

## ***Leptomantis fasciatus* (Boulenger, 1895) as a possible nuptial gift offered by a male Raffles's Malkoha, *Rhinortha chlorophaea* (Raffles, 1822)**

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A nuptial gift in nature is generally a courtship offering, such as nutritional materials or secretions, that is presented by one partner to the desired mate as a prelude to sexual reproduction. Such an offering may serve to improve reproductive fitness of the donor and, frequently, of the recipient as well (see Lewis and South, 2012). The phenomenon is not uncommon and known from a variety of invertebrate groups, as diverse as molluscs, insects, and spiders (Albo and Costa, 2010; Pauchet et al., 2015), and it has been more rarely reported in birds (Lack, 1940; Lewis et al., 2014).

On 21 May 2017, the rhacophorid frog *Leptomantis fasciatus* (Boulenger, 1895) was observed and photographed in the bill of a male Raffles's Malkoha, *Rhinortha chlorophaea* (Fig. 1), a 30-cm passerine related to cuckoos (family Cuculidae), during courtship, close to the canopy of a hill dipterocarp forest on Borneo. This bird is distributed from Myanmar and Thailand, south through the Malay Peninsula, to Sumatra and Borneo and associated islands (Smythies, 1999: 328). Weather conditions at the time of these observation were bright overcast, and a sequence of 66 images was recorded using a Canon EOS 1D X MkIII camera, mounted with a EF500mm f/4L ISII USM lens, with 1.4x III converter, for a focal distance of 700 mm. These were taken as part of natural history observations from the canopy walkway for about five hours a day, during 7–14 days, conducted five times a year, over a five-year period. In the following description, times related to the

encounter are indicated as hours, minutes, and seconds (hh:mm:ss). The entire encounter is documented in Appendix I.

During the current observation, the male bird placed itself on the base of the outstretched wings of the female while holding the frog transversely across its pectoral-scapular region. The observation took place at a height of ca. 36 m above ground, within a primary mixed dipterocarp forest at the Belalong Canopy Walkway (4.5518°N, 115.1603°E; WGS 84), within the Ulu Temburong National Park, Temburong District, Brunei Darussalam. The pair was first sighted at 8:17:50.76 h, with the female in open view and perched on a semi-horizontal branch and the male largely concealed by leaves, ca. 30 cm to the left of the female.

About one third of a second later (at 8:17:51.11 h), the male changed its position slightly and revealed the frog in its bill, as viewed by the observers through an incomplete screen of twigs and leaves. At 8:17:51.71 h, the male appeared to present the frog to the female, holding the frog laterally to the female, dorsally to the camera. Just under one second later (at 8:17:52.60 h), the male mounted the wings of the female, which she held in a sub-horizontal position. The male stood laterally to the body of the female so that the left lateral view of male and frontal view of female were captured. The male then turned its body so as to be nearly parallel to that of the female. At 8:17:53.20 h, roughly 2.5 s after the birds were first sighted, mating was presumed to have started, with the male mounted over the body of the female. Mating lasted for a total of 1.67 s, until 8:17:54.87 h when the bird's posture changed. About half a second later, the male unmounted to the right of the female, still holding the frog. About 10 s later, the male moved behind the female. Another second later, he leapt forward with the frog in its beak to a near-vertical branch a few centimetres away, and a fraction of a second later he leapt to another branch, ca. 35 cm away. About 26 s later, the birds had swapped positions,

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**Figure 1.** A courting male Raffles's Malkoha (*Rhynortha chlorophaea*) presenting a Banded Treefrog (*Leptomantis fasciatus*) as a nuptial gift to his mate, at the Belalong Canopy Walkway, Ulu Temburong National Park, Brunei Darussalam. Photograph by Hans Hazebroek.

with the male back on the mating branch and the female on the vertical branch. About 2 s later, the male moved to perch in front of the female. Less than 8 s after this, the female returned to the mating branch. At 8:18:43.45 h, the female looked towards the male, which was observed still holding on to the frog, before flying off. The entire encounter lasted a little over 52 s.

Subsequent images to the one presented in Fig. 1 show the male holding the frog after the female departed. It is unclear whether the female failed to accept the presumed nuptial gift, or if the male did not intend to give it to her. This particular pair was known to hold territory in the area around the Belalong Canopy Walkway, and the birds have often been seen foraging in the canopy,

presumably for small prey, such as caterpillars. The frog may have been discovered in canopy habitat while resting by day.

The Banded Treefrog, *Leptomantis fasciatus*, is a mid-sized (snout–vent length to 55 mm) arboreal rhacophorid found in lowland forests of Borneo (Inger et al., 2017). Characteristic features of the frog observed in the images that identify it as *L. fasciatus* include a widened head; long, slender, webbed feet; expanded digit tips; a uniformly brown dorsum; darkly banded dorsal parts of the hindlimbs; faintly rufous pes; pale venter and variegated flanks. Little has been recorded of its natural history on account of its rarity, and there has been no documentation of it as prey despite intensive

herpetological surveys in the past three decades (Das, 1995; Grafe et al., 2010).

The diet of Raffles's Malkohas has been described as insects, including "caterpillars, cicadas, crickets, beetles, locustids" (Smythies, 1999: 328). Confamilial species, such as the Red-faced Malkoha (*Phaenicophaeus pyrrhocephalus*) from Sri Lanka (Kamalgoda and Anthony, 2003; Sirimanna et al., 2011) and the Chestnut-breasted Malkoha (*P. curvirostris*) from Borneo (Smythies, 1999: 331) have been recorded to feed on lizards. This observation is the first report of avian predation on *L. fasciatus*, as well as the first record of a frog in the diet of *R. chlorophaea*. Perhaps more interesting for a behavioural ecologist, it presents a first, rare documentation of presumed nuptial gift-giving or 'nuptial bragging' via offering of perhaps a novel dietary item by a male Malkoha.

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**Appendix I.** Sequence of behaviour noted related to the offering of a *Leptomantis fasciatus* as a possible nuptial gift by a male Raffles's Malkoha, *Rhinortha chlorophaea*.

Photo ID	Time	Activity
BQ0I5604	08:17:50.76	Raffles Malkoha pair first sighted; female in open view perched on sub-horizontal branch, male largely concealed by leaves, ca. 30 cm to the left of female
BQ0I5608	08:17:51.11	male changes position slightly (mm-sized shift), frog in his bill can be unmistakably glimpsed between twigs and leaves
BQ0I5609	08:17:51.71	male 'presents' frog to female, holding it ca. 4 cm in front of her, exposing part of his dorsal side to the camera
BQ0I5612	08:17:52.60	male mounts female, standing on her wings; wings are held sub-horizontal but not stretched out; body of male at right angles to body of female
BQ0I5615	08:17:52.87	male turns his body to be approximately parallel to body of female
BQ0I5619	08:17:53.20	mating begins
BQ0I5639	08:17:54.87	mating ends
BQ0I5640	08:17:55.27	male unmounts female to stand on her right while holding frog
BQ0I5644	08:18:05.48	male moves behind female to her left while continuing to hold frog
BQ0I5647	08:18:06.76	male leaps forward while holding frog
BQ0I5649	08:18:06.94	male leaps forward again to reach another branch some 35 cm ahead, continuing to hold the frog
BQ0I5655	08:18:32.96	male has swapped position with female and has returned to mating branch with the frog, while female has moved up to his left
BQ0I5661	08:18:34.79	male moves up to the level of female and perches in front of her, largely hidden from camera view
BQ0I5664	08:18:42.06	female returns to mating branch; male is largely hidden between leaves above and behind female with only his tail visible
BQ0I5670	08:18:43.45	female looks towards male (partly hidden in foliage) before she flies off