Prey-handling in the Bornean Keeled Pit-viper *Tropidolaemus subannulatus*

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Abstract : The plasticity of feeding behaviour of predators is strongly influenced by foraging mode, depending on whether they are active foragers, sit-and-wait predators or opportunist feeders. In this study, we conducted ex-situ feeding experiments on the Bornean Keeled Pit-viper, *Tropidolaemus subannulatus*, a lowland rainforest species distributed on Borneo, Sulawesi and the Philippines. Observations were based on four wild-collected females maintained under laboratory conditions. A total of eight common predatory behaviours were observed that can be classified into three discrete phases, namely, pre-capture, feeding, and post-feeding phases, during experiments with new-born and live young *Rattus norvegicus*. In the pre-capture phase, which is temporally the shortest, there were head shifts, eye fixation and head movement towards prey. During the long feeding phase, actions involved strikes, awaiting to ensure prey death, and swallowing of prey. Post-feeding phase is a process of muscular recovery, followed by high-rate of tongue flicks, that can last for up to 15 min. Understanding foraging and prey-handling behaviour has the potential to provide deeper understanding on evolutionary fitness, as well as the biotic and abiotic factors which interacts with the concerned species.

Keywords: snake, ethogram, feeding, prey predator, behaviour.

INTRODUCTION

Prey immobilisation options available for snakes that consume large prey are constrained by their lack of limbs, and restricted largely to constriction or envenomation. Striking is a distinctive technique of defence as well as a predatory mechanism (Lillywhite 2014). A predatory strike is apparently calculated and carefully executed, a successful strike requiring the capability to cover spatial distance between the predator and its target, ensuring the latter has no time to respond to the strike, and be accurately make physical contact with the target (Young 2010). Snakes can strike at speeds beyond the tracking capacity of the human eye, and it has been reported that a snake lunge can take under half a second, from resting position, erection of fangs, injection of venom and return to initial stance (Kardong 1986, Kardong and Bels 1998, LaDuc 2002).

Among venomous species, envenomation strategy tends to be different, depending on the nature of prey. Larger prey tends to be envenomated and immediately released, since large prey may be dangerous and can actively struggle. On the other hand, snakes typically maintain a grasp on smaller prey types, and continue to hold them in the mouth firmly prior to swallowing, which takes place after the prey ceases to struggle (Lillywhite 2014). Snakes typically transport their prey via asynchronous ratcheting movements of their upper jaws in which the jaws from left or right side of the head, alternately move over the prey (Gans 1961, Cundall 1987, Kley and Brainerd 1999), suggesting that the lower jaws have little direct role in prey transportation, but act as a control of prey position in the mouth and to press it against teeth of the overlying palatine and pterygoid bones.

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