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Araneophagic behaviour of the elusive snake *Liopeltis calamaria* (Günther, 1858) (Reptilia: Squamata: Colubridae)

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Abstract

Colubrids have evolved various modes and specializations in feeding behaviour including handling dangerous preys. This paper reports araneophagic behaviour in calamaria reed snake, *Liopeltis calamaria* (Günther, 1858). In an experiment on feeding behaviour of this species, conducted in captivity, spiders were preferred prey than other soft-bodied insects. This observation confirmed and is in congruence with the earlier observations from the gut content of *Liopeltis* species.

Keywords: Diet, Feeding Behaviour, *Liopeltis*, Nilgiris, Spider

Introduction

The colubrid genus *Liopeltis* Fitzinger 1843, commonly known as reed or striped-neck snakes comprise seven species distributed in south and Southeast Asia (Poyarkov e*t al*. 2019). Among them, *Liopeltis calamaria* (Günther, 1858), originally described from Sri Lanka (Type locality) is also known to be distributed in India and Nepal (Smith, 1943; Bhattarai *et al*. 2017). In India, *L. calamaria* is reported from parts of Central India, Western Ghats and Eastern Ghats (Wall, 1921; Smith, 1943; Srinivasulu e*t al.,* 2014; Chunekar & Alekar, 2015; Narayanan, 2016). Despite its wide distribution, *L. calamaria,* like its congeners, is relatively rare in wild and poorly known in most aspects of the natural history (Smith, 1943; Wall, 1919). Wall (1919) reported an extensive collection of snakes in Nilgiris and Wayanad that included five specimens of *L. calamaria*. In the same work, he had accounted the diet and feeding habit for some of the snakes he collected, but nothing for *L. calamaria*. However, based on the presence of spiders in the stomach, they are suspected to feed on spiders and possibly other arthropods (Manthey & Grossmann, 1997; Jackson e*t al.*, 1999; Poyarkov e*t al*., 2019). In this note, we report a recent sighting of *L. calamaria* from a previously unknown location with new information on its diet and feeding behavior.

Material and Methods

On 26th June 2019 at 12:30 hrs the authors sighted a small, dorsally brown colored snake crossing the road in a tea plantation at Sholur, Nilgiris (11.470910°N, 76.644603°E, 2038m ASL) (Figure 2). The snake was picked live and all morphological data were collected from the live individual for further identification. It was later identified as *Liopeltis calamaria* based on the key diagnostic characters following Wall (1921) and Smith (1943). As nothing was precisely known about diet of the species, we decided to keep the snake in captivity to observe its feeding habit. The snake was kept in a terrarium of 12″ × 6″ × 6″ plastic box with approximately 2″ soil substratum. Small vertebrates and invertebrate preys (Table 1) were collected from residential area and were dropped in to the terrarium to record the feeding preference of the species. The experiment was carried out for a period of 32 days and prey animals were dropped at an interval of 1 day for the first 3 days, followed by one or two preys every day.

Results

Among 31 trials of providing food choices to the snake, 25 trials were positive. The snake showed greater preference for spiders than any other invertebrates, although it

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Table 1. Prey species offered to *Liopeltis calamaria* in captivity

Sl. No.	*Prey species*	*Broad classification*	*Acceptance of prey*
1.	*Cnemaspis* sp.	Reptilia: Squamata: Gekkonidae	Rejected
2.	Gecko egg (*Cnemaspis* sp.)	Reptilia: Squamata: Gekkonidae	Rejected
3.	*Raorchestes* sp.	Amphibia: Anura: Rhacophoridae	Rejected
4.	*Araneus* sp.	Arachnida: Araneae: Araneidae	Accepted
5.	*Neoscona* sp.	Arachnida: Araneae: Araneidae	Accepted
6.	*Hasarius* sp.	Arachnida: Araneae: Salticidae	Accepted
7.	*Oxyopes* sp.	Arachnida: Araneae: Oxyopidae	Accepted
8.	*Dendrolycosa* sp.	Arachnida: Araneae: Pisauridae	Accepted
9.	Jumping spider sp. 1	Arachnida: Araneae: Salticidae	Accepted
10.	Jumping spider sp. 2	Arachnida: Araneae: Salticidae	Accepted
11.	Jumping spider sp. 2	Arachnida: Araneae: Salticidae	Accepted
12.	Grasshopper	Insecta: Orthoptera: Acrididae	Accepted
13.	Mantis	Insecta: Mantodea: Mantidae	Rejected
14.	Earthworms	Annelida: Clitellata: Haplotaxida	Rejected

predated on a grasshopper in one instance. In all the time only live preys were accepted and dead preys were rejected. Unlike most of the snakes, this species caught the prey from the abdomen and the prey was killed before devouring. However, in the case of grasshopper it was devoured head first.

Observations

Upon dropping the spider, the snake always readily attacked the prey by grabbing the abdomen of the spider leaving its head part outside (Figure 1). In all events, the snake ingested the spider from backwards, ingesting the abdomen first and the head later. Also, the snake always held the prey at the backward of its mouth and in most instances crushing the prey against the ground or the terrarium or the surface (Figure 1). The whole process from strike to complete ingestion of the prey usually lasted a minute or less. The list of all the spiders accepted is provided (Table 1). The snake, however, also accepted the grasshoppers twice. Nevertheless, we also tried other smaller non arthropod preys like frogs, gecko eggs and others (Table 1) but, none of these were accepted.

Figure 1. Feeding habit and prey capture in *Liopeltis calamaria* (Günther, 1858). A-E: the snake feeding on spiders, F: the snake feeding on grasshopper.

Figure 2. *Liopeltis calamaria* (Günther, 1858) captured from Sholur, Nilgiris.

Discussion

Arthropods in the diet of snakes are not unheard of, as several other snakes *Opheodrys aestivus*, *Symphimus mayae*, *Philodryas agassizii*, *Stenorrhina freminvillei*, *Indotyphlops braminus*, *Gerarda prevostiana, Fordonia lucobalia,* species belonging to the genus *Sonora, Ficimia* and *Pseudoficimia* and in general Typhlopids are known to feed on spiders and other arthropods (Stafford, 2005; Mizuno & Kojima, 2015; Wall, 1919; Brennan & Holycross, 2006). Although, previous works hinted the possible spider predation in other *Liopeltis* based on the gut content (Poyarkov e*t al*., 2019; Jackson e*t al*., 1999), no direct records or observations were known, at least to the best of our knowledge. Furthermore, such behavior of holding arthropods from backwards and crushing against the floor is previously known in *Rena dulcis* (Reid & Lott, 1963). But, in no events the snake severed or decapitated the head of the prey as mentioned in *Rena dulcis* (Reid & Lott, 1963) and *Indotyphlops braminus* (Mizuno & Kojima, 2015).

Dealing with toxic preys are often risky but some species of snakes like *Thamnophis sirtalis*, *Tropidonophis* sp., *Hebius pryeri* are known to have evolved resistance for the toxins from the prey (Feldman *et al.,* 2009; Mori & Moriguchi, 1988). Whereas, a few species like *Rhabdophis tigrinus* and the frogs belonging to the family Dendrobatidae are known to sequester poison from the prey species (Hutchinson e*t al.,* 2007; Santos and Grant, 2011). With current observation, it is certain that spiders and other arthropods comprise an important part of the diet of *L. calamaria* as suspected in the previous studies. However, it can also be possible that the diet likely consists of other invertebrates and/or unknown preys. Further observation on its feeding behavior and toxin resistance and sequestering, if any, is of broader interest towards understanding the natural history of this elusive species.

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References

Bhattarai, S., Chalise, L., Gurung, A., Pokheral, C.P., Subedi, N. and Sharma, V. 2017. Geographic distribution: *Liopeltis calamaria* (Lined Stripe-necked Snake). *Herpetological Review*, **48**(1): 129.

Brennan, T.C. and Holycross, A.T. 2006. *A Field Guide to Amphibians and Reptiles in Arizona*. Arizona Game and Fish Department. Phoenix, AZ: 1-150.

Chunekar, H. and Alekar, S. 2015. Range extension of the Calamaria Reed Snake, *Liopeltis calamaria* (Günther 1858) from the Western Ghats, Maharashtra, India. *Reptiles and Amphibians*, **22**: 79-80.

Feldman, C.R., Brodie, E.D. Jr., Brodie, E.D. and Pfrender, M.E. 2009. The evolutionary origins of beneficial alleles during the repeated adaptation of garter snakes to deadly prey. *Proc. Natl. Acad. Sci., U.S.A.*, **106**(32): 13415-20. https://doi.org/10.1073/pnas.0901224106. PMid: 19666534, PMCid: PMC2726340.

Günther, A. 1858. *Catalogue of Colubrine Snakes of the British Museum*. British Museum, London: 1-281.

Hutchinson, D.A., Mori, A., Savitzky, A.H., Burghardt, G.M., Wu, X., Meinwald, J. and Schroeder, F.C. 2007. Dietary sequestration of defensive steroids in nuchal glands of the Asian snake *Rhabdophis tigrinus*. *Proc. Natl. Acad. Sci., U.S.A.*, **104:** 2265-70. https://doi.org/10.1073/pnas.0610785104. PMid: 17284596, PMCid: PMC1892995.

Jackson, K., Underwood, G., Arnold, E. N. and Savitzky, A. 1999. Hinged teeth in the Enigmatic Colubrid, *Iguanognathus werneri*. *Copeia*, **1999**(3): 815-18. https://doi.org/10.2307/1447621.

Manthey, U. and Grossmann, W. 1997. *Amphibien and Reptilien Südostasiens*, Natur und Tier-Verlag, Münster, Germany [in German]: 1-512.

Mizuno, T. and Kojima, Y. 2015. A blindsnake that decapitates its termite prey. *Journal of Zoology*, **297**: 220-24. https://doi.org/10.1111/jzo.12268.

Mori, A. and Moriguchi, H. 1988. Food habits of snakes in Japan: A critical review. *Snake*, **20**: 98-113.

Narayanan, S. 2016. On the occurrence of the Calamaria Reed Snake *Liopeltis calamaria* (Günther, 1858) (Squamata: Colubridae), in the Kalakadu Mundanthurai Tiger Reserve. *India Reptile RAP*, **18**: 29-30.

Nikolay, A. Poyarkov, Jr., Nguyen, T.V. and Vogel, G. 2019. A new species of the genus *Liopeltis* Fitzinger, 1843 from Vietnam (Squamata: Colubridae). *Journal of Natural History*, **53**: 27-28, 1647-1672. https://doi.org/10.1080/00222933.2019.1656784.

Phillips, B.L., Brown, G.P. and Shine, R. 2003. Assessing the potential impact of cane toads on Australian snakes. *Conserv. Biol.*, **17**: 1738-47. https://doi.org/10.1111/j.1523-1739.2003.00353.x.

Reid, J.R. and Lott, T.E. 1963. Feeding of *Leptotyphlops dulcis dulcis* (Baird and Girard). *Herpetologica*, **19**: 141-42.

Santos, R. and Grant, T. 2011. Diet pattern of migration in a poisonous toad from Brazil and the evolution of chemical defenses in diurnal amphibians. *Evol. Ecol.*, **25**: 249-58. https://doi.org/10.1007/s10682-010-9407-0.

Smith, M.A. 1943. *The Fauna of British India, Ceylon and Burma, Including the Whole of the Indo-Chinese Sub-Region. Reptilia and Amphibia*. 3 (Serpentes), Taylor and Francis, London: 1-583.

Srinivasulu, C., Srinivasulu, B. and Molur, S. (Compilers). 2014. The Status and Distribution of Reptiles in the Western Ghats, India. Conservation Assessment and Management Plan (CAMP). Published by Wildlife Information Laision Development Society, Coimbatore, Tamil Nadu, India: 1-148.

Stafford, P.J. 2005. Diet and reproductive ecology of the Yucatán cricket-eating snake *Symphimus mayae* (Colubridae). *Journal of Zoology*, **265**: 301-10. https://doi.org/10.1017/S0952836904006338.

Wall, F. 1919. Notes on a collection of Snakes made in the Nilgiri Hills and the adjacent Wynaad. *J. Bombay Nat. Hist. Soc.*, **26**: 552-84.

Wall, F. 1921. *Ophidia Taprobanica or the Snakes of Ceylon*. Colombo Mus. (H. R. Cottle, govt. printer), Colombo, Sri Lanka: 1-581. https://doi.org/10.5962/bhl.title.54947.