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Yet another kukri snake piercing an anuran abdomen: *Oligodon ocellatus* (Morice, 1875) eats *Duttaphrynus melanostictus* (Schneider, 1799) in Vietnam

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Abstract

A case of *Oligodon ocellatus* eating a toxic adult toad, *Duttaphrynus melanostictus*, in Cat Tien National Park, southern Vietnam, is provided. We found a kukri snake having buried its head deeply into the abdomen of the toad and probably being in the process of eating organs. Subsequently, the toad was swallowed whole and the kukri snake moved away and disappeared with the toad's hind feet still visible from its mouth. It is hypothesised that the behaviour of eviscerating or piercing anurans to eat their organs has been developed in the *O. cyclurus* species group or clade. This has now been observed in three species.

Key Words

Anura, behaviour, Bufonidae, bufotoxin, Colubridae, organs, poison, posterior maxillary teeth, Squamata

Introduction

Recently, a unique and novel feeding mode amongst snakes was described as the kukri snake *Oligodon fasciolatus* had been observed cutting open the abdomen of the poisonous toad *Duttaphrynus melanostictus* and eating its organs (Bringsøe et al. 2020). Here, we provide an example of a similar behaviour in the closely-related species *Oligodon ocellatus*, the Ocellated Kukri Snake.

In comparison with *O. fasciolatus*, *O. ocellatus* has a more eastern range and lives in Vietnam, Cambodia, Laos and eastern Thailand (Stuart et al. 2006; Vassilieva et al. 2016; Pauwels et al. 2021). The present observation was made in Cat Tien National Park, which is, by Geissler et al. (2011), considered the southernmost known occurrence in Vietnam. *Duttaphrynus melanostictus* occupies a large distribution in southern and south-eastern Asia and is especially common in urban areas (Bringsøe et al. 2020).

At 19:22 h on 31 May 2020, a large (approx. 70 cm total length) *O. ocellatus* was found preying on a large (approx. 13 cm SVL) female *D. melanostictus* on the tiles of the main foyer of Forest Floor Lodge, Cat Tien National Park, Dong Nai Province, Vietnam. Coordinates of the locality: 11°26.15'N, 107°25.69'E and altitude approx. 130 m a.s.l. The lodge is situated on the banks of the Dong Nai River and is surrounded by mixed *Lagerstroemia* and *Dipterocarpus* secondary forest. When first observed, the snake's head was buried to the posterior edges of its eyes into the abdomen of the toad and the snake was moving its head and neck side to side as if trying to work its way inside (Fig. 1). The toad was dead. Blood from the toad had spread on to the tiles. At 19:56 h, the snake removed its head from the side of the toad and moved around to begin swallowing the toad headfirst (Fig. 2). At 19:58 h, the snake dragged the toad several centimetres away before continuing to swallow it. Ten minutes later, the snake moved away when only the hind feet were sticking out

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Figure 1. *Oligodon ocellatus* retracting its head from the abdomen of *Duttaphrynus melanostictus*, into which it was previously deeply buried. Photo JH.

Figure 2. Eventually *Oligodon ocellatus* started swallowing *Duttaphrynus melanostictus* whole. This process was observed until only the hind feet of the toad were sticking out of the snake's mouth as the snake moved away. Photo JH.

of the snake's mouth. No further sign of the snake or the toad was seen later.

Both species are commonly seen around the headquarters of the National Park. Due to the nightly appearance of a toad in the same corner, it is believed the same toad had occupied that space for two or more years. The biology of *O. ocellatus* is very poorly known as, basically, nothing has been published. Thus, its diet is hitherto unknown. In trophic terms, we believe it may well be a generalist, eating a wide variety of vertebrates including reptile eggs, as documented for two relatives of the *O. cyclurus* species group, namely *O. fasciolatus* and *O. formosanus* which also eviscerate anurans (Bringsøe et al. 2020, 2021).

As reported earlier (Bringsøe et al. 2020), similar predation by *O. fasciolatus* on *D. melanostictus* may take hours before the toads die. This means that the event might have taken place more than an hour before the observer arrived. The volume of blood present on the tiles indicates the struggle had taken place over an area of about 1 m^2. The observation of the snake having its head inserted deeply into the toad's abdomen suggests that *O. ocellatus* may use the same feeding strategy for eating organs after having slit open the abdomen with the enlarged posterior maxillary teeth. As was observed in *O. fasciolatus*, we assume that the snake successfully swallowed the toad whole. We find it likely that it had first managed to eat some organs.

Bringsøe et al. (2020) speculated that ingestion of organs of toads might occur because *O. fasciolatus* tries to avoid the bufotoxins from the parotid glands in the neck region and smaller glands on the back, due to the snake lacking resistance to the bufotoxins, although one semi-adult *D. melanostictus* was swallowed whole by *O. fasciolatus*. However, the present observation provides a strong sign that certain species of kukri snakes are fully resistant to bufotoxins and that prey size is crucial in determining whether toads and other anurans can be swallowed whole. The unique behaviour of eviscerating anurans and eating their organs may have potentially evolved specifically in the *O. cyclurus* species group or clade because it has now been recorded in three of its species, *O. fasciolatus*, *O. formosanus* and *O. ocellatus* (Bringsøe et al. 2020, 2021), although the biology of most of the 83 *Oligodon* species (Uetz et al. 2020; Pauwels et al. 2021) is poorly known. Unfortunately, in two earlier studies of squamate resistance to toads' cardiac glycoside toxins (Ujvari et al. 2015; Mohammadi et al. 2016), *Oligodon* spp. were not included.

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