary size and bulk, as well as the photographic record which stretches over more than a century, there can be little doubt about its claim to fame.

Later references and images of Niven's tiger orchid include the interesting account by the Gardens' famous assistant director, E J H Corner, in *The Marquis: A Tale of Syonan-to* (1981), which recounts the passage of events during Singapore's occupation by Japanese forces in World War II. On page 159, Corner describes the

botanically motivated Japanese soldier, Shuichi Asakura, with whom a photograph was taken in April or May 1945 "against the spreading *Brownea* tree and the giant *Grammatophyllum* orchid at the top of the Main Gate Drive [*sic*]". The photograph is reproduced in the book and shows the orchid profusely flowering at that moment,

though confusingly the caption has been switched with that of another image and also states "1944", not 1945. From this reference we learn that Niven's tiger orchid was already considered a "giant" 70 years ago!

In 1861, Niven planted the now giant tiger orchid beside Office Gate Road. This road still exits from the Gardens into Cluny Road, where a green automated vehicle service gate has been installed to the east of Ridley Hall. However, today, the part of this road where the orchid was planted is merely a narrow path covered by a pergola with the curtain of aerial roots from the vine *Cissus verticillata*. Main Gate Road did not exist in 1861. It was made in 1864 and connected the Main (Tanglin) Gate with the Office Gate Road at the junction marked by the great orchid. You can see the junction in the historic photographs reproduced here.



Two historic photographs showing the scenery of the Gardens. The top image shows the historic tiger orchid at the junction of Office Gate Road and what is known today as Main Gate Road. The bottom image was taken from the area where the Monkey House used to be and is looking up towards the bandstand, and shows another small tiger orchid planted on Lawn D. (Images Courtesy of Dr Michele Rodda)



Two images of the historic tiger orchid, the bottom being a postcard produced from a photograph that likely dates to around the same time as the top photograph. (Images courtesy of Dr Michele Rodda)

In 2015, to draw attention to this remarkable specimen, as well as to protect it, we have erected a cage around the clump and can now tell the Gardens' many visitors about its significance. This is about

more than just its age and size, since its mid-19th century planting date suggests that it is most likely a wild Singaporean specimen. This is hugely important in biological terms, because until now the

tiger orchid has been regarded as having gone extinct in Singapore early in the 20th century. This opinion is now being revised and the many tiger orchids of Malaysian origin re-introduced by Gardens' staff to



► The tiger orchid in bloom in 2014. (Photo credit: Yam Tim Wing)



► The 'caged' tiger orchid. (Photo credit: Edmund Chia)

Singaporean habitats over the past 20 years can now, perhaps, be supplemented with stock of local origin. In July 2014, after a long drought between January and March, our giant tiger orchid was persuaded to bloom and following careful hand pollination subsequently set a number of fat seed pods filled with millions of dust-like seeds. The Gardens' scientists are raising seedlings from these as well as testing the genetic make-up of the plant to determine whether its pedigree can be shown to be different from its Malaysian cousins.

Enclosing the giant tiger orchid in a cage is also symbolic of other aspects of the Gardens' rich history. At the time of its acquisition, the land donated by the colonial government included 6 hectares of rain forest, which was said to be the haunt of wild tigers. Besides this, from 1875 the Gardens began to develop a zoo, which included various carnivores, amongst them captive tigers. The larger animals suffered many losses in the early days of the zoo so that it was soon the policy to keep only smaller creatures, such as ornamental birds and monkeys. However, with the arrival

of Director Henry Ridley in 1888, the zoo enjoyed something of a revival, since he was as interested in animals as he was in plants and is even rumoured to have kept a pet tapir in the Gardens. We know from newspaper reports in the 1890s that Ridley also had tigers in cages prior to the zoo being closed for good in 1905. Thus, our tiger orchid cage can also help tell the story of the Gardens' brief dalliance with zoology. 🌿

Nigel P. Taylor
Director SBG

EARLY PHOTOGRAPHIC VIEWS OF THE GARDENS AND ITS SURROUNDINGS



► The main approach to the Gardens from town was via Orchard Road. This is a view from the late 19th century, showing how Orchard Road was set in the countryside. The main means of transportation of goods at the time was by foot or carriage.

PHOTOGRAPHY arrived in Singapore as early as 1839, and by the second half of the 19th century, the photographic studios of Thomson, Sachtlér and Lambert were active on the island. The new Singapore town was considered very picturesque and the local photographers were particularly skilled at capturing some of the most iconic views, in particular in the European town, Chinatown and along the Harbour. That is where many fine new public buildings and bustling commercial enterprises were located. Most of the island was still quite rural, with crops being cultivated along the few main roads and large stretches of land still covered by forest. The countryside provided popular photographic subjects and many of the images taken of the natural vegetation and neatly arranged plantations of coconut and pepper have been preserved to the present day.

Today, the Botanic Gardens is in the centre of the city, but in 1859, when the land was acquired for its present location, it was surrounded by countryside. The establishment of the Gardens coincided with the first development of Tanglin as a tranquil country housing estate. Other than the Gardens, the Tanglin Barracks is the only establishment from the same time period that is still in existence today. The land for the Tanglin Barracks was acquired in 1860, and some of its buildings were



► Singapore was still partly covered by forest when the Gardens was established. This photograph, taken by Lambert probably in the 1880s, shows how new roads had to be cut through the thick vegetation in a similar fashion as modern day logging roads are constructed, just with much less machinery.



► Tanglin in the second half of the 19th century was a tranquil housing estate far away from the noise of the city. This photograph of Tanglin Road gives us an idea of what Holland Road may have also looked like in the past.



► This image, dated 1877, shows Swan Lake and its iconic islet surprisingly colonised by a large *Ficus*, before it was replaced by the nibung palms that are still growing there today.

Murton's Palm collection:



► One of the earliest photographs of Murton's palm collection, taken from the present day location of the *Plumeria* collection near the Bandstand, showing the recently established palms. The vegetation further behind the palms is also still very sparse and two buildings can be seen. The first of these, a circular pavilion, is the Monkey House (see *Gardenwise* 42), while the larger building behind is one of the original parts of Tanglin Barracks. This particular building is the officers' mess, and it is still present and has been incorporated into the Ministry of Foreign Affairs building.



► Murton's palm collection around 1900. The palms as well as the surrounding vegetation had matured by this point, and the Tanglin Barracks are no longer visible.



► A very popular postcard depicting Murton's palm collection, taken from the present day site of Holttum Hall and looking towards the south side of Bandstand Hill.



■ The image above shows Tanglin Gate as it was in the late 19th century. The pillars are very similar to those of the present gate, but the vegetation behind is much more sparse. The vegetation quickly filled this space to provide a majestic background to the gate. The postcard to the left likely dates to the 1920s or 30s, although the original photograph may have been taken earlier.



constructed around the same time as some of those in the Gardens. In fact the first barracks consisted of nine attap roofed buildings erected from 1863. One of these original buildings, the officers' mess denoted by a series of arches, has been incorporated into the Ministry of Foreign Affairs building, just across the road from the Gardens' Tanglin Gate, and can be seen in historic photographs.

Whilst Orchard and Tanglin roads were tranquil countryside routes and Bukit Timah Road was no more than a narrow dirt track, the Gardens was already an attraction for locals and foreign visitors alike. Numerous photographs were available for sale, and a growing demand came with the increase of Western tourists visiting Singapore near the end of the 19th century.

By 1900, Lambert, a prominent photographer working in Singapore and other parts of Southeast Asia at that time, had a catalogue of more than 3,000 different views on offer. From 1894, printed postcards entered into circulation, and many photographs were adapted to fit this new format. The sale of postcards proved to be hugely successful, and Lambert alone had formatted more than 250 of his views into postcards.

The selection of early views of the Gardens included here allows one to see how the Gardens has changed throughout much of its 156 years' long history, and also reveals which parts of the Gardens have remained popular while others have fallen out of favour.



► The vegetation along Holland Road was not very thick in the 1880s and the Tanglin barracks across the road were still visible at the time.



► The giant waterlily (*Victoria amazonica*) was once cultivated in Swan Lake, as shown in this picture from the early 20th century. Large specimens can now be found in Symphony Lake.



► Swan Lake was the subject of many popular postcards. This one from about 1920 has been hand-tinted using vivid colours and shows two gentlemen posing for the camera wearing headgear typical of the period.



► The Tyersall Istana was clearly visible from the bandstand before the famous gazebo was built. This view was lost in 1905 though, as the Istana burned down and was never reconstructed.

What is perhaps most striking about these early photographs is that the majority of the plants look unimpressively small, as they were recently established at the time and the grounds had yet to mature. In contrast, the main paths were the same as they are now, as they had been laid out by that time and have not changed since. The earliest known image of the Gardens dates to 1871, which documents the attendance of King Chulalongkorn of Siam to an early flower show held at the Gardens (see *Gardenwise* 42). Other than this image, the earliest dated views of the Gardens are from 1877, just 18 years from its establishment, and

when Murton, a Kew-trained horticulturist, was superintendent. Murton was committed to improve the Gardens both in horticulture and research. He established the Library and the Herbarium and also introduced numerous fine plants, in particular palms.

Before the landscaping of Palm Valley in 1879, the main palm collection was planted by Murton in a triangular plot located between the present-day Swiss Granite Ball fountain, the Bandstand, and the Plant House. This area in the past was passed by most visitors, as they would have entered the Gardens from Office Gate and travelled

by carriage to the Bandstand (Office Gate was designated for vehicle access at the time, and is today a service gate along Cluny Road). Easily accessible, this was a very popular photo spot and was reproduced in many postcards (see also 'An old tiger caged' in this issue). At the time, it was possible to see the Tanglin Barracks from this location, although they soon became obscured by the growing vegetation. Later the palm collection was relocated to Palm Valley, and the only plants remaining from the original landscape is the large tiger orchid (*Grammatophyllum speciosum*) planted in 1861 and the clump of nibung palm (*Oncosperma tigillarum*) which dates to 1878.

The main approach to the Gardens was via the Main Gate, which is known today as the Tanglin Gate. The original spacing of the gate's pillars has been retained and their style is also similar to those of the original; however, its swinging gates are a more recent design. The location has also shifted somewhat to accommodate the realignment of Cluny Road, but perhaps the most remarkable difference one can see today is the change in the landscape behind the gate. Originally the planting was quite open, but the trees have grown, and today they provide a majestic background to the gate. Tanglin Gate has long been a favourite subject for photographers and many early views are available which document how both the gate and the surrounding plantings have evolved throughout the history of the Gardens.

Swan Lake, the oldest ornamental water body in Singapore, has changed little since it was first dug out and dammed up, although it was previously called the First or Main Lake. One noticeable difference, however, was the presence of a large *Ficus* tree on the islet, which today is covered in lush nibung palms.

The Bandstand is arguably one of the most popular and recognisable sights of the Gardens. However, few photographs were taken there in its early days, as it was only a flat parcel of land at the time (the Bandstand gazebo was not erected until later). However, from this spot it was possible to have a magnificent view over the Tyersall Istana, which was rebuilt in 1892 for the Sultan of Johor. The view did not last long though, as the building burned down in 1905 and was never reconstructed, so that view has been lost forever. 🌿

Michele Rodda
Herbarium

All images courtesy of Dr Michele Rodda

TROPICAL SPLENDOUR – SINGAPORE'S FIRST INTERNATIONAL EXHIBITION OF BOTANICAL ART



ON 10 July, the Singapore Botanic Gardens launched Tropical Splendour, an exhibition showcasing some of the best examples of contemporary botanical art. The exhibition is hosted in the CDL Green Gallery beside Botany Centre and will run until 1 November 2015. It features 55 paintings by 36 different artists from around the world and these were selected to portray a broad range of tropical plants that will be familiar to most of the Gardens' visitors. The exhibition was generously donated by the owner of the artworks, Dr Shirley Sherwood, who has been a great supporter of botanical art over the past 25 years. Visitors to England's Kew Gardens will know that Dr Sherwood and her family have sponsored the Shirley Sherwood Gallery of Botanical Art, the only purpose-designed botanical art gallery in the world, where there are regular exhibitions including many examples from her fine collection.

Interested in plants and art since childhood, Dr Sherwood earned her undergraduate degree in botany from Oxford University and her D.Phil working in a team that discovered the important drug Tagamet. She started the Shirley Sherwood Collection in 1990, and it now includes more than 800 paintings and drawings, representing the work of over 240 contemporary artists from 30 countries around the world. While curating exhibitions of works from her collection, she has exhibited artworks in many prestigious locations including the Smithsonian Institute in Washington DC, the Ashmolean Museum in Oxford and the Real Jardín Botánico in Madrid. She has also written six books and many articles on botanical art. Awarded the OBE (Order of the British Empire) for services to botanical art in early 2012, Dr Sherwood is on the board of the Smithsonian, is a Fellow of the Linnaean Society, was awarded the Veitch Memorial Medal by the Royal Horticultural Society and is a Hon. Fellow of St Anne's College, Oxford.

Here we reproduce a small selection of the artworks now on display in the CDL Green Gallery in order to encourage readers of *Gardenwise* to visit this ground-breaking exhibition. The exhibition also presents the visitor with background information on the development and purpose of botanical art, which can only be summarised here. It is a unique medium in which

art and science come together. Botanical art was first developed in the service of botanical science as a means of very accurately depicting plants in support of the botanical descriptions that botanists prepare as part of communicating the characteristics of plants. Even with the advent of high quality photography, the botanical artist still has a key role to play in presenting the botanical features of a plant in ways that photography cannot equal. Whilst botanical drawing may have primarily served science, there is no doubt that it is also an important art form in which the artist carefully composes the plate so that the key parts of the plant are not only accurately, but also very tastefully displayed. This may involve careful planning, because at the time the drawing is begun not all the elements of the plant to be depicted may be available. For example, later, it may be necessary to add in fruits and seeds, so space for these needs to be left on the plate before the drawing is finally completed. Another tradition of botanical art is that the artist faithfully records all details of the plant, even including blemishes! 🌿

Nigel P. Taylor
Director SBG



► Pandora Sellars (UK) – design including *Laelia tenebrosa*



► Bryan Poole (New Zealand) – *Cyathea dealbata*



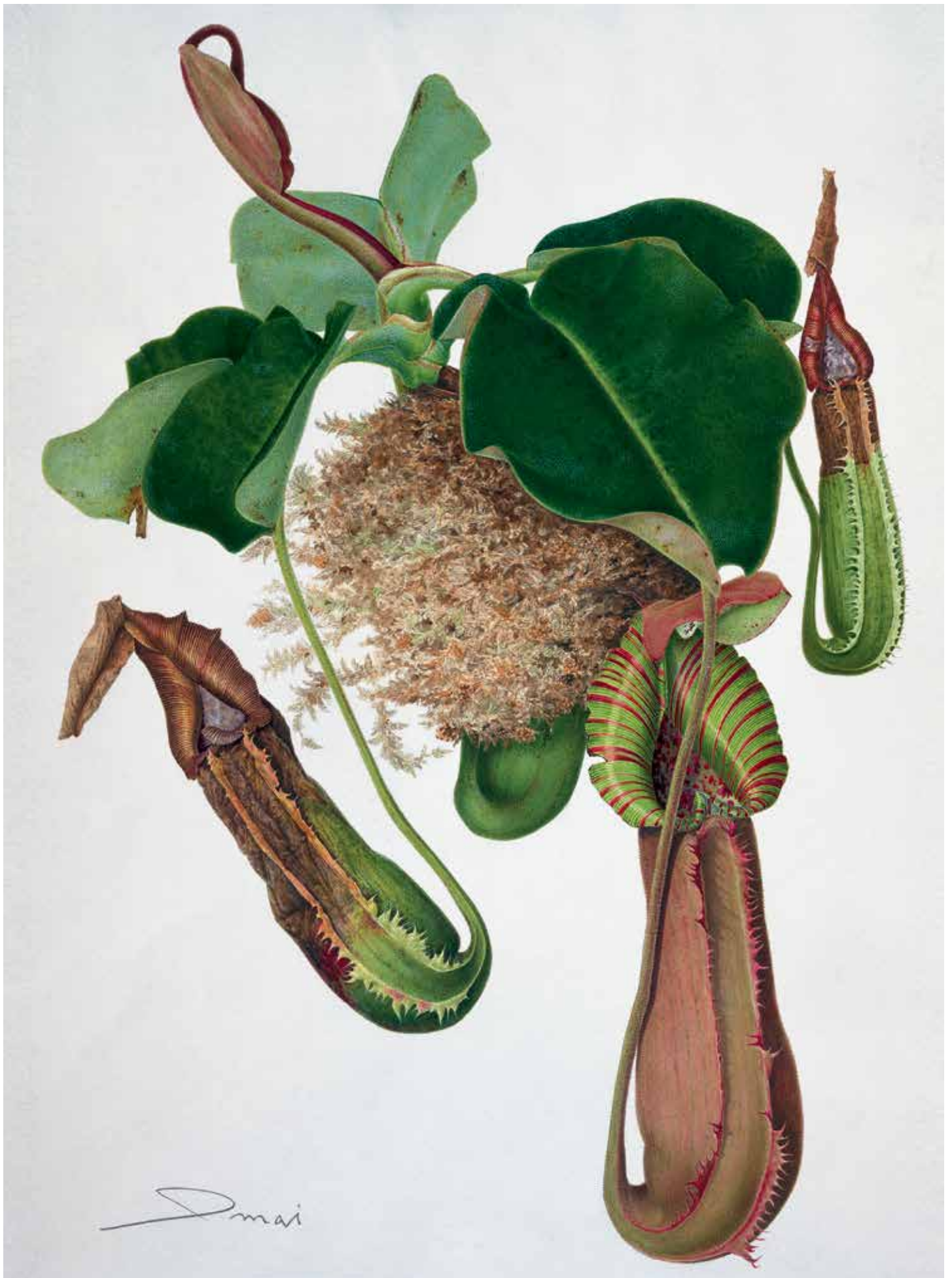
► Pandora Sellars (UK) – *Paphiopedilum parishii*



► Álvaro Evandro Xavier Nunes (Brazil) – *Averrhoa carambola*



► Jessica Tcherepnine (USA) – *Cocos nucifera*



► Mariko Imai (Japan) – *Nepenthes truncata*



► Smallest among the *Hanguana* species in Singapore, *Hanguana neglecta* has been neglected for over a century in spite of growing profusely along a path in Bukit Timah Nature Reserve.

HANGUANA IN SINGAPORE DEMYSTIFIED!



IT all started innocently enough. During my regular surveys of Singapore native gingers, I have kept my eyes peeled for other interesting plants, particularly those growing amongst gingers on the forest floor. Over the years, I could not help but notice that several species of *Hanguana* occur in our primary forests. Although rather similar in their foliage, I observed that some had white fruits, while others had fruits ruby red or black in colour.

Upon investigation, I was surprised that only a single species, *Hanguana malayana*, had ever been recorded to be native to Singapore. A further search of all *Hanguana*-related literature revealed that *Hanguana*, the only genus of the small family Hanguanaceae, is perhaps the least studied monocot family in Asia.

If the different *Hanguana* species look similar when alive, the similarities are even more pronounced in dried herbarium specimens. Spotting differences when all the colours have faded and the fruits have shrunk is most difficult. Further confusion is caused by all *Hanguana* species being dioecious (i.e. individual plants bear inflorescences with either female flowers or male flowers), and the male inflorescences look rather different from the female ones. It is therefore no surprise that until quite recently, most works which were predominantly based on studies of herbarium material concluded that the family consists of only one highly variable species, *Hanguana malayana*.

However, recent studies based on living, fruiting material have uncovered the stunning diversity of the genus *Hanguana* in Southeast Asia. Several new species, mainly from Peninsular Malaysia and Borneo, have been described in the last five years. I believe this is only the tip of the iceberg.

Botanists are generally either generalists or specialists. A generalist can enter the forest and identify almost every plant put in front of him or her quite easily to the family and generic levels. Often, a generalist can identify a plant to the species level, although the names applied are usually those already listed in checklists or an existing flora account without further verification with type specimens or original descriptions. A specialist, on the other hand, will often devote his or her lifetime to getting thoroughly familiar with a single family, or in some cases even just a single large genus. Acquiring a detailed knowledge of any particular plant group requires years of study of already described species and their types, as well as great familiarity with the plants and their possible morphological variability in the field.

So a generalist in our Singapore forest would likely identify any *Hanguana* species

he or she would encounter as *H. malayana*, simply because it is the only recorded species for Singapore. A specialist, on the other hand, tends to be more questioning and would likely ask a series of questions, such as: Is this really *H. malayana*? If so, then why does it look different from other *Hanguana* plants that I've seen in the field? What is the original description of *H. malayana* and what does its type specimen look like? Which of the plants in Singapore, if any, is the true *H. malayana*?

Being a ginger specialist for over 15 years, I knew that to deal with another plant group, especially such an understudied one, I would need to call on a botanist with expertise in that plant group for help. My friend Peter Boyce, who has clocked 10 years more in *Hanguana* research than myself fit the bill nicely.

Peter, who has been active in the region for more than 20 years, was already well aware of the state of Singapore *Hanguana* species and readily got on board with me for this exciting journey. We started by questioning and comparing existing types and descriptions of all my recent *Hanguana* collections and photo-documentation. We also looked into the morphology of female flowers and ripe fruits in greater detail than previous studies. We discovered the presence of small scales sheathing the base of inner staminodes (staminodes are the remnants of anthers), as well as valuable morphological characters on the seeds. The results of our study far exceeded our expectations.

All in all, we concluded that there are four species of *Hanguana* native to Singapore. Of these, only *Hanguana nitens*, a species described in 2010 from Peninsular Malaysia, was previously known to science. In Singapore, *H. nitens* is currently known only from a single population in the Central Catchment Nature Reserve and is therefore considered to be Critically Endangered. The leaves are long, narrow, beautifully corrugated and true to the specific epithet *nitens*, which means shiny, making it a potentially good ornamental plant.

The remaining three species are all new to science – amazing discoveries, considering that only about 3% of primary forest is left in urbanised Singapore!



► The young berries of *Hanguana rubinea* are initially white, but as they mature they change to a pretty ruby red.

One of the new species was found right next to a heavily used path in Bukit Timah Nature Reserve. We have named it *Hanguana neglecta* to reflect that this smallest of Singapore *Hanguana* species, which has black berries and beautiful upright leaves with a somewhat velvety appearance, has been neglected for the more than 100 years since the nature reserve was established.

Then there is the *Hanguana* with beautiful ruby red fruits and hence has been named *Hanguana rubinea*. Occurring in a number of locations, this is perhaps the most common species in Singapore, and can be regularly encountered in various parts of the Central Catchment Nature Reserve, especially along trails around MacRitchie Reservoir, as well as in Bukit Timah Nature Reserve.

The last and also the rarest species, *Hanguana triangulata*, has cream-white fruits and a sharply triangulate stigma. Known from less than 10 adult individuals, this species ranks the highest in our targeted conservation efforts.

An observant reader would by now be asking a very apt question: What happened to *Hanguana malayana*, the



► *Hanguana triangulata* is at first glance very similar to *Hanguana rubinea* in general habit, but its berries remain white until fully mature and they have an unmistakably sharply-triangular stigma.



► Largest of the Singapore *Hanguana* species, *Hanguana nitens* has beautifully corrugated shiny leaves and black fruits.

only species previously believed to be native? The answer to this question is almost as interesting as the discovery of the new *Hanguana* species. Although the identity of *H. malayana* is still not well understood, there are only two potential candidates, but neither occurs in Singapore! The large helophytic species often seen growing by the edge of waterbodies and currently interpreted to be *H. malayana* is freely available in Singapore nurseries and occasionally used in landscaping. But our field explorations so far have not confirmed the presence of any population of this plant which could be considered wild. However, we have seen some populations of *H. malayana* that were planted in the last decade or two in various locations around Singapore which have thrived and may naturalise easily.



As far as we know, there is also no historical evidence that *Hanguana malayana* was ever native to Singapore. All *Hanguana* specimens previously collected in Singapore and identified as *H. malayana* have turned out to be one of the four species listed above. There is also no confirmed herbarium record of *H. malayana* from areas close to Singapore (such as Johor). All confirmed collections from Peninsular Malaysia were collected in Perak, Selangor, Terengganu, and Malacca (this being a single historical collection), which are all at least 200 km from Singapore. In Sumatra, the only specimen that we encountered with locality details was from Medan (about 600 km from Singapore). Considering the results of our study, there is no reliable evidence, historical or recent, that would support the theory that *Hanguana*



malayana was ever native to Singapore. This species should therefore be reclassified as cultivated within the Singapore context, and removed from the list of native plants in Singapore.

The poor understanding of the genus *Hanguana* in Singapore and gross misapplication of the name *Hanguana malayana* obviously have heavy impacts on

conservation assessments and conservation needs of our four native species, all of which are Endangered or Critically Endangered locally. Further, *H. rubinea* and *H. triangulata* are endemic to Singapore, so our efforts to conserve these two species are important on a global scale. In Singapore, *Hanguana* species occur only in primary forest, and therefore observation of any changes to their population sizes over time

► This stately sun-loving species, which is currently interpreted to be *Hanguana malayana*, forms large colonies and has been planted in various locations in Singapore. However, it is not native.

may also serve as indicators of habitat quality. Fortunately, immediate *in situ* and *ex situ* conservation and propagation efforts for this interesting yet extremely neglected plant family are already underway.

The *Hanguana* journey has been both exciting and enlightening. It taught me a couple of lessons. First, that although Singapore is the most densely collected country in Southeast Asia and only a small amount of primary vegetation is left, we are not yet done with fully documenting and understanding our forests' rich biodiversity. Second, that while herbarium-based taxonomy can be successfully applied to some plant groups, satisfactory progress on other groups without having an intimate knowledge of fertile material from the field, *Hanguana* being a prime example, is almost impossible. 🌿

Jana Leong-Škorničková
Herbarium

All photos by Jana Leong-Škorničková

STRENGTHENING TIES WITH VIETNAM

FOR the past couple of years, the Singapore Botanic Gardens has been extending short-term training to staff of neighbouring botanical institutions on various aspects of managing a botanic garden. During the first half of this year, the Gardens hosted two lovely ladies from Vietnam for hands-on training in herbarium curation and management.

The first trainee was Ms Phan Thi Thanh Nha, from the Herbarium of the University of Science (PHH), Ho Chi Minh City, Vietnam National University. She was attached to the Singapore Herbarium from 5 to 31 January 2015. PHH was established in 1957 and has approximately 10,000 voucher specimens in its collection. The majority of the specimens were collected in Vietnam, while some are from foreign countries such as Cambodia, Thailand, Philippines, Japan, the United States and France. In addition to vascular plants, more recent collections include algae, bryophytes, pteridophytes and lichens. Ms Phan is the curator of this small herbarium and is currently pursuing her Master's degree.

The second Vietnamese to have been accepted for training in herbarium curation and management was Ms Nguyen Thai Mai Hong, who was attached here from 25 May to 18 June. She hails from the Herbarium of the Institute of Tropical Biology (VNM), Ho Chi Minh City, Vietnam. Like Ms Phan, Ms Nguyen is one of the main curation staff of her herbarium. VNM is the oldest herbarium in Vietnam, founded in 1861. It has over 150,000 specimens collected from around Asia, especially Vietnam, Laos and Cambodia.



Ms Nguyen Thai Mai Hong from the Herbarium of the Institute of Tropical Biology (left) being supervised by our long serving Assistant Herbarium Officer, Mdm Suganthara Davi d/o Krishnan (right) on the finer points of mounting herbarium specimens. (Photo credit: Serena Lee)



Ms Phan Thi Thanh Nha from the Herbarium of University of Science. (Photo credit: B.C. Ho)

Both Ms Phan and Ms Nguyen underwent intensive training in general curation of herbarium collections. They were involved in preparing herbarium specimens from live plants; mounting, organising and sorting the specimens to their various families; and databasing the information, including digitising images of the specimens and linking them to the BRAHMS (Botanical Research and Herbarium Management System) database. They also learnt about the process of loaning voucher specimens to overseas institutions and handling their return.

Both ladies found the training very useful and have voiced their commitment to use what they have learnt to improve the curation and management of their herbaria in Vietnam. The Gardens' staff were happy to share our knowledge with our overseas counterparts. It is hoped that such exchanges will further strengthen the ties between the institutions of both countries.

Nura Abdul Karim
Horticulture, Operations and Development

ELUSIVE MYCOHETEROTROPHIC ANGIOSPERMS FROM THE RAINFORESTS OF BRUNEI

CHLOROPHYLLOUS plants (or plants containing chlorophyll) are generally characterised by having green vegetative parts that are able to engage in photosynthesis – in other words, they can generate their own food by synthesising carbon dioxide and water using energy from the sun. However, some plants are achlorophyllous (meaning they lack chlorophyll), and have instead evolved to acquire food by parasitising other plants or fungi. The most well-known examples of achlorophyllous parasitic plants are those in the magnificent genus *Rafflesia* (Rafflesiaceae), which parasitise exclusively on *Tetrastigma* vines of the grape family (Vitaceae).

Some achlorophyllous plants have evolved to obtain food from fungi and these are known as mycoheterotrophic plants. In the past, these plants were wrongly characterised as saprophytes because they were thought to be capable of generating food by breaking down organic matter similar to fungi. At present though, no true saprophytic angiosperms are known to occur. In general, mycoheterotrophic plants grow in deep shade amongst organic litter on the forest floor, and they are only evident during their reproductive stage when they display attractive diminutive blooms. Here are two fine examples from Borneo, recently encountered in the pristine jungle of Brunei Darussalam!

BURMANNIA COELESTIS

The genus *Burmattia* (Burmanniaceae) was officially described by the father of taxonomy, Carl Linnaeus, in 1753, and was typified by *Burmattia disticha*, a species that originates from Sri Lanka. There are about 60 species recognised, and they are mostly distributed in the tropics and warm temperate regions. The genus can be classified into two sections, namely (i) section *Foliosa*, which consists of mostly large and robust chlorophyllous species (a fine example provided here is *Burmattia longifolia* from the Cameron Highlands), and (ii) section *Burmattia*, which includes both chlorophyllous and achlorophyllous species.

Burmattia coelestis is an achlorophyllous species from the section *Burmattia*, and it was described from a collection made in Nepal by Nathaniel Wallich in 1821. However, the species is now recorded to occur throughout tropical Asia, from eastern Nepal and Assam through Malesia to the northern parts of Australia. The specimen photographed here was an unexpected discovery while on a botanical collecting trip in the humid *kerangas* forest of Brunei Darussalam.



► *Burmattia longifolia* growing in the montane forest of the Cameron Highlands in Peninsular Malaysia. It was discovered growing in small groups on the moist forest floor.



► Colonies of coral-like *Burmannia coelestis* emerging from the rainforest floor in Brunei Darussalam.



► Close-up view of 'glowing' *Burmannia coelestis* flowers emerging from the deeply shaded floor of the rainforest.

PETROSAVIA STELLARIS

The little-known monocotyledonous family, Petrosaviaceae, consists of only two genera, namely *Japonolirion* and *Petrosavia*. The difference between them is that *Japonolirion* species are chlorophyllous, while *Petrosavia* consists of mostly achlorophyllous species that are mycoheterotrophic.

Petrosavia is a small genus consisting of only three species, *Petrosavia sakurarii*, *P. sinii* and *P. stellaris*. Plants in this group are extremely rare and found only in the temperate forests of Japan and China and the montane forests of Southeast Asia, including Borneo. The genus *Petrosavia* was first established by the Italian naturalist and botanist Odoardo Beccari in 1871, in honour of Dr Pietro Savi, Professor of Botany at the University of Pisa in Italy. *Petrosavia stellaris* is the type species of the genus *Petrosavia*, and it was named from a collection that Beccari made in Sarawak. The peculiar specimen photographed here was discovered at about 1,000 m above sea level, in montane forest at Ulu Temburong National Park. 🌿

Low Yee Wen
Herbarium

All photos by Low Yee Wen



► *Petrosavia stellaris*, a rare miniature monocotyledonous plant emerging from the forest floor during its reproductive phase, encountered in the montane forest of Ulu Temburong National Park, Brunei Darussalam.

CURRENT TAXONOMIC PUBLICATIONS

IN the last two issues of *Gardenwise*, 'From the Taxonomy Corner' has featured the importance of taxonomic publications, sometimes going back centuries, to establish the names we use for plants today. The term 'publications' has traditionally implied works printed on paper. In this article I use the term in this sense. There is, of course, also a burgeoning field of online publishing and the presentation of data in innovative ways that is not possible in print, including in botany and related subjects, but these may be a topic for a future issue of *Gardenwise*.

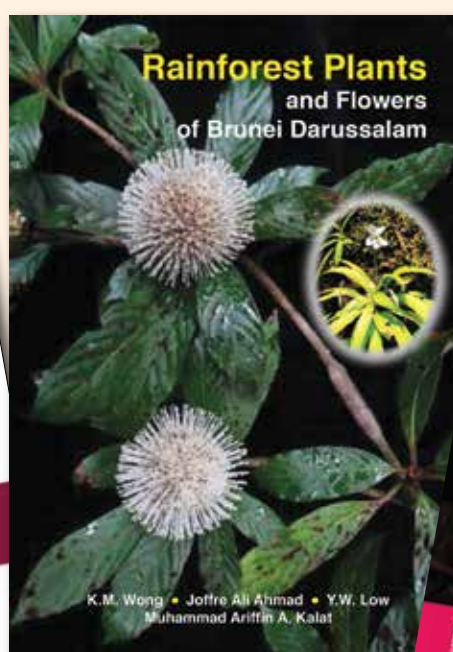
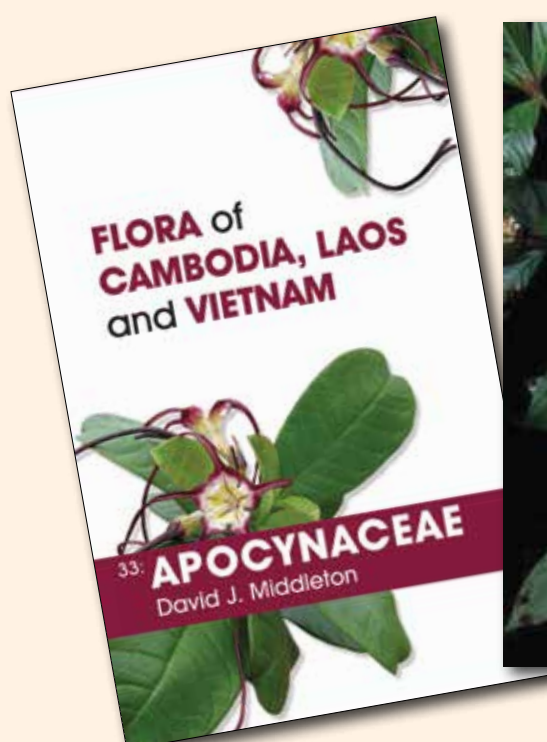
In this article I highlight the main types of taxonomic publications, namely research articles, taxonomic revisions and monographs, Floras, checklists, and popular literature including articles and books. I also discuss their importance for our understanding of plant diversity in Southeast Asia.

Research articles are published in scientific journals and are where we describe new species of plants, discuss the relationships between plants, theorise on what has led to the current distributions of plants, highlight the conservation needs of plants, and write on many and varied other botanical subjects. Amongst the research articles published in 2014, the staff of Singapore Botanic Gardens published one new genus and 43 new species, including four new plant species from Singapore. These new

species range from the herbaceous ginger, *Zingiber singaporense*, to the tree, *Utania nervosa*, both native to Singapore, and also include climbers, epiphytes, succulents, trees and herbs from lowland forests to mountaintops and from dark understorey habitats to fully exposed limestone outcrops and arid areas, the vast majority of them from Southeast Asia. They were published in a wide range of scientific journals, from many different countries, such as *Adansonia*, *Blumea*, *Bradleya*, *Gardens' Bulletin Singapore*, *Phytotaxa*, *Plant Ecology & Evolution*, *Thai Forest Bulletin* and *Webbia*. In the early era of taxonomic botany, from Linnaeus in the mid-18th century to around the middle of the 19th century, it was more common to publish new species in books than in journals. Gradually more and more journals were established and the new species found in

the great ages of exploration in the late 19th and early 20th centuries often appeared in these works. Nowadays, it is much rarer for new species to be published in books than journals.

Taxonomic revisions are publications, usually in scientific journals, in which all the species in a group of plants, often an entire genus, are catalogued and described. These works commonly also include a key to identify the species and information on their distributions, ecology and other useful or interesting facts or observations. Taxonomic revisions are particularly useful for other working botanists to be able to identify their own collections or as raw data for other applications, including the scientific underpinning of popular works. In 2014, Singapore Botanic Gardens' staff members published revisions of genera in the Gesneriaceae (*Billolivia*, *Ornithoboea*), species complexes within larger genera of Apocynaceae (*Hoya*), and a regional revision of a genus in the Gentianaceae (*Utania*). **Monographs** are more detailed works with otherwise similar content to revisions but usually published as stand-alone books. They aim to be a complete synthesis of our current understanding





of an entire group of plants. By their very nature they tend to the culmination of years of detailed study and, consequently, appear infrequently.

The largest outputs, in terms of species described by Singapore Botanic Gardens' staff members, tend to be in Floras. **Floras** are books that catalogue and describe the plant diversity of a particular region. The Singapore Botanic Gardens is active in the large Flora projects of Southeast Asia: *Flora Malesiana*, *Flora of Peninsular Malaysia*, *Tree Flora of Sabah and Sarawak*, *Flora of Thailand* and *Flora of Cambodia, Laos and Vietnam*. In 2014 we published accounts in two large Flora treatments, one on many genera of orchids in Thailand and one on two subfamilies of the Apocynaceae in Cambodia, Laos and Vietnam. The compiling of a Flora account by a specialist on a group of plants is as scientifically rigorous as a taxonomic revision and, as it covers a wide range of species in a geographic region, it is particularly useful for non-specialists to use for the identification of plants in that region. As such, Floras tend to be the most read and used of the taxonomist's outputs.

Floras may be the most useful taxonomic outputs, but most of the large regional Flora projects are proceeding at a very slow pace. **Checklists** can serve to partially fill the void where a Flora has not been completed, or yet begun, or to update an account that may now be considered to be out-of-date. At their simplest, they list all of the species expected to be found in a particular area. A prime example is the *Checklist of the Total Vascular Plant Flora of Singapore* by Chong,

Tan & Corlett, published in 2009. There is, however, nothing simple in terms of the work needed to compile them.

The accumulated knowledge present in these research articles, revisions, monographs, Floras and checklists, along with the field experience gained whilst collecting the materials necessary to write them, also allows the taxonomist to write broader popular works on the natural history of particular plant groups or particular areas. Examples of these from the Singapore Botanic Gardens include regular articles in *Gardenwise* and other popular magazines and books, such as recent ones on the natural history of Mt Kinabalu and the *Rainforest Plants and Flowers of Brunei Darussalam*.

Why is it important that the taxonomic work done in the Singapore Botanic Gardens, and elsewhere, be published? We take it for granted that plants have names and that someone somewhere knows what a particular plant is called, where it might be found, what it is related to, and whether it is useful, rare, dangerous or edible. The truth is actually that sometimes the plant does not yet have a name, nobody knows what it is related to, and without the handle of a name it is more or less impossible to access any other information that you might want to know about it. To determine if a plant has already been described or not, the taxonomic literature that has accumulated to the present day must be consulted. In practice, of course, there are not enough hours in the day to read everything that has gone before, but working taxonomists are trained to know

what resources to use to aid them in their searches and the vital literature to consult for the plants being investigated. The vast majority of taxonomic research does not result in new species, yet the results are just as important and must also be published. If we find a plant does have a name then that information unlocks the previous literature on that plant. For tropical plants, earlier writings may be scanty. In this case, and indeed in all cases, it is the job of the plant taxonomist to ensure that as we uncover information about the natural world around us that we do not keep that knowledge to ourselves but instead share it with the world through the work we publish.

What publications might we expect to see coming out of the taxonomy team at Singapore Botanic Gardens in the near future? Just published this month (August 2015) is a book on the gingers of Cambodia, Laos and Vietnam, and in the pipeline is a book on *Hoya* in Borneo, checklists for regions of Myanmar, more Flora accounts for Peninsular Malaysia and Thailand, regional revisions of genera, and many new species to describe. While there is still forest to explore and species to document, there will be a need to publish the work so that we can make more sense of the world around us and make informed decisions on conservation. And, by publishing our findings, we will share not only our knowledge but also our passion for nature. 🌿

David Middleton
Herbarium

BOTANICAL RESEARCH FELLOWS IN THE GARDENS 2014–2015

THE Singapore Botanic Gardens Fellowship began in 2004 and the Burkill Fellowship in 2010. In 2014–2015, 13 researchers were awarded Fellowships to come to the Singapore Herbarium (SING) and make use of the more than 750,000 specimens held here. During this period, over 38 type specimens were discovered in the general collections – veritable needles in hay stacks! The 2014–2015 Research Fellows and their achievements are presented below.



Dr Vincent Demoulin was at SING from 12 to 30 Aug 2014. Vincent came from the University of Liège, Belgium, and is no stranger to the Herbarium. His

profile as an academic and mycologist was featured in *Gardenwise* 26. Now retired, he came this year to continue his studies on the extensive fungal polypore collections made by E J H Corner, the assistant director of the Gardens from 1929 to 1941.



Dr Soejatmi Dransfield is an expert on bamboos. Jatmi was at SING from 8 to 22 Oct 2014. Currently, she studies the bamboo genera *Schizostachyum*, *Dinochloa* and

Racemobambos. Her curation and studies at the Herbarium have helped with annotations of various bamboo genera in our collections, including *Cyrtocloa*, *Yushania*, *Oldeania* and *Vietnamosasa* (see *Gardenwise* 44).



Dr Carmen Puglisi from the Royal Botanic Garden Edinburgh, UK, was at SING from 10 to 28 Nov 2014. While here, Carmen curated over 86 specimens of *Boea*, *Damrongia*, *Dorcocheras*, *Microchirita* and *Paraboea*. She

studied the Thai and Malaysian specimens of *Microchirita* for her revision of the genus and was able to finalise a number of upcoming articles and Flora accounts to be co-authored with Dr David Middleton, our Keeper of the Herbarium. Carmen also worked in the Gardens' molecular lab, where she sampled, processed and generated DNA data from 80 specimens for further research into Gesneriaceae phylogeny. The first taxonomic article produced during her stay with us has been submitted for publication, and further work on the systematics of *Ornithoboea* and *Microchirita* is ongoing.



Dr John Dransfield is a world renowned palm taxonomist and was in Singapore from 8 to 22 Oct 2014. John verified

and re-identified many palms alongside the Gardens' living collections personnel, verified the numerous specimens that we have in the Herbarium, found time to give staff of the Gardens a '101' session on palms and also a talk as part of the Gardens' Speaker Series entitled 'The Madagascar giant suicide palm – a tale of tiger prawns, carbon sequestration and internet chat-rooms' (see *Gardenwise* 44)!



Ms Ridha Mahyuni, a PhD candidate from Bogor Agricultural University, Indonesia, visited SING from 3 to 16 Nov 2014 to study our collections, including types,

pertinent to her work on the revision of *Psydrax* (Rubiaceae) in Malesia. Thirty-one specimens were re-identified from *Canthium* and transferred to *Cyclophyllum*, *Everistia*, *Psydrax* or *Pyrostria*. A number of *Psydrax* specimens will be described as new species. She also had discussions on the taxonomy of the group with Dr Wong Khoon Meng, our Rubiaceae expert.



Mr Wisnu Handoyo Ardi proposed a study of *Begonia* (Begoniaceae) from Eastern Indonesia for his Fellowship stint with us. He was with us from 17 Nov to 1 Dec 2014, and during this period prepared the following manuscripts – 'A Note of *Alpinia*

Subsection *Cenolophon* from Sulawesi' and 'Studies *Begonia* from Moluccas II & III'. SING specimens were studied and cited in the papers.



Dr Bryn Dentinger is Head Mycologist at the Jodrell Laboratory, Royal Botanic Gardens, Kew, UK. During his time at the Gardens,

from 28 Nov to 7 Dec 2014, Bryn provided both field and lab training to Dr Gillian Khew, Mui Hwang and myself. This included how to core soil samples, which we did in Bukit Timah Nature Reserve. He demonstrated best practices, from field to lab, for collection, documentation and preservation of soil samples. Our samples were then processed for DNA extraction and preparation of next-generation sequencing in order that the total fungal diversity in each sample may be studied. It is hoped that these efforts will revive the legacy of mycological work started by E J H Corner during his time at the Gardens.



Drs Willem J J O de Wilde and Brigitta E E Duyfjes are a husband-wife team whose research interests span a number of families, including Najadaceae, Passifloraceae, Myristicaceae, Polygalaceae, Cucurbitaceae, Campanulaceae, Lythraceae and Alangiaceae. They are one of the most prolific floristic-writing teams that we have had the honour of giving a fellowship to. They were at SING from 1 Feb to 28 Feb specifically to study Lythraceae and Alangiaceae for the Flora Malesiana account on both of these families. They presented 'The splendour of two colourful plant families' at the Gardens' Speaker Series which was well received. We can be assured now that Lythraceae and Alangiaceae have been very well curated for SING!



Dr Sri Rahayu is based in Bogor, Indonesia, and is working in collaboration with Dr Michele Rodda, our Asclepiadaceae-Apocynaceae

taxonomist on the delimitations of two *Hoya* species, *Hoya cinnamomifolia* and *Hoya purpureofusca*. While at the Gardens from 2 to 22 Mar 2015, Rahayu did much work with the lab sequencing samples collected from various locations across Java. Phylogenetic work, alongside morphology, will help to elucidate the relationship between the two species and contribute to further understanding of Javanese *Hoya*.



Dr Padma Raj Gajurel is an assistant professor at the North Eastern Regional Institute of Science and Technology in India.

His research is on 'The Genus *Piper* (Piperaceae) of Indo-Malayan region: Studies on Taxonomic problems and Phytogeographical affinities of some species'. During the time that Padma was with us (from 12 to 31 Jan 2015), he sought to identify and list taxa occurring in the Indo-Malayan region with their distributional range, and tackled taxonomic issues of selected species in consultation with literature and herbarium specimens held in the Gardens' repositories.



Ms Bai Lin is a PhD candidate from the South China Botanical Garden and was at SING from 2 Feb to 2 Mar 2015. Her dissertation is entitled 'Taxonomic

study of *Zingiber* in China'. She worked closely with her external supervisor Dr Jana Leong-Škorníková, our ginger specialist, in comparing and discussing the overlap of *Zingiber* species between China and other countries in the Indochinese floristic region in order to establish potential synonymies. Two research papers were completed during her stay. Discussions also involved recent results from molecular data from other geographical regions. This was her third visit to SING and we look forward to seeing her again as her studies develop further.



Ms Hannah Atkins is a researcher at the Royal Botanic Garden Edinburgh and also a PhD candidate at the University of Edinburgh. Hannah has

been working on *Cyrtandra* since 1998 and while at SING (from 24 Mar to 3 Apr 2015) she was able to review all of our materials in this genus. She made around 90 new determinations and located 11 types that were unrecognised as such in our general collections. These have been set aside for high-resolution imaging and will eventually be uploaded to the internet (e.g. plants.jstor.org/stable/10.5555/al.ap.specimen.sing0050765). Her work at SING will go towards publication of a revision of *Cyrtandra* in Sulawesi, already in preparation. This visit also allowed her to collaborate with David Middleton on a checklist of *Aeschynanthus*, a large genus of about 160 species of epiphytes. 🌿

Serena Lee
Herbarium

All photos by Serena Lee, except for the photo of Hannah Atkins, which was taken by Stuart Lindsay

DRACULA ORCHIDS, VAMPIRES WITHOUT A BITE....

FIRST discovered in the 1870s, these unusual orchids were once included in the genus *Masdevallia*, but became a separate genus in 1978 where they were given the new generic name of *Dracula* by a botanist named Carlyle August Luer. The word *Dracula* means 'little dragon' or 'little devil', but many readers would, no doubt, link this name instead to the legendary mythical vampire from Transylvania – Count Dracula! The flowers of several of the species are blood red, and the sepals have long, pendent, pointy spurs which are reminiscent of the deadly fangs of a vampire.

The genus *Dracula* consists of around 118 species that can be either epiphytic or terrestrial in habit. These strange and odd looking orchids are native to Mexico, Central America, Colombia, Ecuador and Peru. They inhabit moist and shady tropical montane cloud forests and grow naturally at elevations up to around 2,200 metres. A number of *Dracula* species are cultivated, though it must be mentioned that they remain very rare, even 'in captivity'. For the past few years, we have been growing *Dracula vampira* and *D. hirsuta* in the Cool House of the National Garden, and recently our plants put on quite a show for our visitors when they produced a number of blooms.

Generally, *Dracula* orchids grow in tufts from short rhizomes, and lack pseudobulbs (enlarged, thickened bulb-like fleshy stems that act as storage organs). Each stem produces one large, thin, plicate leaf with a sharply defined midrib. These glabrous, light to dark green leaves are spongy (possibly taking over the function of the missing pseudobulbs) and have a short tip.

Most *Dracula* flower stalks either hang down or grow horizontally from the base of the plant, often for some distance. A few species produce upright flower stalks. The terminal flowers are usually triangular in shape and are borne singly or successively. The sepals are showy with long tails and the petals are usually small and slightly thickened. There is a well-developed column (a single reproductive structure derived from the fusion of the male and female parts) with two distinct pollinia (a mass of pollen grains that is transferred as a unit during pollination). The lip or labellum is most intriguing – it is often quite large, cupped, and lined with parallel or radiating ridges that resemble the cap and gills of an inverted mushroom. Some flowers may emit a mushroom-like odour. All these characteristics suggest that *Dracula* flowers may be pollinated by saprophagous or mycophagous flies.

DRACULA VAMPIRA

Dracula vampira is a large epiphytic multi-stemmed orchid with erect leaves that range from 15 to 28 cm long. Its name is truly reminiscent of Count Dracula, so who says there are no vampires! *D. vampira* has large distinct flowers. The sepals are rounded with the top corners pulled into a long, thin tail that may extend up to 11 cm in length. The sepals are green in colour but covered in numerous blackish-purple veins and the tails are almost completely black. The petals are white in colour with purple veins, but they are hardly noticeable as the large sepals dwarf the petals. The lip is also white, but marked with pinkish veins. *D. vampira* does not grow in soil but on the lower sections of trees that accumulate plenty of damp leaf litter on forested mountainsides.



► The dark, sinister-looking *Dracula vampira* up-close. Note the large-gilled lip.



► *Dracula hirsuta* with its hairy sepals and petals. Each sepal ends in a long tail.

DRACULA HIRSUTA

Dracula hirsuta is found in Ecuador growing in wet montane forests at elevations around 1,600 metres. It is a small-sized, warm to cool growing epiphyte with thin stems enveloped basally by two to three loose, tubular sheaths and carrying a single apical leaf that is erect, thinly leathery and very narrowly obovate. Its specific epithet comes from the flowers, which are covered in erect hairs.

So the next time you visit the Cool House, a word of caution – tread carefully and be vigilant, lest you encounter a toothless *Dracula* among the lush greens! 🌿

**Nura Abdul Karim
David Lim**

Horticulture, Operations and Development

All photos by David Lim

WRITER-IN-THE-GARDENS RESIDENCY PROGRAMME

MANY creative minds throughout history have been inspired by nature, from literary authors from the transcendentalist movement to impressionist artists. The famous painter Claude Monet captured his sense of wonder for the natural environment in his quote, “I am following Nature without being able to grasp her, I perhaps owe having become a painter to flowers.”

In 2014, the Singapore Botanic Gardens and the National Arts Council (NAC) began a collaboration to establish the Writer-in-the-Gardens Residency Programme. This programme aims to create opportunities for new and established writers to create literary works by drawing inspiration from the verdant greenery of the Singapore Botanic Gardens. Selected writers are also given the opportunity to conduct educational workshops in creative writing and illustration.

The first two recipients to be awarded this residency were established author Chan Wai Han and bestselling illustrator Cheng Puay Koon. Along with the Gardens’ Education Branch, on 29 March 2014, they conducted outreach sessions to share their specialised knowledge of the literary arts with the



► Cheng Puay Koon teaching participants the basics of sketching. (Photo credit: Yvonne Chong)

public. Wai Han held a storytelling session at Jacob Ballas Children’s Garden, entitled ‘Stories with words and songs’, during which she shared ways to use the imagination to create simple songs and stories. Puay

Koon conducted a session called ‘Drawing with joy’, which focused on the basics of sketching. Participants practiced what they learnt by illustrating some of the animals in the Gardens.



► Chan Wai Han conducting a storytelling session entitled ‘Stories with words and songs’. (Photo credit: Yvonne Chong)



► Participants practicing their illustration skills by drawing animals in the Gardens. (Photo credit: Yvonne Chong)



Adeline Foo sharing with participants the tools needed to write their own story. (Photo credit: Steffi Loe)



Participants gaining inspiration while on a guided tour of Jacob Ballas Children's Garden. (Photo credit: Cyrena Lin)



Lee Kowling teaching participants to complement their stories with illustrations. (Photo credit: Cyrena Lin)



A participant using her imagination and creativity to work on her very own picture book. (Photo credit: Cyrena Lin)



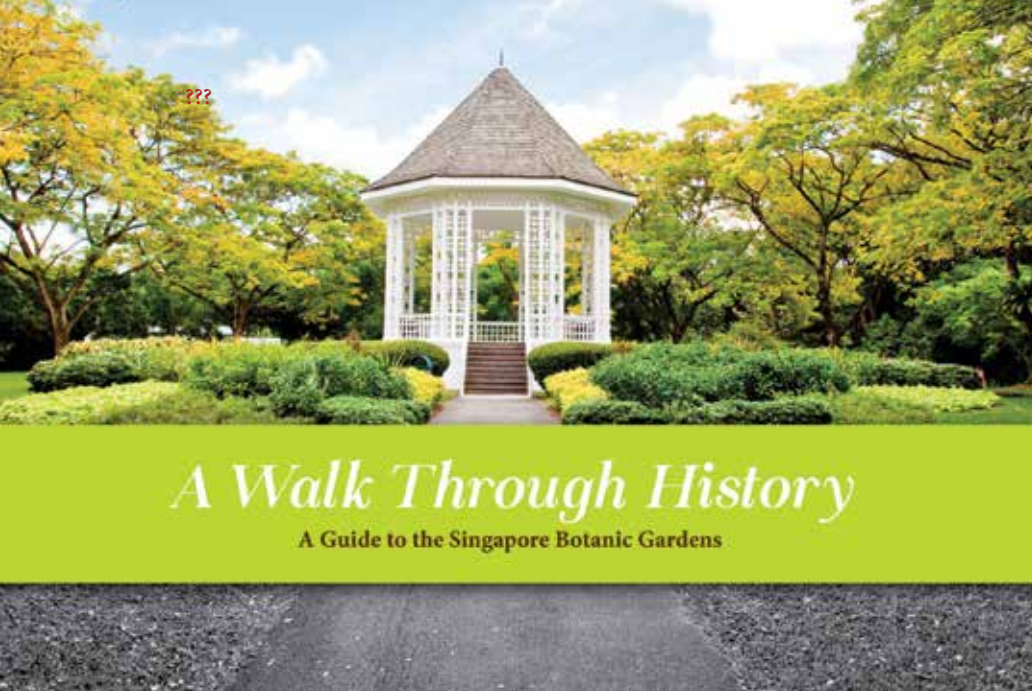
A participant sharing her completed creation, with Adeline Foo (left) and Lee Kowling (right). (Photo credit: Cyrena Lin)

Riding on the success of the Residency Programme in 2014, the second year brought in award-winning author Adeline Foo and children's book illustrator Lee Kowling. Together, on 7 March 2015, Adeline and Kowling held a creative writing and craft workshop entitled 'Walk, write & draw in the Gardens'. This workshop gave participants first-hand experience of the process of creating a picture book.

The workshop began with Adeline teaching participants about the framework needed to create a story, and was followed by a guided tour of Jacob Ballas Children's Garden. The children then set to work writing their very own stories with characters and a plot inspired by their visit. Kowling guided the participants to use their creativity and the materials at hand to illustrate and give life to their stories. By the end of the workshop, each child had created their very own storybook with illustrations to bring home.

The Writer-in-the-Gardens Residency Programme has indeed given the opportunity for creative minds to be inspired by the wonders of the natural world. 🌿

Steffi Loe
Muhammed Taufiq Jamal
Education Branch



Illustrated with historic images from the Gardens' archives as well as numerous recent colour photographs, *A Walk Through History* will appeal to anyone interested in Singapore's first UNESCO World Heritage Site.

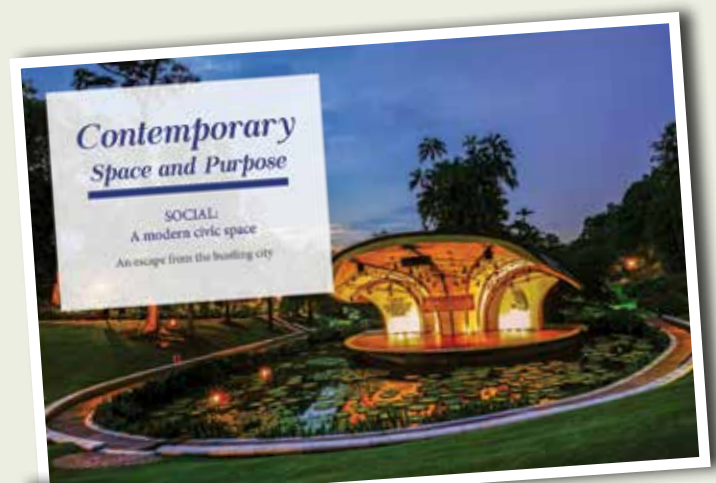
The guide is available at major bookstores and in retail stores at the Singapore Botanic Gardens – the Gardens Shops (also available online at www.botanicgardensshop.sg).

Retail price: S\$10

ISBN to 978-981-09-6277-7

PUBLISHED in August 2015 by the National Parks Board, *A Walk Through History – A Guide to the Singapore Botanic Gardens* is a concise reference to the heritage and modern features of the Gardens. At 88 pages and A5 sized, it is easily portable for visitors interested in exploring the site. Included is a pull-out map marked with suggested routes, making it a useful tool for trip planning.

The guide is separated into three parts, the first being an introduction to the 156-year history of the Gardens. The second part takes a closer look at the people, plants and buildings that are significant to its rich heritage. Last is a focus on the social, educational and natural values of the Gardens in a modern sense, with highlights on themed areas such as the Ginger Garden and some of the wildlife that can be found around the grounds.



Ginger Garden

Opened in 2003, the **Ginger Garden** is an extensive area showcasing the order of plant families known as the Zingiberaceae, and encompasses a lovely collection of ginger, banana, bird-of-paradise flowers, traveller's palm, heliconia and prayer-plants. Many of these have important cultural roles as food, flavourings, colourants and as medicines. The collection boasts plants with attractively coloured leaves or unusual habits, such as flowering at ground level, or with false stems made up of leaf sheaths, such as the banana, which are giant herbs, not trees! At the heart of the garden is the Halia restaurant with a menu focused on gingers (Halia means 'ginger' in Malay). Look out for the 1,600 Fingers Banana plant with its huge cache of tiny fruits and, as evening falls, the incredibly sweet-scented, white flowered *Hedyotis corymbosa*.

This garden feature reflects the important research on ginger relatives carried out at the Gardens over the past century and more, but it is actually only the tip of the iceberg, since there are extensive behind-the-scenes collections of these plants, which also support species conservation and reintroduction programmes in Singapore. The *Ginger Garden* booklet is a popular guide describing a range of the most interesting ginger relatives grown at the Gardens.



The influence of the Torch Ginger (Zingiber) is used in the preparation of the traditional Nanyang dish.



A Scotsman takes charge

Having acquired its first gift of land, in 1860 the Agri-Horticultural Society persuaded Lawrence Niven to develop its Gardens. Niven was born in 1826 in Lanark, Scotland, and was the son of the head gardener of a grand estate, where it is likely he would have observed the style of the English Landscape Movement, which emphasised natural features, free-flowing landscapes and informal design.

Niven left for Singapore at age 20 to manage rubber plantations. However, from 1857, the once lucrative mining began to fail because of disease and plantation owners such as Hoon Ah Kay (Gutter known as 'Whampoa') had to sell off their property. Whampoa was a leading member of the Agri-Horticultural Society and owned land adjacent to that given for the Gardens. He was and several land parcels to that given for the Gardens. He was likely the person who negotiated the land transfer with the colonial authorities. He would also have known that Niven had managed one of the largest rubber estates, that belonging to C.R. Phipps at Bras Basah, and so we can guess that it was he who recruited Niven for the Society.

In his role as first appointed manager of the Gardens, Niven quickly transformed the site. He cleared the post-garden secondary vegetation and replaced it with lawn. He constructed curving paths and within his first year had levelled off the highest point of the site for use as a band parade area.



One of the original brass images of Lawrence Niven. Courtesy of Singapore Botanic Gardens Archives



Mammals

At one time the **Rain Forest** was home to wild tigers, but today its native mammals are more modest in size and less feared. The most easily seen are the cheeky plantain squirrels, which give many visitors cause to stop and point, though they are less variety of plants is on their menu! A recent arrival was a pair of otters, which visited Hoon Ah Kay in 2014 to enjoy the abundance of fish in this newly stocked water body. The most numerous mammals, however, are the bats, whose fluttering flights can be observed throughout the Gardens as dusk beckons. Many are insect-eaters, the most remarkable being the tiny *Myotis* bats (*Myotis* spp.), which live by day inside some of the Gardens' bamboo plants.

The common Park Square *Calliandra* is widely spread all around the Gardens.

KEY VISITORS TO THE GARDENS

January–June 2015



► H.E. Prayut Chan-o-cha and Assoc. Prof. Naraporn Chan-o-cha with Dr Vivian Balakrishnan and Mr Kenneth Er during their visit to the National Orchid Garden in June 2015.



► H.E. Tony Abbott, with Dr David Middleton giving a brief description of *Dendrobium* 'Golden Friendship' during his June visit to the National Orchid Garden.

Dr Abdul Rahim bin Nik, Secretary General of the Ministry of Natural Resources and Environment (NRE), Malaysia

Ms Arunpak Pitakpong, Assoc. Prof. Nooduan Muangsan, Mr Peeranat Jatoorattawichot, Suranaree University of Technology, Thailand

H.E. Benjamin Dubertret, Ambassador of France

Dr Bill McDonald, Queensland Herbarium, Australia

Dr Brigitta Duyfies, **Dr Jan-Frits Veldkamp**, **Dr Willem de Wilde**, NCB Naturalis Leiden, The Netherlands

H.E. Mr Dariusz Karnowski, Ambassador of Poland to UNESCO

H.E. Mr Darko Tanaskovic, Ambassador of Serbia to UNESCO

Drs David and Dixie Z. Damrel, Clemson University Herbarium, United States of America

Mr David Johnston, Governor General, Canada

Mr David Richardson, Commonwealth War Graves Commission, United Kingdom

Mr Fang Kun, Director, PRC Ministry of Foreign Affairs, Asian Affairs Department, People's Republic of China

Mr Giacomo Marabiso, Deputy Secretary General, Italian Chamber of Commerce in Singapore

Dr Gianluca Rubagotti, Deputy Head of Mission, Embassy of Italy

Ms Hannah Atkins, Royal Botanic Garden, Edinburgh, United Kingdom

H.E. Haruhisa Takeuchi, Ambassador of Japan

Mr Heng Swee Keat, and staff from Ministry of Communications and Information, Singapore

Mr Herman Hollander, Chairman, Board of Kasteel Keukenhof, The Netherlands

Dr Hidetoshi Nagamasu, **Dr Yamada Isamu**, Kyoto University, Japan

H.E. Mr Ivo Goldstein, Ambassador of Croatia to UNESCO

H.E. Jairo Hernández-Milián, Ambassador of Costa Rica

Dr Jane Goodall, Jane Goodall Institute

H.E. Mr Janos Ader, President of Hungary, and spouse

Mr Jarearnsak Sae-Wai, **Mr Ong Jin Yao**, National Taiwan University, Taiwan

Dr Jim Broughton, Natural History Museum, United Kingdom

Mr Jiroat Sangrattanasert, Prince of Songkla University, Thailand

H.E. Mr José Filipe Moraes Cabral, Permanent Delegate of Portugal to UNESCO

H.E. Mr José Manuel Rodríguez Cuadros, Ambassador of Peru to UNESCO

Mr Khaw Boon Wan, Minister for National Development, Singapore

Ms Lam Nyee-Fan, University of Malaya, Malaysia

Dr Lúcia Lohmann, Biociências da Universidade de São Paulo, Brazil

H.E. Ms Mame Fatim Gueye, Ambassador of Senegal to UNESCO

H.E. Ms Maria-Francesca Spatolisano, Ambassador of European Union to UNESCO & OECD

H.E. Ms Maria Theresa P. Lazaro, Ambassador of Philippines to UNESCO

Dr Martin W. Callmänder, Conservatoire et Jardin Botaniques, Switzerland

Dr Melodina Fabillo, Queensland University of Technology, Australia

H.E. Mr Mohd Zulkifli Bin Mohd, Ambassador of Malaysia to UNESCO

Ms Nguyen Thi Huu Hoa, Head of Thu Thiem Investment & Construction Authority (ICA), and delegation, Socialist Republic of Vietnam

Prof. Sir Peter Crane, Dean of Forestry, Yale University, United States of America

Rt Hon Philip Hammond, Foreign Minister, and spouse, United Kingdom

Ms Phyö Kay Khine, University of Marburg, Germany

H.E. Prayut Chan-o-cha, Prime Minister of Thailand, and **Assoc. Prof. Naraporn Chan-o-cha**

Sri Rahayu, Bogor Botanic Gardens, Indonesia

Dr Razali Jaman, Forest Research Institute Malaysia, Malaysia

Dr Rogier de Kok, **Dr Sven Buerki**, Royal Botanic Gardens, Kew, United Kingdom

H.E. Ms Ruchira Kamboj, Ambassador of India to UNESCO

Dr Shirley Sherwood, United Kingdom

Dr Shuichiro Tagane, Kyushu University, Japan

Ms Siti Noor Aishah binti Mohd Noor, **Ms Wan Nuur Fatiha binti Wan Zakaria**, Universiti Malaysia Sarawak, Malaysia

Staff from National Biodiversity Centre, Bhutan

H.E. Mr Stefan Wessman, Ambassador of Finland to UNESCO

Suzhou delegates, Study Visit Programme, People's Republic of China

Tanya Plibersek, Deputy Leader of the Opposition, Australia

Dr Terry Henkel, Humboldt State University, United States of America

Dr Tim Curtis, Head of the Culture Unit, UNESCO Bangkok office

H.E. Tony Abbott, Prime Minister of Australia, Australia

Dr Veronica Manson, Director/Cultural Attaché, Italian Cultural Institute in Singapore

H.E. Mrs Vilma Kathleen McNish, Ambassador of Jamaica to UNESCO

Dr Vivian Balakrishnan, Minister for the Environment and Water Resources, Singapore

Ms Wu Shi-Hui, Hengchun Tropical Botanic Garden, Taiwan

Dr Xue Bine, South China Botanical Garden, People's Republic of China

Assoc. Prof. Yalcin Kaya, Trakya University, Turkey

Yukiya Amano, Director-General, and delegates, International Atomic Energy Agency (IAEA)

THROUGH A GLASS NEGATIVE

MOST archives possess some type of photographic collection, and the Gardens' archives are no exception. Today, many people think of photographs in digital terms, but not so long ago, the word 'photograph' would have brought to mind plastic-based negatives and slides. Prior to plastic-based negatives, however, photographic emulsions were made on glass supports, which we refer to as glass plate negatives.



► A glass plate showing the Herbarium and Holttum Hall, taken in 1920.



► A photo of the Herbarium and Holttum Hall printed from the original glass plate negative.

Although glass can be heavy, bulky and fragile, it was considered an ideal support for negative and positive emulsions in early photography. In use from the 1850s to the 1920s, plates made from glass were used by both amateur and professional photographers. Two types of glass negatives were used, wet collodion negatives and dry negatives. The wet collodion process was introduced in 1851, and plates produced with this method are distinguished by having curved or wavy lines along their edges. This was a result of the entire plate not being covered immediately during the hand-coating process. Dry plate negatives, which were silver-based negatives on



► The Library's collection of variously-sized glass plate negatives.

glass using gelatin as a binder, replaced wet collodion negatives in the 1880s and remained in use until the 1920s. Dry plate negatives were convenient for photographers because they could purchase prepared plates from manufacturers in standard sizes. This form of photographic material largely faded from the consumer market in the early years of the 20th century, as more convenient and less fragile films became increasingly available. However, glass plates were far superior to film for research-quality imaging, because they were extremely stable and less likely to bend or distort, especially in large-format frames for wide-field imaging.

The Library currently has around 500 glass plate negatives of different sizes in our collection and most are in pretty good condition. These have been reproduced in various publications, including *The Botanic Gardens, Singapore: Illustrated guide* by I H Burkill, the *Agricultural Bulletin of the Malay Peninsula*, the *Agricultural Bulletin of the Straits and Federated Malay States* and the *Gardens' Bulletin, Straits Settlements*. Among the glass plate negatives in the Library are historic photos of the Gardens' scenery, buildings and plant specimens. 🌿

Christina Soh
Library