An observation of predation by a Yellow-spotted Monitor (*Varanus panoptes panoptes*) on a venomous Lesser Black Whipsnake (*Demansia vestigiata*)

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Abstract

We report on an observation of a large Yellow-spotted Monitor (*Varanus panoptes panoptes,* Varanidae) successfully predating upon a venomous Lesser Black Whipsnake (*Demansia vestigiata*, Elapidae). The medium-sized elapid snake managed to bite the monitor several times before being consumed. The monitor displayed signs of neurotoxic envenoming, including hind limb lethargy, before making a rapid and full recovery. This observation corroborates research findings on varanid resilience to neurotoxic binding and cephalic osteoderms as a defence against venomous prey.

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Introduction

Cape York is a biodiversity hotspot due to the variety of ecosystems and the warm, wet tropical climate. The region is particularly rich in reptiles, including venomous snakes of the elapid family (Elapidae). Despite their defensive capabilities, venomous snakes are a food source for other native predators such as raptors, kookaburras, other snakes, and monitor lizards.

Large Australian monitor lizards (*Varanus* sp.), referred to locally as 'goannas', are apex predators that speciated rapidly in a landscape devoid of native placental mammal carnivores when they colonised Australasia (Sweet & Pianka 2007). The widely distributed Yellow-spotted Monitor (*Varanus panoptes*) is a large-bodied terrestrial lizard reaching a total length of 1.4 m (Wilson & Swan 2021). They have a generalist diet, consisting of anything they can overpower, including: insects, mammals, birds, amphibians, snakes, even other monitor lizards and smaller members of their own species (Shine 1986; James *et al*. 1992; Christian 2004; Rhind & Doody 2011). To defend against injury or envenoming by predators, prey, or competitors, many monitor lizards have armouring in the form of cephalic osteoderms (Erickson *et al*. 2003; Maisano *et al*. 2019). Additionally, some monitors have demonstrated resistance to neurotoxins in snake venoms, hypothesised as a defence against predation by venomous snakes (Jones *et al*. 2021). Other studies have indicated that the group are still susceptible to blood-targeting coagulotoxins (Youngman *et al*. 2021).

Both Lesser (*Demansia vestigiata*) and Greater Black Whipsnakes (*D. papuensis*) are considered potentially dangerous to humans, and should be treated with caution. Bites are reported to cause painful localised swelling and may be severe, especially in children. There is also evidence of a fatal human envenoming by *D. vestigiata* in Papua New Guinea (Jackson, unpublished data), although this case is impossible to substantiate. The diet of *Demansia* species is dominated by scincid lizards (Shine 1980). Both species of Black Whipsnake are active diurnal predators, relying on their speed and fast-acting venom to chase down and incapacitate prey (Jackson *et al*. 2016). Here we report on an observation of *V. panoptes* capturing and consuming *D. vestigiata*. The observation occurred on 22 June 2023 at the mouth of the Starcke River, southeast Cape York Peninsula, Far North Queensland.

Observation and Discussion

We were aware of the Yellow-spotted Monitor in the area, having observed it basking near the Starcke River boat ramp earlier that day. The Juunjuwarra Traditional Owners were familiar with this individual monitor, referring to it affectionately as 'stumpy the traveller' in reference to its distinctive shortened tail from an old injury and because it has been observed as far as 6 km from its regular site at the Starcke River boat ramp. Despite large monitor lizards (*guwarrga* in *Guugu Yimitharr*) being sought-after traditional foods for the Juunjuwarra people, 'stumpy' has remained untouched. Pictured behind the monitor lizard is *bukka balinga* (Round Hill), a culturally significant site to the Juunjuwarra people containing a permanent freshwater spring and is marked by many scar trees (Fig. 1).

The Juunju ranger team were at the Starcke River boat ramp site constructing a fence and gate, funded by Cape York NRM and intended to exclude vehicles from sensitive coastal habitat. Upon hearing a commotion behind us, we rushed over to find the Yellow-spotted Monitor with a Lesser Black Whipsnake in its mouth (11:40 a.m.). Initially, the sight of the team rushing over startled the monitor, which dropped its prey. The snake, being too injured to flee, was retrieved by the monitor a few seconds later. The monitor picked up the snake mid-body, enabling the snake to bite the monitor on the neck and lower jaw – areas of the monitor where cephalic osteoderms are at their highest concentrations (Erickson *et al*. 2003; Maisano *et al*. 2019) – several times (11:43 a.m.; Figs. 2, 3). The monitor then dropped its prey and gripped it by the head, pinning it to the gravel and shaking its head violently (11:46 a.m., Fig. 4). The monitor then manipulated the snake, crushing the head in its jaws before swallowing the snake whole (11:47 a.m.; Figs. 5, 6). The observed event lasted about seven minutes, but we did not see the original interaction or capture of the snake where an initial bite may have occurred.

Figure 1. The Yellow-spotted Monitor post meal with bukka balinga (Round Hill) in the backdrop. All photos are by J.S. Dobson.

Figure 2. The Lesser Black Whipsnake biting the Yellow-spotted Monitor.

Figure 3. The Yellow-spotted Monitor capturing the Lesser Black Whipsnake mid-body, allowing the snake to bite the monitor on the neck.

Figure 4. The Yellow-spotted Monitor pinning and shaking the Lesser Black Whipsnake.

Figure 5. The Yellow-spotted Monitor manipulating the Lesser Black Whipsnake to bite the head.

Figure 6. The Yellow-spotted Monitor moments before swallowing the Lesser Black Whipsnake.

Upon completing its meal, the monitor remained still for about five minutes, despite the number of observers in close proximity. When it eventually moved on, the lizard was noticeably dragging its hind legs, a sign common in cases of postsynaptic neurotoxic envenoming. Australian elapid venoms are rich in 3-finger toxins (3FTxs), which typically inflict neurotoxicity by binding and antagonising postsynaptic nicotinic acetylcholine receptors. However, whilst 3FTxs are present in *D. vestigiata* venom, they exist in relatively small quantities in a venom apparently dominated by enzymatic toxins (St Pierre *et al*. 2007; Jackson *et al*. 2016). Whilst the observed signs were consistent with post-synaptic neurotoxicity caused by 3FTxs, it is always possible that a distinct toxin class, or combination of factors, contributed to the monitor's impairment.

We observed the monitor for about 10 minutes post meal. In that time, the monitor appeared to make a full recovery. This observation is consistent with findings that some monitor lizards may have resistance to 3FTx binding, or that cephalic osteoderms may help prevent severe envenomings. This large individual monitor is a welcome sight given their numbers have declined significantly in some areas since Cane Toads (*Rhinella marina*) arrived (Doody *et al*. 2009). As *D. vestigiata* are by far the most commonly encountered diurnal elapid in the area (JSD, personal observation), they may provide an important food source for large monitors in the region.

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