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Herpetofauna of the Pulau Banggi Group of islands off Northeastern Borneo

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The limestone islands of the Pulau Banggi (ca. 07°14–19'N, 117°5–10'E) group are situated off the northeast coast of the island of Borneo, and due south of the Philippines islands of Balabac and Palawan (Fig. 1). In geographical terms, they lie between the basins of the South China Sea and that of the Sulu Sea, and cover a total land area of 699 km². Banggi, the largest of these islands, is ca. 700 km² in area and has a coastline of 420 km (Teh et al., 2005). Other important islands of the group include Balambangan and Malawali, the former island with extensive limestone formation, with outcrops reaching 120 m (Tuen et al., 2002). Administratively, these islands fall under Kudat District of Sabah (East Malaysia), and are included in the proposed (in 2003) Tun Mustapha Marine Park, designated primarily to protect the rich marine life of the surrounding seas. The archipelago comprises about 70 islands, 33 of which are inhabited by an estimated 80,000 people of various ethnic origins (Busing, 2001).

The first naturalist recorded to have collected on these islands is Francis Henry Hill Guillemard (1852–1933), in 1883, on board the 420 ton auxillary screw yacht 'The Marchesa', which visited islands of eastern Asia and New Guinea on a natural history expedition. Although the purpose of the stop at Banggi was to obtain freshwater, Guillemard also made a collection of birds (Chasen and Boden Kloss, 1930). In 1886,

Alfred Hart Everett (1849–1898), then Resident of Trusan, Sarawak, and formerly with the British North Borneo Company, an important collector of Bornean fauna, visited these islands, and again made ornithological collections. The earliest herpetological collection took place on these islands in 1927, organized and led by Cecil Boden Kloss (1877–1949) of the Raffles Museum, Singapore, in collaboration with Henry Maurice Pendlebury (1893–1945), systematic entomologist with the Federated Malay States Museum. Besides the archipelago, the Expedition also worked in adjacent mainland, in what was then the Residencies of Sandakan and Kudat. Material from these collections is extant in the collection of the ZRC. However, little has been published on the herpetofauna of the region, apart from the citation of a specimen of *Bronchocela cristatella* in Tan (1993).

We report here the results of two separate inventories, undertaken in 2003 by the first author on Pulau Balambangan in the month of June, and by the second author on Pulau Banggi, in July. Lowland limestone forests characterize these islands, and include forests of tall trees of the Dipterocarpaceae, besides *Calophyllum* spp. and *Ficus* spp., growing sometimes on steep cliffs, besides limestone cliffs and coastal, sandy beaches (descriptions in Rahman and Abdullah, 2002). As sampling periods were short (2–5 days), we employed opportunistic collection methods, such as collections along established trails and adhesive traps, rather than pit-fall trapping, searches in leaf-litter plots, and time constrained searches. We also examined specimens in museum collections to augment our list.

Abbreviations used include:

BOR.– The Borneensis Collection of Universiti Malaysia Sabah (including collections of Universiti Kebangsaan Malaysia, UKMS), Kota Kinabalu, Sabah, Malaysia,

ID.– The field collection number of the first author,

SSM.– Sabah State Museum and Archives, Kota Kinabalu, Sabah, Malaysia, and

ZRC.– Zoological Reference Collection, Raffles Museum of Biodiversity Research, National University of Singapore, Singapore (USDZ in Leviton et al., 1985). For one specimen, the voucher specimen (prefixed with ZRC [IMG]) is a digital image.

Nomenclature of amphibians follows Frost *et al.* (2006) as revised by Frost (2007); that of the Pythonidae follows Rawlings et al. (2008).

AMPHIBIANS

FAMILY DICROGLOSSIDAE

Limnonectes kuhlii: BOR 12409–12411, BOR 12412–12418, Sungai Kepitan, Kampung Kalangkaman, Pulau Banggi (07°18'N, 117°5.2'E), 27 July 2007.

Limnonectes leporinus: BOR 12408, Sungai Kepitan, Kampung Kalangkaman, Pulau Banggi (07°18.'N, 117°5.2'E), 27 July 2007; ZRC 1.12152 (*ex* ID 7779), west coast of Pulau Balambangan (07°12'N, 116°45'E), 18 June 2003.

FAMILY MICROHYLIDAE

Kalophrynus pleurostigma: ZRC 1.12151 (*ex* ID 7772), bank of an unnamed freshwater stream on west coast of Pulau Balambangan (07°12'N, 116°45'E), 18 June 2003.

Microhyla borneensis: BOR 12402, Kampung Kalangkaman, Pulau Banggi (07°18.5"N, 117°5.16'E), 26 July 2003.

FAMILY RHACOPHORIDAE

Polypedates macrotis: ZRC 1.10885, *ex* ID 7773, west coast of Pulau Balambangan (07°12'N, 116°45'E), 18 June 2003.

Rhacophorus appendiculatus: BOR 12405–07, BOR 12412, Forest path nr. Kampung Kalangkaman, Pulau Banggi (07°18'N, 117°5'E), 27 July 2007.

Rhacophorus pardalis: BOR 12401, BOR 12404, Forest path nr. Kampung Kalangkaman, Pulau Banggi (07°18'N, 117°5.1'E), 26 and 27 July 2007, respectively.

FAMILY RANIDAE

Hylarana raniceps: BOR 12403, BOR 12419, Sungai Kepitan, Kampung Kalangkaman, Pulau Banggi (07°18'N, 117°5.2'E), 27 and 28 July 2007, respectively.

REPTILES

FAMILY AGAMIDAE

Bronchocela cristatella: BOR 02721, Pulau Balambangan (cited by Tan, 1993:2) (no further sampling data).

FAMILY GEKKONIDAE

Gekko gecko: SSM 0383, Pulau Balambangan; ZRC 2.5732 (*ex ID* 7948), west coast of Pulau Balambangan (07°12'N, 116°45'E), 19 June 2003; UKMS (at present BOR) Re. 443, ZRC 2.1018–1023, "Pulau Banggi" (no further sampling data).

Gekko monarchus: ZRC 2.6557 (*ex ID* 7776) and ZRC 2.6558 (*ex ID* 7778), west coast of Pulau Balambangan (07°12'N, 116°45'E), 18 June 2003.

FAMILY SCINCIDAE

Apterygodon vittatum: ZRC 2.6559 (*ex ID* 7774), west coast of Pulau Balambangan (07°12'N, 116°45'E), 18 June 2003.

Emoia atrocostata: ZRC 2.1564, Pulau Banggi (no further sampling data); west coast of Pulau Balambangan (07°12'N, 116°45'E; I. Das, field sighting, 21 June 2003).

Eutropis multifasciata: UKMS (at present BOR) Re. 391, Wak Wak, Pulau Banggi, Kudat District (07°08'N, 117°06'E); UKMS (at present BOR) Re. 402, Selamat Darat, Pulau Balambangan, Kudat District (07°15'N, 116.56'E) (no further sampling data).

FAMILY ELAPIDAE

Laticauda colubrina: Tan (2008) presented recorded this species from Pulau Banggi.

FAMILY PYTHONIDAE

Broghammerus reticulatus: ZRC 2.3143–3147, Pulau Banggi (no further sampling data).

FAMILY COLUBRIDAE

Boiga dendrophila: ZRC [IMG] 2.64, west coast of Pulau Balambangan (07°12'N, 116°45'E), 20 June 2003. Tan (2008) presented an image of this species from Pulau Malawali.

Chrysopelea paradisi: ZRC 2.3599, Pulau Banggi (no further sampling data).

Dendrelaphis caudolineatus: ZRC 2.6560 (*ex ID* 7777), west coast of Pulau Balambangan (07°12'N, 116°45'E), 18 June 2003.

FAMILY CROCODYLIDAE

Crocodylus porosus: Not collected, but reported by the local Bajau tribesmen as occurring off the waters of Pulau Balambangan.

In Excluding marine turtles, for which no data are currently available, Pulau Banggi and adjacent islands are home to at least eight species of amphibians and 12 species of reptiles. All, save one (*Gekko gecko*) are

widespread across the lowlands of Borneo, a distributional pattern similar to that shown by the island group's avifauna (Chasen and Boden Kloss, 1930). The sole reptile not known from Borneo is widely distributed in the Philippine Archipelago, and may either be a recent emigrant via the Palawan-Balabac corridor, or competitively excluded on the main island by the closely related and presumably ecologically similar *Gekko smithii*. The islands to the north of the Pulau Banggi group lie within the jurisdiction of the Philippines, and the herpetofaunas of Palawan and Balabac has been enumerated by Mocquard (1890) and Boulenger (1894).

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Caption to text figure

FIG. 1: Map showing location of the Pulau Banggi group of islands, Kudat District, Sabah, off the northeast coast of Borneo, and the islands of southern Philippines. Broken lines indicate 40 m contour.