

## Reproductive biology of *Sylvirana nigrovittata* (Blyth, 1856) (Anura, Ranidae) from Kedah, Peninsular Malaysia

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The medium-sized ranid frog *Sylvirana nigrovittata* has a total length of 55-60 mm (Berry, 1975). This riparian evergreen forest dwelling species can be recognised by its rounded snout, distinct tympanum, finger and toe tips dilated into small disks, disk of toe tips larger than finger, upper arm with dark-centred glandular swelling and a very broad dark brown stripe on both lateral sides (Berry, 1975). It is widely distributed, being found across Cambodia, China, India, Indonesia, Laos, Malaysia, Myanmar, Thailand and Vietnam, usually between 200-600 m asl (IUCN, 2015). In Peninsular Malaysia the species is mostly found in primary rainforests (Berry, 1975) and is known from Temenggor Forest (Kiew et al., 1995), Bukit Larut and Gunung Bubu (Grismer et al, 2010), and Bukit Perangin (Ibrahim et al., 2012).

On 19 March 2016, between 20:00 and 20:30, an axillary amplexed pair of *S. nigrovittata* was observed in a small rock pool at Lata Bayu, Baling, Kedah, Peninsular Malaysia (5°43'N, 100°48'E; <200 m asl) (Fig. 1). The rock pool was 65 x 25 cm across/5-20 cm deep and approximately 1 m from a waterfall (Fig. 2). It contained clear stagnant water, a sandy-gravel bottom and was filled with dead leaves and twigs. The pool was directly exposed to sunlight and there had no vegetation around it. The air temperature and humidity at the site were 24°C and 64% respectively. Another six males of the same species



Figure 2. Breeding pool of *S. nigrovittata*

performed advertisement calls locally, and were also detected around the area, confirming the area as a breeding resource.

Between 23:00-23:30, the female frog was observed depositing its eggs in the pool, whilst the male remained perched on a rock nearby (Fig. 3). Both specimens were captured and measured its snout-vent length (male=44 mm, female=56 mm), head width (male=14 mm, female=15 mm) and mass (male=6 g, female=10 g) using digital calliper and electronic balance. After measurement, both specimens were released back to their natural habitat. The clutch size comprised 553 eggs with diameter between 0.9 and 1.1 mm ( $mean=0.99 \pm 0.057$  mm,  $n=10$ ) (Fig. 4). The eggs were rounded in shape, pigmented, black and white in colour, and enclosed by viscous jelly. The clutch was clumped in shape and deposited on the water surface in sunlight.

The egg clutch was collected and raised in a laboratory setting until hatching. Eggs and larvae were reared in a glass aquarium (60 cm x 30 cm x 30 cm), consisting of tap water, dead leaves and an aerator to supply oxygen. On 22 March 2016, around 10:00-11:00 (after approximately 59-60 hours), the eggs hatched into small tadpoles (Gosner's stage 19) that had a total length of about 3 mm. Only 455 (82.28%), out of 553 eggs were hatched and developed into tadpoles. Seven days later, the total length of the tadpoles were 5-6 mm ( $mean=5.4 \pm 0.52$  mm,  $n=10$ ) (Gosner's stage 25). The tadpoles remained dark brown in colour, oval in

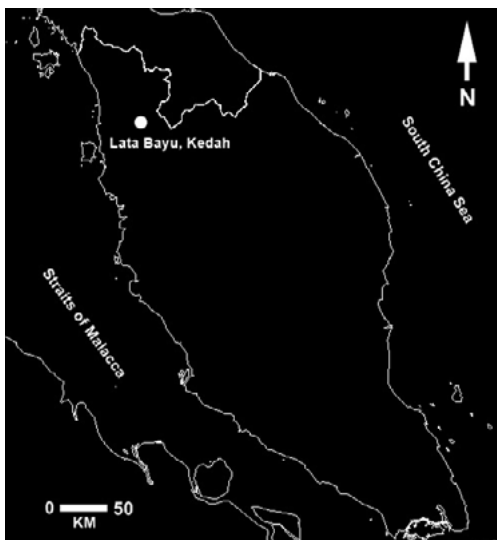


Figure 1. Map of Lata Bayu, Kedah, Peninsular Malaysia



**Figure 3.** A calling male of *S. nigrovittata*



**Figure 4.** Egg clutch of *S. nigrovittata*

shape with a light tapering tail. The larval development phase followed Gosner (1960). All the tadpoles were released back to their natural habitat after measurements have been made.

Currently, 107 amphibian species inhabit the forests of Peninsular Malaysia but information and knowledge on their reproductive biology is poorly known. Previous data for Malaysia on breeding ecology of frogs has been documented for *Fejervarya limnocharis* and *Fejervarya cancrivora* (Ibrahim et al., 1999), *Chalcorana labialis* (Shahriza et al., 2010: 2016) and *Ingerophrynus parvus* (Shahriza et al., 2012: 2015). *Sylvirana nigrovittata* is a common frog but one currently considered in decline across its range (IUCN, 2015). The observations herein therefore add to the understanding of frog reproductive biology from Peninsular Malaysia.

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