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First reported predation of a Clouded Monitor (*Varanus nebulosus*) by the Reticulated Python (*Malayopython reticulatus*) in Singapore

Przemysław Zdunek^{1,*} and Marcel Finlay²

Certain monitor lizards of the family Varanidae are known to feed on snakes (Karunaratna et al., 2017; Ong and Sy, 2019; Godwin et al., 2020). In comparison, predation by snakes on monitor lizards in various countries has been observed with increasing frequency (Table 1). Prey sizes and feeding frequencies depend on size: small snakes feed primarily on small mammals, and larger individuals choose larger prey (Shine et al., 1998).

The Clouded Monitor, *Varanus nebulosus* (Gray, 1831), is a semi-arboreal lizard and one of the most widely distributed varanid species throughout much of South and Southeast Asia (Koch et al., 2013; Auliya and Koch, 2020). There are few observations of predation by snakes on these varanid lizards: Bringsøe (2020) proved predation ended with the success of *Boiga melanota* (Boulenger, 1896) from Thailand, while Chan (2019) showed the attempted predation on *Varanus nebulosus* by *Ophiophagus hannah* (Cantor, 1836) in Indonesia. In both cases, the lizards were juvenile. A documented case of *Ophiophagus hannah* successfully predating on an adult *Varanus nebulosus* (40–50cm) comes from northeastern Thailand (Jones et al., 2020).

The Reticulated Python, *Malayopython reticulatus* (Schneider, 1801), is a large terrestrial predator that also occurs in Singapore and is commonly encountered in the highly urbanised landscape there. It feeds mainly on mammals ranging from rats, bats, squirrels to large prey such as wild boars (Devan-Song et al., 2017). This snake occasionally feeds on varanids, e.g., *Varanus*

salvator macromaculatus (Laurenti, 1768) (Shine et al., 1998; Auliya and Abel, 2000; Corlett, 2011).

On 22 July 2022, at 17:12 h, a reticulated python was observed swallowing a clouded monitor in a drain, several hundred meters from a human-inhabited area, at the side of an abandoned road with a secondary forest on either side in Onraet Road, Mount Pleasant, Singapore (1.3294°N 103.8328°E; 23 m elevation). This incident occurred on a day after a heavy downpour. The capture of the lizard by the snake was not seen. The *Malayopython reticulatus* grasped the *Varanus nebulosus* by the head and coiled tightly around its torso (Fig. 1). The size of the lizard was estimated to be approx. 100 cm total length, and the snake was 8–10 cm in diameter. Both animals did not move during the 12 minutes of the whole observation. The snake likely swallowed the lizard and moved away as it was not spotted at the site 24 hours later. The site is adjacent to a Chinese cemetery and visitors would potentially be a disturbance to the snake.

Low et al. (2016) reported the predation by a *Malayopython reticulatus* of a large lizard (*Iguana iguana*) in Singapore, suggesting biological control of invasive species by the snake. To the best of our knowledge, this is the first observation of predation by *Malayopython reticulatus* on *Varanus nebulosus* in Singapore. Observations such as these, even as single events, broaden the scope of information about the natural history and ecology of monitor lizards and their ophidian predators.

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Table 1. Predation records for snakes on monitor lizards excluding those described in this work of *Varanus nebulosus*.

Monitor lizard species	Snake species	Age	Type of observation	Location	Reference
<i>Varanus albigularis</i>	<i>Naja annulifera</i>	Juvenile	-	Southern Africa	Shine et al., 2006
<i>Varanus albigularis</i>	<i>Naja nigricincta</i>	-	-	Southern Africa	Shine et al., 2006
<i>Varanus bengalensis</i>	<i>Python molurus</i>	Adult	Direct observation*	India	Mash, 1945
<i>Varanus bengalensis</i>	<i>Python molurus</i>	Adult	Direct observation	India	Bhardwaj, 2007
<i>Varanus bengalensis</i>	<i>Ophiophagus hannah</i>	-	-	India	Bhaisare et al., 2010
<i>Varanus bengalensis</i>	<i>Ahaetulla anomala</i> **	Juvenile	Direct observation	India	Chowdhury et al., 2017
<i>Varanus bengalensis</i>	<i>Ptyas mucosa</i>	Juvenile	-	Sri Lanka	Karunaratna et al., 2017
<i>Varanus bengalensis</i>	<i>Python molurus</i>	Adult	-	Sri Lanka	Karunaratna et al., 2017
<i>Varanus bengalensis</i>	<i>Naja naja</i>	Juvenile	-	Sri Lanka	Karunaratna et al., 2017
<i>Varanus bengalensis</i>	<i>Ophiophagus hannah</i>	Adult	Direct observation	India	Joshi, 2018
<i>Varanus bengalensis</i>	<i>Naja naja</i>	Adult	Direct observation	India	Vyas et al., 2022
<i>Varanus bengalensis</i>	<i>Ptyas mucosa</i>	Juvenile	Direct observation	India	Vyas et al., 2022
<i>Varanus cumingi</i>	<i>Ophiophagus hannah</i>	Subadult	Direct observation	Philippines	Siler et al., 2011
<i>Varanus doreanus</i>	<i>Aspidites melanocephalus</i>	Juvenile	Stomach contents	Australia	Natusch and Lyons, 2017
<i>Varanus gouldii</i>	<i>Aspidites ramsayi</i>	Adult	Direct observation	Australia	Bruton, 2013
<i>Varanus indicus</i>	<i>Boiga irregularis</i>	Juvenile	Stomach contents	Guam	Wostl et al., 2011
<i>Varanus palawanensis</i>	<i>Ophiophagus hannah</i>	-	Direct observation	Philippines	Sy and Ong, 2019
<i>Varanus salvator</i>	<i>Boiga dendrophila</i>	-	Stomach contents	Southeast Asia	Greene, 1989
<i>Varanus samarensis</i>	<i>Ophiophagus hannah</i>	-	Direct observation	Philippines	Sy, 2021

* Observation in captivity.

** Initially misidentified as *Ahaetulla nasuta* (Kalki and Weiss, 2020).

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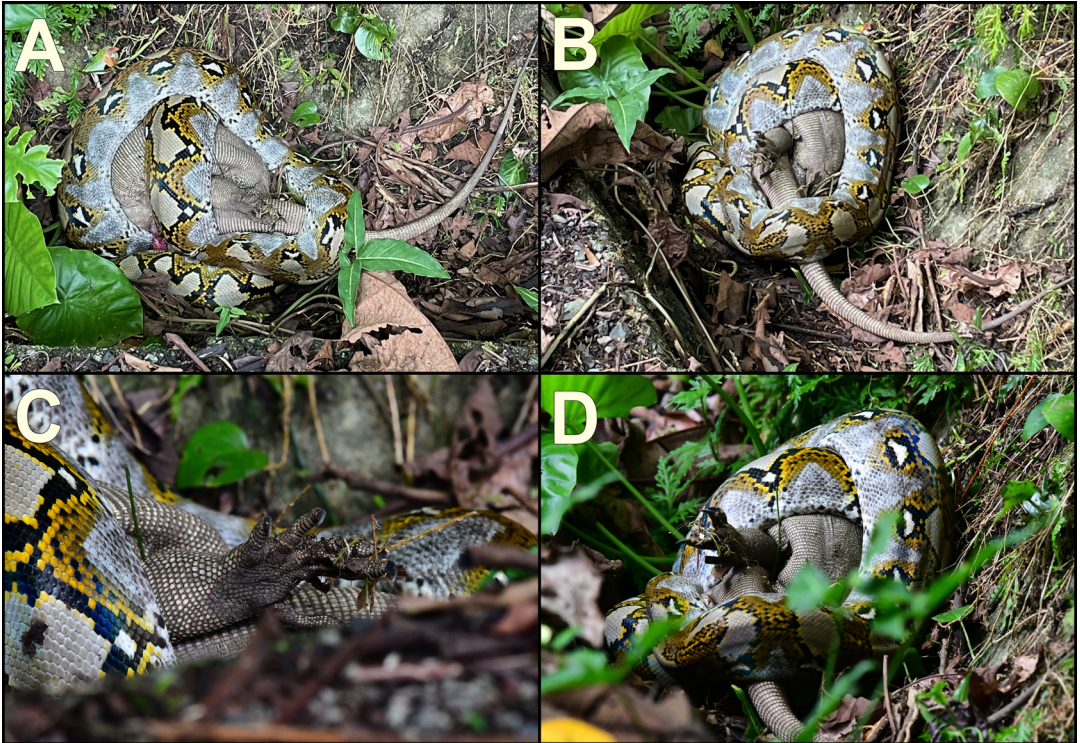


Figure 1. Pictures showing the position (in different angles; A–D) of a reticulated python (*Malayopython reticulatus*) feeding on an immobilised adult clouded monitor (*Varanus nebulosus*). Photographs by Marcel Finlay.

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Table 1. Predation records for snakes on monitor lizards excluding those described in this work of *Varanus nebulosus*.

<i>Varanus bengalensis</i>	<i>Python molurus</i>	Adult	Direct observation	India	Bhardwaj, 2007
	Correct species:				
<i>Varanus bengalensis</i>	<i>Eryx conicus</i>	Adult	Direct observation	India	Bhardwaj, 2007