



1StopBorneo Wildlife

FEAST IN THE CANOPY

REVEALING THE MYSTERY GUESTS OF THE TOWERING STRANGLER FIG TREES



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Background



Over the past few years, 1StopBorneo Wildlife has conducted extensive research on Borneo's figs and their role in the forest ecosystem. Through ground-based camera traps and visual surveys, we documented various terrestrial and low-canopy wildlife visiting fig trees. However, this data left an important question unanswered:

Who's eating the figs up in the canopy?

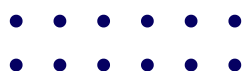
Although continuous 24-hour ground camera trapping and extensive beneath-tree photography documented civets, mousedeer, porcupines and even sun bears consuming fallen or low-hanging figs, a suite of strictly arboreal frugivores, particularly primates, hornbills and gliding mammals remained under-recorded because many fig crops occur high in the canopy, outside the field of view of ground-level cameras.

To address this, we ran a formal pre-test in February 2025 at Deramakot Forest Reserve, installing a single canopy camera to validate rigging, camera settings and detection efficiency. Its success gave us confidence to scale up. We then launched a multi-phase canopy camera-trapping program: Phase 1 (June 2025) in Tawau Hills Park and Phase 2 (July 2025) expanding within Tawau Hills Park and at Beluran Safari. To our knowledge, this is the first program to deploy camera traps directly in fig crowns in Sabah, and among the first in the world. The study remains active, with additional trees and fig taxa to be added as they fruit.

From Ground to Canopy



F. dubia (Tawau Hills Park)



The Big 4 Figs

At 1StopBorneo Wildlife, we identified four keystone fig species that are especially attractive to large wildlife. Known as the Big 4 Figs, they are:

1. *Ficus dubia*
2. *Ficus subcordata*
3. *Ficus cucurbitina*
4. *Ficus stupenda*



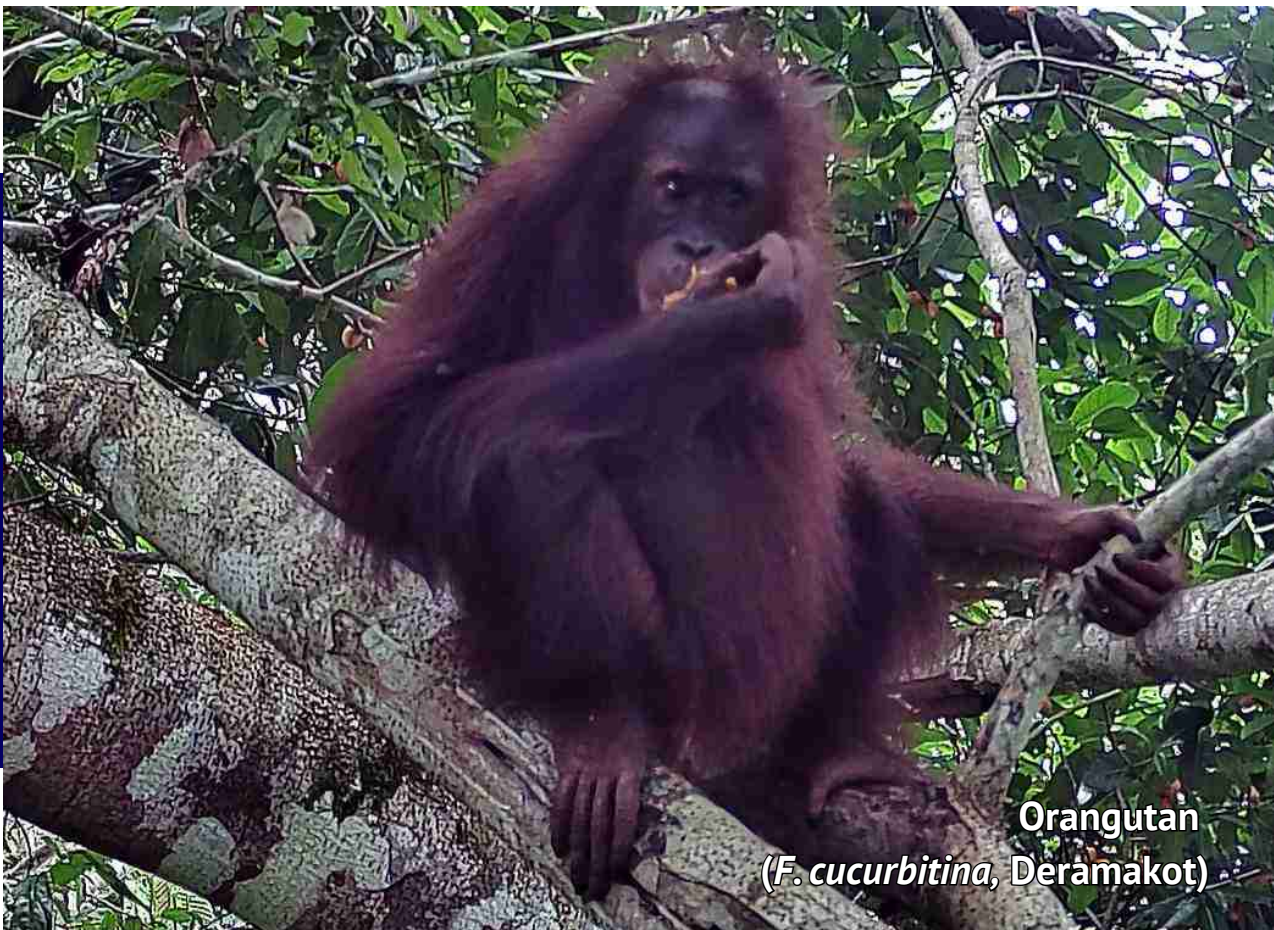
Objective

To identify wildlife species that are attracted to and consume figs in the canopy layer, in order to understand how different fig species contribute to canopy biodiversity.

Pre-Test

Long-term camera-trap records from a highly productive *Ficus cucurbitina* tree beside the Deramakot roadside documented exceptionally high wildlife use during a two-week fruiting episode (July 2024). That dataset included multiple large primates (four individual orangutans were recorded), red langur, North Bornean gibbon and pig-tailed macaques, as well as other visitors such as Bornean palm civet, binturong, Prevost's squirrel, horsetail squirrel, yellow-throated marten and rhinoceros hornbill. These Deramakot records demonstrated the potential value of targeting canopy fruiting figs for inventorying arboreal fauna and motivated further canopy testing.

In February 2025 a pre-test was carried out using a single infrared camera placed in the crown of a fruiting *Ficus cucurbitina* at Deramakot Forest Reserve. The trial evaluated rigging methods, camera positioning, trigger settings, night-time image quality, and the practical logistics of canopy maintenance. The pre-test returned a high detection rate and clear nocturnal imagery, confirming the reliability of the climbing protocol, camera settings and data workflow. Encouraged by these results, the program expanded into a continuous, multi-phase canopy study in Tawau Hills Park and Beluran Safari.



Orangutan
(*F. cucurbitina*, Deramakot)

Ficus cucurbitina (Deramakot)



***Ficus cucurbitina* (Deramakot)**



Red Leaf Monkey



Yellow-Throated Marten



***Ficus cucurbitina* (Deramakot)**



Binturong



Small-Toothed Palm Civet



Ficus cucurbitina (Deramakot)



***Ficus cucurbitina* (Deramakot)**



Olive-Backed Woodpecker



Rhinoceros Hornbill

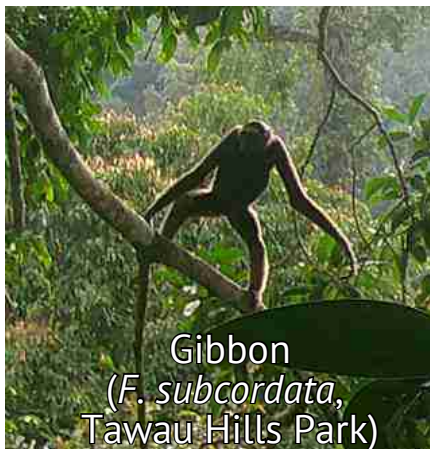


Methodology

Phase 1

Tree Selection

Two fruiting individuals each of *Ficus dubia* and *Ficus subcordata* were chosen based on fruit abundance, canopy accessibility and safety in Tawau Hills Park.



Gibbon
(*F. subcordata*,
Tawau Hills Park)

Camera Deployment

- As many camera traps as needed to maximize canopy coverage (between 6 to 10 units per tree)
- Motion-triggered photos and video (2 shots and 1 video per trigger), infrared only.
- Cameras active continuously for one month

Data Processing

- All images and videos reviewed and sorted by species

Phase 2

Tree Selection

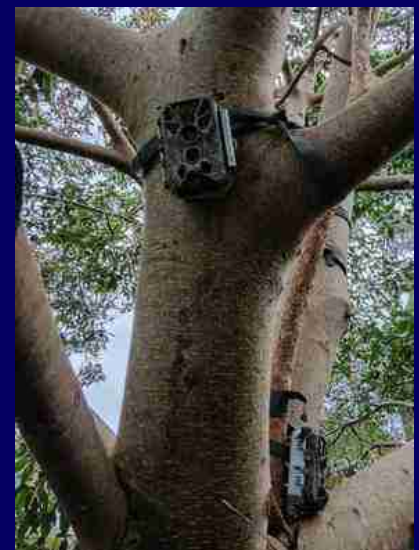
Two additional fruiting trees were identified and camera-trapped in July 2025: one *Ficus subcordata* in Tawau Hills Park and one *Ficus kerkhovenii* in Beluran Safari.

Camera Deployment

Same protocol as Phase 1 — 6–10 cameras per tree deployed to maximize coverage of the fruiting crown; motion-triggered photos and video (2 photos and 1 video per trigger), infrared only. Cameras remained active for the deployment period and were maintained by certified climbers.

Data Processing

All footage from Phase 2 was downloaded, reviewed and identified using the same workflow as Phase 1. Species IDs were cross-checked against field guides and expert opinion where needed.



Results

Wildlife Species Checklist

Order	Common Name	Scientific Name	Fig Host
Primates	Southern pig-tailed macaque	<i>Macaca nemestrina</i>	<i>F. subcordata</i> & <i>F. kerkhovenii</i> & <i>F. cucurbitina</i>
	Red leaf monkey	<i>Presbytis rubicunda</i>	<i>F. dubia</i> & <i>F. subcordata</i> & <i>F. cucurbitina</i>
	Sabah grey langur	<i>Presbytis sabana</i>	<i>F. dubia</i> & <i>F. subcordata</i>
	North Bornean gibbon	<i>Hylobates funereus</i>	<i>F. dubia</i> & <i>F. subcordata</i> & <i>F. cucurbitina</i>
	Orangutan	<i>Pongo pygmaeus</i>	<i>F. kerkhovenii</i> & <i>F. cucurbitina</i>
Carnivora	Binturong	<i>Arctictis binturong</i>	<i>F. dubia</i> , <i>F. subcordata</i> & <i>F. kerkhovenii</i> & <i>F. cucurbitina</i>
	Small-toothed palm civet	<i>Arctogalidia trivirgata</i>	<i>F. dubia</i> & <i>F. subcordata</i> & <i>F. cucurbitina</i>
	Yellow-throated marten	<i>Martes flavigula</i>	<i>F. kerkhovenii</i> & <i>F. cucurbitina</i>
Chiroptera	Large flying fox	<i>Pteropus vampyrus</i>	<i>F. subcordata</i>
Rodentia	Prevost's squirrel	<i>Callosciurus prevostii</i>	<i>F. dubia</i> , <i>F. subcordata</i> & <i>F. kerkhovenii</i> & <i>F. cucurbitina</i>



Rodentia	Plantain squirrel	<i>Callosciurus notatus</i>	<i>F. subcordata</i>
	Horse-Tailed Squirrel	<i>Sundasciurus hippurus</i>	<i>F. cucurbitina</i>
	Red giant flying squirrel	<i>Petaurista petaurista</i>	<i>F. dubia</i>
	Cream-coloured giant squirrel	<i>Ratufa affinis</i>	<i>F. dubia</i>
	Squirrel sp	-	<i>F. kerkhovenii</i>
	Rodent sp. 1	-	<i>F. dubia</i>
	Rodent sp. 2	-	<i>F. dubia</i>
	Rodent sp. 3	-	<i>F. subcordata</i>
Bucerotiformes	Helmeted hornbill	<i>Rhinoplax vigil</i>	<i>F. subcordata</i>
	Rhinoceros hornbill	<i>Buceros rhinoceros</i>	<i>F. dubia, F. subcordata & F. kerkhovenii & F. cucurbitina</i>
	Black hornbill	<i>Anthracoceros malayanus</i>	<i>F. subcordata</i>
	Wreathed hornbill	<i>Rhyticeros undulatus</i>	<i>F. subcordata</i>
Accipitriformes	Wallace's hawk-eagle	<i>Nisaetus nanus</i>	<i>F. dubia</i>



Columbiformes	Thick-billed green pigeon	<i>Treron curvirostra</i>	<i>F. dubia</i>
Passeriformes	Bornean black magpie	<i>Platysmurus aterrimus</i>	<i>F. subcordata</i>
	Bird sp.	-	<i>F. dubia</i>
Piciformes	Olive-backed woodpecker	<i>Gecinulus rafflesii</i>	<i>F. cucurbitina</i>



Discussion

Canopy dependency

Many key frugivores (hornbills, large primates, binturong) were detected only at canopy heights (>20 m), reaffirming that ground surveys miss important components of the frugivore community.

Species overlap

Most species used multiple fig hosts, but *F. subcordata* recorded higher hornbill diversity while *F. kerkhovenii* attracted very large-bodied and range-sensitive species (e.g., orangutan, yellow-throated marten), suggesting some figs provide unique resources.



Method effectiveness

High camera density per crown and combining stills with short video improved detection and identification, validating the pre-test and field protocol.

Implications

Conservation Planning

The identification of multiple threatened and endemic species including the Helmeted Hornbill, Binturong, and Sabah grey langur underscores the importance of protecting fig trees and their associated habitats in conservation strategies. These trees act as biodiversity hotspots within the forest canopy.

Forest Restoration

Knowing which fig species attract a high diversity of wildlife can guide reforestation programs. Incorporating high-priority fig species such as *Ficus subcordata* and *Ficus dubia* into replanting schemes can accelerate the return of fauna and promote ecological resilience in degraded areas.

Ecological Research

This study contributes valuable data on canopy frugivory, species interactions, and temporal activity patterns in the treetops. Such information is critical for understanding trophic dynamics, pollination and seed dispersal mechanisms, and forest regeneration.

Long-term Monitoring Potential

The methodology tested here opens the door for long-term, non-invasive wildlife monitoring in the canopy layer. As camera technology becomes more advanced and accessible, this approach can be scaled to other sites and integrated into broader biodiversity assessments across Borneo.



Red Leaf Monkey × Gibbon × Sabah Grey Langur
(*F. dubia*, Tawau Hills Park)

Conclusion

The combined results from the pre-test, Phase 1 and Phase 2 demonstrate that canopy camera trapping is a robust and necessary approach for documenting treetop frugivory in Sabah. Across the monitored fig crowns we recorded a diverse community of canopy specialists such as primates, hornbills, arboreal carnivores and multiple squirrel and bat species, many of which are under-represented or absent in ground surveys. Different fig species host overlapping but partly distinct assemblages; some figs (notably *F. subcordata* and *F. kerkhovenii*) play outsized roles in supporting conservation-priority species.



Gibbons
(*F. subcordata*, Tawau Hills Park)



Yellow-Throated Marten
(*F. kerkhovenii*, Beluran Safari)



Black hornbill
(*F. subcordata*, Tawau Hills Park)

Practical Recommendations

- Continue & expand monitoring – complete sampling of remaining “Big 4” figs (*F. cucurbitina*, *F. stupenda*) with repeat deployments across seasons to quantify temporal variation.
- Protect key trees – identify and prioritize protection of large fruiting figs within park management and logging-avoidance zones.
- Incorporate figs into restoration – use fig taxa demonstrated to attract diverse frugivores in enrichment planting to restore faunal communities.
- Standardize protocol & share data – adopt the validated canopy protocol (high camera density, stills and video) as standard for canopy studies in Borneo and publish/submit image datasets to relevant authorities and research repositories.
- Public engagement & policy – use charismatic canopy imagery to promote fig conservation among stakeholders, local communities and policymakers.



Sabah Grey Langurs
(*F. dubia*, Tawau Hills Park)

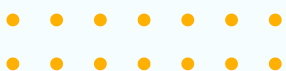
Ficus dubia (Tawau Hills Park)



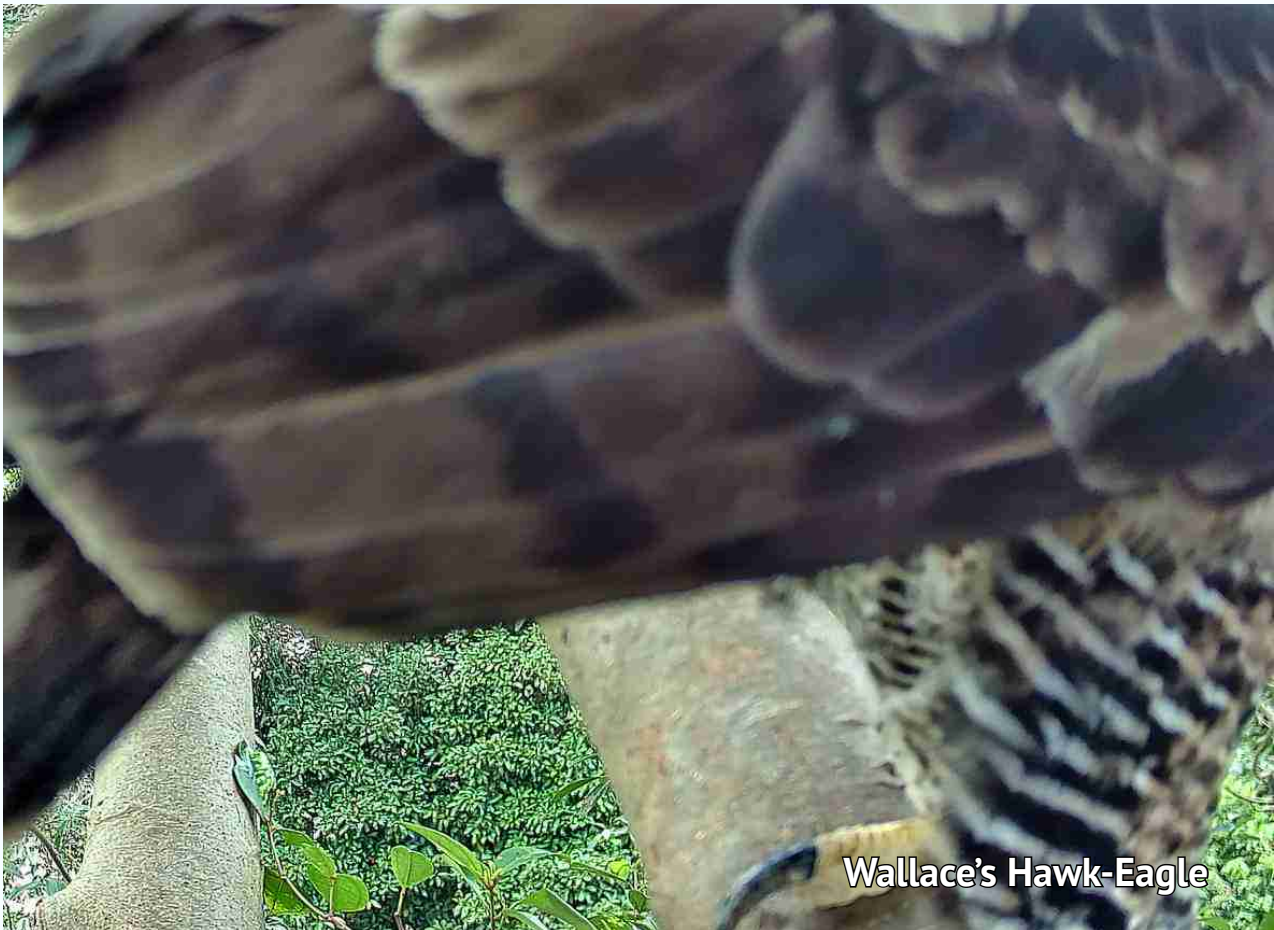
Thick-Billed Green Pigeon



Rhinoceros Hornbill



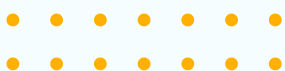
Ficus dubia (Tawau Hills Park)



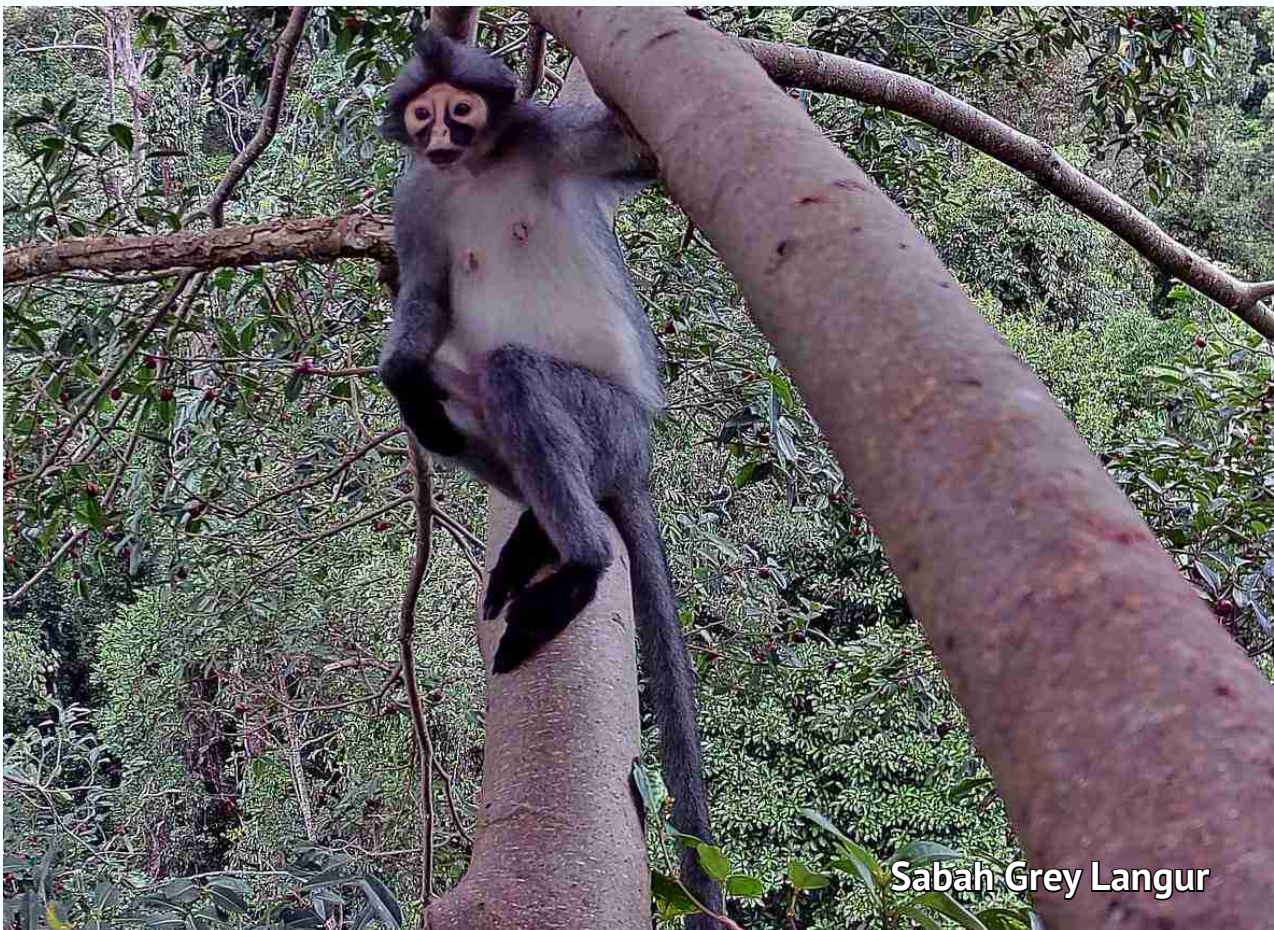
Wallace's Hawk-Eagle



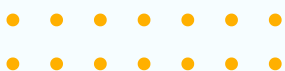
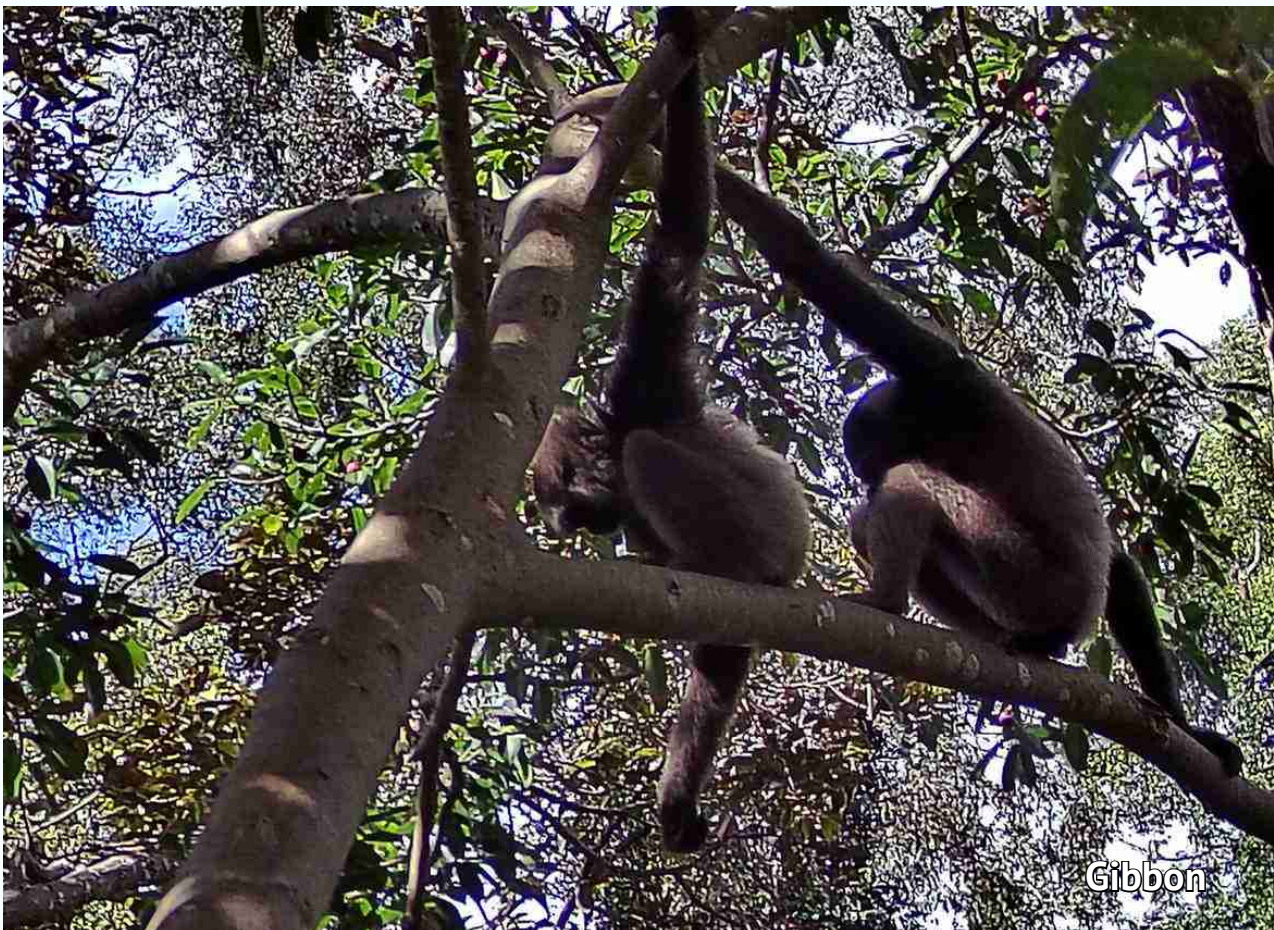
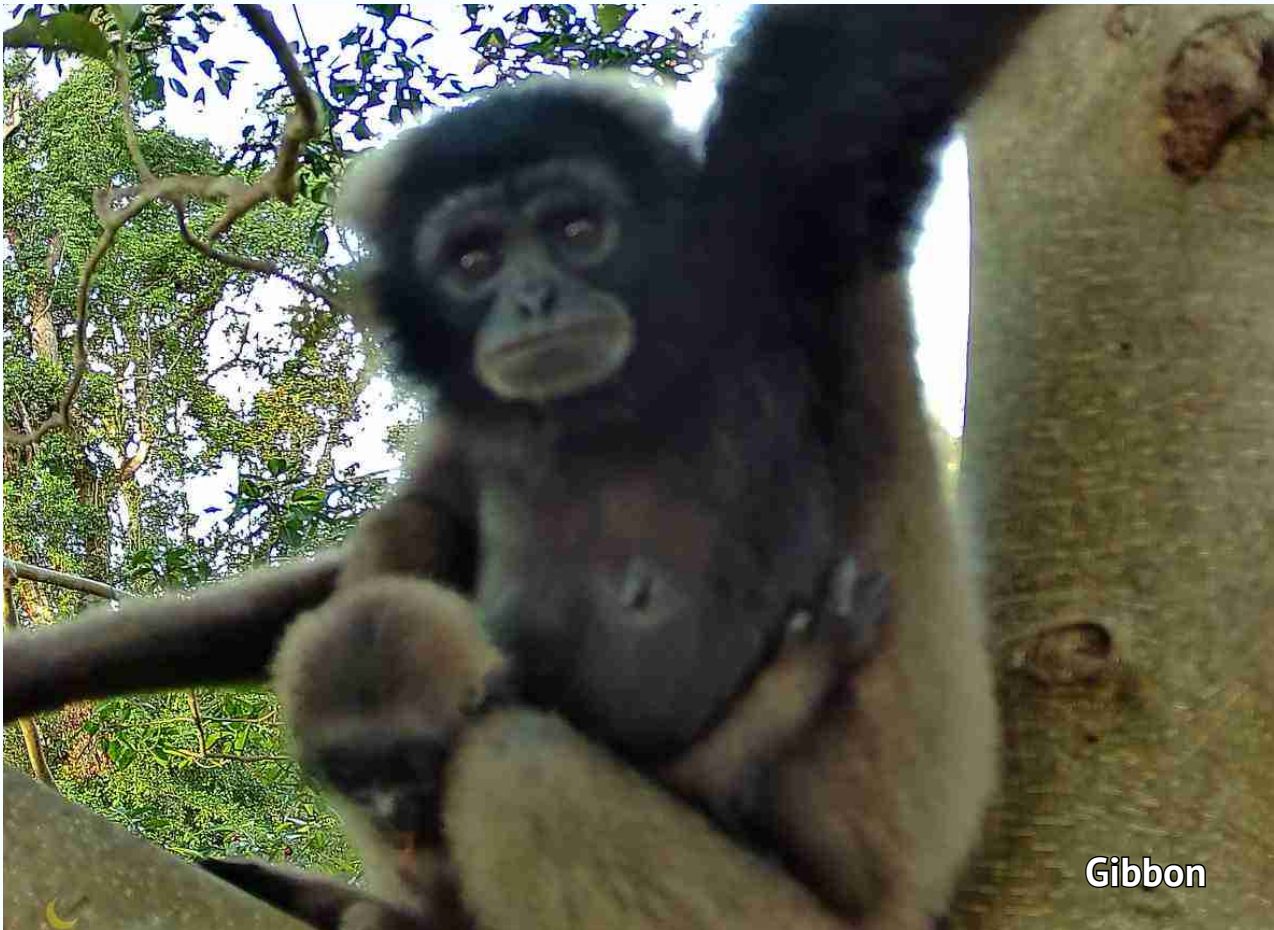
Prevost's Squirrel &
Rhinoceros Hornbill



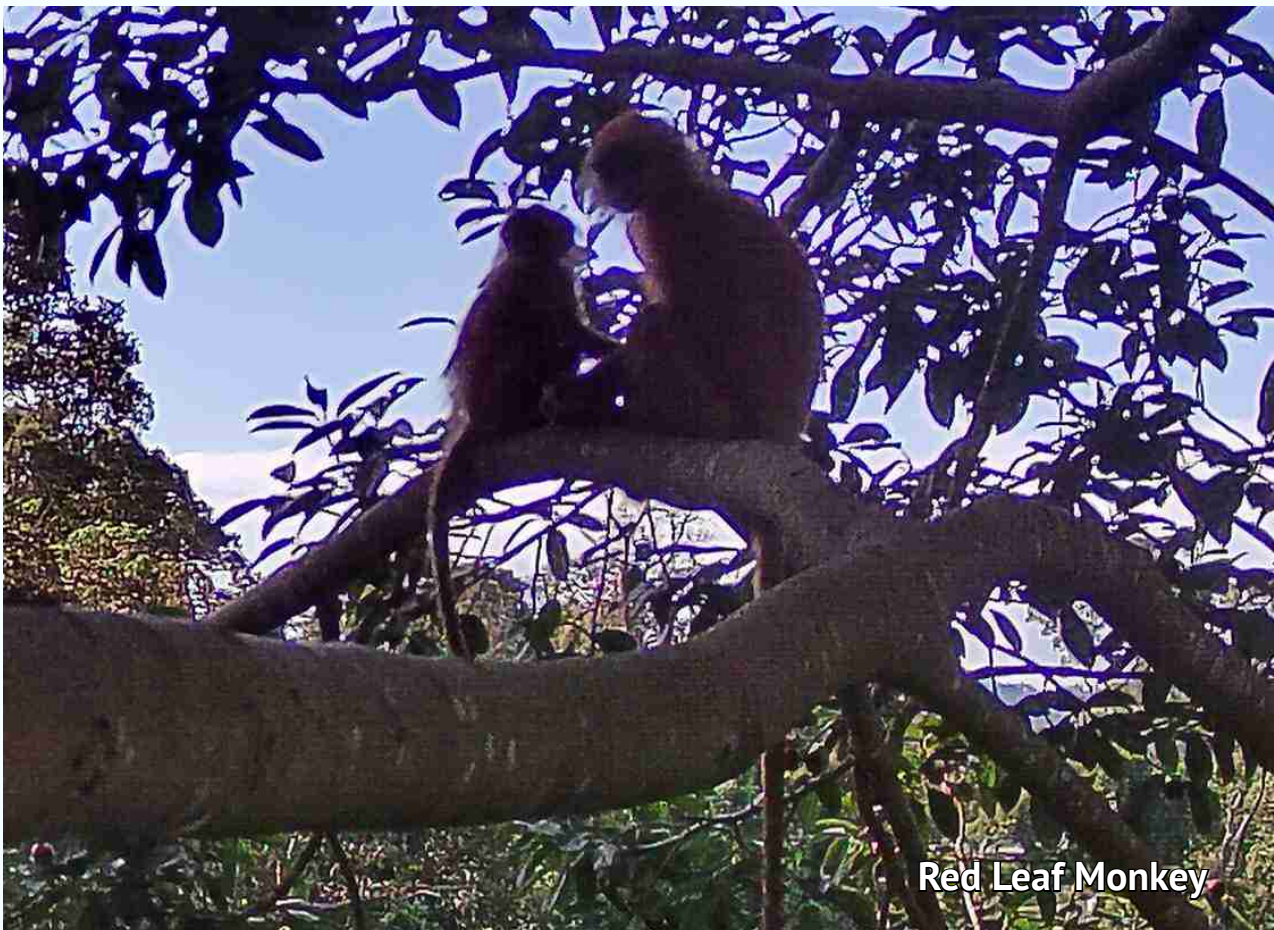
Ficus dubia (Tawau Hills Park)



***Ficus dubia* (Tawau Hills Park)**



Ficus dubia (Tawau Hills Park)



Ficus dubia (Tawau Hills Park)



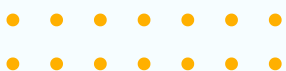
Ficus dubia (Tawau Hills Park)



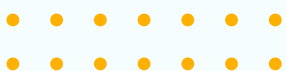
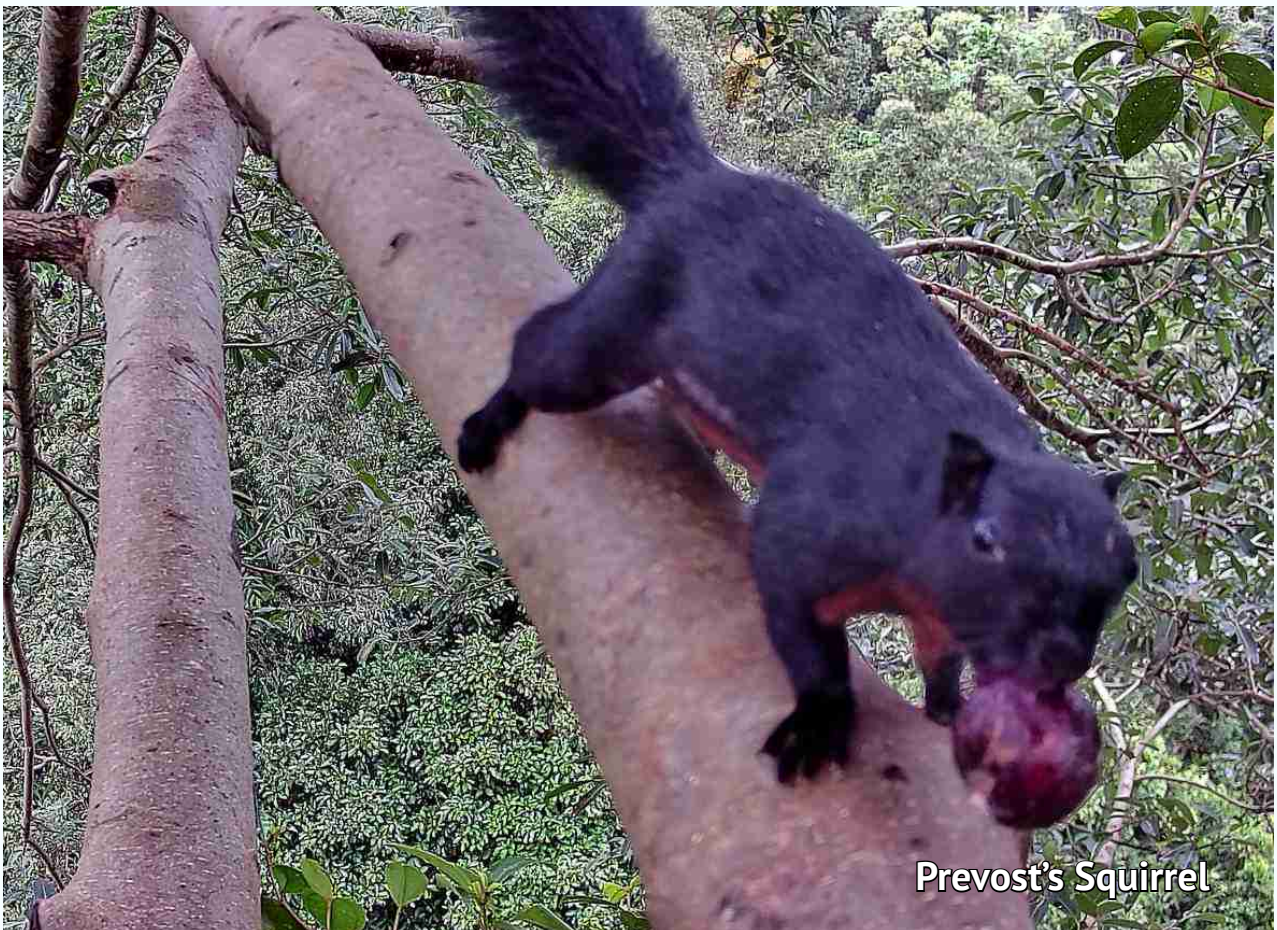
Small-Toothed Palm Civet



Red Giant Flying Squirrel



Ficus dubia (Tawau Hills Park)



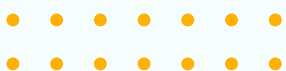
***Ficus dubia* (Tawau Hills Park)**



Rodent sp 1



Rodent sp 2



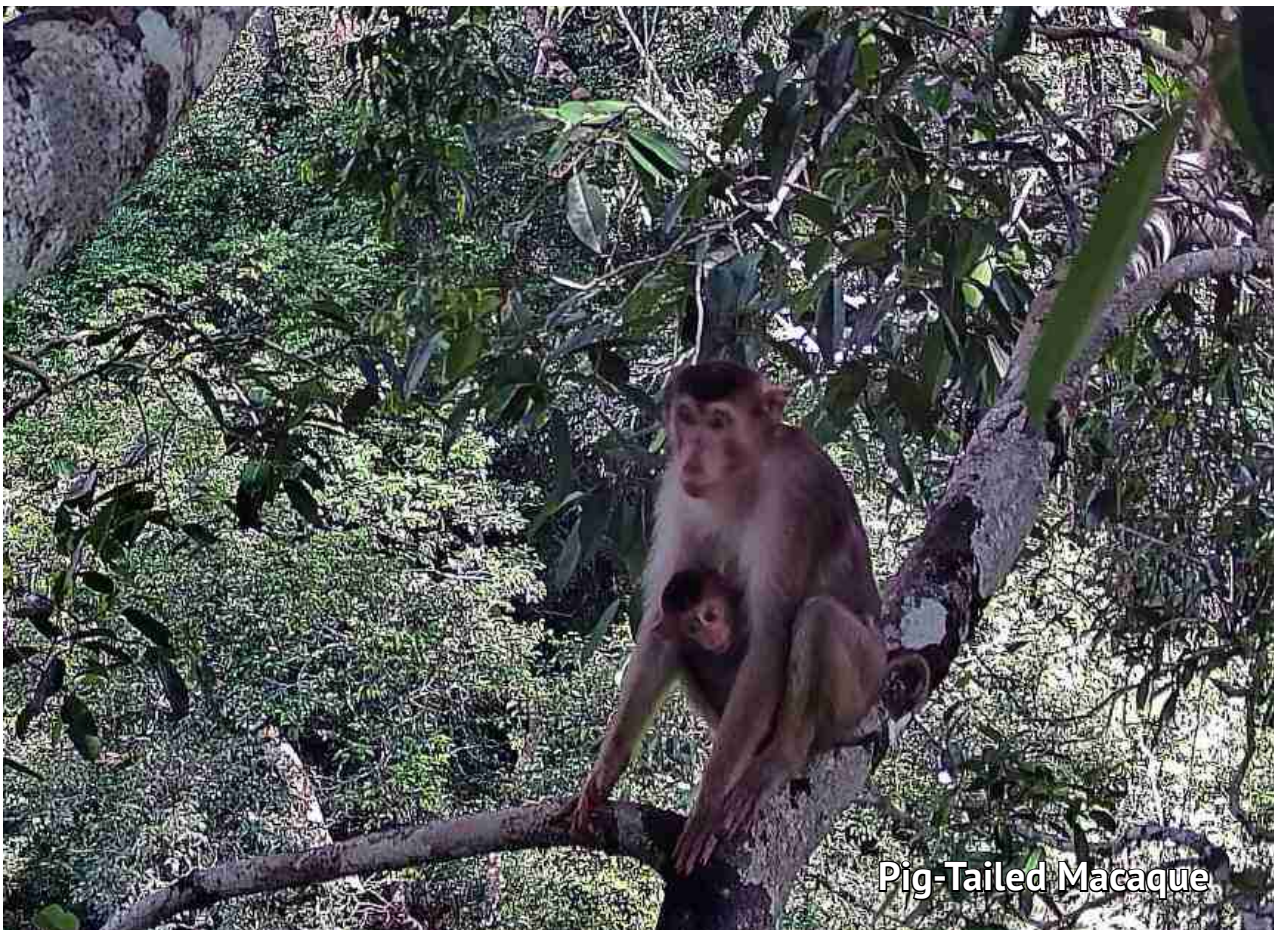
***Ficus subcordata* (Tawau Hills Park)**



Ficus subcordata (Tawau Hills Park)



Ficus subcordata (Tawau Hills Park)



***Ficus subcordata* (Tawau Hills Park)**



Rhinoceros Hornbill &
Pig-Tailed Macaque

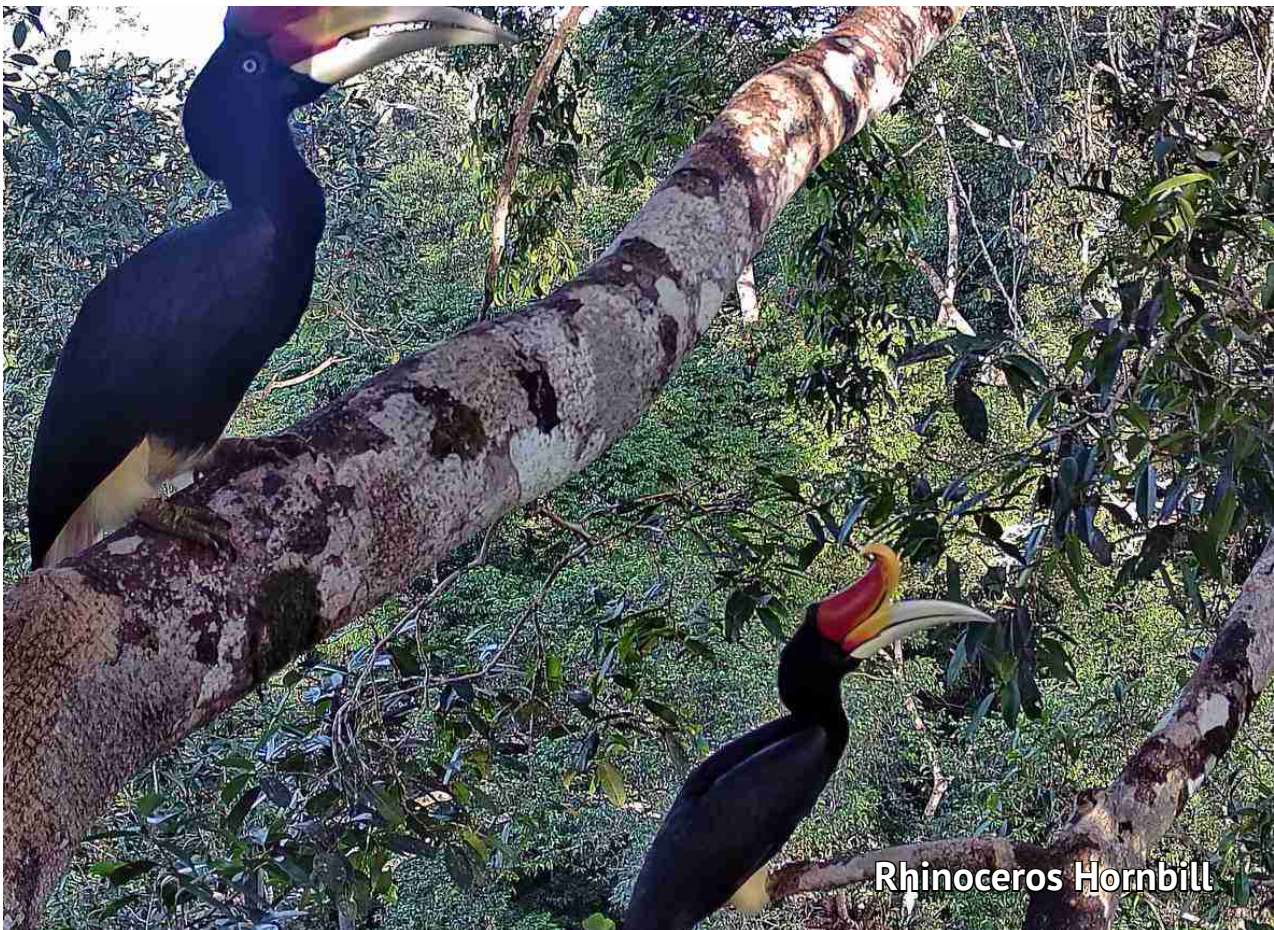


Gibbon

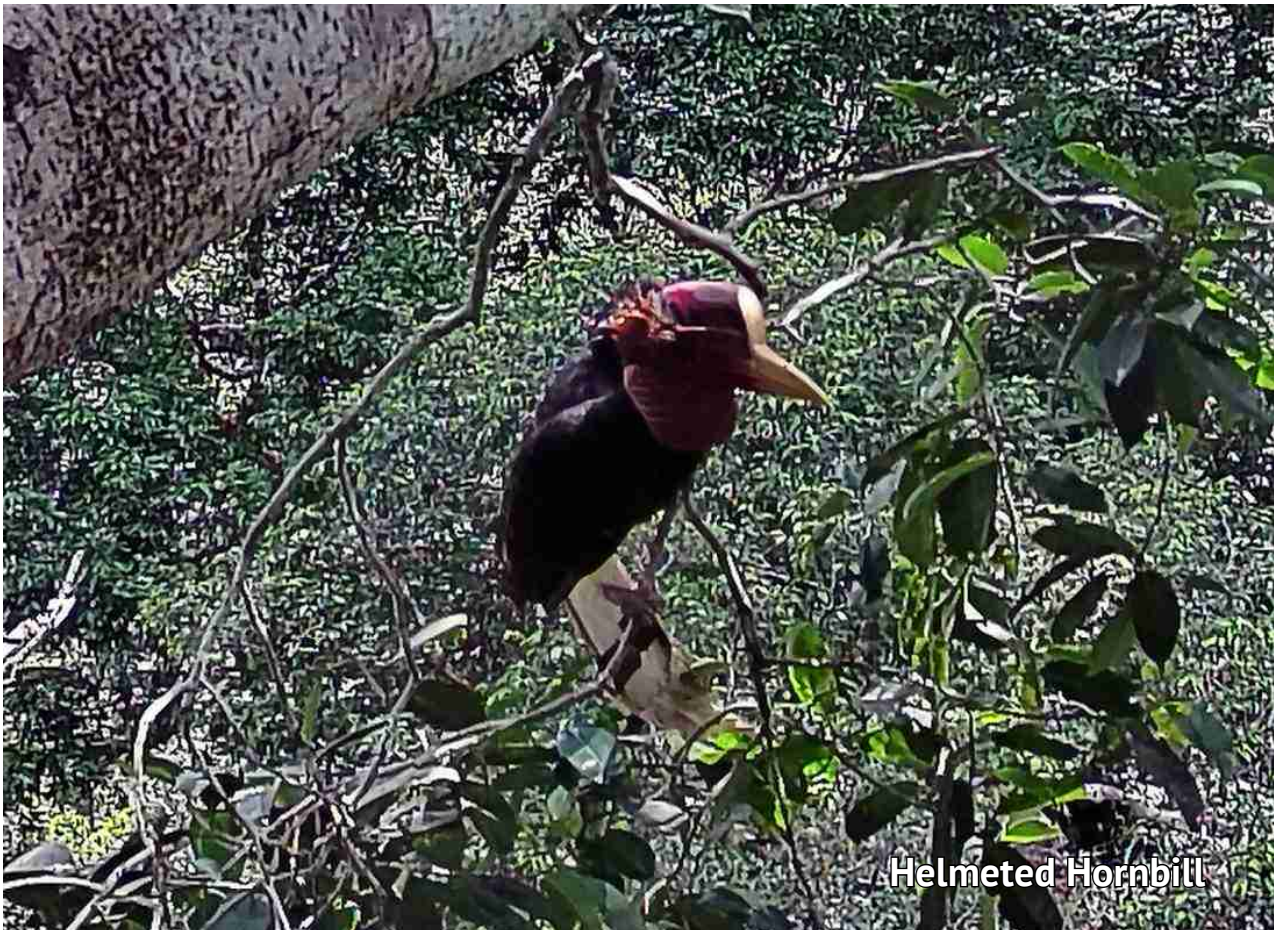
***Ficus subcordata* (Tawau Hills Park)**



Ficus subcordata (Tawau Hills Park)



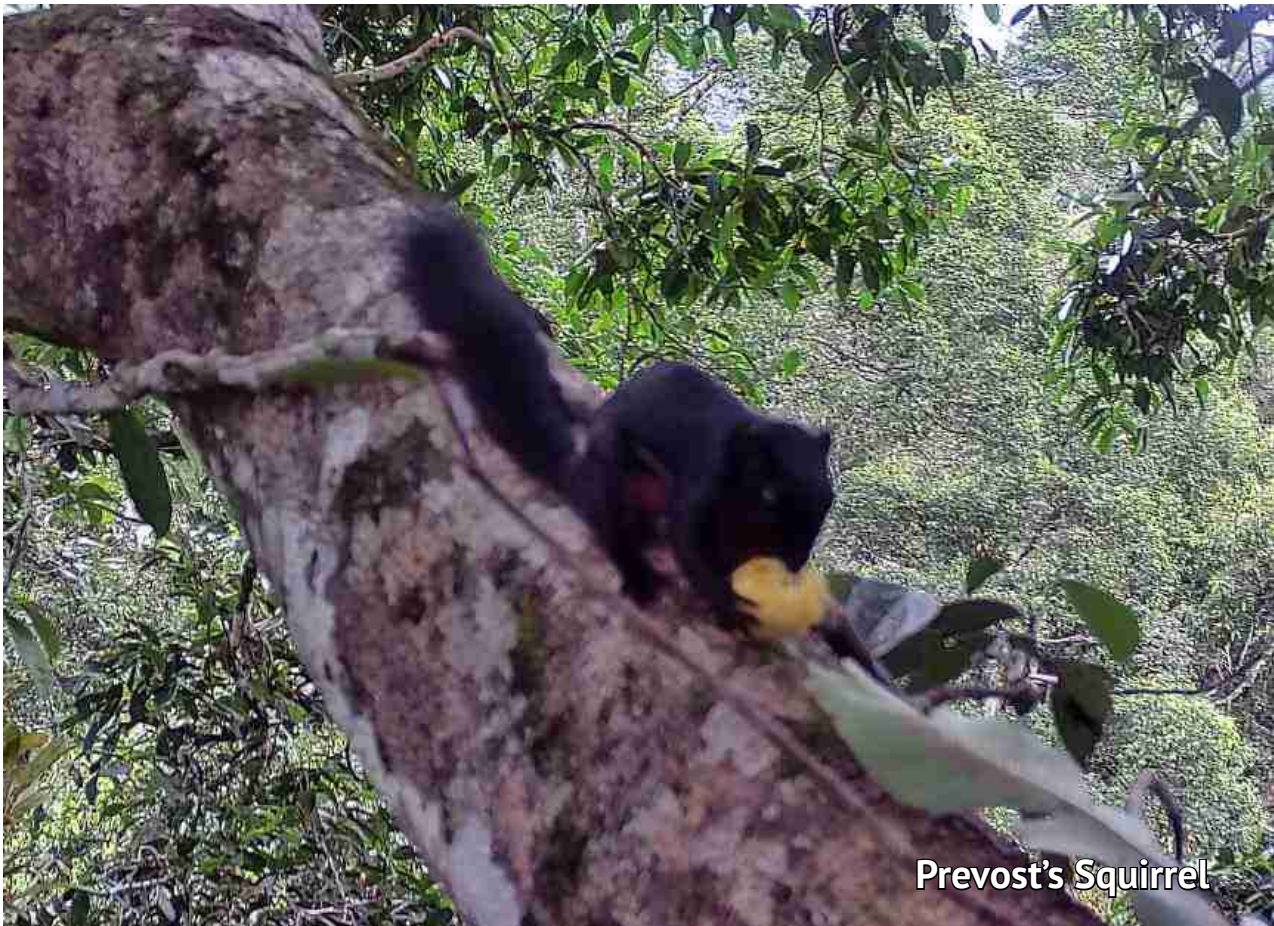
***Ficus subcordata* (Tawau Hills Park)**



***Ficus subcordata* (Tawau Hills Park)**



Plantain Squirrel



Prevost's Squirrel



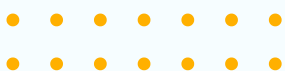
Ficus kerkhovenii (Beluran Safari)



Pig-Tailed Macaque



Orangutan



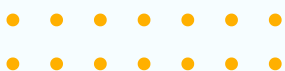
***Ficus kerkhovenii* (Beluran Safari)**



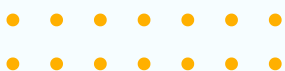
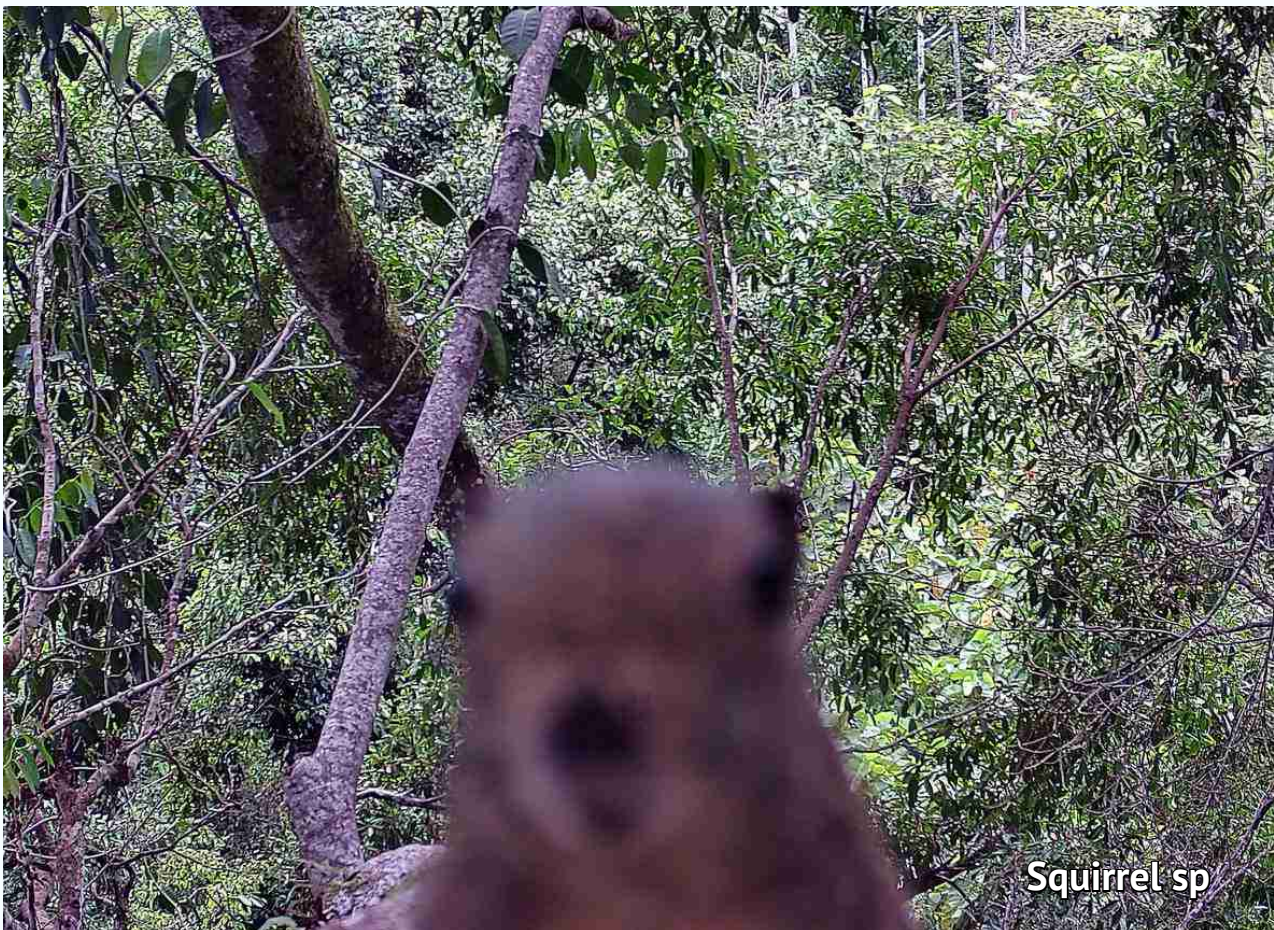
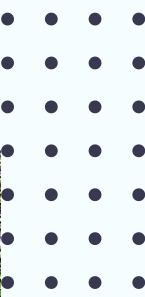
Small-Toothed Palm Civet



Yellow-Throated Marten



Ficus kerkhovenii (Beluran Safari)



Ficus kerkhovenii (Beluran Safari)



***Ficus subcordata* (Tawau Hills Park)**



Red Leaf Monkey



Pig-Tailed Macaque



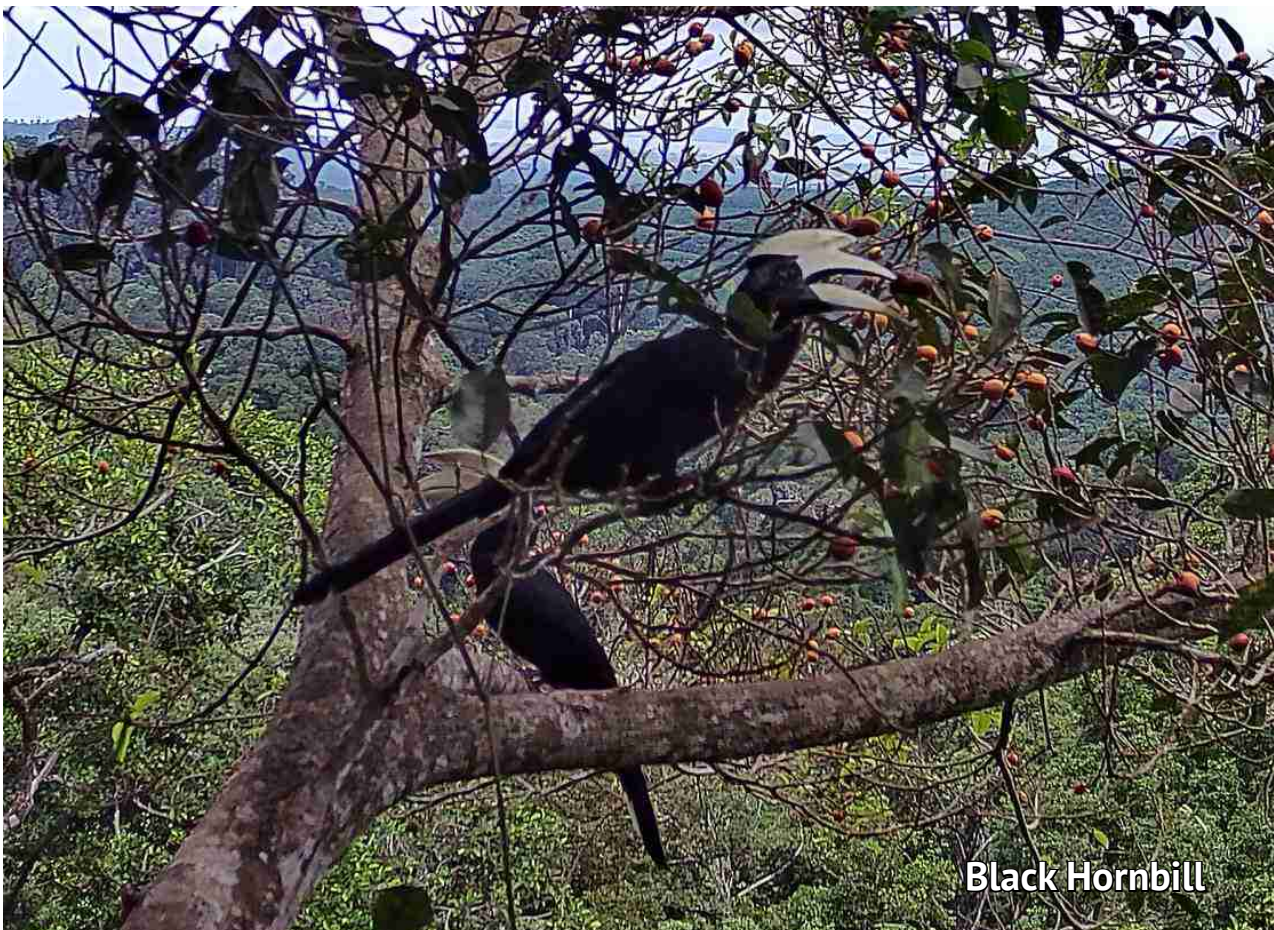
Ficus subcordata (Tawau Hills Park)



***Ficus subcordata* (Tawau Hills Park)**



Rodent sp 3



Black Hornbill



***Ficus subcordata* (Tawau Hills Park)**



Our Best Team



Adzley Madran



Masliadi bin Asri



Ledumin Duraman



Elvinis Gunong



Kong Vui Li



Abritus Jikim



Rowen Wolfale

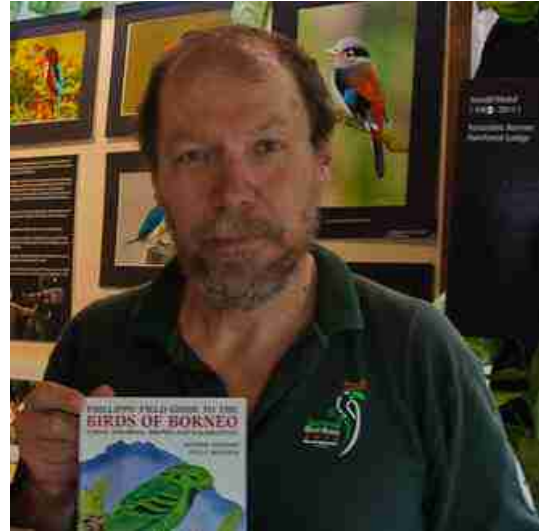


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Research Permits



LEMBAGA PEMEGANG AMANAH TAMAN-TAMAN SABAH
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Rujukan: **TTS/IP/800-4/2/6** 28 May 2025

Shaves Chaema
Founder
1StopBorneo Wildlife
012-8248052

Sir/Madam,

PERMIT : REQUESTING PERMISSION FOR CLIMBING FIG TREES IN TAWAU HILLS PARK FOR RESEARCH PURPOSES

Your letter dated 21 May 2025 is kindly referred.

- Please be informed that the Park Management has no objection and hereby approves the request for climbing fig trees in Tawau Hills Park for research purposes for your organization from **20 May 2025 to 21 May 2025**.
- However, you are required to report and complete the indemnity form each time the activity is conducted at the Operations & Enforcement Office of Tawau Hills Park.

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Arboreal camera traps reveal wildlife feasting on Borneo's fruiting fig trees

**Carolyn Cowan**
31 Jul 2025 BorneoComments Share article





Sabah Grey Langur (white morph)
(*F. dubia*, Tawau Hills Park)

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Thank You

