

Submerged in Sarawak

Surveying tropical freshwater aquatic plant species in the peat swamps and fast flowing streams of Sarawak, Borneo.

14th-29th May 2026

Zac Barber



Figure 1 - Rafflesia tuan-mudae found in secondary forest in Padawan, Sarawak.

All photos by author.

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Introduction

About the author

As a horticulturist based in London, the opportunity to embark on this aquatic plant study trip represented a truly exciting milestone in my career. My passion for the underwater world began long before my professional life, rooted in years of fishkeeping and a fascination with the ecosystems that exist beneath the surface.

This early curiosity laid the foundation for a deeper appreciation of aquatic plants and the habitats they support. Since joining Kew Gardens, I have been fortunate to develop this interest further, gaining direct experience with an extraordinary breadth of plant species and the expertise of world-leading botanists and horticulturists. Working at Kew has deepened my understanding of the critical role plants play within their ecosystems, and has reinforced my commitment to learning, conservation, and the promotion of plant knowledge.

However, I recognise that there is always more to discover. This trip offered a rare chance to explore aquatic habitats first-hand, broaden my botanical knowledge beyond the garden setting, and connect the work I do at Kew with the wider natural world. It was not simply a professional development opportunity, but a chance to immerse myself in the environments I have always been drawn to, and to bring those insights back to my work and my passion for the aquatic world.

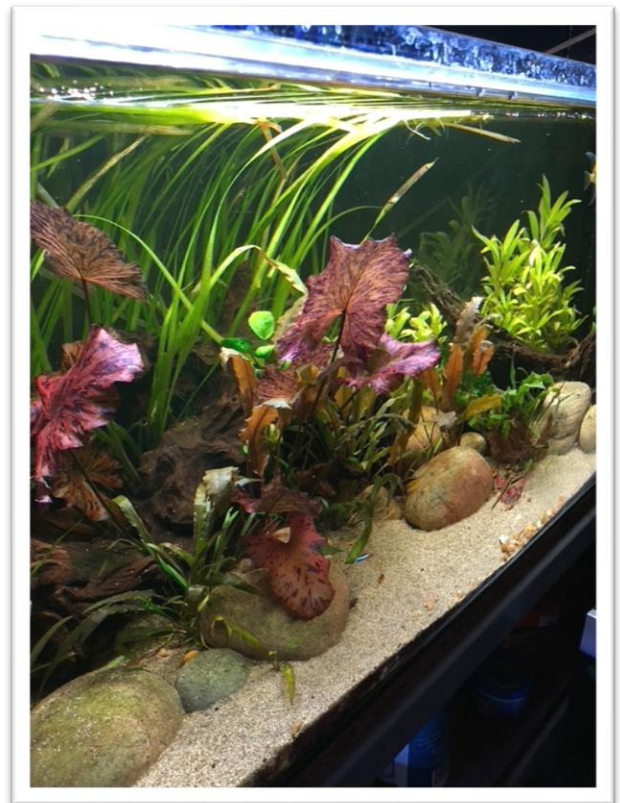


Figure 2 and 3 - Lily Pond in the Princess of Wales Conservatory, Kew and my first ever planted aquarium.

Project Brief

In May 2026, I undertook a two-week travel scholarship to Borneo with the goal of observing tropical aquatic plants in-situ, with a particular focus on the family Araceae. The trip centred on understanding the attributes of these plants and the remarkable ways in which they have adapted to their environment, exploring their importance to the local ecosystem, and identifying what can be done to better protect and display them ex-situ.

During the trip I visited a range of aquatic habitats across the region, gaining first-hand experience in the identification and surveying of aquatic plants in the field. Borneo's exceptional diversity of aquatic environments, spanning acid swamps through to chalk riverbeds, provided an invaluable opportunity to observe plant distribution across dramatically contrasting habitats, and to develop a practical understanding of the adaptations that allow these species to thrive in such varied conditions. Working directly within these sites allowed me to build expert knowledge that I will carry forward into my work at Kew Gardens, both in the care of our living collections and in our wider conservation efforts.

Why Borneo?

Borneo is widely regarded as one of the most biodiverse islands on the planet, and for anyone with a passion for aquatic plants it represents an unparalleled destination. Its flora encompasses over 12,500 species of vascular plants across 271 families, making it the second most floristically diverse island in the world after New Guinea. Within this extraordinary landscape, the family Araceae is exceptionally well represented, with 462 recorded species, it ranks among the most significant plant families on the island. Borneo is particularly notable for its rheophytic aroids, species adapted to fast-flowing river environments, with more than 130 aroid species exhibiting rheophytism across the island, a concentration described in the literature as disproportionately large on a global scale (Boyce & Wong, 2019).

The genus *Cryptocoryne*, a group of submerged aquatic aroids well known to fishkeepers and aquarists worldwide, is especially diverse here, with fourteen species recognised from Borneo alone, found across a range of habitats including peat swamps, rivers, streams, and intertidal zones.



Figure 4 – *Cryptocoryne uenoi* in acidic stream south of Kuching.

Aims and Objectives

Aim 1:

To study aquatic plant diversity and distribution in natural habitats across Sarawak, Borneo.

Objectives:

- Conduct field observations with local expert Michael Lo to understand ecological conditions influencing aquatic plant growth, with emphasis on Araceae.
- Document the range of habitats (peat swamp, rivers, forest streams) between Kuching and Brunei.
- Assess conservation challenges facing aquatic plants in situ.

Aim 2:

To evaluate the representation and cultivation of aquatic plants in ex-situ settings in Sarawak.

Objectives:

- Visit Sarawak Botanic Gardens to study aquatic plant collections and display methods.
- Compare horticultural practices in Borneo with those used at Kew Gardens to identify strengths and gaps.
- Explore cultivation techniques through a visit to Peter Boyce's nursery and consider applications for UK botanic gardens.

Aim 3:

To share the knowledge and experience gained during this study trip as widely as possible, ensuring that the insights gathered in the field contribute and promote greater awareness of aquatic plants and their conservation.

- To write an article for *Practical Fishkeeping* magazine documenting my experiences and findings from Borneo.
- To deliver a lecture on the 2nd of November 2026, presenting the key findings and personal highlights of the trip.
- To produce a dissertation exploring aquatic plant representation in botanic gardens.



Figure 5 - Male and female Mudskippers at a mangrove swamp near Bako National Park.



Figure 6 - Visiting fast flowing stream to find *Cryptocoryne*.



Figure 7 - *Cryptocoryne striolata*



Figure 8 - Lowland forest canopy above stream.

Itinerary

Date	Activity
Thursday 14/05/26	- Travel to airport and fly to Kuala Lumpur.
Friday 15/05/26	- Arrive at Kuala Lumpur and get connecting flight to Kuching, Borneo. - Arrive in Kuching.
Saturday 16/05/26	- Explore the city of Kuching and visit Sarawak Botanic Gardens, tour of Botanic Garden propagation area.
Sunday 17/05/26	- Explore Kuching, settle into city, contact guide and confirm meeting point.
Monday 18/05/26	- Meet Michael Lo and begin touring in Lundu, a coastal region of Sarawak. Exploring secondary forest and coastal heathland.
Tuesday 19/05/26	- Touring with Michael Lo in Serian, southwest of Kuching. Visiting fast flowing streams and searching for <i>Bucephelandra</i> species.
Wednesday 20/05/26	- Touring with Michael Lo in Santubong National Park. Hiking through protected rainforest looking for varied species of flora and fauna within the park.
Thursday 21/05/26	- Touring with Michael Lo in Bau, looking for <i>Cryptocoryne</i> species in fast flowing streams. Spending second half of day at Peter Boyce's Nursery which houses many different aroids for research purposes.
Friday 22/05/26	- Touring with Michael Lo visiting river areas south of Kuching and searching for <i>Rafflesia</i> in foothills of a mountain.
Saturday 23/05/26	- Spend a day in Kuching as a day off from travel due to fatigue. Visit recommended tourist spots to understand the city.
Sunday 24/05/26	- Visit Santubong River and surrounding Mangrove areas, to view wildlife and habitats on a boat tour.
Monday 25/05/26	- Visit fish breeder and conservationist named Lum specialising in threatened fish species and habitat restoration.
Tuesday 26/05/26	- Visit and trek Bako National Park to understand primary and secondary forest formation and viewing different biomes in different altitudes.
Wednesday 27/05/26	- Revisit Lum the tropical fish breeder to take pictures of work and potentially write an article based on his work for <i>Practical Fishkeeping</i> Magazine. - Meet up with Michael Lo to visit the foothills of Gunung Serapi, Kuching. Night walk looking for nocturnal animals and <i>Nepenthes</i> species.
Thursday 28/05/26	- Pack up ,my belongings and get ready for flight back home. Spend day in Kuching relaxing in preparation for long haul flight. - Fly from Kuching to Kuala Lumpur and from Kuala Lumpur to London.
Friday 29/05/26	- Arrive back in London at 5:45am.

Main

The City of Kuching.

Kuching itself was a wonderful surprise. Having never travelled outside of Europe before, it was a vibrant and eye-opening introduction to Southeast Asia, and I could not have asked for a better place to begin the experience. The food was exceptional, a highlight being the seafood at Topspot Food Court, which was outstanding, and the local laksa, which quickly became a firm favourite. The art, culture and architecture were fascinating, with some of the newer buildings making a real impression alongside the more traditional street scenes.

What struck me particularly was how in touch with nature the city felt, plants seemed to be everywhere, with houseplants adorning shops, restaurants and homes throughout. The temples were truly wonderful, full of colour, detail and atmosphere. On my first evening I had the pleasure of watching a local football match, spending time with locals cheering on Kuching FC, an unexpected but thoroughly enjoyable way to immerse myself in the community and experience the city's warm and passionate spirit. The people were some of the friendliest I have ever encountered, and Kuching set the tone for the trip perfectly.



Figure 9 - Chinese Temple, Kuching.



Figure 10 - Rhinoceros Hornbill painting, national bird of Borneo.



Figure 11 - A man tending to an incense urn, Kuching.



Figure 12 - Asian Glossy Starling perched at its nest, Kuching.



Figure 13 - A packed Sarawak Stadium on game night, Kuching City FC.

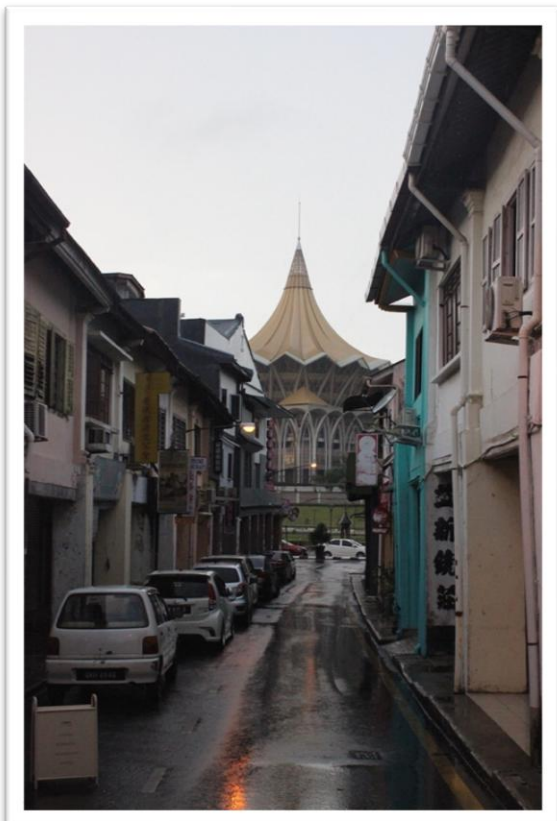


Figure 14 - Kuching's old town streets with the Sarawak State Legislative Assembly building beyond.



Figure 15 - The vibrant Topspot Food Court, Kuching's famous seafood hub.

Sarawak Botanic Garden

The Sarawak Botanic Garden was a welcome and accessible stop, with free entry making it an easy addition to the itinerary. A medium-sized garden, it was thoughtfully laid out with distinct zones including a banana garden, bamboo garden, fernery, bromeliad garden and lily pond, all set amongst a backdrop of mature trees and shrubs that gave the site a lush, established feel. The planting was diverse and well maintained, and wandering through the different sections offered a good early introduction to the breadth of plant life found in the region.



Figure 16 - Fern display, highlighting mature root plates as fern mounts.

A guided tour of the nursery provided a fascinating behind-the-scenes look at how the garden propagates and manages its collection. The growing media used was a practical mix of heavy clay soil, sand and chicken manure, well suited to the tropical conditions, and the nursery housed an impressive range of material including ferns, orchids, *Araceae*, tree seedlings and bromeliads, a snapshot of the region's incredible plant diversity in one compact space.

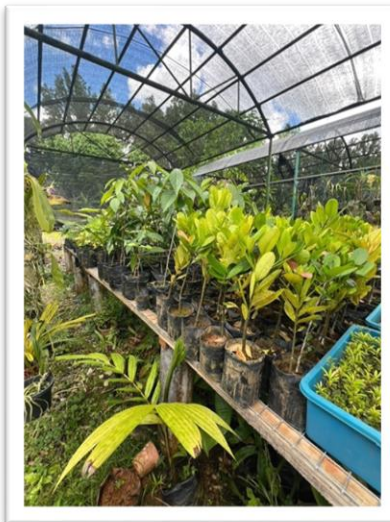
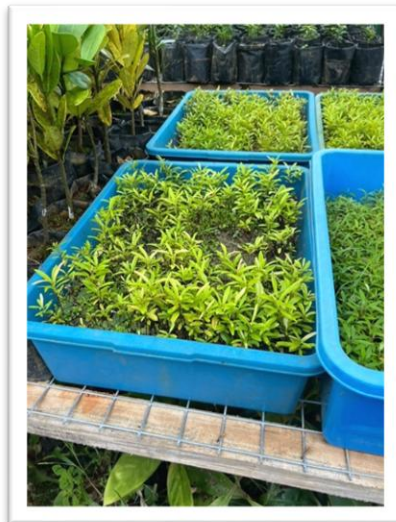


Figure 17, 18 & 19 - Seedlings, Saplings and Orchids, Sarawak Botanic Garden Nursery.

As someone with a particular passion for aquatic plants, the one area where the garden left something to be desired was its aquatic display. Beyond a large pond planted with *Nymphaea*, there was very little representation of aquatic flora, a gap that, if anything, reinforced the importance of the work that could be done to better display these plants in botanic garden settings.



Figure 20 - Doubled Branded Crow Butterfly (*Eupolaea sylvester*).



Figure 22 - *Dillenia suffruticosa*.



Figure 23 - Entrance to Sarawak Botanic Garden.



Figure 21 - *Rhipidophora foraminifera*.

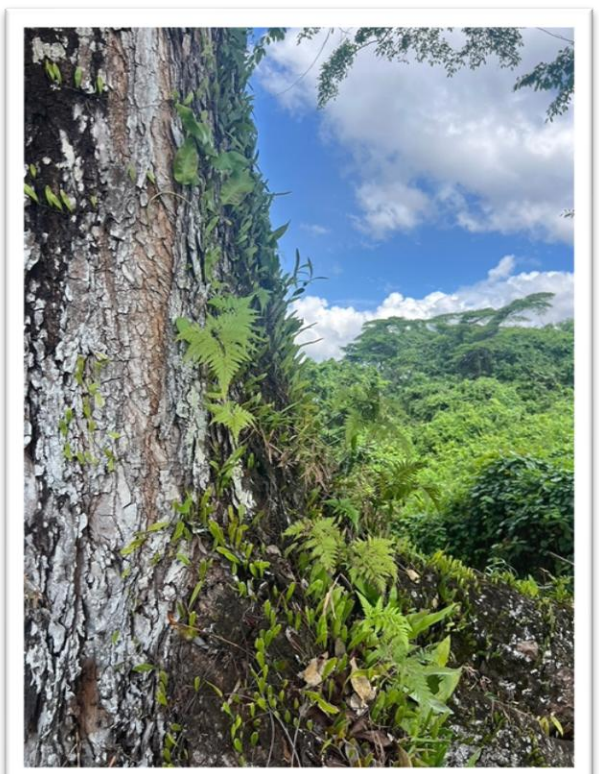


Figure 24 - Epiphytes growing on large *Ficus* tree.

Botanising in Sarawak

Day 1 (Monday): Lundu and Sematan

The first day with Michael Lo took us into the jungle around Lundu, Sarawak, an immediately overwhelming and impressive introduction to Bornean flora. The diversity on display was remarkable, with families including *Piperaceae*, *Araceae*, *Cucurbitaceae*, *Pandanaceae*, *Fabaceae* and *Orchidaceae* all represented, and climbers incredibly prevalent throughout the vegetation. A visit to a local peat stream was a particular highlight, where Michael has been actively collecting *Cryptocoryne xbatangkayensis* specimens to maintain their population in his personal nursery in response to the ongoing deforestation of the area driven by palm oil production a stark and sobering reality of the pressures facing these plants in the wild. This was the first of many aquatic plant species seen on this trip.

Later that day we visited a coastal area near Sematan, where the landscape and vegetation shifted dramatically. The sandy, nutrient-poor soil supported a very different community of plants, with *Nepenthes* species and orchids among the standout finds. Perhaps most fascinating however were the myrmecophilous plants growing on the majority of trees throughout the area, plants that have evolved a remarkable symbiotic relationship with ants. It was a type of plant partnership I had never encountered in the field before, and a striking illustration of just how specialised and extraordinary the adaptations of Bornean flora can be.

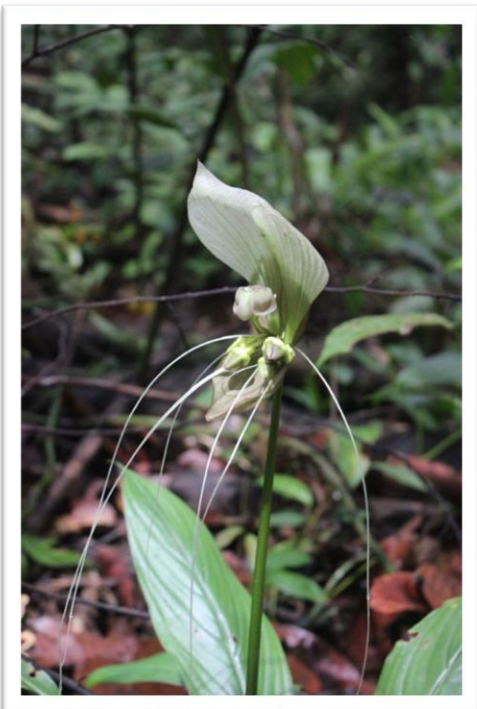


Figure 25 - *Tacca integrifolia*, seen in its white form, rarer than its usual black inflorescence.

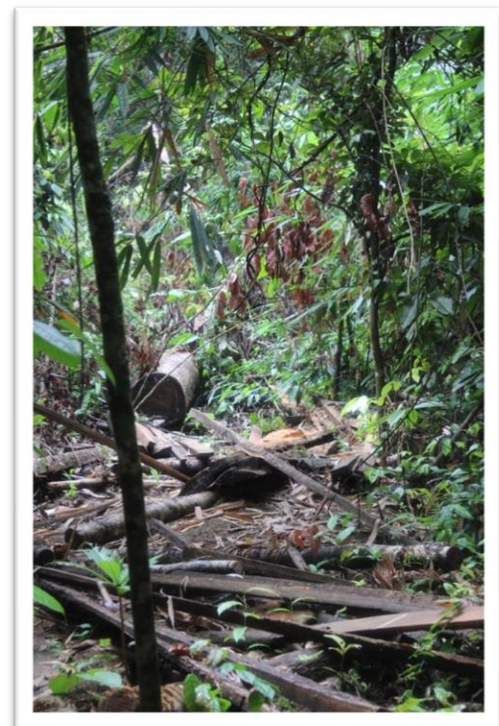


Figure 26 - Deforestation driven by palm oil production, Sarawak.



Figure 27 - *Trichosanthes wawrae*



Figure 28 - Fast stream, cutting through secondary forest due to heavy rain.



Figure 29 - *Piper crocatum*



Figure 30 - *Nepenthes rafflesiana*



Figure 31 - *Bromheadia finlaysoniana*



Figure 32 - *Dischidia* sp.

Day 2 (Tuesday): Serian

Day two took us through Serian, where the landscape opened into something altogether more dramatic. Our destination was the Sadong River and its surrounding water supply, a network of fast flowing limestone streams and rocky waterfalls that would prove to be the setting for one of the most exciting botanical encounters of the trip. It was here, amongst the rushing brown waters and misted rock faces, that we encountered the genus *Bucephelandra* in its natural habitat for the first time, and it did not disappoint.



Figure 33 - *Bucephelandra* sp. growing on rocky surface of limestone stream.

Growing directly on exposed limestone surfaces and rocky outcrops, these remarkable rheophytic plants were a testament to the extraordinary adaptations that allow them to thrive in such challenging conditions. A second trek through nearby jungle revealed *Bucephelandra* in a slightly drier context, clinging to rocks fed by a gentle trickle of water, demonstrating just how versatile these plants can be across a range of different microhabitats.

The rivers themselves were a spectacular sight. From slow-moving tea-brown streams to high velocity, crystal-clear rapids with a rather unforgiving nature. Both containing an equal amount of aquatic life; fish and plants both showing equally impressive adaptations. Plants growing with strong spreading roots to help lock into the rocky streams during high rainfall and fast water flow, and fish equipped with similar sticky mouthparts to stop them from being dragged away. Aroids with wide leaf shapes to soak up sunlight when submerged in the murky currents during rainy season, and their cold-blooded counterparts with wide eyes to help hunt and navigate in the tea-stained waters.

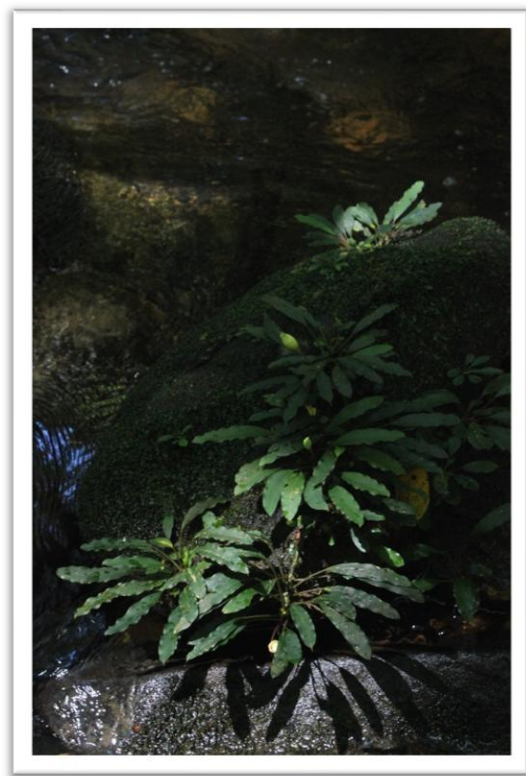
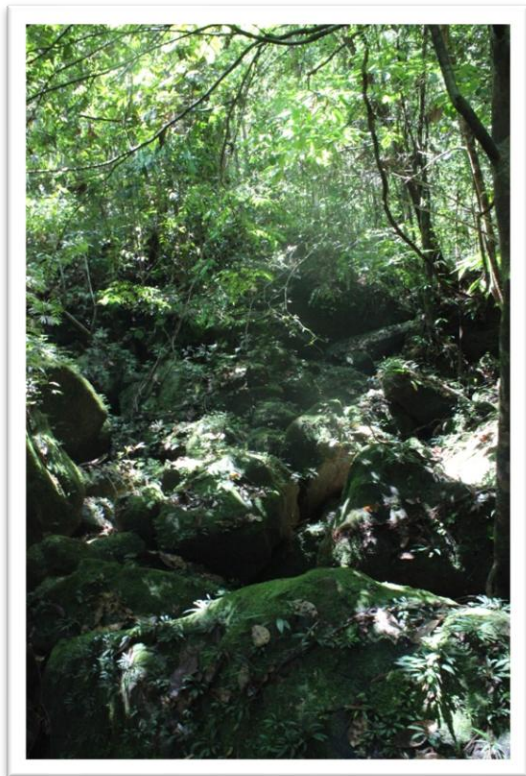


Figure 34 - Dried slope inhabited by *Bucephalandra* and rocky outcrop covered in *Bucephalandra*.

Accompanying the rheophytes was an impressive array of ferns, orchids, and other interesting flora. Most notably was the *Diplazium cordifolium* with its luminescent leaves reflecting light from the jungle floor. Another bright coloured gem found locally was the jewel orchid, *Ludisia discolor*, displaying bright white venation amongst the leaf litter.



Figure 35 - *Diplazium cordifolium* and *Ludisia discolor*.

Day 3 (Wednesday): Santubong National Park

Day three took us to Santubong National Park, where a 250-metre climb through primary rainforest delivered one of the most immersive and memorable days of the entire trip.

The forest was alive in every sense. Botanically, the Queen of Orchids, *Grammatophyllum speciosum*, was an unmissable highlight. Its enormous presence amongst the canopy a true spectacle. Interesting *Pandanus* species, an array of palms, ferns and epiphytes completed a botanically rich ascent that offered something new at every turn.



Figure 36, 37 & 38 - *Grammatophyllum speciosum*, *Pandanus* sp., Barking Tree Frog.

Wildlife was equally abundant throughout the climb. The common macaques made their presence known in characteristically bold fashion, raiding lunchboxes with impressive efficiency, an orchestrated attack on unacquainted tourists. The more elusive silver leaf monkey offered a respite from the madness of macaque life. These primates were quieter and altogether more graceful of an encounter. Though a sudden movement will send them off into the canopy. Tree pit vipers guarded the entrance to the nearby restaurant, a pair, male and female, on opposing sides of the entrance ensuring they were in full view. It felt almost scripted, I am sure they were rewarded generously for their time, posing for the cameras.



Figure 39 - Silver Leaf Monkey, Santubong National Park.



Figure 40 - Bornean Keeled Green Pit Viper, Santubong National Park.

Reaching the summit of the climb rewarded us with a beautiful waterfall, with a small splash pool at the base, waiting for all the sweaty tourists. This pool happened to be home to a small family of around six Malaysian Softshell Turtles. All varying in ages, from juvenile, teenage and adult, each showing different camouflage and shape due to their size and habitat. The adults were a greyish black colour and were speckled, to me, imitating a rock a predator would come across and ignore. Whereas the youngest of them were small and brownish orange in colour mimicking a leaf found on the water's surface. These adaptations were quite impressive and my guide, Michael, and I, were sat in awe of these wonderful reptiles.



Figure 41 - Adult and juvenile Malaysian Softshell Turtles, Santubong National Park.

The afternoon brought a complete change of scenery as we descended and made our way to a nearby peat swamp, where Michael introduced me to the remarkable fish fauna that inhabit these oxygen-deprived blackwater environments. Due to my keen interest in aquatic plants, I believe having an understanding of the other aquatic life that coincides with these plants is equally as important as knowing about the plants themselves. Two species of *Betta* and one species of *Channa* were caught and observed, all perfectly adapted to life in these murky, low-oxygenated waters thanks to a labyrinth organ that allows them to breathe atmospheric air directly from the surface. It was a fascinating parallel to the botanical adaptations I had been observing the days prior.



Figure 42 - Michael Lo catching fish in peat swamp.



Figure 43 - *Betta* sp. found in peat swamp leaf litter.

Day 4 (Thursday): Bau and visiting Peter Boyce's Nursery

The morning took us to a fast-flowing stream in Bau in search of *Cryptocoryne* and the ever-peculiar Borneo Sucking Loach (*Gastromyzon sp.*). The stream was a dynamic environment to explore, fast currents giving way to small, still pockets of warm water, creating a mosaic of microhabitats. Flanking the river on either side were large trees, the most striking of which was a species of *Tristaniopsis*, with flaking bark revealing a beautiful warm orange beneath.

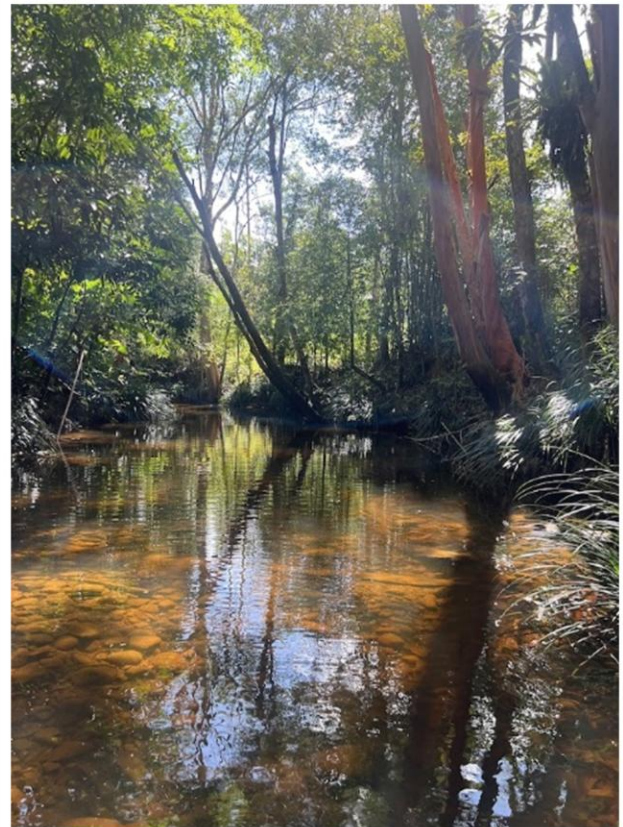
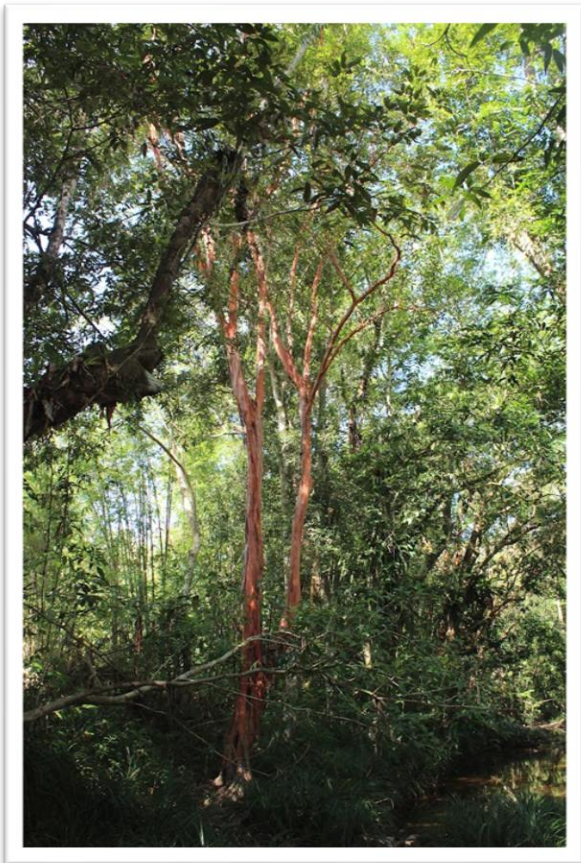


Figure 44 & 45 - *Tristaniopsis* sp. and surrounding habitat.

The highlight of the morning came when we eventually located *Cryptocoryne striolata*, growing in a slower moving section of the river, amongst a sandy, tree-root covered bank. Its fresh copper-coloured leaves shimmered against the white sand, whilst the older foliage presented a deep, rich green with subtle undulations along the leaf margins.



Figure 46 - *Cryptocoryne striolata*

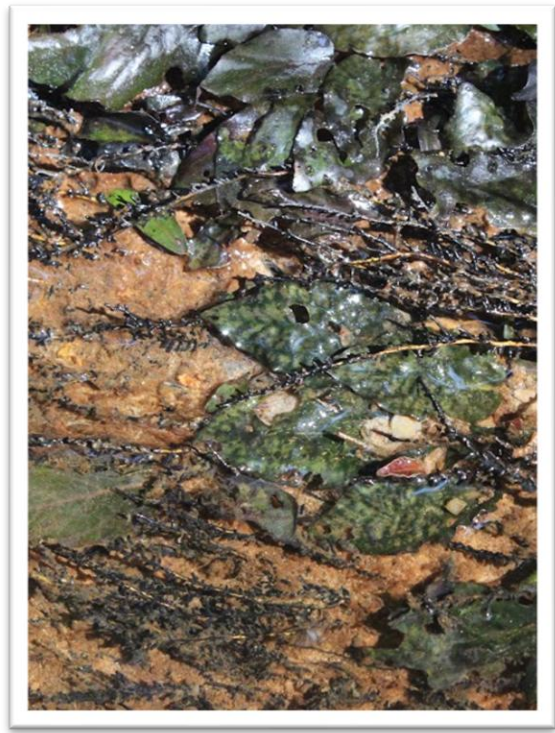
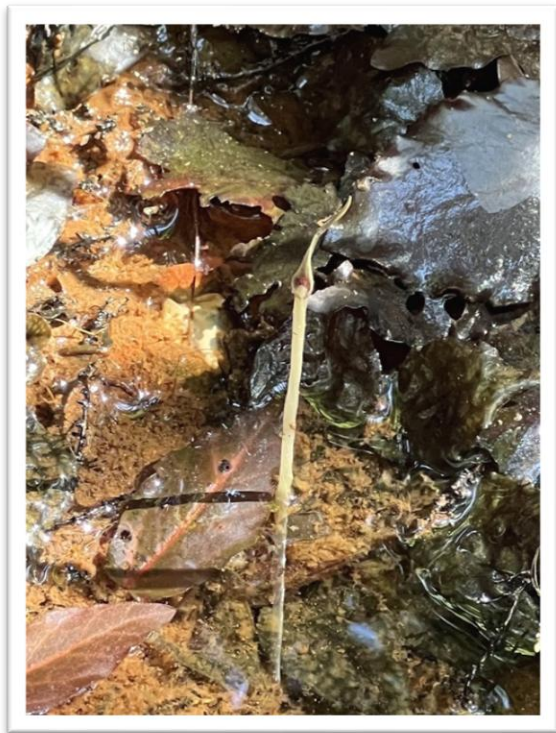


Figure 47 & 48 - *Cryptocoryne striolata* inflorescence and mature leaves.

The afternoon brought a very different experience but an equally memorable one as we visited the nursery of Peter Boyce, a former Kew herbarium taxonomist and one of the world's leading authorities on the family *Araceae*. His collection was a testament to a lifetime of expertise, housing an extraordinary diversity of orchids, aroids, begonias and a wealth of other species I have never seen before. His *Cryptocoryne* and *Begonia* were particularly interesting, displaying some incredible colours and shapes found amongst the native flora of Borneo. Taking the opportunity to ask Peter about his time at Kew and his life in Borneo was a genuine privilege.

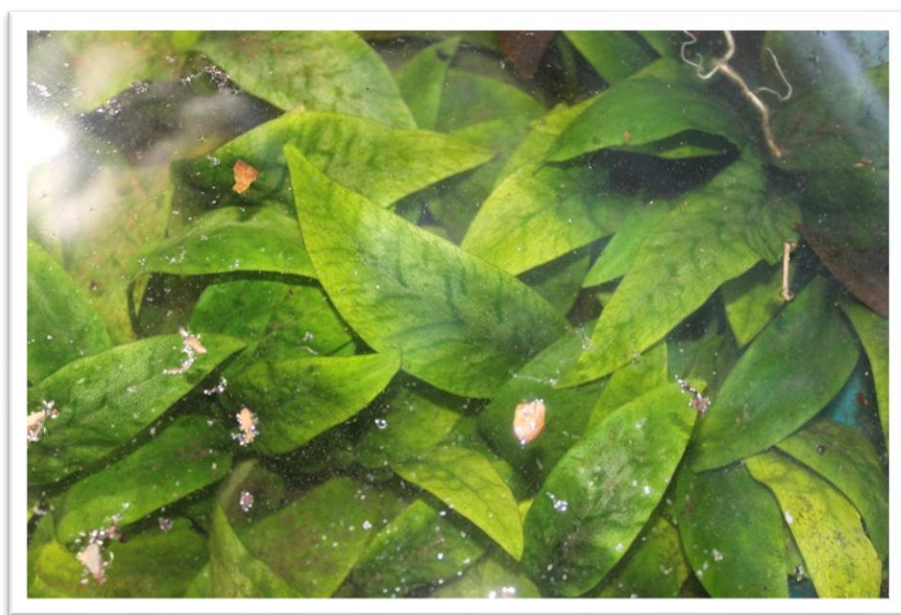


Figure 49 - *Cryptocoryne* sp.



Figure 50, 51 & 52 - *Bucephalandra* sp., *Bulbophyllum* sp. and orchid section of Peter's nursery.

Day 5 (Friday): Padawan and Kuching

The morning began close to the heart of Kuching, with a visit to a nature reserve where Michael has been quietly conducting guerilla conservation work of real significance. Concerned by the ongoing loss of habitat and the vulnerability of wild *Cryptocoryne* populations, Michael has been carefully relocating plants from exposed and threatened sites in the wild to the safety of this protected green space within the city. The species he has established here, *C. striolata*, *C. ferruginea* and *C. xbatangkayensis*, represent an important safeguard against local extinction.



Figure 53 - *C. xbatangkayensis*.



Figure 54 - *C. ferruginea*.

The afternoon, however, belonged entirely to the most extraordinary moment of the entire trip. Word had reached Michael that a *Rafflesia tuan-mudae* has recently been spotted in bud near Padawan, south of Kuching, and he was determined we would not miss it. An hours drive followed by a 45-minute hike through rural farmland brought us to the foothills of a nearby national park, and there it was, in full bloom. Measuring an impressive 83cm across, with further buds swelling in the surrounding vegetation ready to burst. The smell was something altogether harder to describe, a pungent combination of hot chill and rotting flesh that had the local fly populations in a feeding frenzy.

Unpleasant to the human nose perhaps, but a masterclass in evolutionary pollination strategy. To encounter one of the worlds most extraordinarily rare and wonderful plants in the wild, at its peak, was a privilege that is difficult to overstate.



Figure 55 - *Rafflesia tuan-mudae* and its different morphological features.



Figure 56 - *Rafflesia tuan-mudae*

Solo in Sarawak

Day 6 (Saturday): Rest Day

A well-earned day off, spent soaking up more of what Kuching had to offer was the plan of the day. The morning was spent wandering the city, photographing the architecture and exploring a stretch of riverside I had not yet reached. It was here I had my first Laksa. Over a week into the trip, long overdue, and absolutely well worth the wait. Laksa is a spiced noodle dish found across Southeast Asia, varying enormously in flavour and style from region to region. Sarawak Laksa, however, is widely considered the best of them all.



Figure 56 - Sarawak Laksa and view of the Sarawak River.

The evening took an unexpected and thoroughly enjoyable turn when I stumbled across a local football pitch and, on the off chance, joined in. A full game with locals in sweltering heat... exhausting, chaotic and great fun.

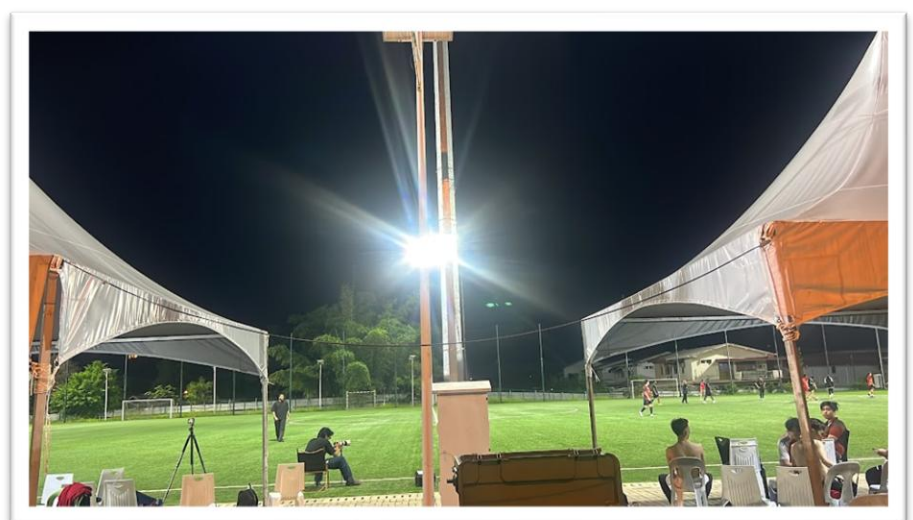


Figure 58 - Football pitch where I played with some locals.

Day 7 (Sunday): Santubong River

After a quieter day in the city, the evening more than made up for it. Setting off at 4pm from the jetty at Santubong National Park, we headed out onto the river for a cruise through the mangrove swamps, a habitat I had been keen to explore since arriving in Sarawak. The water here is brackish, a mix of fresh and saltwater that creates a unique transitional environment capable of supporting an extraordinary range of species found nowhere else. The mangrove vegetation itself was fascinating, its complex root systems stabilising riverbanks and providing food and shelter for a remarkable array of wildlife.



Figure 59 - Mountainous views from the boat, Santubong River.



Figure 60 - Mangrove root systems.

And the wildlife certainly delivered, Mudskippers darted across the exposed mudflats, Saltwater Crocodiles lingered with quiet menace along the waters edge, and Proboscis Monkeys, one of Borneo's most iconic primates, were spotted moving through the mangrove canopy. These monkeys feed primarily on mangrove leaves which shows how important these habitats are to their survival. We also spotted the Irrawaddy Dolphin which is on the IUCN red list as critically endangered, with only around 100 individuals in the local Borneo population. They were as rare as the photos we got of them, few and far between.

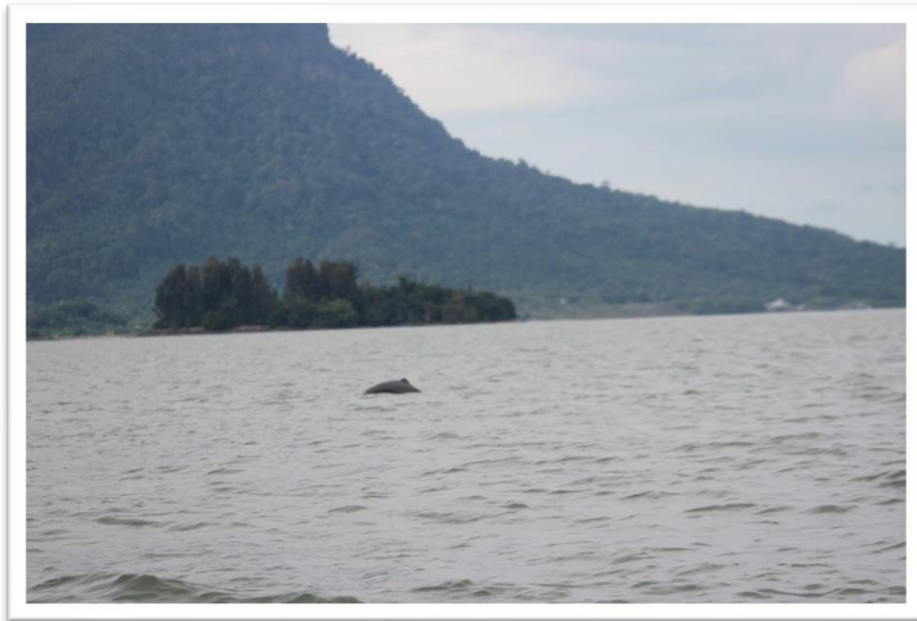


Figure 61 - Irrawaddy Dolphin, in the Santubong River.



Figure 62 - Proboscis Monkey, Santubong River.



Figure 63 - Proboscis Monkey ready to leap to the next tree.



Figure 64 - Saltwater Crocodile.

Day 8 (Monday): Celebrations and Semenggoh Nature Reserve

There are days on a study trip that go exactly to plan, and then there is day eight. I think by reading this report that, as much as I love nature, plants and botany, football is a big part of my life and experiencing it halfway across the world was fantastic. The morning of day 8 was no exception. Having somehow found myself awake until 4am watching Arsenal FC lift the Premier League trophy on my mobile phone, only the second time in my lifetime and the first being in 2004 when I was a mere toddler, I was pretty shattered by the time I planned to get out into Kuching. Science, botany and professional development were set aside for much of the morning...

However, one warm cup of coffee later, set me on my way. A trip to Semenggoh Nature Reserve was on the cards and I couldn't wait. Semenggoh is one of the best places in Borneo to see wild orangutans, and hopes were high. The reserve itself was wonderful, lush and atmospheric. Unfortunately, the universe had other ideas. The heavens opened with an enthusiasm that can only be described as deeply personal, and the orangutans, with considerably more sense than me, stayed firmly in the canopy and out of sight. A slightly soggy, orangutan free afternoon then. But Arsenal are premier League champions, so on balance, a good day.

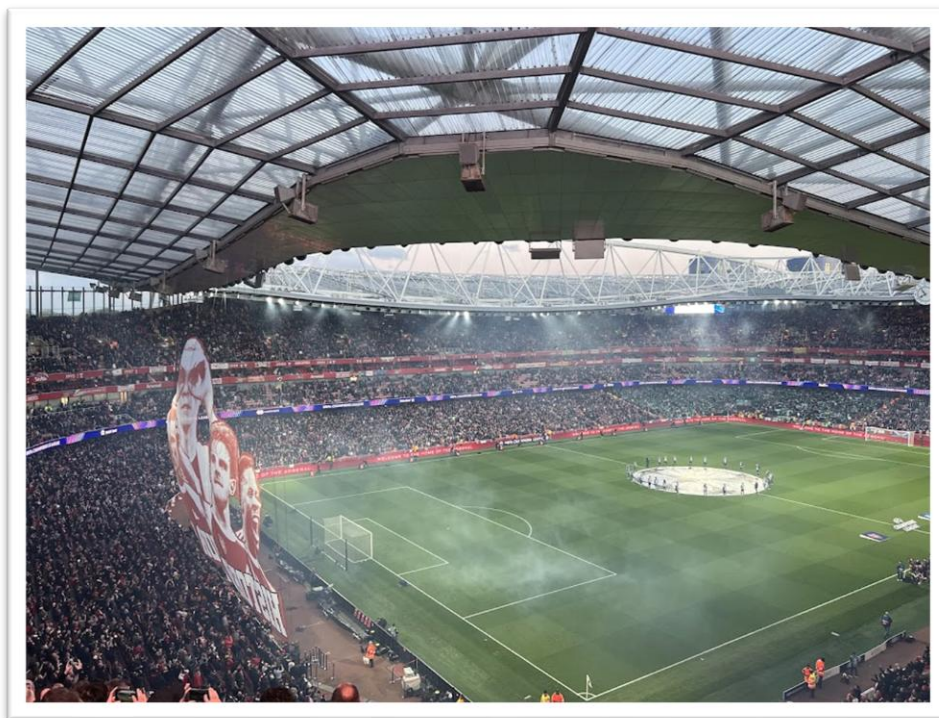


Figure 65 - A trip to the Emirates Stadium, to watch Arsenal take on Portuguese side Sporting in the Champions League, 15/04.2026.

Day 9 (Tuesday): Bako National Park

Day nine brought one of the most rewarding and botanically diverse days of my solo week. Bako National Park, one of Sarawak's oldest and most celebrated reserves, was the destination. It began with an impromptu travel arrangement, splitting the boat taxi from the port to the park entrance with a lovely Dutch couple I had just met. A brief conversation on the boat quickly turned into an invitation to join them on a hike. One of them having been on the trails before made me feel this was the right call, and it absolutely was.

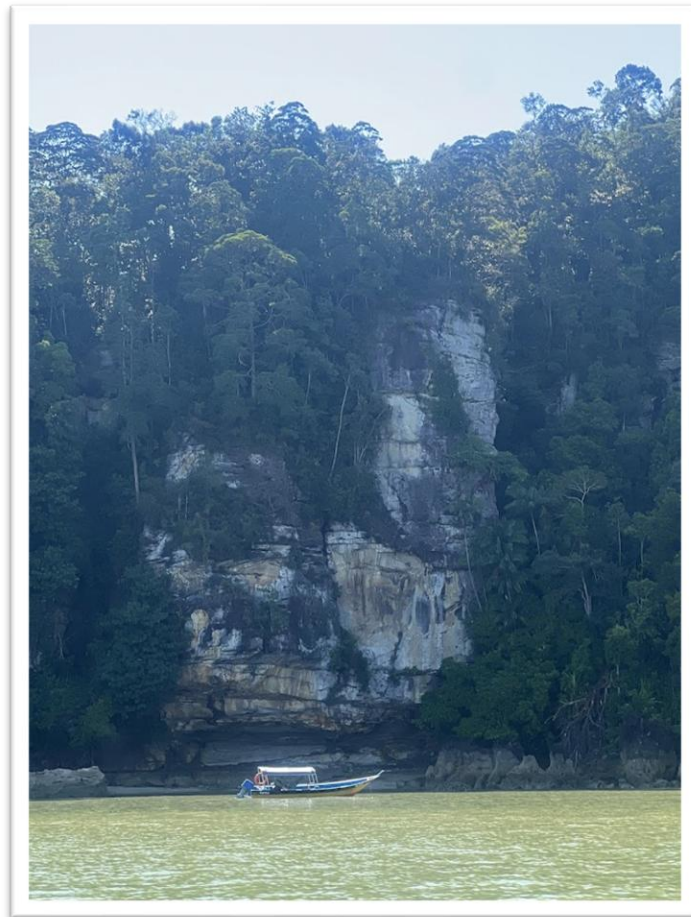


Figure 66 - Boat trip to Bako port.

The 5-hour hike took us through 4 distinct biomes, each one shifting almost imperceptibly into the next as we gained elevation. Starting at the base, the coastal mangrove and beach vegetation gave way to the towering Dipterocarp forest, dense, humid and alive with sound. This transitioned into peat swamp forest before the trail opened out dramatically onto kerangas at the summit; an exposed, windswept heathland of low, hardy vegetation that had a resemblance to the coastal habitat I visited with Michael the week prior.

Nepenthes species were the stars of the show, appearing in impressive variety across the upper slopes, their pitchers ranging from delicate and slender to robust and deeply coloured. Ferns and palms accompanied them in abundance throughout the climb, whilst natural rock pools filled with collected rainwater created pockets of miniature ecosystems. The ants here were a world unto themselves, with some species reaching an alarming size, toe-length specimens that made sure we watched our step.

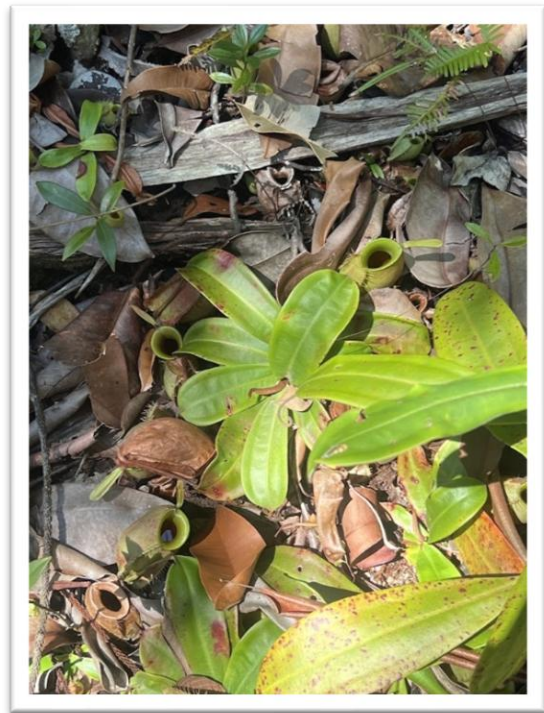


Figure 67 - An assortment of different *Nepenthes* species in Bako National Park.

Bako delivered on every level and whilst the Rhinoceros Hornbill, the parks most iconic resident, remained unseen on this occasion, the ecological richness certainly filled the gap.

Day 10 (Wednesday): Lum's fishery and night walk with Michael.

Day ten was a day of two very different halves. The morning was spent back at Lum's facility, the specialist breeder and conservationist I had briefly visited earlier in the trip. This time with more time to spare, I was able to ask questions about his work, his conservation programmes for *Betta* and *Gastromyzon* species, and the broader challenges of breeding and maintaining populations of these fish outside of their natural habitat. It was a fascinating and informative visit, and with my *Practical Fishkeeping* article firmly in mind, plenty of photos were taken of his remarkable collection.



Figure 68 - Lum and his assortment of aquarium setups.

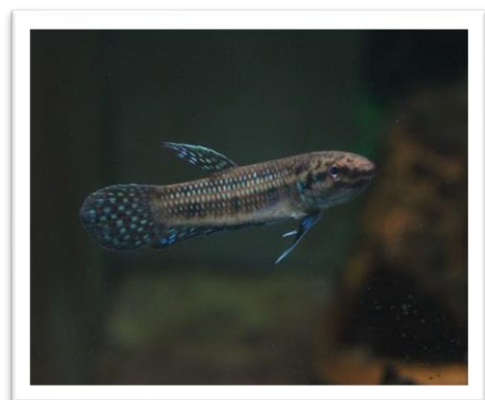


Figure 69 & 70 - *Gastromyzon* sp. 'black and white' and *Betta* sp. 'Shioseira'

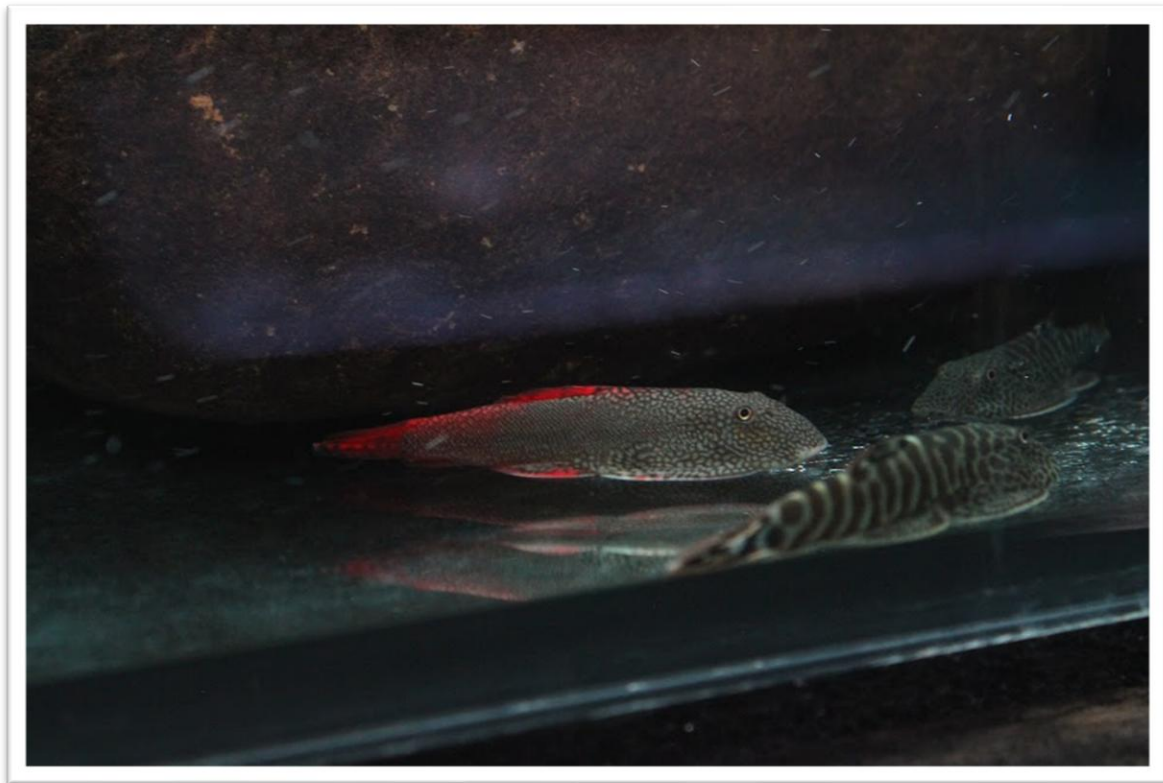


Figure 71 - *Gastromyzon katibasensis*, poached regularly from the wild as prices for a single fish can fetch up to \$500.

The evening brought a bittersweet end to a fantastic trip. A final night in the field with Michael, who had been such an extraordinary guide, host and font of knowledge throughout the trip. We began with a last dinner together, at his favourite food court, before heading out into the jungle near Kubah National Park. As darkness fell and torches were in hand, I felt quite out of my comfort zone.

The nocturnal jungle is a completely different world. Spiders, lizards and frogs emerged from the undergrowth in abundance, and Michael pointed out some fascinating and little-known behaviours amongst the species we encountered. Particularly extraordinary was the relationship between certain ground-dwelling *Nepenthes* and local frogs. The frogs would spawn into the pitchers of the *Nepenthes* where the tadpoles would grow and develop within the pitcher itself. It is a remarkable example of opportunistic symbiosis: the *Nepenthes* in question lack the enzymatic capacity to break down complex proteins and so derive no benefit from consuming the tadpoles., feeding instead on decaying vegetation that falls from above. The pitcher becomes, in effect, a nursery, a perfectly contained aquatic microhabitat hidden within a single plant.



Figure 72 - The Nepenthes in question, the home of local frog's offspring.



Figure 73 – Juvenile Balu bow-fingered gecko.



Figure 74 - Borneo Forest Dragon (Gonocephalus bornensis).

The infamous *Tarsier*, one of the most sought-after nocturnal sightings in Borneo, remained stubbornly hidden, which was a disappointment, but one softened by the richness of everything else the night had to offer. It was a fitting and memorable final outing with Michael, and a proper send off for what has been unforgettable trip in his company.

Conclusion

Returning from two weeks in Sarawak, it is difficult to overstate the impact this trip has had, both professionally and personally. What began as a lifelong passion for the aquatic world, nurtured through years of fishkeeping and deepened through my work at RBG Kew, has been transformed by first-hand experience in one of the most biodiverse places on the planet. Borneo exceeded every expectation.

From the fast-flowing limestone rivers of Bau to the blackwater peat swamps of Lundu, from coastal heathlands of Bako to the slippery rock faces of the Sadong River, this trip provided an unparalleled opportunity to observe aquatic and rheophytic plants in their natural habitats. Encountering *Cryptocoryne*, *Bucephelandra* and a wealth of *Araceae* species in the wild, understanding their adaptations, their ecological relationships and the pressures they face, has given me a depth of knowledge that cannot simply be gained from books or garden collections alone. The relationships between plants, fish, insects, frogs and the broader ecosystem have reinforced just how critical these habitats are, and how urgent the need for their protection.

The aims and objectives of this trip have been well and truly met. Material and insights gathered throughout the trip will form the basis of an article for *Practical Fishkeeping* magazine, bringing the importance of these ecosystems to a wider public audience. A lecture is scheduled for the 2nd of November 2026, where I look forward to sharing the highlights and findings of the trip with colleagues and the broader community. Lastly, the foundations of a dissertation exploring aquatic plant representation in botanic gardens have been firmly laid, shaped by the stark contrast between what I had observed in the wild and what is currently represented in ex-situ collections.

Perhaps the most valuable takeaway from this trip, however, was witnessing the fragility of these habitats first-hand. The shadow of palm oil deforestation looms large over Sarawak's extraordinary ecosystems, and the quiet, determined conservation work carried out by people like Michael and Lum serves as both an inspiration and a reminder of how much still needs to be done. Botanic gardens have a vital role to play in this effort, and I return to Kew with a renewed sense of purpose and a clear vision of how I can contribute.

Acknowledgements

I would like to express my sincere gratitude to the **Royal Horticultural Society**, the **Merlin Trust**, the **Bentham Moxon Trust** and the **Kew Guild** for their generous funding of this scholarship trip, without which none of this would have been possible.

My deepest thanks go to Michael Lo, whose brilliant knowledge, passion and generosity made the trip unforgettable. Id like to thank Peter Boyce for helping me get in contact with Michael, showing me around his nursery and research facility, and providing familiar conversation. A special thanks to Jennifer Warner who helped me initially plan and get contacts to begin the processing of the trip.

Lastly, a very personal thank you to Lydia, for the encouragement, the reassurance and for helping me take the leap of travelling alone. This trip would not have happened without your push.



Figure 75 - Rafflesia and I.

Final Budget Breakdown

Item	Cost	Company
Flights	£939.89	British Airways and Malaysia Airlines
Accommodation	£482.65	Booking.com
Food/Drink (includes Tour Guide Meals)	£400	Grab/Local
eSim	£55	Saily
Transport	£48.13	Grab
Train to and From Airport	£25.20	Southwestern Railway
Tour Guide (inc night walk)	£545.36	Michael Lo
Tour guide petrol	£36	Various
Park Entrance Fees	£48	Various
Equipment/Essentials	£160.50	Amazon/Other
Santubong River Cruise	£68.72	Booking.com
Hiking Shoes and River Sandals	£150	Sports Direct & About The Run
Documentation Equipment	£78	Empress Studio, Kuching
Other	£125.78	Various
TOTAL	£3,163.23	
Funding		
Merlin Trust International Horticultural Travel Bursary	£750	
RHS Bursary Award	£1,612	
Bentham Moxon Trust	£500	
The Kew Guild	£400	
TOTAL	£3,262	
FUNDS TO BE RETURNED	£98.77	