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Cover

Beddome's aecilian *(Ichthyophis beddomii)*: A medium-sized (avg. 20 cm long) secretive, burrowing species of caecilian endemic to the Nilgiris and parts of Central Western Ghats. Its distinctive parallel yellow stripes on a soil-brown background skin colour are quite characteristic. Found in hill-streams under stones; also reclines inside marshy substratum. Egg-laying. Mostly nocturnal. Insectivorous.

Photo: S.R.Ganesh

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SNAKES OF HOSPETE REGION, BALLARI, KARNATAKA - A CONSERVATIONAL NOTE BASED ON RESCUE OPERATIONS

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Introduction

There are nearly 285 species of snakes in India (Aengals et al., 2011) and they are ecologically important fauna that play a vital role in the ecosystem. Only some have been relatively well-studied and many other species remain little understood. Of late, many research works on Indian snakes have mainly focused on taxonomic studies, involving mainly museum-based research (Aengals et al., 2011). Venom-related studies and biochemical aspects have also been extensively worked out from a medical perspective (Whitaker & Whitaker, 2012).

Conservational studies on Indian snakes have been few and far-between. Examples include works on the Indian python *Python molurus* (Bhupathy & Vijayan, 1989; Bhupathy, 1990; Krishnan et al., 2009; Ramesh & Bhupathy, 2010) and the King Cobra *Ophiophagus hannah* (Gowrishankar et al., 2013 a, b). Those

studies that highlighted snake conservation, have mainly focused on snake road-kill issues (Das et al., 2007; Selvan et al., 2011; Pragatheesh & Rajvanshi, 2013).

While such researches are indispensable, very few studies targeting man-snake encounters and snake-rescue operations are available. Chief among them include works from Tamil Nadu (Ganesh et al., 2005), Maharashtra (Nande & Deshmukh, 2007), Kerala (Balakrishnan, 2010), Madhya Pradesh (Thakur, 2011), West Bengal (Nath et al., 2011) and Gujarat (Vyas, 2013). These distant and different regions harbour a different assemblage of snake species than that found in this part of India. In this work, we put in our decade-long experiences rescuing snakes from in and around human-settlements in Hospete region in south-central India.

Study Area

Hospete (15°16′ N, 76°23′ E; 300-900 m asl) is located in Ballari district of Karnataka State, in south-central India. This place is situated on the banks of the Tungabhadra River. A number of mining operations and industries are present here because of the mineral deposits in this region, mainly iron-ore and manganese. Hence, the World Heritage Site at Hampi as well as the Tungabhadra Dam is under threat from these mining operations. The climate of the region is characterized by distinct wet and dry seasons. Rain falls during the monsoon season from about June to October. March to June can be very dry and hot, with temperatures regularly exceeding 40°C and the winters trembling cold, with temperature often dropping to 10°C during winter nights. The region consists of hilly terrain with dry deciduous forests too.

Methodology

We rescued snakes using proper and established techniques that are safe both for the snakes and the handlers. We followed Whitaker (1970) method of pipe and bag technique and identified each snake using Whitaker & Captain (2004). For taxonomically challenging snake species, we consulted practicing herpetologists (see Acknowledgements) to identify such snakes. Detailed investigations on such rare and little-known snakes are under-preparation and will be presented elsewhere. In the data below a rescue every week means the snake is abundant (A), every fortnight means that species is common (C), every 2-3 months means that snake is occasional (O) and just one or two in a year or more means that species is rare (R). All rescue operations were performed under the supervision of or as per the direction of the Karnataka Forest Department Staff.

Results

We recorded a total of 31 snake species from Hospete region. They belonged to 25 genera and six families. Since the vast majority of our data stems from snake-rescue operations, some snakes that are common in wild-habitats but are not inclined to encounter humans would still be considered as rare. The following is a taxonomic checklist that furnishes basic information on snakes of Hospete region.

Typhlopidae

1. Brahminy Worm Snake *Indotyphlops braminus* O

Afrotyphlopinae

2. Beaked Worm Snake *Grypotyphlops acutus* R

Erycidae

3. Red Sand Boa *Eryx johnii* O
4. Common Sand Boa *Eryx conicus* O

Pythonidae

5. Indian Rock Python *Python molurus* O

Colubridae

6. Common Bronzeback Tree Snake *Dendrelaphis tristis* C
7. Indian Rat Snake *Ptyas mucosus* A
8. Indian Trinket Snake *Coelognathus helena* O
9. Bholanath's Racer *Coluber bholanathi* R
10. Banded Racer *Argyrogena fasciolata* R
11. Common Wolf Snake *Lycodon aulicus* C
12. Barred Wolf Snake *Lycodon striatus* C
13. Yellow Collared Wolf Snake *Lycodon flavicollis* R
14. Indian Bridal Snake *Dryocalamus nympha* R
15. Banded Kukri Snake *Oligodon arnensis* C
16. Streaked Kukri Snake *Oligodon taeniolatus* C

Sibynophinae

17. Black-headed Snake *Sibynophis subpunctatus* O

Natricinae

18. Buff-striped Keelback *Amphiesma stolatum* A
19. Checkered Keelback *Xenochrophis piscator* A
20. Olive Keelback *Atretium schistosum* C
21. Green Keelback *Macropisthodon plumbicolor* C

Homalopsinae

22. Green Vine Snake *Ahaetulla nasuta* C
23. Indian Cat Snake *Boiga trigonata* C
24. Forsten's Cat Snake *Boiga forsteni* R
25. Yellow-green Cat Snake *Boiga flaviviridis* R

Psammophinae

26. Unidentified Sand Snake *Psammophis* sp. R

Elapidae

27. Common Krait (venomous) *Bungarus caeruleus* C
28. Wall's Sind Krait (venomous) *Bungarus* cf. *walli* R
29. Spectacled Cobra (venomous) *Naja naja* A

Viperidae

30. Russell's Viper (venomous) *Daboia russelii* A
31. Saw- Scaled Viper (venomous) *Echis carinata* R

As can be seen from this list, the rat snake, cobra, checkered keelback and Russell's viper are abundant snakes that regularly turn-up in snake rescue calls. Among these, two species, the Russell's viper and the cobra are highly venomous and can deliver deadly bites to humans. Many more species such as the keelback water snakes, the bronzeback, vine snake, the trinket snake, kukri snakes, common wolf snake and common krait are common snakes. Many species of snakes are uncommon in this landscape. Half of the total species (16 out of 31 spp.) are either

occasional or rare species. Noteworthy examples include the racers, some species of cat snakes and wolf snakes, the sand snake and Wall's krait.

Special mention must be made of endangered species like the python that turns up in rescue situations. Our experiences show that a good protection of appropriate release sites, i.e., Protected Forest Areas nearby such as Daroji Bear Sanctuary act as safe abode for such endangered snakes. Further explorations and more detailed studies might reveal more snake species from this under-studied landscape. A regular and year-round water supply to this region's habitats by the Tungabadra River is also a major reason for high faunal diversity and encounter incidences in Hospete region.

Acknowledgements

We thank the Karnataka Forest Department Officers and field staff for their tremendous encouragement and support, without which these operations would not have been possible. We are grateful to the local people of Hospete for cooperating with us by calling our rescue team during snake-encounters and not killing them instead. We express our thanks to the many herpetologists namely P. Gowrishankar (Bangalore), S.R. Ganesh (Tamil Nadu) and Vivek Sharma (Madhya Pradesh) and our friend and fellow snake-enthusiast Adithya Vattam of Bellari for all their help, advise, interactions and suggestions.

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FURTHER RECORD OF TRAVANCORE WOLF SNAKE *LYCODON TRAVANCORICUS* (BEDDOME, 1870) FROM GADAD, DANG, GUJARAT, NORTHERN WESTERN GHATS

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The Travancore Wolf Snake *Lycodon travancoricus* is a small non-venomous snake common in Western Ghats and Eastern Ghats of India (Whitaker & Captain, 2008). This species is nocturnal and a good climber. It is mainly found in rainforest and semi deciduous forest and also seen in human-modified habitats like estates and spice plantations. This species mainly feeds on geckos, skinks, frogs & small rodents and lives under rocks, narrow cracks, logs, burrows, etc.

On 31st June 2016, during field trip to Dang Hills, we sighted an adult Travancore wolf snake near Gadad village (20°43'51.2"N & 73°51'5.4"E 48 m) in Gujarat, Northern Western Ghats. The snake was found in hollow pipe fixed under road for flowing rain water. The pipe was dry as there was no rain since last few days in that area. We found a few individuals of Murray's house gecko (*Hemidactylus murrayi*) in the same pipe near the snake. We assumed that the snake went inside the pipe for preying on the geckoes. We took necessary measurements (Table 1) and photographs for documentation (Image-1).

This species was long-believed to be restricted in distribution to the Western Ghats, but later on further records from hills of Central India and even Eastern Ghats have come up (Whitaker & Captain, 2004). First record of this species from Gujarat was from Vansda National Park (Sharma & Jani, 2015). However, morphological details of that specimen was lacking. Though our present record is within the same district of the past record, more informative data were collected this time.

Table 1. Morphological details of the Gadag specimen of *Lycodon travancoricus*

Supralabials	9 (3rd to 5th touching eye)
Loreal	1 (Not in contact with internasals)
Preocular	1
Postocular	2
Dorsal	17:17:15 in row
Ventral	143
Sub Caudal	76
Anal scale	Undivided
Snout to Vent length	290 mm.
Total Length	347 mm.

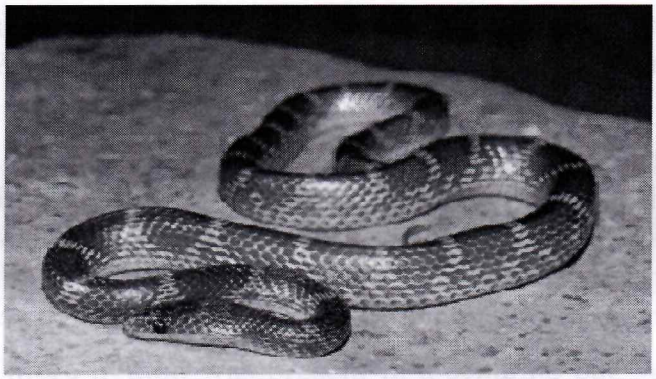

Figure 1. Live adult Travancore wolf snake from Gadag, Gujarat

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ETHNOZOOLOGICAL OBSERVATIONS ON INDIAN ROCK PYTHON (*PYTHON MOLURUS*) IN RAJASTHAN, WITH NOTES ON OTHER HERPETOFAUNA

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Kotra and Jhadol *tehsils* are two tribal dominated remote *tehsils* of Udaipur district situated at Gujarat border. Forests are dense and streams are semi-perennial over here. The hills of this area are inhabited by the Bhil, Garasiya and Kathodia tribals. Animism and zoolatry is widely seen among these tribals. Many tribal clans pay great respect to certain snake species and other animals (Sharma 1994, 1998, 2002 & 2009 ; Snodgrass *et al.* 2007). The Indian Rock Python (*Python molurus*) is a very large growing, non-venomous snake that is legally protected in India (Whitaker & Captain, 2008). It is the most respected snake of the tribals. This snake species feeds on wild animals like frogs, lizards, aquatic birds, monkeys, langurs, hares, porcupines, jackals, jungle cats, deer and their fawns, Indian gazelle and leopards and also on domestic animals like sheep, goats, dogs and poultry (Whitaker & Captain, 2008). Though, predation on domestic animals cause economic loss to the tribals, even then this giant snake is spared by them whenever it is encountered.

A *tilak*-like, i.e., a chevron-shaped mark is present on the head of the Indian Rock Python. Since traditionally Brahmins adorn their forehead with a *tilak*, local tribals believe that Rock Python is a Brahmin of the snake kingdom. They believe that killing a Brahmin is a sin and hence killing a Rock Python is also an equal one.

Bhil and Garasia tribes conserve the Rock Python as they think that killing of the Rock python will cause drought in their village. Rock Python likes proximity of water (Whitaker & Captain, 2008), particularly in dry areas like Rajasthan, so Bhil and Garasia tribals protect the species believing that pythons are harbinger of rains. If a python is present in the revenue boundary of their village, it is considered a good omen and a positive indicator of good rains that year.

Last year, on 23rd May, I received a phone call from a villager from Jhadol area. The caller requested me to send a rescue team to rescue a python from a well in their village. I informed an NGO - run rescue team to do the needful. The team rushed to the spot. After some efforts, the python was pulled out of the well. It was a full grown rock python. Since it was in water for a long time, it was briefly kept in sunlight before bagging, so as to let it bask in the sun.

The snake was then bagged and was to be released in the nearest forest area but the villagers did not allow it. They were apprehensive that their python would probably be released in the boundary of another village. They did not want to lose their village's python this way. They believed that letting go a python to another village would cause deprival of their agriculture fields from the monsoon rains.

Since one more python was present in a separate bag which was rescued while the team was on the way, the villagers also doubted that their particular python could get potentially mixed up in their catch. To ensure an unambiguous identity of their particular python, one boy wrote his name on the back of the python using a nail-polish. They were claiming "this python is ours and we neither want to lose it, nor we want another in exchange". They were shouting "this one is ours and we like ours only."

As per the wish of the locals, that python was released in the revenue boundary of their village with a condition that they must not write or otherwise mark a protected animal like the python unscientifically. People nodded their heads for a big yes.

Ethnozoology of the tribals are remarkable in many pockets of Rajasthan. Totemism is a common phenomenon among tribals like Bhils, Garasiyas and

Kathodias in Southern Rajasthan and other part of the State. Many tribals trace their ancestry from serpents as well. Bhils of *Dindor* clan (*gotra*) seeks their origin from *dindu* snake i.e. Checked keelback (*Xenochropis piscator*), hence they are named *dindor* i.e. off springs of the *dindu*.

Checkered keelback is a common snake of water bodies, which is locally spared when encountered by the Kathodias also. They consider it a sacred snake. While fishing by indigenous methods, if a Checkered keelback is trapped inside their bamboo basket along with fishes, the snake is allowed to escape by them.

Bhils of Bhuria clan never kill serpents which have brown coloured body (*bhuria* is a local term used for naming the brown or ash colours). There is a belief among *Bhurias* that their "*guru*" used to rub ash on his body and used to sleep under the trees. Once upon a time, while their *guru* was sleeping under a tree, a brown coloured snake came out from his "*comandala*" i.e. water pot, which was taken as their ancestor by the followers. Even today, brownish coloured snakes like rat snake (*Ptyas mocusa*) and checkered keelback are spared by the *Bhurias*.

There are certain animals which are called "*Rakit*" i.e. protected. "*Rakit*" is a word of local dialect which is derived from Sanskrit word "*Rakshit*" i.e. protected. "*Rakit*" animals are generally not killed by the triabls of Southern Rajasthan. Squirrels, monkeys, flying foxes, mongooses, peafowl, black drongos, sarus cranes, pythons, cobras, rat snakes, checkered keelback snake, red sand boa, Indian bullfrog, rock bees etc. are considered "*Rakit*" animals by the Bhils and Garasiyas. The Indian bull frog (*Hoplobatrachus tigerinus*) is called "*Dhedak Mata*" i.e. a goddess, which brings rain. When there is drought, special prayers are made in the worship of bull frog calling *dhedhak mata pani po, pani po*.... i.e. "O! frog goddess please give us water to drink, give water..."

Certain zoolatry traditions of the tribals of Rajasthan, seen in the remote hills of southern part of the state, are worth preserving to conserve our biodiversity.

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FIRST PRECISE RECORD OF DARJEELING SNAIL EATER *PAREAS MACULARIUS* (REPTILIA : COLUBRIDAE) IN MIZORAM, NORTH EAST INDIA.

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There are around 285 species of snakes in India (Whitaker & Captain, 2004). Some species are endemic to some of the specific localities. Endemism claimed to specific locality, probably be due to lack of studies on the species in details in various other localities / areas.

In the month of July 2016 during rains, on a drizzling showers throughout the day, it was reported around 15 hrs, that a small snake has been killed at 'Vengsang' area of Champhai district of Mizoram of North East India. I rushed to the spot and found that the snake was killed (Fig.) and was adequate to examine and identify.

Morphometric measurements and scalation were taken which are as follows – Body length – 35 cm, body scales 15:15:15, undivided sub-caudal, mental groove absent, supralabials 7 without touching eyes, temporal 2+3. Scales on back feebly keeled, head broader than neck, eyes with vertical pupil.

Black brown with narrow black and white bar spots on body. Each spot is located on single dorsal scale with white front side and rest black.

The snake was identified as Darjeeling Snail eater *Pareas macularius* (Theobald, 1868) as per Whitaker and Captain (2008) and Smith (2003).

Whitaker and Captain (2008) stated *Pareas macularius* as nocturnal and terrestrial in habits, which is in contrary to present observation at 15 Hrs. This observation however may be due to rainy season and drizzly day. Yet this habit is worthy of record and needs further confirmation.

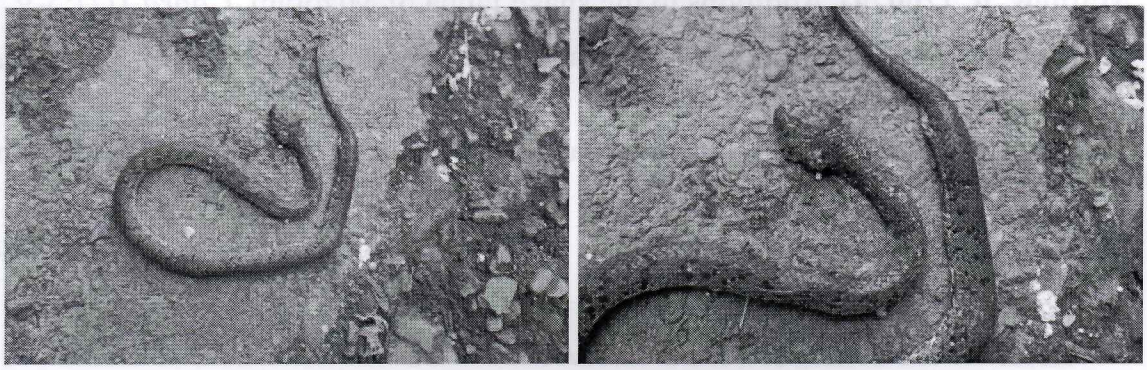

Fig. Full body and head region of *Pareas macularius*.

The distribution range of this species has been reported to be West Bengal (Gopaldhara and Darjeeling districts), Sikkim, possibly, much of the North east; Myanmar and Upper Laos (Smith, 2003; Whitaker and Captain. 2008).

Harit & Ramanujam (2002), Mathew (2007a & 2007b), Harit (2008 & 2010) and Laltanpuia (2008) have reported several snakes from the area excluding this snake. Hence this is the first authentic record of occurrence from the state and a range extension from West Bengal and Sikkim to the state of Mizoram, North East India, which is worthy of record and documentation.

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FURTHER RECORD OF COLLARED BLACK HEADED SNAKE *SIBYNOPHIS COLLARIS* (GRAY, 1853) (REPTILIA : COLUBRIDAE) IN MIZORAM, WITH A NOTE ON ITS FEEDING BEHAVIOUR.

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The distribution range of Collared black headed Snake *Sibynophis collaris* (Gray, 1853) has been reported to be Himalayas from Shimla to the North East India. Nepal, China, Myanmar, Thailand and Malaysia, found up to 3050m (Whitaker & Captain, 2008).

During a Beetle survey in May 2013 around 14 Hrs, in Champhai district of Mizoram, North East India, a snake was feeding on a blind snake (fig. 1) was observed on road side, on way to Kelkang village. The snake was identified to be Collared Black headed snake *Sibynophis collaris* as per Whitaker & Captain (2008). This snake was first reported from North Vanlaiphai area of Mizoram (Mathew, 2007) in addition to the snake fauna of Mizoram (Harit & Ramanujam, 2002), and now confirms its occurrence in the state.

The Snake feeds on skinks, lizards and frogs; one was found to swallow a snake (Whitaker & Captain, 2008). The current observation on *Sibynophis collaris* feeding on a blind snake seems to be the noteworthy feeding behaviour of the snake. Mohapatra (2010) reported a case of another congener, *S.sagittarius* feeding on a worm snake, in Orissa. This suggests that ophiophagy, particularly on small-bodied worm snake is perhaps more widely exhibited by *Sibynophis spp.* than currently understood.

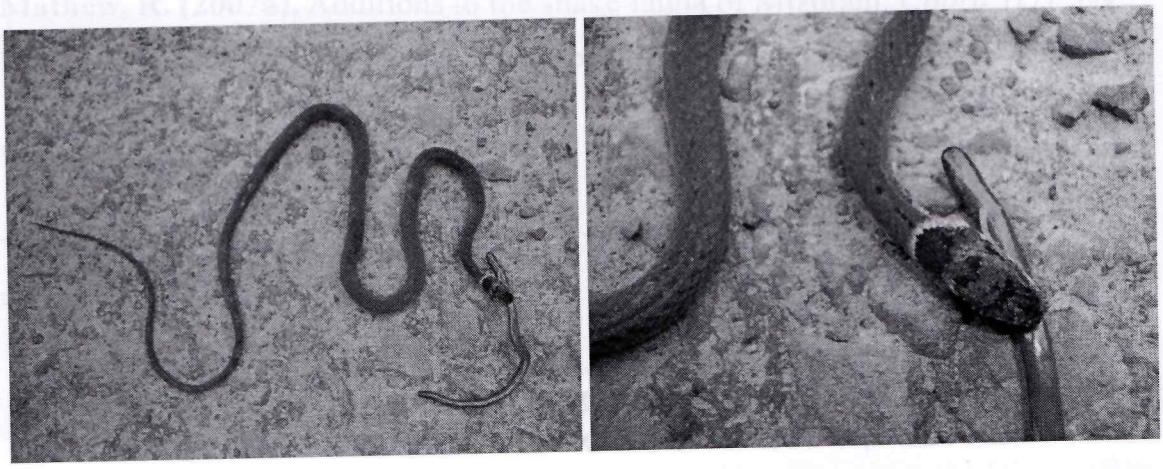

Fig. 1. *Sibynophis collaris* (Gray, 1853) feeding a Blind snake (full view and close view).

Acknowledgements

Author is thankful to the Principal, Government Champhai College, Mizoram for encouragements and providing facilities and Mr. Pawlian for his assistance during the survey.

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OPPORTUNISTIC SCAVENGING BY THE INDIAN COBRA *NAJA NAJA* (LINN.)

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Scavenging is reported to be rare among non-captive snakes, despite the fact that most species of captive snakes put up well with being fed on dead animals, i.e., carrion-feeding. Recent reviews on the topic suggests that although considered as unusual, an increasing body of published literature points out that scavenging may not be as uncommon in snakes as has been presumed before. DeValut & Krochmanl (2002) indicate that several families of snakes such as those belonging to Viperidae, Colubridae, Achrochordidae, Boidae and Elapidae have been reported to scavenge on a wide spectrum of prey-base such as fishes, rodents, snakes, birds and small mammals. Much of these studies are based on observations in the wild, mainly on the American snake taxa, and some are based on pre-designed experiments with captive snakes. Among Indian snakes, scavenging has been reported recently in the banded kukri snake (*Oligodon arnensis*) that was observed to feed on a road-killed garden lizard (*Calotes versicolor*). Herein I report my observation on scavenging by an Indian cobra (*Naja naja*).

On July 19, 2016, at about 13:30 hrs I was inspecting the enclosure of Indian Fox (*Vulpes bengalensis*) in the Sajjangarh Biological Park, at the western outskirts of Udaipur, Rajasthan. The day before (i.e., on 18th) a few chicken pieces were given as feed to the fox, but a few pieces were found lying uneaten on the floor of the holding area of the enclosure. An adult Indian cobra *Naja naja* (ca 1.5 m long) was noticed to enter the holding area of the pen, at about 13:30 hrs. It soon approached the flesh pieces lying on the floor of night cuboidal. It selected a piece, the neck portion of a chicken, measuring approximately 5 cm long and 2 cm wide and started swallowing it. The snake hardly took 3-4 minutes to swallow the piece. While it was trying for the next piece, the care-taker approached the spot and due to his movement, the cobra got disturbed and it reared up hood-spread. Immediately the care-taker ran out of fear and the snake too scurried off from sight.

The Indian cobra feeds on rats, mice, frogs, eggs and fish (Daniel 2002, Das 2002, Deoras 1981, Murthy 1990, Whitaker & Captain 2004). Like other snakes, it feeds on live prey but in the present case, it was noticed to feed on a piece of meat. Whereas the prey (=carrion) involved in most of the earlier reported cases were of naturally dead animals either entire or remains thereof, in the present case a meat piece is what was eaten by the snake. As a rare occurrence, a butchered feral hog (*Sus scorfa*) part was reported to be scavenged upon by a cottonmouth snake (*Agkistrodon piscivorus conanti*) in the America (see DeVault & Krochmal, 2002). This type of opportunistic scavenging is quite unusual observation for a snake, that too a well-documented species like the Indian cobra and is hence worth placing on record.

Acknowledgements

The author is thankful to Dr. Himanshu Vyas, Veterinarian, Biological Park Sajjangarh and Shri Ram Singh, care-taker, for assistance provided during the study.

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AN INCIDENCE OF CANNIBALISM IN SPECTACLED COBRA (*NAJA NAJA*)

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The Indian or spectacled cobra *Naja naja* (Linnaeus, 1758) is a common and widespread species of elapid snake distributed in south Asia (Das, 2002; Daniel, 2002; Whitaker & Captain, 2008; Khaire, 2010). It is one of the medically important 'Big Four' venomous snakes of India (Whitaker, 2001). Much has been recorded about the feeding habits and prey spectrum of this species. Whitaker (2001) states that this species eats rodents, toads, frogs and birds in that order of preference and also even monitor lizard. Das (2002), Whitaker & Captain (2008) and Khaire (2010) state that this species eats toads, frogs, mice, small birds and even smaller snakes. Daniel (2002) specifically states that it eats, among other prey as mentioned above, also snakes including other cobras. Here I report my observation on cannibalism by spectacled cobra, i.e. this species preying on another individual of its own kind.

On 28th Sep 2014, at 16:16 hrs. I witnessed an incidence of an adult spectacled cobra feeding on a smaller adult spectacled cobra (Fig. 1). The incident took place in Kannada University Campus, Hampi, Bellary district, Karnataka. The larger snake that was eating measured around 5.5 ft long and the smaller one that was eaten, was around 3.5 ft long. By the time I reached the scene, as soon as receiving information by the university staff, the snake was half-swallowed. I witnessed the incident happen from 16:16 hrs. to 16:19 hrs., by which time, even the tail tip of the prey disappeared into mouth of the larger snake. The snake rested for about 5 minutes and then slithered off into its hideout.

As can be seen from the accompanying image, the distinct hood-marking and front-fangs of the predator snake and the speckled ventral scales of the prey snake, attest to their unambiguous species identifications. Earlier such reports on curious feeding behaviours of the spectacled cobra including it eating Russell's viper (Palot, 2016) and chicken eggs (Rameshwaran, 2014) do testify its eclectic food preference. Although there are earlier observations suggesting snake-eating behaviour in spectacled cobra (Daniel, 2002; Das, 2002), the present note with photographic evidence of it eating another conspecific is worth placing on record.

Acknowledgements

I thank the staff of Kannada University, Hampi, for enabling my faunistic observations within their campus.

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Figure 1. An adult spectacled cobra feeding on another adult conspecific (Photo by author).

EDITOR'S NOTE

[The following studies may throw further light on cannibalism among snakes. Gocmen et al (2008) analyzed various reasons behind cannibalistic behavior among non-cannibalistic snakes. Polis (1981) and Polis and Myers (1985) have listed age, size, sex, density of conspecifics, available food, degree of relatedness, and some other factors as possibly affecting the occurrence and magnitude of cannibalism. Some cases of cannibalism in reptiles seem to reflect a strategy of demographic importance (Rootes and Chabreck, 1993; Castilla and Van Damme, 1996).

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RANDOM HARVEST

How come the Western Ghats have so many frogs? The 'burning question' answered:

A paper by S.P. Vijayakumar and colleagues published in the *Proceeding of the Royal Society B: Biological Sciences*, teases out one of the most complicated issues in South Asian zoology – how come the Western Ghats have so many frog species? The authors have tested this by using the bush frogs (*Raorchestes*) as their model group. These frogs, nearly 60 species have all been mostly 'described' but rarely studied in detail – particularly their evolutionary aspects. This paper found out the 'drivers' of speciation in the Western Ghats by using bush frog 'clades', which is the most biodiverse vertebrate genus in the region as the model system. The authors studied bush frogs on 13 of the 14 prominent ranges in the Ghats. They specifically aimed at the relative influence of three disparate drivers, namely - Quaternary glaciations, ecological gradients and geological processes on the evolution of bush frogs. They found 'a large in situ radiation (more than 60 lineages), exhibiting geographical structure and clade-level endemism, with two deeply divergent sister clades' north and south of the ancient Palghat Gap. One of the most important findings is that a vast majority of the bush frog sister species (or lineages) were isolated on adjacent hill ranges indicating allopatric speciation. The authors report that different elevational strata serve different purposes, and that the hill tops serve as 'centres of lineage diversification' while the foothills, especially of the southern ranges serve as 'museums' housing the most ancient of species.

* * * * *

Breeding biology of the endemic *Xanthophryne* toads

A paper by Nikhil Gaitonde and colleagues published in the *Journal of Natural History*, studied the breeding biology of toads of the genus *Xanthoprhyne*. This genus is endemic to the northern Western Ghats of India, with two known species – *Xanthophryne koynayensis* and *Xanthophryne tigerina*. The authors based on their field observation remark that this genus of toads are 'specialized to the lateritic rocky outcrops at mid-elevations in high rainfall areas'. The authors state that these toads have sporadic but multiple instances of spawning that may well last 2–4 days mainly during early monsoon. The authors describe this habit as 'explosive breeding behaviour' wherein male toads were seen to engage in 'pelvic thrusts', a new and so far unknown behaviour among frogs and toads. Female toads deposit eggs in rather shallow rainwater pools in small depressions formed on lateritic rock boulders. It is here that their tadpoles metamorphose. The authors observed that these seasonal rocky pools have very limited resources and are susceptible to desiccation soon due to a break in the rains. The authors have found out that the females synchronise their breeding to perfectly match those local rainfall patterns where each population occurs. The authors caution that these rare and endemic toads require statutory protection for their continued survival.

* * * * *

On the signalling behaviour of fan-throated lizards

In a recent paper by Ambika Kamath, published in *Journal of Herpetology*, some aspects of colour ornamentation in adult male fan-throated lizards (genera *Sitana* and *Sarada*) in peninsular India were analysed. The author studied the variation in throat-fan or dew-lap form and structure as well as the display behaviour in eight populations of Fan-Throated Lizards. The lizards studied were in different regions such as Deccan plateau, Coromandal Coast and Cape Comorin Plains. The study informs that the display behaviour of these lizards consists of partial and complete throat-fan extensions, body postural changes, rapid head-turning behavior, and occasional bipedality. Behavioural variations were mainly seen in aspects like throat-fan elaboration, its size and coloration. The study concludes that a pronounced increase in the aforesaid features implied male-biased sexual size dimorphism and that, changes in habitat did not matter. The study highlights that sexual selection may impose a pronounced increase in both throat-fan size and colour of the fan-throated lizards.

Readers are informed that a nearly contemporaneous study published in *Contributions to Zoology* authored by Deepak and colleagues (dealt with in *Random Harvest* in an earlier issue) had changed the taxonomic classification of the fan-throated lizards (also see below), necessitating regionally-appropriate new scientific names to be used for Ambika's sampled populations.

* * * * *

Another new fan-throated lizard from Tamil Nadu

A new species of fan-throated lizard related to the *Sitana ponticeriana* has been described by Deepak and colleagues in the journal *Zootaxa*. The new species inhabits open dry land environs around Cape Comorin or Kanyakumari, in the far south of India and has been thus far recorded only south of Tamirabarani River, near Tirunelveli. The new species has been named *Sitana marudhamneydhal* stemming from two ancient Tamil words, *marudham* and *neydhal* referring to pasture fields and seashore respectively. The new species significantly differs in body scalation and dewlap size from other related members found in Tamil Nadu and Sri Lanka. The authors state that the breeding of the new species is during October-December, in sync with this region's rainfall pattern.

* * * * *

Studies on Indian grass skinks

The skinks of the genus *Eutropis*, sometimes called grass skinks of India has been recently studied by a series of papers and some long-standing questions on their taxonomy and distribution, clarified.

A paper by Thasun Amarasinghe and others published in *Zootaxa*, has redescribed the little-known Beddome's skink (*Eutropis beddomei*). The authors have examined its holotype in the Natural History Museum London, and also studied the type specimen of its junior synonym *Euprepes septemlineatus* housed in Zoological Survey of India Museum in Kolkata. The paper confirms the synonymy between these species proposed by the British herpetologist Malcom Smith in 1935. More importantly the paper redescribed this little-known species based on many preserved specimens and mapped its distribution, both in India and Sri Lanka.

Another paper by the same team, also published in *Zootaxa*, studied two morphologically-similar skinks namely the Bibron's skink (*Eutropis bibronii*) and the Nagarjunsagar skink (*E. nagarjunensis*). The authors have corrected the scientific

name of the Nagarjunsagar skink this way, from the earlier epithet *nagarjuni* – a misrepresentation resembling that named after a man. The authors elaborate that in fact the lizard was so named after its locality of finding – the Nagarjunsagar Dam in Andhra Pradesh. As for the Bibron's skink, the authors state that its existence in Sri Lanka is questionable and that it must be considered as endemic to India. The authors redescribe the type specimens of these species in European and Indian museums and also provide detailed morphological and historical accounts for both the species.

A paper by Chelmala Srinivasulu and colleagues published in *Zootaxa*, describes the taxonomy of the little-known Ashwamedh's skink. It was first described as *Lygosoma ashwamedhi* by ZSI scientists from Andhra Pradesh. It has been one of the most poorly-known Indian lizard thus far. The authors studied the genetics and body form of some newly collected lizard specimen and found close congruence with the type specimen of *Lygosoma shwamedhi* present in Zoological Survey of India Museum in Kolkata. The authors report that their study has transferred this species to the genus *Eutropis* and have renamed it as *Eutropis ashwamedhi*, making it a member of grass skinks.

A paper by Sudesh Batuwita published in *Journal of Herpetology*, works out the taxonomy of the bronze grass skink (*Eutropis macularia*) species complex in Sri Lanka and in some parts of India. The author who studied populations of what had been called *E. macularia* from Sri Lanka found out that actually these belong to two new species namely *Eutropis austini* (named after herpetologist Christopher Austin of USA) and *Eutropis greeri* (named after herpetologist Allen Greer of Australia). He also redescribed the endemic Sri Lankan species *E. madaraszi*. He also redescribed the type specimen of *Eutropis macularia* housed in Zoological Survey of India Museum in Kolkata and declared that *E. macularia* is endemic to India and concludes that further studies on Indian populations will better clarify its taxonomy.

* * * * *

Taxonomic revisions and new descriptions of ground geckoes

A couple of papers by Ishan Agarwal and others published in the journal *Zootaxa*, clarifies the taxonomy of the Collegal ground gecko *Cyrtodactylus* (previously *Geckoella*) *collegalensis*. The authors examined the type specimens of *Cyrtodactylus collegalensis* and that of *C. speciosus*, both described by R.H. Beddome in 1870, now at the Natural History Museum, London. They based on

the historical details and new collections from the respective localities namely Malemadeshwara-Kollegal hills of Karnataka and Erode-Coimbatore hills of Tamil Nadu redescribed these two little-known species. They remarked that these two are endemic only to thee little hill ranges and not as widespread as earlier believed.

They also studied populations of similar-looking lizards in the distant Maharashtra and described it as a new species *Cyrtodactylus varadgirii* (named after herpetologist Varad Giri of India). The authors remarked that although the Maharashtra population is well-known to scientific community, previous studies have mostly treated it under the catch-all name *Cyrtodactylus collegealensis*. But studies on the actual type specimen showed clear differences from the Maharashtra population. The authors remark that *C. varadgirii* is one of the most widespread and common members of ground geckoes in India that is actually tolerant of degraded and less-wooded habitats as well.

In the second paper, two new species from Mysore plateau of south India are described. The first one *Cyrtodactylus rishivalleyensis* was named after Rishi Valley School, where the author studied. Also, it inhabits high-elevation forests of Horsely Hills, adjacent to the Rishi Valley in Andhra Pradesh. The second one *Cyrtodactylus srilaekhae* (named after Srilekha, Ishan Agarwal's mother) inhabits the Bangalore uplands in deciduous hill slopes. These new descriptions and taxonomic revisions point out to cryptic diversification within these lizards that led to subtle and often meek morphological differences, explaining their obscurity till date.

* * * * *

Studies on the Wester Ghats wood snakes

The wood snakes or narrow-headed snakes (genus *Xylophis*) of the Western Ghats remain a rarely-studied and little-known group. Two new papers, both published in the journal *Current Science* elaborates on the natural history of two such species of this genus.

The first paper by the late S. Bhupathy and others describes the geographic range, projected extent of occurrence and habitat associations of the recently-described Captain's wood snake *Xylophis captaini*. The team based on extensive fieldwork in Agasthyamalai Hills of south Kerala enumerates on the subterranean behaviour of this low- to mid-elevation preferring forest dwelling snake. The authors based on ecological niche modelling studies projects the predicted geographic range

of this species based on their sightings and published locality records to western slopes and foothills of Travancore hills, south of Palghat Gap. They also suggested a revised conservation ranking for this species.

The second paper by P. Santhoshkumar and P. Kannan describes the breeding biology of the Perrotet's wood snake or striped narrow-headed snake (*Xylophis perroteti*). The authors based on their fieldwork in the upper Nilgiris region, enumerate the body lengths, weights and egg-production rates (fecundity and carrying capacity) of this species. Extensive seasonal field studies, morphometric measurement analysis as well as direct examination of internal body cavities of many specimens have enabled the authors to remark or these aspects.

* * * * *

Taxonomic revision and new description of *Indirana* frogs

Two new articles on the leaping frogs (genus *Indirana*) belonging to family Ranixalidae, that is largely endemic to the Western Ghats have come up recently. These articles worked out both genetic and morphological taxonomy of these frogs and stabilised the taxonomy of known species and described new species and even genera.

The first paper authored by Dahanukar and colleagues, published in *Journal of Threatened Taxa*, presents a comprehensive paper on the leaping frogs of the family Ranixalidae. The authors based on collections throughout the Western Ghats and split the genus into many clades corresponding to two genera. A new genus name Sallywalkerana (named after the wildlife boilogist Sally Walker of India) was erected by the authors. They described four new species namely *Indirana sarojamma* (named after Saroja a staff of Zoo Outreach Orgaisation, for her long and dedicated service) from Agasthyamalai hills; *Indirana duboisi* (named after batrachologist Alain Dubois of France) from Udupi region; *Indirana tysoni* (named after an astro-scientist Neil deGrasse Tyson of USA 'who popularised science') from Coorg region; *Indirana yadera* (a combination of words named after the late Yamini, Deepa and Ravishankaran the authors' friends) from Travancore and Anaiamlai hills.

This apart, the paper also clarifies the taxonomy of the known species by re-examining the type specimens lodged in European museums. The authors restrict *Indirana semipalmata, I. beddomii* and *I. brachytarsus* to Southern Western Ghats, whereas those names have traditionally been mistakenly used to refer to

more northerly populations from Karnataka and Goa. The authors, based on very high genetic variations and reduced webbing, erected a new genus Sallywalkerana for three high-elevation narrow-endemic species from Southern Western Ghats, namely – *S. diplosticta, S. phrynoderma* and *S. leptodactyla* that were previously under genus *Indirana*.

The second paper by Sonali Garg and S.D.Biju published in the journal *PLOS One*, described two more new species and also re-represents and further expands the revised classification mentioned above. The first species *Indirana bhadrai* (named after Bhadra Wildlife Sanctuary) inhabits Bhadra hills, a part of Bababudangiri-Mullayangiri range in Karnataka. The second species *Indirana paramakri* (named after Malayalam words *para* meaning 'rock' and *makri* meaning 'frog') inhabits the Wyanad hills of Kerala. The authors reconstructed the phylogenetic tree and the revised distribution maps of these frogs by adding further data from their own collections.

– S.R. Ganesh

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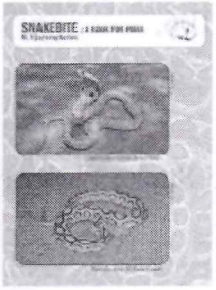

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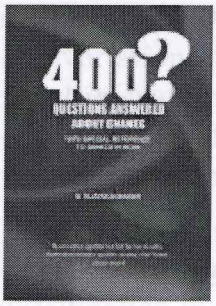

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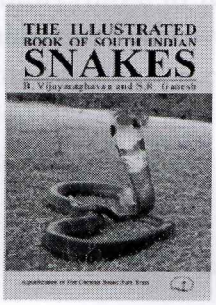

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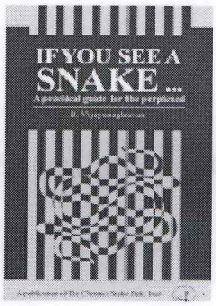

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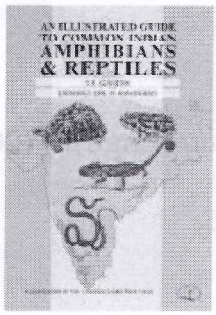

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