

Biodiversity Record: Predation of variable reed snake by blue Malayan coral snake

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Subjects: Blue Malayan coral snake, *Calliophis bivirgatus flaviceps* (Reptilia: Squamata: Elapidae);
Variable reed snake, *Calamaria lumbricoidea* (Reptilia: Squamata: Colubridae).

Subjects identified by: Kamalakaran Raja and Jerome Lee.

Location, date and time: Singapore Island, Upper Seletar Reservoir Park, Mandai Track 7; 22 March 2023; 2110–2203 hrs.

Habitat: Fringe of secondary forest.

Observers: Kamalakaran Raja, Bhavani Mahendran, Jerome Lee, Shanyl Ong, Cecily Lim, Emmanuel Goh and Bryan Seah.

Observation: A blue Malayan coral snake of about 100 cm total length, was encountered in the leaf litter adjacent to the road. It was biting onto the midsection of a variable reed snake (Fig. 1) that was estimated to be about 30 cm total length. The reed snake was gripping onto branches and rocks to break free from the coral snake. In a span of over 30 to 40 minutes, the coral snake constantly readjusted its bite, moving closer to the reed snake's head. Concurrently, the reed snake made intermittent bursts of movement, attempting to burrow or slither away. When the coral snake bit on the part of the reed snake that was less than 10 cm from the latter's head, both snakes rolled and twisted about rapidly (Fig 3). Without releasing its bite, the coral snake readjusted its grip and worked its jaws towards the head of the reed snake. Once its jaws reached the head of the reed snake, the coral snake proceeded to swallow it (Fig. 4). The reed snake was motionless once the swallowing began, but it was not clear if it had already died. The swallowing process took six minutes, following which the coral snake slithered off into the nearby vegetation away from the road.

Remarks: Like other members of its genus, *Calliophis bivirgatus* feeds on snakes, occasionally other venomous ophiophages; at least one act of cannibalism has been observed in this species locally (Anonymous, 1988 as *Maticora bivirgata*). Current studies show that the venom of *Calliophis bivirgatus*, a unique cytotoxin known as callitoxin (Yang et al., 2016), is known to be fast-acting and cause spasticity and paralysis (Tan et al., 2015), potentially subduing prey quickly to prevent it from both escaping or endangering the predator itself (Yang et al., 2016). However, the venom did not seem fast-acting in this observed instance, where the time between encountering the snakes and ingestion of the prey was almost 50 minutes. An observation of *Calliophis bivirgatus* predating on a pink-headed reed snake (*Calamaria schlegeli*) was recorded to last over two hours (Koh, 2020). Envenomation should have occurred when the coral snake was biting on to the reed snake.

The behaviour of biting and holding on to prey has also been observed in three other *Calliophis bivirgatus* predation events involving a barred kukri snake (*Oligodon signatus*) (Xu & Teo, 2013), an orange-bellied ringneck (*Gongylosoma baliodeirum*) (Meija, 2014), and a pink-headed reed snake (*Calamaria schlegeli*) (Koh, 2020). Apart from the aforementioned predation event involving a conspecific (Anonymous, 1988 as *Maticora bivirgata*), none of the other prey species were observed to defend themselves against the predatory coral snake by biting back. While the rapid twisting and spinning that was observed towards the end of this observation could have been a final attempt by the reed snake to break free from the jaws of the coral snake, it could also have been the former undergoing muscle spasms as the venom took hold (Dashevsky et al., 2021). This prolonged process of succumbing to the venom and multiple escape attempts by *Calamaria lumbricoidea* somewhat mirrors that of the predation event involving a *Calamaria schlegeli* (Koh, 2020). These could hint at members of the genus *Calamaria* bearing some manner of resistance towards the venom of *Calliophis bivirgatus*.



Fig. 1. Coral snake in the leaf litter, biting on to the midsection of a variable reed snake. (Photograph by: Shanyl Ong).



Fig. 2. Reed snake slithering away in an attempt to break free from the coral snake's jaws. (Photograph by: Jerome Lee).



Fig. 3. Reed snake went into a violent roll, either to break free or due to muscle spasms from envenomation. Note how the coral snake is close to losing its grip. (Photograph by: Bryan Seah).



Fig. 4. The swallowing process took under six minutes. A) Coral snake devouring the variable reed up to its mid-section. B) Ingestion almost complete with the tail tip disappearing into the coral snake's mouth. (Photographs by Shanyl Ong).

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