

(February 23, 2021)

- SHINE, G., & NAMEER, P. O. (2012)** First record of Slender Coral Snake *Calliophis melanurus* (Shaw, 1802) south of the Palghat Gap, Western Ghats. *Reptile Rap* 14, 33-35
- SMITH E. N., OGALE H., DEEPAK V., & GIRI V. B. (2012)** A new species of coral snake of the genus *Calliophis* (Squamata: Elapidae) from the west coast of peninsular India. *Zootaxa* 3437: 51–68
- UETZ, P., FREED, P., & HOŠEK, J. (EDS.) (2021)**. The Reptile Database, <http://www.reptile-database.org> (February 23, 2021)
- WHITAKER, R. & CAPTAIN, A. (2004)** Snakes of India – The Field Guide. Draco Books, Chennai, India.
- JADHAV, M., ASODE, S., KININGE, S., KURUNDWADKAR, S., & YADAV, O. (2021)** New records of Castoe's Coralsnake, *Calliophis castoe*, from Kolhapur District, Maharashtra, India. *Reptiles & Amphibians* 28 (2), 268-269

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**Evidence towards antipredatory behaviour  
by Indian Spiny-tailed lizard *Saara hardwickii*  
(Gray, 1827) towards Indian Red sand  
boa in Desert National Park, India**

**CITATION.** Jangid, A.K., Tripathi, R., and Daniel C.G. (2022). Evidence towards antipredatory

behaviour by Indian Spiny-tailed lizard (*Saara hardwickii* GRAY 1827) towards Indian Red sand boa in Desert National Park, India. *Hamadryad*: 39, 79-82.

**KEYWORDS.** Arid, Defensive strategy, Natural history, Tail spination, Thar desert.

The Indian Spiny-tailed lizard *Saara hardwickii* (Gray 1827) is the only herbivorous lizard in the Indian subcontinent. Earlier reported to be widespread, the current known largest population density of this species is confined to the arid tracts of India, which are in Kutch district in Gujarat (Dutta & Jhala 2007), and Jaisalmer district in Rajasthan (Ramesh & Ishwar 2008; Kaur et al. 2020). These lizards have an average snout-to-vent length of 175 mm, with blunt snouts, dorso-ventrally flattened bodies and thick tails that are covered with hard spiny ornamented scales (Smith 1935). Locally known as “Sanda”, these diurnal lizards excavate long curved burrows with an elliptical mouth (Figure 1a) in gravel plains, which leads into a tunnel that gradually slopes downward (Ramesh & Sankaran 2013). They live in clustered colonies with multiple burrows scattered in close vicinity (Abdulali 1960; Minton 1966) and close their burrows with sand soon after the sun sets or during rains (Figure 1b). The species represents an important prey base in this particular landscape as they are fed upon by the Great Indian Bustard *Ardeotis nigriceps*, Laggar Falcon *Falco jugger*, Tawny Eagle *Aquila rapax*, Steppe Eagle *Aquila nipalensis*, Short-toed Snake Eagle *Circaetus gallicus*, Cattle Egret *Bublcus ibis*, Indian Fox *Vulpes bengalensis*, Desert Fox *Vulpes Vulpes pusilla*, Golden Jackal *Canis aureus*, Bengal monitor Lizard *Varanus bengalensis*, Desert Monitor Lizard *Varanus griseus*, and Red Sand Boa *Eryx johnii*, to name a few (Gupta 1975; Dutta & Jhala 2007; Pardeshi et al. 2008; Home & Jhala 2009; Maurya et al. 2009; Jhala et al. 2012; Ramesh & Sankaran 2013). *S. hardwickii* is ‘vulnerable to extinction’ (Molur & Walker 1998) owing to the decline in population due to loss of habitat and poaching pressure (as a result of superstitious medicinal properties of the lizard’s body fat; Ramesh & Ishwar 2008).

The Red Sand Boa *Eryx johnii* (Russell 1801), of the family Boidae, are a widely distributed species found throughout the Indian subcontinent, and are common within the limits

of Desert National Park Wildlife Sanctuary in Rajasthan (Whitaker & Captain 2004; Uetz et al. 2020). *E. johnii* is a nocturnal boa species, which inhabits burrows in dry and sandy soil found across Peninsular India (Marimuthu & Asokan 2014). An adult individual of *E. johnii* lengths between 600–1200 mm. The species has been reported to feed on rodents, birds, lizards, and insects (Whitaker & Captain 2004; Sharma 2007; Ingle 2011). Though this species has been observed to exit abandoned *S. hardwickii* burrows (Ramesh & Sankaran 2013), no direct observation of any defence strategy used by the lizard has been reported.

On September 22, 2017 at 21.18 hours, within the compound of the forest department check

post at the Desert National Park Wildlife Sanctuary at Sam village [26.83526°N 70.50914°E; ca. 225 m a.s.l.], Rajasthan, the authors spotted a Red Sand Boa trying to enter the burrow of *S. hardwickii* (Figure 2a, b). The lizard was observed to have its entire upper body (Snout-to-vent) inside the burrow, with only its spiny tail protruding out of the burrow (Figure 2c, d). The snake made multiple attempts to enter the burrow, but was never seen biting the tail of the defensive lizard. The lizard also made several whip-like swipes with its tail, presumably to deter or injure the predator trying to enter. We hypothesize that the spiny ornaments on the tail of the lizard adds an additional tier of difficulty for the predator to push past the burrow opening.



**Figure 1.** a) Elliptical mouth of burrow of Spiny-tailed lizard *Saara hardwickii* (Gray, 1827); b) Closed mouth of burrow of Spiny-tailed lizard



**Figure 2.** a) & b) Red Sand Boa *Eryx johnii* trying to dig out the sand from Spiny-tailed lizard's burrow; c) & d) Defensive tail whipping action used by Spiny-tailed lizard.

The entire predatory episode lasted about three hours and prolonged well into the night.

There have been multiple speculative discussions suggesting the defence benefits offered by the spiny tail of *S. hardwickii* (Ramesh & Sankaran 2013; Hashmi et al. 2014), but no study has so far provided evidence confirming the use of such a defence strategy. Therefore, we report the first evidence to support the defensive strategy employed using the spiny tail of *S. hardwickii* against *Eryx johnii*.

The authors have in multiple instances observed half eaten bodies of the lizard discarded across the landscape with the tails totally intact suggesting that predators avoid consuming the heavily ornamented tail, and that the tail ornamentations are an evolutionarily selected anti-predatory defensive trait.

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### References

- ABDULALI, H. (1960) Notes on the Spiny-tailed Lizard *Uromastix hardwickii* P[Sic] Gray. *Journal of the Bombay Natural History Society* 52, 421-423.
- DUTTA, S. & JHALA, Y.V. (2007) Ecological aspects of Indian Spiny-tailed Lizard *Saara hardwickii* in Kutch. *Journal of Bombay Natural History Society* 104, 255-265.
- GUPTA, P.D. (1975) Stomach contents of the Great Indian Bustard *Choriotis nigriceps* (Vigors). *Journal of Bombay Natural History Society* 71, 303-304.
- HASHMI, M.U.A., KHAN, M.Z., NAWZ, U.H., & KARIM, G.I. (2014) Observation of the Status, Distribution, Habitat and Population Estimation of the Indian Spiny Tailed Lizard *Saara hardwickii* (Gray, 1827) of Thatta District of Sindh Pakistan. *American Journal of Zoological Research* 2(3), 46-50.
- HOME, C. & JHALA, Y.V. (2009) Food habits of the Indian Fox (*Vulpes bengalensis*) in Kutch, Gujarat, India. *Mammalian Biology* 74, 403-411.
- INGLE, M. (2011) Herpetofauna of Naglok region, Jashpur district, Chhattisgarh. *Records of Zoological Survey of India* 111(4), 79-96.
- JHALA, Y.V. ET AL. (2012) *Research and Conservation of Endangered and Threatened fauna of Kachchh: An integrated approach* (Project Report). Wildlife Institute of India, Dehradun. 592 pp.
- KAUR, M., JOSHI, M., SARMA, K., ASRAFUZZAMAN, S. & DAS, S.K. (2020) Population status, habitat suitability and threat assessment of Indian spiny-tailed lizard *Saara hardwickii* (Gray, 1827) in the Thar desert of Rajasthan. *Journal of Wildlife and Biodiversity* 4(3), 80-90.
- MARIMUTHU, R. & ASOKAN, K. (2014) Red Sand Boa *Eryx johnii johnii* (Russell, 1801) breeds at VOC park mini zoo, Coimbatore, Tamil Nadu. *Zoo's Print* 29(3), 21-22.
- MAURYA, K.K., BOPANNA, I.P. AND DUTTA, S. (2009) Cattle Egret *Bubulcus ibis* preying on Indian Spiny-tailed Lizard *Uromastix hardwickii* in Kachchh. *Indian Birds* 5(2), 48-49.
- MINTON, S.A. (1966) A contribution to the herpetology of the western Pakistan. *Bulletin of the American museum and Natural history* 134, 27-184.
- MOLUR, S. & WALKER, S. (1998) *Report of the workshop 'Conservation Assessment and Management Plan for reptiles of India'*. BCPPP-Endangered species project, Zoo Outreach Organization, CBSG, India. Coimbatore, India. 175 pp.
- PARDESHI, M., KUMAR, V.V., GAJERA, N. & KUMAR, A. (2008) Hardwick's Spiny tailed Lizard (*Uromastix hardwickii*, Gray 1827) preyed on by Indian Sand Boa (*Eryx johnii*, Russell 1801). *Journal of Bombay Natural History Society* 105(3), 343-344.
- RAMESH, M. & ISHWAR, N.M. (2008) *Status and distribution of the Indian Spiny-tailed lizard Uromastix hardwickii in the Thar Desert, western Rajasthan*. Technical Report T01. Group of Nature Preservation and Education. 50 pp.
- RAMESH, M. & SANKARAN, R. (2013) Natural history observations on the Indian Spiny-tailed Lizard *Uromastix hardwickii* in the Thar Desert.

In: B.K. Sharma (Ed), *Faunal Heritage of Rajasthan, India: General background and Ecology of Vertebrates*. Springer Science & Business Media, New York, pp. 295-330.

**SHARMA, R.C. (2007)** *The fauna of India and the adjacent countries- Reptilia*. The Director, Zoological Survey of India, Kolkata. 410 pp.

**SMITH, M.A. (1935)** *The fauna of British India, including Ceylon and Burma. Reptiles and Amphibia, Vol. II. Sauria*. Taylor and Francis, London. 440 pp.

**UETZ, P., HALLERMANN, J. & HOSEK, J. (EDS.) (2020)** *Eryx Johnii*- The Reptile Database. Available from: <http://reptile-database.reptarium.cz/species?genus=Eryx&species=johnii> (June 01, 2020).

**WHITAKER, R. & CAPTAIN, A. (2004)** *Snakes of India: The field guide*. Draco Books, Chennai, India. 479 + xiv pp.

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### **Anurophagy in *Indirana chiravasi* (Anura: Ranixalidae) from Goa, India**

**CITATION.** Shinde, A., Joshi, P., Velguenkar, A. P. and Shinde, G. (2022). Anurophagy in *Indirana chiravasi* (Anura: Ranixalidae) from Goa, India. *Hamadryad*: 39, 82-85.

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The Western Ghats endemic anuran genus *Indirana* Laurent, 1986 is presently constituted of 14 species (Frost, 2022). Members of this genus are small to moderate-sized, bear a large and distinct tympanum, Y-shaped terminal phalanges, and extensive to moderate webbing between the toes (Modak et al. 2015). This ancient anuran lineage is known to have an unusual reproductive mode (Gaitonde & Giri 2014) and larval development (Annandale 1918). The group also shows cryptic diversity (Nair et al. 2012; Ramesh et al. 2020). Modak et al. (2018) described *Indirana leithii* Boulenger, 1888 as primarily insectivorous after finding large proportions of insect appendages in the gut; they also reported the presence of arachnids, annelids, and a large amount of plant material in the diet of post-metamorphic *I. leithii*. Subsequently, Kulkarni et al. (2020) revealed the presence of cannibalistic tendencies in *Indirana leithii*. The diet composition of other members of *Indirana* is presently unknown and is poorly studied. We herein report an instance of anurophagy in *Indirana chiravasi* Padhye, Modak, and Dahanukar, 2014, a quite distantly related congener of *I. leithii* (Padhye et al. 2014).

March is a dry period in Goa with relatively low frog activity. During day surveys we came across bush frogs (mainly *Pseudophilautus* sp.) perched on tree branches, bushes, and also on the ground; and other individuals of *Indirana chiravasi* and *Minervarya* sp. along the stream and in the adjoining riparian zone. On 2 March 2021 at 0925 h, an adult *Indirana chiravasi* of unknown sex was found under a laterite rock along a dried-up stream near Mollem village, Goa (15°22'22.6"N 74°13'03.2"E). The individual was put into a plastic jar for further observations, where it regurgitated a partially digested bush frog about 10 minutes after its collection. We suspect the ingestion occurred the previous night and although unlikely, we do not rule out the possibility of this being a scavenging event. The predator and its prey were carefully removed and placed on a rock for photography (Figure 1). Due to the unavailability of instruments, no attempt was made to measure the size and weight of the specimens. The *Indirana* stayed at this spot near the bush frog