

Records of Günther's gracile skink, *Riopa guentheri* (Peters, 1879) (Reptilia: Scincidae: Lygosominae) from Central India

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Abstract

Günther's gracile skink, *Riopa guentheri* (Peters, 1879) is reported for the first time from Madhya Pradesh and eastern parts of Maharashtra. The records are supported with eight voucher samples collected from four locations in Madhya Pradesh and Amravati district, Maharashtra. Previous distribution locality of this species from Jharkhand is corrected to Bishrampur of Chhattisgarh. Morphological description of this little known species is provided along with detailed account on hemipenis. Furthermore, notes on its natural history and habitat information are discussed based on the recent observations.

Keywords: Amravati, Chhattisgarh, Hemipenial Morphology, Madhya Pradesh, Maharashtra, Range Extension

Introduction

The genus *Riopa* Gray, 1839, recently resurrected from the earlier referred genus *Lygosoma* Hardwicki & Gray, 1827, accommodates nine species, namely *Riopa punctata* (Gmelin, 1799), *R. albopunctata* Gray, 1846, *R. anguina* Theobald, 1868, *R. goaensis* Sharma, 1976, *R. guentheri* (Peters, 1879), *R. lineata* (Gray, 1839), *R. lineolata* Stoliczka, 1870, *R. popae* Shreve, 1940 and *R. vosmaerii* (Gray, 1839) (Freitas *et al.*, 2019). *Riopa guentheri* originally described as *Eumeces güntneri* by Wilhelm Peters, patronymic to Albert Günther. The species has undergone numerous generic reshuffling (see Boulenger, 1887; Smith, 1935; Das, 1996 and Freitas *et al.*, 2019). Members of the genus *Riopa* occur in fossorial or sub-fossorial habitats and sometimes found on forest floor or in anthropogenic habitats. In India, this genus is represented by six species, of which *R. goaensis*, *R. guentheri*, *R. lineata*, and *R. vosmaeri* are endemic to India; and *R. punctata*, and *R. albopunctata* are widely distributed in South Asia (Freitas *et al.*, 2019; Uetz *et al.*, 2020). Many authors reported *Riopa guentheri* as a terrestrial, insectivorous and

diurnal supple-skink, mostly found below rock boulders and logs in forest as well as human modified habitats up to an altitude of 1800m asl (Srinivasulu & Srinivasulu, 2013; Vyas, 2014). This species has been reported from Gujarat (Vyas, 2006, 2014), Western Maharashtra (Chopra, 1964; Vyas & Prajapati, 2010), Goa (Sharma 2002), Karnataka (Ali *et al.*, 2006; Datta-Roy *et al.*, 2014), Andhra Pradesh and Telangana (Rao *et al.*, 2005; Srinivasulu & Das, 2008; Javed *et al.*, 2010) and Kerala (Sharma, 2002). Vyas (2014) mentioned about distribution of *R. guentheri* from Bishrampur, Palamu district, Jharkhand based on a historical collection, which is housed at the Natural History Museum of Stanford University.

Material and Methods

The National Zoological Collection at the Zoological Survey of India (ZSI), Central Zone Regional Centre (CZRC), Jabalpur presently have eight specimens, which have been collected from four localities of Madhya Pradesh and Amravati district of eastern Maharashtra (see materials examined). For morphometric measurements,

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body and tail lengths were taken with a non-elastic thread placed over the mid-dorsal line, which was then measured using a measuring tape to the nearest 1 mm. Meristic characters were taken after Vyas (2014), with the help of Mitutoyo™ digital calipers, to the nearest 0.1 mm. Each character was measured thrice and the mean was used. For minute characters such as scale counts and hemipenis morphology, specimens were observed through a stereo-zoom microscope (Leica M2054 A) and photographed. The hemipenis was everted from a freshly dead specimen and the organ was separated by cutting it across the base using a surgical blade. Later the hemipenis was immersed in warm water to soften the tissue and was filled with petroleum jelly. The fully inflated hemipenis was then kept in 1% alizarin red solution for nearly one minute and later taken for photography. For the description of hemipenial morphology terminology, we followed Greer (1979) and Nunes *et al.* (2014). Species identification was made by using diagnostic characters by Smith (1935), Tikadar & Sharma (1992) and Vyas (2014).

Materials examined: Eight examples. ZSI-CZRC-V-6307 (i & ii), adult males, 2 examples: India, Madhya Pradesh, Sagar district, Nauradehi Wildlife Sanctuary, Khaparkheda (23°24'03.7"N 78°50'51"E), 550 m asl, 03-VII-2017, coll. P. Mohapatra *et al.*; ZSI-CZRC-V-6399, subadult, unsexed, 1ex.: India, Madhya Pradesh, Raisan district, Barna Dam, near Bari Rest house (23°02'07.93"N, 78°04'24.96"E), 332 m asl, 15-ii-2010, coll. J. Thilak *et al.*; ZSI-CZRC-V-6412, adult male: India, Madhya Pradesh, Agar-Malwa district, Bagrikheda (23°41'25.29"N, 76° 6'17.26"E), altitude 472 m asl, 21-V-2013, coll. P. Mohapatra and M. Ingle; ZSI-CZRC-V-6717, female, 1 ex.: India, Madhya Pradesh, Shajapur district, Mohan Barodiya (23°36'35"N, 76° 22'41"E), 438 m asl, 12-III-2018, coll. Ashok K. Bhilala; ZSI-CZRC-6940, 2ex., adult female & juvenile (unsexed); India, Maharashtra, Amravati district, Chichati waterfall, Chikhaldara (21°22'45.5"N 77°22'24.2"E), 950 m asl, 09-xi-2018, Coll. Khan Ashharraza; ZSI-CZRC-V-6941 sub adult male, 1ex.: India, Maharashtra, Amravati district, Chikhaldara, Bhimkund (21°23'22"N 77°20'57"E), 1030 m asl, 28-VI-2019, coll. Abhijeet Dani.

The mitochondrial genetic sequence data of cytochrome b (Cytb) and cytochrome c oxidase subunit I (COI) of ZSI-CZRC-V-6307i has been published in GenBank with accession numbers MK681742 and MK089442, respectively.

Previous records: ZSI-CZRC-V-6940 (i & ii), adult female and juvenile respectively: India, Maharashtra, Amravati District, Chikhaldara, Chichati Waterfall (21°22'45.5"N 77°22'24.2"E), 950 m asl, 09-XI-2018, Coll. Khan Ashharraza; and ZSI-CZRC-V-6941, subadult male 1ex. India, Maharashtra, Amravati District, Chikhaldara, Bhimkund (21°22'45.5"N 77°22'24.2"E), 1030 m asl, 09-XI-2018, Coll. Abhijeet Dani.

Abbreviations: asl: above sea level; ZSI: Zoological Survey of India; CZRC: Central Zone Regional Centre; SVL: snout to vent length; TaL: tail length; ED (h): horizontal eye diameter; N-E: posterior end of nostril to anterior end of eye; EO (h / v): horizontal (h) and vertical (v) length ear opening; FL: length of frontal scale; FP & IP: length of fronto-parietal and inter-parietal together; Sn-FAL: length from tip of snout to the forearm; SL: number of supralabials and IL: number of infralabials; *denotes incomplete or regenerating tails.

Results and Discussion

During the course of present study, we reported five new localities for *Riopa guentheri*; first record for Madhya Pradesh (Chandra & Gajbe, 2005; Sur *et al.*, 2007) and Vidarbha region of northeastern Maharashtra. Bagrikheda, Nauradehi Wildlife Sanctuary, Mohan Barodiya, Barna Dam are the newly reported sites for Madhya Pradesh and Chikhaldara for Maharashtra. The collection herein, recorded from Chikhaldara represents a radial range extension of ~360 km from the closest known locality Salher, Nashik (Vyas, 2014) and extends the range for *Riopa guentheri* considerably in central India. Also, here we corrected the historical record of the species from Jharkhand to Chhattisgarh. As a result, the distribution range of *Riopa guentheri* has extended towards East of Indian peninsula (Figure 2).

In some localities, *Riopa guentheri* is sympatric with the common supple skink, *R. punctata*. Though adults of *Riopa guentheri* and *R. punctata* look apparently alike, the number of paravertebral row of scales i.e. 62-76 in *Riopa punctata* vs. 87-100 *R. guentheri* is a good taxonomic identification character. However, juveniles of *R. guentheri* are morphologically different and can be visually distinguished from its sympatric congener *R. punctata* by having only two fawn, broad stripes on dorso-lateral, starting from snout to tail base (vs. three narrow, white stripes & two white dorso-lateral bands in *R.*



Figure 1. An adult *Riopa guentheri* (ZSI-CZRC-V-6307i) from Nauradehi Wildlife Sanctuary, Madhya Pradesh. Photo by Pratyush P. Mohapatra.



Figure 2. A subadult *Riopa guentheri* (ZSI-CZRC-V-6940ii) from Chikhaldara, Amravati, Maharashtra India. Photo by K. Ashaharraza.

punctata) and reddish-brown tail with black spot at each scale base (vs. uniform vibrant red scales in *R. punctata*). This ontogenetic variation in juvenile morphology is being reported firstly herein.

The referred specimens had 23-27 scales around the midbody, 87-96 scales on the paravertebral row, and distance between axilla to groin was 2.9 - 3.5 times longer than the distance from tip of snout to forelimb. The meristic and morphological characters of studied specimens are provided in Table 1.

During present study, we also searched for the holotypes of *R. guentheri* and considered it to be lost. It was assumed to be nested in Zoological Museum Berlin (ZMB). Since it is noteworthy to know that the specimens

of *R. guentheri* were sent to Wilhelm Peters by Albert Günther from London as *R. punctata*. Apparently type specimens for both species were sent from India and there are two specimens in ZMB, but they are not the types (F. Tillak pers. comm.). The locality given to *R. guentheri* in ZMB is Ghats, South Canara, India; a British Indian district presently covers the area of Dakshin Kannada & Udupi of Karnataka and Kasaragod district of Kerala. In fact, published catalogue about the type specimens of the Scincid lizards in ZMB have not enlisted those specimens (Bauer, 2008). In addition, there are five specimen in the collection of National Museum of Natural History, Paris, which were collected from Kurkuvadi (=Kurduvadi, Solapur, Maharashtra) in 1946 and cannot be types (P. David pers. comm.).

Morphological Variations or Abnormalities

Three out of the five studied specimens had regenerating tail, which indicates predation pressure in the collection localities. Similarly, ZSI-CZRC-V-6412 had abnormal fore and hind limbs: the right arm of the specimen had no digits, and the 3rd and 4th toes of the right leg are reduced in size, no claws. Although very little is known about the ecology and biology of the species, it can be speculated that all these abnormalities might have resulted due to inter or intraspecific interactions.

Hemipenial Morphology

The right hemipenis of the ZSI-CZRC-V-6307i was dissected (Figure 3a-c). The hemipenis is simple and is differentiated into two distinct parts, the basal stalk or pedicle and a club shaped head or capitulum. The pedicle is straight tubular structure and the capitulum divided into two parts, the proximal part with fleshy protrusion and the calcified distal region. The total length of the hemipenis is 3.7mm and it is 1.9mm wide at the base of capitulum. The sulcus is simple but the canal is covered with a transparent layer. The stalk is slightly narrower at the proximal part (width, 0.7mm) than the distal end (width, 0.8 mm) and devoid of any micro-ornamentation. The sulcus spermaticus runs along the stalk and at the base of the capitulum it is covered with fleshy labia on both sides and then opens to a cup shaped groove or scallop. The right labium is like a thin muscle layer which in natural state covers the sulcus canal and the left labia

Table 1. Meristic and mensural (in mm) characters of *Riopa guentheri* housed in ZSI-CZRC, Jabalpur

	ZSI-CZRC-V-6412	ZSI-CZRC-V-6307i	ZSI-CZRC-V-6307ii	ZSI-CZRC-V-6399	ZSI-CZRC-V-6717	ZSI-CZRC-V-6940i	ZSI-CZRC-V-6940ii	ZSI-CZRC-V-6941
Sex	Male	Male	Male	Unsexed	Female	Female	Unsexed	Male
Meristic characters								
SVL	114.0	95.0	96.0	73.0	97.0	78.5	52.6	60.4
TL	92*	119.0	59*	92.0	70*	110.2*	63.1	34.7*
ED (h)	2.4	2.1	2.2	1.7	2.2	2.2	1.5	1.6
N-E	3.0	2.7	2.4	2.2	2.1	1.9	1.65	1.9
EO (h/v)	1.1/1.2	0.9/1.2	1.1/1.5	0.9/1.0	1.1/#	0.9/0.7	0.5/0.8	0.6/0.7
FL	3.7	3.4	3.0	2.9	3.4	2.8	2.3	2.3
FP & IP	4.3	3.8	3.6	3.0	3.2	3.4	2.6	2.8
Sn-FAL	24.0	20.2	20.4	15.9	20.8	18.8	14.1	16.3
Axilla-groin	83.4	63.8	66.0	46.4	63.5	56.6	37.0	42.8
Mensural characters								
SL (l/r)	7/7	7/7	7/7	7/7	7/7	7/7	7/7	7/7
IL (l/r)	6/6	6/6	6/6	6/6	6/6	6/6	6/6	6/6
Scale around the mid body	24	26	24	24	24	24	23	27
Scales on the paravertebral row	94	94	94	94	93	93	96	87

(Figure 3c). This typical arrangement is possibly for secure transportation of sperm in limb reduced skinks and herewith it is reported for the first time in Lygosominae skinks. The apex is differentiated with callices and devoid of any calcified structures. At the sulcal side, the fleshy protrusion is partially divided at the sulcus opening and at the asulcal side the fleshy protrusion forms a band which is wider at the middle. The fleshy protrusion on both sulcal and asulcal sides are without any micro-ornamentation or calices. Scattered calices are found on the capitulum at sulcal and asulcal sides.

Hemipenis of Scincid lizards are almost entirely nude organs without ornamentations in their hemipenial body or lobes (Greer, 1979; Nunes *et al.*, 2014) and there is no authenticated report on the hemipeneal morphology of supple skinks of the subfamily Lygosominae (see Nunes *et al.*, 2014). Simple morphology of the hemipenis of *Riopa guentheri* also confirms the previous descriptions of the species of the family Scincidae (Nunes *et al.*, 2014). Furthermore, covering of the sulcus canal by the thin labial layer needs to be checked in other Lygosominae

skinks.

Natural History Notes

R. guentheri is reported to be occurring in wide range from 15 m asl (Valsad Town, Gujarat) up to 1600 m (Kalsubai, Maharashtra). Thanatosis – a defensive behavior is also displayed by species (Patel *et al.*, 2016). *Riopa guentheri* is largely a subterranean species. It was observed that *R. guentheri* occurs in a wide range of habitat types ranging from xeric and semi-arid areas to humid moist deciduous forests. Mostly the individuals were found under rock boulders and logs within loose soil. Specimens observed under captive condition often dig themselves into the soil during day time and were seen on the surface during night time. In captivity, they readily accepted gryllids (bush crickets) and crickets. ZSI-CZRC-V-6412 was collected under a rock boulder below a Tamarind tree, from a semiarid area of Agar-Malwa plateau during the day time. ZSI-CZRC-V-6307i & ZSI-CZRC-V-6307ii, both the male specimens were



Figure 3. Right side hemipenis of *Riopa guentheri* (ZSI-CZRC-V-6307i).

collected from a riparian zone along a seasonal stream, one of which was found under a rock boulder and the other one underneath a log at a distance of nearly 10 m each other. This habitat with rocky outcrops is tropical dry deciduous forest vegetation. ZSI-CZRC-V-6399 was also collected under a log in garden of Bari rest house. ZSI-CZRC-V-6717 was collected near a seasonal stream amidst agricultural field, under a rock boulder. Hence from the above observations, it can be summarized that this is mostly a forest dwelling species and maybe tolerate moderate to high human mediated modification of high use of pesticides in the agricultural fields (Wheat, horse gram and Soya bean). While conducting this study, additional sympatric herpetofauna were found and are listed according to locality: Bagrikheda area- *Calotes minor*, *C. versicolor*, *Riopa punctata*, *Eutropis carinata*, *E. macularia* and *Ophisops jerdonii*; Nauradehi area- *C. versicolor*, *Sitana spinaecephalus*, *R. punctata*, *E. carinata*, *E. macularia*, *Eublepharis satpuraensis* and *O. jerdonii*; Barna dam area: *C. versicolor*, *R. lineata*, *E. carinata*, and *E. macularia*; Mohan Barodiya area- *C. minor*, *C. versicolor*, *E. carinata* and *E. macularia*. The specimens collected from Chikhaldara were found around 1000 m asl alongside of torrent waterfall surrounded by

moist deciduous montane forest of central highlands and the sympatric reptiles were *Platyceps gracilis*, *O. beddomei*, *E. satpuraensis* and *Coelognathus helena nigriangularis* (Ashaharraza, 2017; Ashaharraza & Bibekar, 2019).

Distribution

R. guentheri was until reported only from the Western Ghats and Eastern Ghats (Rao *et al.*, 2005; Srinivasulu & Das, 2008; Javed *et al.*, 2010). Vyas (2014) stated the collection site Bisarampur (=Bishrampur), Jharkhand is about 100 km from the closest known southern locality of Bhimaram, Telangana (Javed *et al.* 2010), which is inaccurate as the distance between these two localities is near about 1070 km. Furthermore, he mentioned that the specimens were collected by A.W. Here on 13th December, 1940 from Bisarampur, Central Province. As per the Imperial Gazetteer of India, volume 26, Atlas, Oxford University Press (1908), Palamu district was never a part of Central Province, rather Bishrampur of Chhattisgarh was a part of Central Province. Hence, occurrence of this species in Bishrampur of Chhattisgarh may be treated as a new distribution range of this species. Hence, based on the present study and previously published literature,

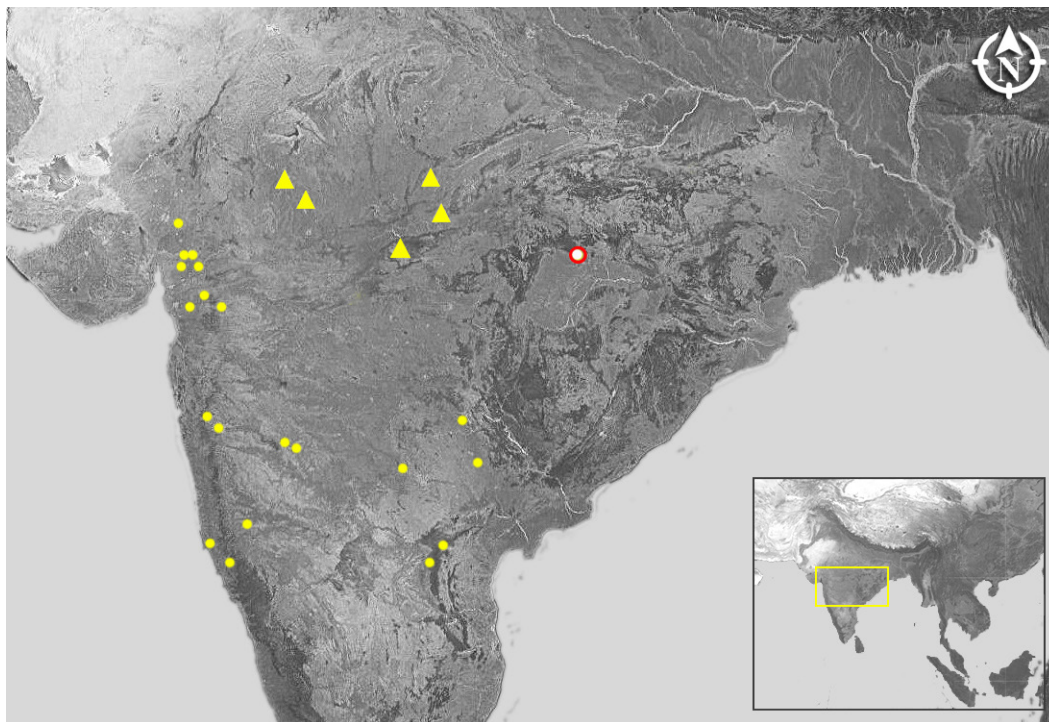


Figure 4. Distribution map depicting new localities (yellow triangles) and modified locality of Bishrampur, Chhattisgarh (hollow red circle) for *Riopa guentheri* and hitherto published records (solid yellow circles) from India.

Riopa guentheri is known to be distributed in nine States of Peninsular India, viz., Madhya Pradesh, Chhattisgarh, Maharashtra, Gujarat, Goa, Karnataka, Andhra Pradesh, Telangana and Kerala (see materials examined for new locality records; Figure 4).

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