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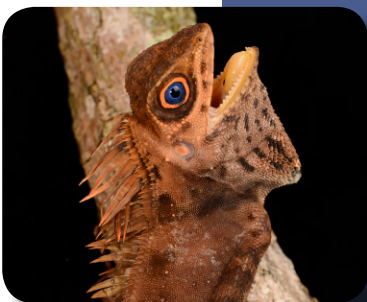
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The high crest, bright blue pupil and orange scales around the eyes make males of *Gonocephalus liogaster* one of the most striking lizards on Borneo. The species has also been recorded from Peninsular Malaysia, Sumatra and Natuna Island, and is associated with lowland rainforests and heath forests. This individual was photographed by Indraneil Das at the Samunsam Wildlife Sanctuary, Sarawak, Malaysia.

Herpetology 2024: Which frog?

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Borneo will not be a disappointment for delegates of the 10th World Congress of Herpetology, in terms of options for field excursions prior to and after the Congress. Delegates can even fit in field trips after sessions to a number of field sites that are virtually within city limits. In this series of articles, we shall describe some of the exciting options for those planning on attending the Congress in 2024. The first one will emphasize sites for amphibians.

Head north to the coast, to Bako National Park (2 727 hectares), a short road and a boat trip to access this popular retreat for Kuching folks. Bako is the State's first National Park and arguably the best place to see Proboscis Monkeys and Silvered Leaf Monkeys, as well as the bizarre Bearded Pigs and Flying Lemurs. Here, the so-called Crab-eating or Mangrove Frog, *Fejervarya cancrivora*, breeds in shallow ditches off the tourist-frequented trails. Herpetologists are, of course, aware that this is one of few amphibians that survive in salt water; previous studies have indicated that adults can survive with salinity up to 2.8%, and tadpoles as high as 3.9%! Other amphibians to be encountered at Bako are peat swamp frogs, including *Pulchrana baramica*, *Ingerophrynus quadriporcatus*, and *Limnonectes paramacrodon*. For those interested in unusual amphibian life histo-

ries, we can mention *Pelophryne signata*, a tree-hole breeder, with endotrophic tadpoles, and *Philautus tectus*, which shows direct development.

More exciting for encounters with multiple species on a single night are lowland forests, which are home to most of Borneo's frogs and caecilians, and visitors will be spoiled for choice. Consider perhaps Gunung Santubong National Park (1 410 hectares), a sandstone massif of 810 m elevation, on the way to the coast, and home to 37 species of frogs. One need not scale the peak in Santubong to see most of these species, which can be encountered in the streams and swamps in the foothills. A highlight here is *Leptobrachium ingeri*, a recently-described species, whose call resembles the bleating of a goat, and the Bornean-version of the Pinocchio-nosed Frog, *Gastrophrynoides borneensis*.

A must-visit locale is the frog pond within Kubah National Park (2 230 hectares), which is used for breeding by at least 14 species of amphibians. Highlights at Kubah include *Rhacophorus nigropalmatus*, *R. borneensis*, and *Feihyla kajau*. Two species of caecilians are known from the locality: *Ichthyophis asplenus* and *I. biangularis*. One has to be lucky to lay eyes on them without actually digging them out, or resorting to pitfall trapping (with a permit, of course). The beautiful *Abovarana luctuosa* has a most melodious call, judged in an online competition* as the most beautiful sound in the world! Another record-making frog here is *Microhyla nepenthicola*, one of the world's smallest frogs breeding exclusively inside the pitchers of a small species of the pitcher plant, *Nepenthes ampullaria*. The tadpoles are endotrophic, receiving no external sources of nourishment, and completing metamorphosis under a fortnight. A total of 69 species of amphibians are now known from this range, a third of which can be encountered on most 2–3 day field trips.

A short distance away, one can find *M. borneensis* on the Bau limestone region, which is also associated with pitcher plants. In this extensive karst landscape, about 40 km towards the interior, are several relatively small but interesting protected areas, including the Deded Krian National Park (1 339 hectares), the only known locality of *M. borneensis*. Other more well-known sites here are the Wind (6.16 hectares) and Fairy Caves (56 hectares) Nature Reserves. While no amphibians are obligates of the deep passages of caves of Borneo, we have a breeding population of *Ansonia spinulifer* in the twilight zone of the Wind Cave.

* <https://beautifulnow.is/contests/the-most-beautiful-sound-in-the-world>



Fig. 1. *Gastrophrynooides borneensis*



Fig. 2. *Ansonia latidisca*



Fig. 3. *Microhyla nepenthicola* adults



Fig. 4. *Microhyla nepenthicola* tadpoles



Fig. 5. *Rhacophorus borneensis*



Fig. 6. *Meristogenys penrissenensis*



Fig. 7. *Philautus hosii*

Further research will indicate where the tadpoles develop. These caves are visited by cityfolks on weekends, the highlights being the long plank walks within the caves, the chittering sound of bats overhead and the edible-nest swiftlets, whose nests are stuck at improbable angles, within spitting distance of the plank walks.

Head 57 km directly north from Bau, along the Bau-Sematan road, and you will reach the town of Lundu that lies at the foothills of the 965 m high, dome-shaped granite massif of Gunung Gading. The National Park (6 530 hectares), therefore, is unique amongst in geology, and shows a hill dipterocarp flora on rugged topography, and as expected, a rich frog fauna. The vegetation of granite scree areas at the foothills is unique, the microhabitats of the rock-and-plant association moisture-laden. Several streams and waterfalls lie strategically off the main trail to the summit, offering herpetologists the opportunity to encounter some of the Park's 47 frog species. Highlights here include the Foot-flagging Frog, *Staurois guttatus*, which is easily

sighted on rocks of the main streams by day. Ethologists will be quick to inform us of the advantages of visual displays, known in all its relatives that inhabit 'noisy' environments such as these, where acoustic signals are drowned by the thunderous sound of water on rocks. Visitors are likely to see with ease several other Bornean endemics at this site, such as *Megophrys nasuta*, three species of stream toads, *Ansonia* (*leptopus*, *longidigita* and *spinulifer*), and *Philautus hosii*. When not busy with frogs, visitors may inquire at the park about the blooming of the world's largest flower, the so-called 'Stinking Corpse Lily', *Rafflesia tuan-mudae*.

The Sama Jaya Forest Park or Stutong Nature Reserve (37.92 hectares) is located within the city of Kuching, and forms its south-western suburbs. Its Kerangas (Bornean heath) forest and peaty conditions are perfect for a number of swamp specialist frogs, such as *Ingerophrynus quadriporcatus*, *Pulchrana baramica*, and *Polypedates colletti*. In the shallow muddy pools, one can easily encounter *Occidozyga*



Fig. 8. *Philautus tectus* eggs



Fig. 9. *Glyphoglossus brooksii*



Fig. 10. *Glyphoglossus capsus*

cf. *laevis*, and its unusual tadpoles, which are carnivorous. The highlight here is *Glyphoglossus brooksii*, a strange, rotund frog of the leaf litter. The well laid-out joggers path forming two concentric trails make field work at this site a breeze.

For those with a little more time at hand, a visit to the ‘roof of Western Borneo’ is a must. Head out some 60 km to the south-east, towards the Kalimantan (Indonesia) border, past the Bau-Serian region, and enter the vast landscape of karst and sandstone ranges that demarcate the border itself.

A resort of 2 020 hectares sits conveniently at around 900 m elevation, the staging point for an ascent to the summit of Gunung Penrissen. Here, at just around 1 100 m, trees gets shorter, their branches and trunks wildly festooned with moss and lichens, orchids and other flowering

plants. The amphibian fauna of the massif is exceptional, with 62 species, a highlight being *Glyphoglossus capsus*, christened the ‘Red-Hot Chili Pepper Frog’, for its odd combination of shape and colours. The sighting of the Bornean Rainbow Toad, *Ansonia latidisca*, rediscovered here by our team in 2011, itself is worth the blood (donated to the innumerable leeches), sweat, and tears.

In this short article is an attempt to fit all frogs and frog-watching sites general visitors to some of Sarawak’s National Parks and other wilderness areas around Kuching can hope to see. More intrepid herpetologists, with time in hand may consider travelling further afield – perhaps to Gunung Mulu National Park (52 860 hectares), over an hour’s flight from Kuching to Sarawak’s interior – to see some of the 105 amphibian species recorded from that Park.



Fig. 11. *Hylarana raniceps*



Fig. 13. *Ichthyophis monochrous*



Fig. 12. *Ichthyophis biangularis*



Fig. 14. *Microhyla borneensis*

At any rate, participants to the 10th World Congress of Herpetology, visiting Kuching in the August of 2024 will not be disappointed with either the herpetofauna of the State or its various ecotourism destinations. Nearly all species are active year round, and logistics of field trips are easy and inexpensive. Finally, modern field guides permitting the identification of the local herpetofauna are available in major bookshops, as well as on-line. In the next issue, we shall talk about the turtles of Sarawak.

We look forward to seeing all of you in the magical state of Sarawak. Till then, stay safe and watch this space for further updates.

Borneo



Fig. 15. *Rhacophorus pardalis*



Fig. 17. *Pulchrana baramica*



Fig. 18. *Nyctixalus pictus*



Fig. 16. *Theioderma lacin*



Fig. 14. *Rhacophorus borneensis* juvenile