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Herpetological diversity in the Central Eastern Ghats, Peninsular India

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Abstract

Herpetological diversity of the Eastern Ghats hill range in the Indian peninsula has been mostly overlooked and incompletely documented. We here present information on the amphibian and reptile diversity in the poorly-explored Central Eastern Ghats hill range in peninsular India. Based on a 1,000-hour bio-inventory study of the series of ranges between the Palar River (abutting Tamil Nadu) and the Krishna River (abutting Telangana) for about 10 months (300 field days), we present the following results. A total of 105 species of herpetofauna, consisting of 24 amphibian species, 35 lizard species, 42 snake species and 4 chelonian species were documented. Several new range extension records and new findings of rare species are discussed, substantiated by photo-vouchers, pre-existing museum specimens or both.

Key words: Amphibians, Andhra Pradesh, biodiversity, hill range, reptile, species richness

Introduction

The Eastern Ghats hill range of southeast India is biologically under-explored (Rawat, 1997). This 1,600 km long discontinuous series of hills extending along the Coromandel coast, from Sirumalai (10.126˚N, 77.959˚E) near Vaigai River in the southwest to up to Simlipal hills (22.119˚N, 86.431˚E) near Subarnarekha River to the northeast, hosts a great biodiversity. However, much of it remains unknown. This is especially true for lesser-known, cryptic, lower vertebrates such as amphibians and reptiles (Daniel, 2002; Das, 2002; Whitaker and Captain, 2004). Much of the existing literature on herpetofauna of the Eastern Ghats are in the form of species accounts such as 19th and 20th century classical taxonomic monographs and treatises (Jerdon, 1854; Günther, 1864; Boulenger, 1890; Smith, 1931; 1935; 1943). Recently, an attempt has been made to compile and present a checklist of what had published thus far (Murthy and Aengals, 2008). The first and the foremost of herpetological explorations in Central Eastern Ghats most likely began with Beddome (1862; 1863) who mentioned places such as Condapilly (= Kondapally, near Amarabad forest) and Nullay Mullay (= Nallamalai). Boulenger (1890) described a new snake *Psammophis longifrons* from Cuddapah region. Ramaswami (1947) reported an *Ichthyophis* caecilian from Kambakkam hills.

The focus of this work is on the Central Eastern Ghats, as the Southern sections have recently been discussed (Ganesh and Arumugam, 2016; Ganesh et al., 2018). After mid-20th century, a new species of snake and some new species of lizards were described from the Nallamalai hills by the Zoological Survey of India. Sharma (1969) described two new skinks Nagarjun's skink (*Eutropis nagarjunensis*) and Ashwamedh's skink (*Eutropis ashwamedhi*) and later (Sharma, 1976) described the Nagarjunsagar racer (*Platyceps bholanathi*) (Amarasinghe et al., 2016; Srinivasulu et al., 2016; Wallach et al., 2014). Subsequently, an account of the Nagarjunsagar herpetofauna was provided by Sharma (1971). Also, Daniel and Bhushan (1985) and Daniel et al. (1986) rediscovered the golden gecko *Caladoactylodes aureus* from Tirumalai. Balachandran and Pittie (2000) reported the flying lizard *Draco dussumieri* from Tirumalai. An annotated herpetofaunal checklist of Nallamalai hills was published by Rao et al. (2005), and was updated by Srinivasulu and Das (2008).

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Seetharamaraju et al. (2009) rediscovered the skink *Riopa vosmaeri* from the central Eastern Ghats. Javed et al. (2010a and b) reported on the distribution of two lizards (*Riopa guentheri* and *Hemiphyllodactylus aurantiacus*) from the Central and Northern Eastern Ghats. Rao et al. (2010) reported the skink *Eutropis innotata* from Central Eastern Ghats. More recently, a series of herpetological surveys were undertaken in Tirumalai hills and some new range extensions such as Elliot's shieldtail (*Uropeltis ellioti*), Slender coral snake (*Calliophis melanurus*), a vine snake species (*Ahaetulla* sp.), the Sri Lankan flying snake (*Chrysopelea taprobanica*), Yellow-collared wolf snake (*Lycodon flavicollis*) and Nagarjunsagar racer (*Platyceps bholanathi*) (Guptha and Rajasekhar, 2011; Guptha et al., 2012a; Guptha et al., 2013a and b; Guptha et al., 2014) and consolidated checklists (Guptha et al., 2012b) were published. A new day gecko was described from Penchalakona hills (Agarwal et al., 2020). Except a few in Nallamalai (Rao et al., 2005; Srinivasulu and Das, 2008), no substantial herpetological inventories have been reported for this region, particularly in the Seshachalam Hill Complex (Guptha et al., 2012a).

Study area

The central Eastern Ghats (Fig. 1; 13.35°-16.30°N; 79.35°-80.20°E) is demarcated by Godavari-Krishna Rivers in the north and the smaller Palar River in the South, politically situated in Andhra Pradesh state. This block is a rather long (> 300 km) north-south oriented linear stretch of hills. The taller peaks in this block, such as Tirumalai, Bhairani Konda and Gundla Brahmeswaram reach a little over 1,000 m a.s.l. These linear stretch of hills were split into an eastern and western series of ranges. The Velikonda-Udayagiri ranges lie towards east and the Tirumalai-Palkonda-Lankamalai-Nallamalai ranges to the west. A narrow stretch of plains (<200 m a.s.l.) that is devoid of forests, medially separates these ranges.

At the southernmost end of the Central block lie the small and detached Tada (or-Kambakkam-Kalahasthi) hills, just north of the Palar River. Northwards is the Seshachalam Hill complex also called Seshachalam Biosphere Reserve (SBR) demarcated by the Somasila basin, formed by the catchment of Penna River near Lankamalai. Further north the Ahobilam-Udayagiri ranges are two parallel hill chains situated between Cudappah-Somasila catchment and Gundla Brameshwaram range to the north. Ahobilam is a pilgrimage site to the west, while Udayagiri range that lies to the east has a historical rock fort, in the Cumbum Forest. Both regions lie outside of the Protected Area Network. Still north lies the Gundla Brameshwaram Sanctuary that extends across Nandyal-Giddalur ranges. At the northernmost extent lies the Nallamalai Hill complex, also called the Nagarjunsagar Srisailam Tiger Reserve (NSTR) which is the largest Protected Area in the country and covers a significant block in the central Eastern Ghats. Present abutting the Krishna River, NSTR is much broader than the parallel hill ranges situated further south.

These hills are covered largely by dry and mixed deciduous forests lower down the slopes and patches of moist deciduous forests are to be seen near some of the higher summits and along the major rivulets and perennial water courses. Two major habitat types are present in this landscape. Open rocky scrub habitat is present mainly along the plains, foothills, lower slopes and open rocky cliffs. A much more vegetated, tree-covered woodland habitat consisting of mixed deciduous forests occurs along the hill slopes and watercourses (Fig. 2). Annual diurnal air temperature averages around 27 °C and the rainfall averages around 150–200 cm in the hills. January to May is the dry season and June to December is the wet season, receiving rains from both southwest (June-August) and northeast (September-December) monsoon systems (see Pullaiah and Rao, 2002 and references therein).

Material and Methods

This work is based on a large-scale (300 km), long-term (300 days) targeted herpetological inventory conducted by the first author in 2016–17 – Ahobilam (June-July 2016), Udayagiri (August-September 2016), Tirumalai (October-November 2016), Nallamalai (December 2016-March 2017). It is also supplemented by general surveys and collections done by the second author in 2009–13. We followed a systematic field sampling design. Every hill block or complex was identified in the map using Google Earth and DIVA-GIS software for understanding the forest spread and elevational gradient present, and surveyed. Diurnal time constrained search method (DTCS, after Ribiero-Junior et al., 2008) and nocturnal visual encounter method (Scott, 1994) were followed for recording the herpetofauna in the wild. We specifically mention sightings of gravid females and juveniles so as to indicate the presence of breeding population, though this is implicitly understood. Gravid females were ascertained by looking through the underside for the presence of visible ova. Also, we mention of recording whenever we document it, so as to provide as much information as possible about the anthropogenic threats. Such information on fresh recruitment of populations (births) as well as loss of populations by human means (deaths) are emphasized in our work, to serve as indicators of the potential population status of species. Individuals thus sighted were identified, the maturity and sex were externally determined (wherever possible), photographed and released in situ. Some species that deviated from literature definitions either in morphological or geographic boundary are mentioned here with a 'cf.' prefix, indicating their uncertainty and that more taxonomic works are needed to fully resolve their identity.

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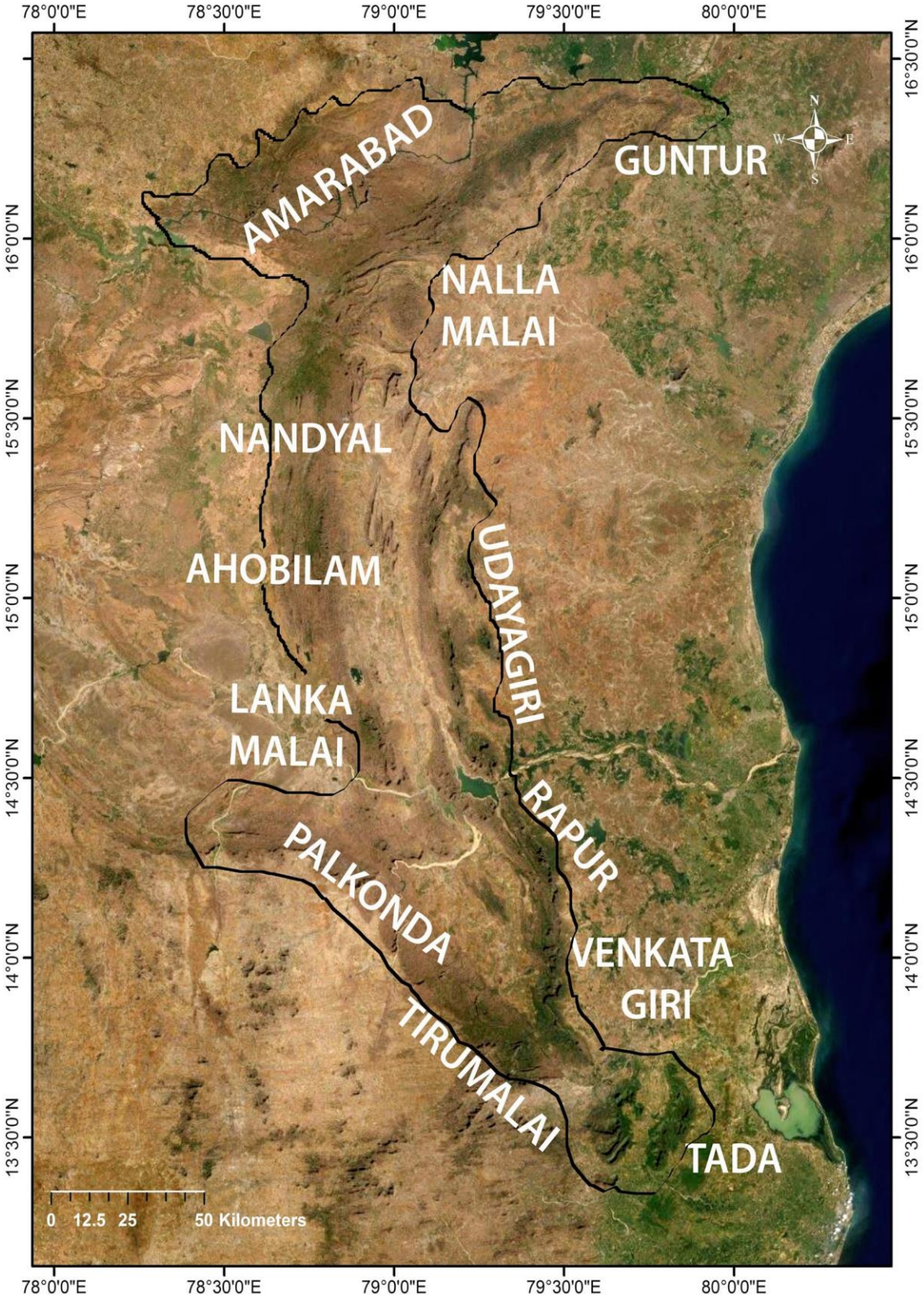

Figure 1: Map of study area showing the central Eastern Ghats, in peninsular India – outline denotes the approximate borders of the region dealt with; individual ranges named alongside.

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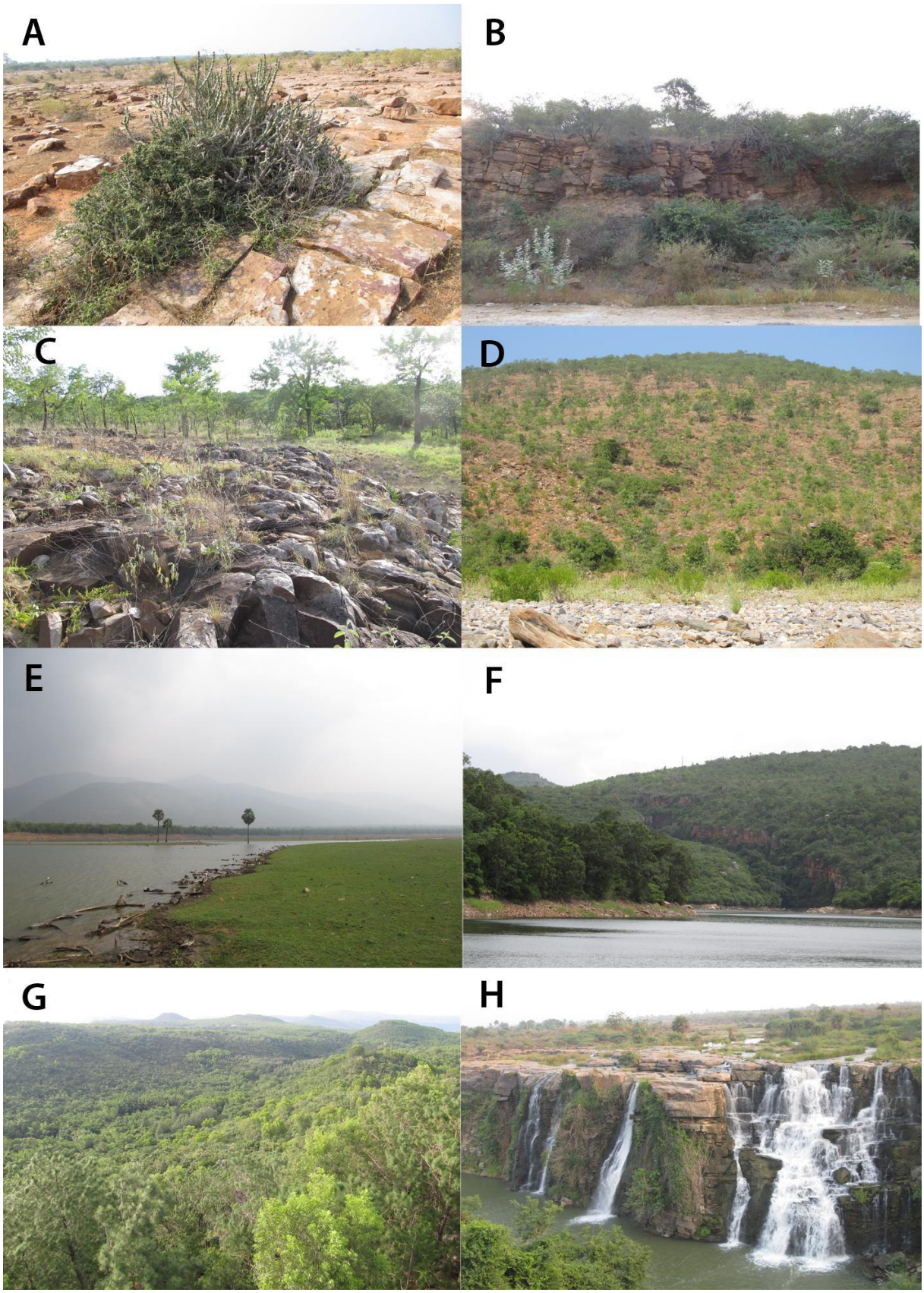

Figure 2: Habitat types prevalent: A: open rocky habitat (Guntur); B: rocky scrub jungle (Udayagiri); C: rocky woodland (Rajampet): D: open dry deciduous forest (Venkatagiri); E: riverine tract (Somasila catchment); F: mixed deciduous forest (Ahobilam); G: moist deciduous forest (Tirumalai); H: Water Falls (Ethipothala, Nallamalai).

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Those that do not conform or resemble any described species are mentioned as sp., and are identified only up to the genus rank. Specimens were collected by the second author and deposited in Bio Lab Tirupati (BLT) and Ecological Resource Monitoring Lab Srisailam (ERM). All these were examined by the first author from both the museums and additionally the older collections existing in the Madras Govt. Museum (MAD) were also studied (Ganesh and Asokan, 2010). Species identifications were based on consultation of original description papers, subsequently published keys and examination of material in the aforesaid zoological museums.

Results

A total of 105 species of herpetofauna belonging to 59 genera and 25 families, consisting of 24 species of amphibians (Fig. 3), 35 species of lizards (Figs. 4, 5), 42 species of snakes (Fig. 6) and 4 species of chelonians were observed. The following detailed taxonomic checklist is furnished based on details of the species recorded, that included live sightings and the corresponding voucher specimens collected / studied (Figs. 7, 8).

Amphibia Gray, 1825
Gymnophiona Müller, 1832
Ichthyophiidae Taylor, 1968

1. Bombay Caecilian *Ichthyophis* cf. *bombayensis* Taylor, 1950
Material Examined: MAD 1.4.1946 from Kambakkam hills.
Recorded from: Tada Falls (Ubbalamadugu hills).
Field Notes: Three live sightings obtained in one site – Tada. An adult sighted under rock in a stream; two more juveniles seen, but could not be restrained for detailed examination. One specimen was 250 mm long (total length); first and second collar groves typically wide, third nuchal groove onwards 370 primary annuli continuing till vent (counted on high-resolution photographs); tail annuli 14; dorsum dark purplish violet, venter slaty gray; annular groves of lighter shade; eye black.
Remarks: The nominotypical population is known only from the Western Ghats (Gower et al., 2007) and no genetic work has been conducted on the Eastern Ghats population to confirm its identity. Re-sighted after many decades in the Tada Falls, from where it was historically reported (Ramaswamy, 1947; also see Ganesh and Asokan, 2010).

Anura Fischer von Waldheim, 1813
Bufonidae Gray, 1825

2. Common toad *Duttaphrynus melanostictus* (Schneider, 1799)
Material Examined: BLT 29 from Talakona; ERMA-1a.
Recorded from: Rajampet, Tirumalai, Venkatagiri, Ahobilam, Rapur Ghats, Lankamalai, Nallamalai, Tada.
Field Notes: An anthropophilic species often observed in disturbed areas, in addition to primary forests. An abundant species, with 184 sightings. Eclectic in habitat association. Sighted under logs, rocks, in leaf litter, on bare ground and on tar roads. Road kills frequently recorded.

3. Dwarf toad *Duttaphrynus scaber* (Schneider, 1799)
Material Examined: ERMA-51 from Peddacheruvu; MAD no number from Udayagiri.
Recorded from: Ahobilam, Tada, Lankamalai (Somasila Dam).
Field Notes: A toad restricted to rather undisturbed habitat patches, semi-fossorial in habits, especially in drier months. Fairly common species, with 55 sightings. Associated with habitats such as rubble piles, ponds and termitaria.
Remarks: Bhargavi et al. (2013) remarked on the patchy records of the distribution of *D. scaber* in eastern peninsular India, and this survey plugged in such gaps within its range.

4. Günther's toad *Duttaphrynus hololius* (Günther, 1876)
Material Examined: MAD no number from Udayagiri.
Recorded from: Tirumalai, Palkonda.
Field Notes: A habitat-specialist toad that is partial to rocky outcrops and boulders. Both adults and tadpoles were sighted in rainwater puddles on boulders. Toads were seen active on bare open rocks at night (19:10–24:00 hrs.). Dormant and resting individuals were sighted sheltered under retreats such as rock crevices and underneath boulder piles during daytime (08:00–16:00 hrs.). Tadpoles were invariably seen to be gregarious and concentrated in rainwater pools formed on rocks. They were actively feeding on the water debris even during mid-day heat. Fairly common species, with 49 sightings distributed across rocky regions.
Remarks: These are new reports from sites (between Chittoor–Nellore–Nagarjunsagar) previously devoid of records (Bhargavi et al., 2013; Ganesh et al., 2020a). Natural history and calling behavior of this species has been summarized in Ganesh et al. (2020a).

5. Peninsular toad *Duttaphrynus peninsularis* (Rao, 1920)
Material Examined: ERM uncat. from Srisailam, Nallamalai.
Recorded from: Nallamalai.
Field Notes: A scarcely sighted toad seen during night, near ephemeral puddles. A rare species, with only seven sightings obtained, many of which were subadults. Sightings were obtained from bare ground, sometimes near water bodies, on rainy nights.
Remarks**:** The peninsular Indian population was also earlier thought to be *D. stomaticus* (Lütken, 1863), but recently Bisht et al. (2021) clarified its distinct taxonomic identity by resurrecting *D. peninsularis* (Rao, 1920).

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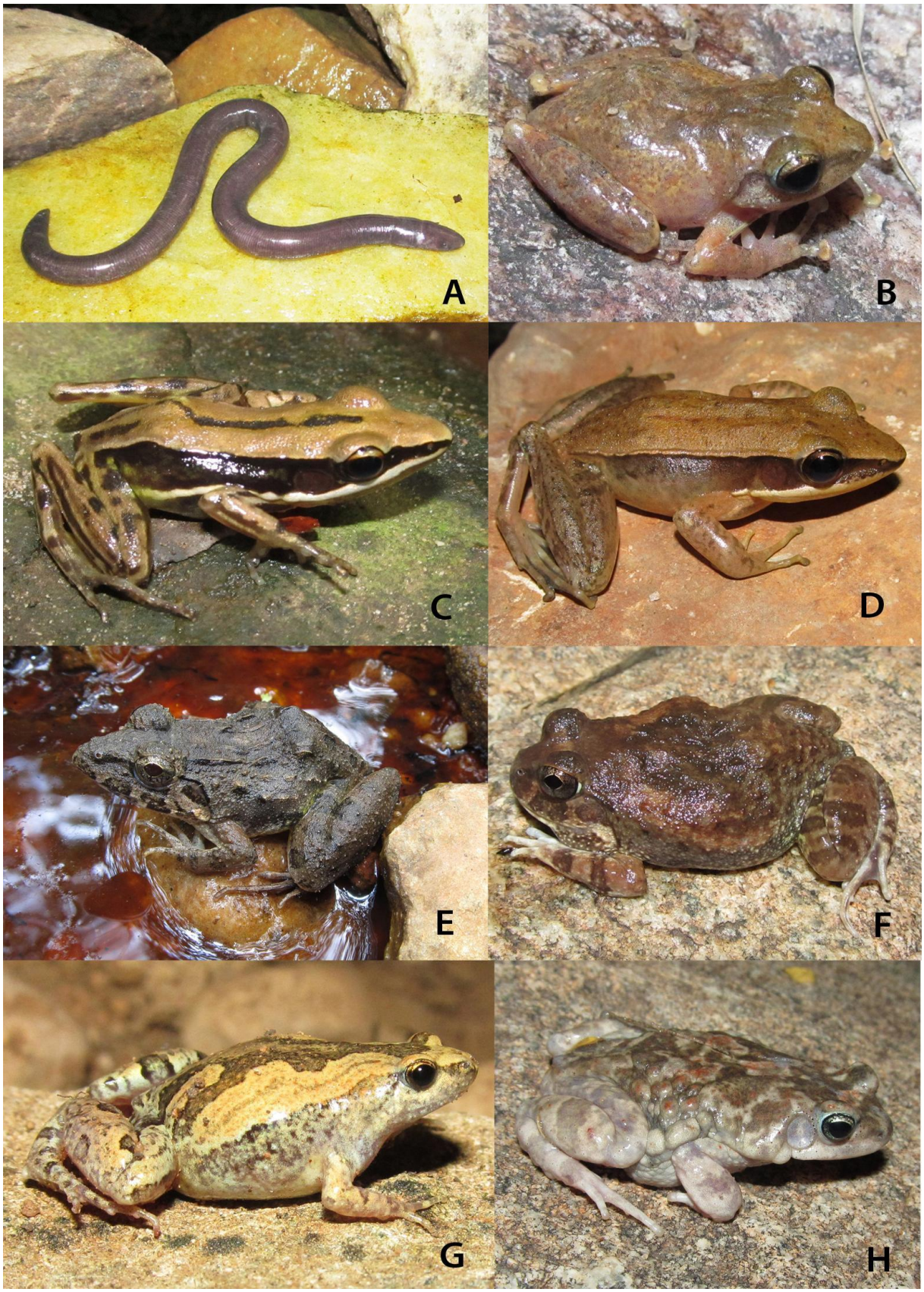

Figure 3: Some amphibians recorded: A: *Ichthyophis* cf. *bombayensis*; B: *Raorchestes* sp.; C: *Hydrophylax* cf. *gracilis*; D: *Indosylvirana* sp.; E: *Minervarya* cf. *nilagirica*; F: *Sphaerotheca pluvialis*; G: *Microhyla ornata*; H: *Duttaphrynus hololius.*

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Figure 4: Some geckos recorded: A: *Calodactylodes aureus*; B: *Cnemaspis* sp.; C: *Hemidactylus* cf. *gleadowi*; D: *H. rishivalleyensis*; E: *H.* cf. *giganteus*; F: *H. flaviviridis*; G: *H. reticulatus*; H: *Hemiphyllodactylus* sp.

Figure 5: Other lizards recorded: A: *Draco* cf. *dussumieri*; B: *Sitana thondalu*; C: *Ophisops* cf. *jerdonii*; D: *Ophisops nictans*; E: *Riopa guentheri*; F: *Eutropis allapallensis*; G: *Eutropis beddomei*; H: *Eutropis nagarjunensis*.

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Figure 6: Some snakes recorded: A: *Platyceps plinii*; B: *Platyceps bholanathi*; C: *Boiga forsteni*; D: *Boiga flaviviridis*; E: *Lycodon flavicollis*; F: *Psammophis longifrons*; G: *Python molurus*; H: *Trimeresurus gramineus*.

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Figure 7: Some preserved specimens examined: A: *Cyrtodactylus rishivalleyensis* (MAD 1928); B: *Nilssonia leithi* (MAD 1937); C: *Hemidactylus* cf. *giganteus* (MAD 1913); D: *Ophisops* cf. *jerdonii* (MAD no #); E: *Platyceps bholanathi* (ERMR-46b); F: *Liopeltis calamaria* (ERMR-29a); G: *Uropeltis ellioti* (BLT-11); H: *Trimeresurus gramineus* (ERMR-31a).

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Figure 8: A: ERMR-11a misidentified as *Calotes rouxi*, here reidentified as *Psammophilus* cf. *blanfordanus*; B: ERMR-38a misidentified as *Lycodon travancoricus*, here reidentified as *Lycodon aulicus*.

Microhylidae Günther, 1858

6. South Asian painted frog *Uperodon taprobanicus* (Parker, 1934)
Material Examined: BLT 28 from Mamandur; ERMA-4a from Sundipenta.
Recorded from: Sighted in Ahobilam, Palkonda, Udayagiri.
Field Notes: A fairly common species sometimes sighted near human settlements, with 54 sightings. Associated with termite mounds, tree trunks, buildings and rubble piles.
Remarks: Garg et al. (2018a) redescribed this species, with a genus transfer.

7. Marbled small-mouthed frog *Uperodon variegatus* (Stoliczka, 172)
Recorded from: Sighted in Ahobilam, Udayagiri, Tirumalai and Nallamalla.
Field Notes: A fairly common and anthropophilic species, with 51 sightings. Associated with building walls, tree trunks, rock faces, leaf litter and on bare ground.
Remarks: Garg et al. (2018a) restricted the concept of this species to Indian populations, describing the Sri Lankan one as a new species.

8. Marbled balloon frog *Uperodon systoma* (Schneider, 1799)
Material Examined: BLT 27 from Mamandur; ERMA-2a from Chinnarutla.
Recorded from: Ahobilam, Udayagiri.
Field Notes**:** A species found mainly in the dry plains country, often near open grasslands, sometimes near ponds. A rather uncommon species, with 38 sightings.
Remarks: This species was redescribed based on its holotype by Garg et al. (2018a).

9. Ornate small-mouthed frog *Microhyla ornata* (Dumeril and Bibron, 1841)
Material Examined: ERMA-8a from Sikharam.
Recorded from: Adults seen in Udayagiri, Nallamalla, Tirumalai.
Field Notes: A common species with 89 sightings, often associated with habitats such as grasslands, near buildings, ponds and leaf litter.
Remarks: Garg et al. (2018b) redescribed this species restricting it to southern India and Sri Lanka, while recognizing conspecificity of the central and northern Indian populations to the morphologically similar and genetically close *Microhyla nilphamariensis* Howlader, Nair, Gopalan, and Merilä, 2015.

10. Red small-mouthed frog *Microhyla rubra* (Jerdon, 1853)
Material Examined: ERMA-6a from Peddacheruvu, MAD no number from Udayagiri.
Recorded from: Adults seen in Ahobilam, Tirumalai (Kapilatheertham).
Field Notes: A fairly common species with 45 sightings, many of which were calling males. Associated with open grasslands, bare grounds and roadsides, during rainy nights.
Remarks: Wijayathilaka et al. (2016) restricted this species to Indian peninsula and described the Sri Lankan population as a new species.

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Rhacophoridae Hoffman, 1932

11. Unidentified bush frog *Raorchestes* sp.
Recorded from: Tirumalai.
Field Notes: A rare and range-restricted species, represented by five sightings. Specimens were seen calling from plants and trees, at perching heights of 1–3 m.
Remarks: Deuti et al. (2014) reported this unresolved population from the same region. Taxonomic studies are necessary to fully identify this population.

12. Common tree frog *Polypedates maculatus* (Gray, 1834)
Material Examined: MAD no. number from Udayagiri, Kambakkam; BLT 30 from Talakona; ERMA-9a, 11a from Gundla Brameshwaram.
Recorded from: Ahobilam, Nallamalai, Rajampet, Lankamalai, Udayagiri, Tirumalai.
Field Notes: A common and anthropophilic species, seen during every night survey. Represented by 93 sightings. Arboreal, often sighted on trees, bushes and building walls. Calls heard during rainy nights.

Dicroglossidae Anderson, 1871

13. Green pond frog *Euphlyctis hexadactylus* (Lesson, 1831)
Material Examined: ERMA-10a from Sikharam.
Recorded from: Ahobilam, Lankamalai, Udayagiri, Nallamalai, Tada.
Field Notes**:** A common species represented by 94 sightings. It is habitat specific, associated only with large stagnant water bodies. Strictly aquatic species.

14. Indian skipper frog *Euphlyctis cyanophlyctis* (Schneider, 1799)
Material Examined: MAD no number from Kurnool; ERMA-3a from Mannanur.
Recorded from: Ahobilam, Lankamalai, Tirumalai, Nallamalai, Tada.
Field Notes: A common aquatic species represented by 176 sightings. It is restricted to stagnant water bodies, including smaller, ephemeral pools.

15. Jerdon's bull frog *Hoplobatrachus crassus* (Jerdon, 1853)
Material Examined: MAD no number from Udayagiri; ERMA-13a from Rampur Penta.
Recorded from: Ahobilam, Udayagiri, Lankamalai, Nallamalai, Tirumalai, Tada.
Field Notes: A fairly common species, with 94 sightings. Sightings obtained from in and around the immediate vicinity of large stagnant water bodies.

16. Indian bull frog *Hoplobatrachus tigerinus* (Daudin, 1803)
Material Examined: ERMA-15a from Sundipenta.
Recorded from: Tada, Ahobilam, Udayagiri, Lankamalai, Tirumalai, Nallamalai.
Field Notes: A fairly common aquatic species, with 41 sightings. Associated with large water bodies and its edges.

17. Paddy-field frog *Minervarya agricola* (Jerdon, 1853)
Material Examined: MAD no number from Nallamalai; BLT 26 from Mamandur; ERMA-17a from Chinnarutla.
Recorded from: Tada, Ahobilam, Lankamalai, Tirumalai, Nallamalai, Palkonda.
Field Notes: An abundant species, sighted almost during all field days. Represented by 192 sightings. Found in dense vegetation, shrubs and grasslands. Semi aquatic.
Remarks: Ganesh et al. (2017a) clarified the nomenclature and taxonomy of this species and resurrected this senior nomen and neotypified it to stabilize the status of this taxon.

18. Annandale's cricket frog *Minervarya* cf. *syhadrensis* (Annandale, 1919)
Recorded from: Tada, Tirumalai, Ahobilam, Nallamalai.
Field Notes: A species restricted to hill forest streams and in riparian tracts among deep gorges. An uncommon species, with 46 sightings. Semi aquatic.
Remarks: The nominotypical population is currently understood to be restricted to the Western Ghats, as a recent study synonymised *M. caperata* (Phuge et al., 2020). Therefore, the status of the Eastern Ghats population remain unresolved.

19. Hill cricket frog *Minervarya* cf. *nilagirica* (Jerdon, 1853)
Recorded from: Tada, Tirumalai.
Field Notes: A rare semi-aquatic species represented by 22 sightings. Partial to flowing water bodies such as hill streams and rivulets in undulating wet forested tracts.
Remarks: Nominotypical populations occur in the Western Ghats and similar disjunct populations occur in the Southern Eastern Ghats (Ganesh and Arumugam, 2016; Ganesh et al., 2018). The identity of the central Eastern Ghats populations requires collection-based taxonomic studies.

20. Indian burrowing frog *Sphaerotheca breviceps* (Schneider, 1799)
Material Examined: BLT 25 from Balapalle.
Recorded from: Rajampet, Udayagiri, Venkatagiri, Nallamalai, Tada.
Field Notes: A semi-fossorial species associated with open grasslands of plains country. Individuals sighted during night. A fairly common, represented by 53 sightings.

21. Roland's burrowing frog *Sphaerotheca rolandae* (Dubois, 1983)
Material Examined: ERMA-16a from Sundipenta.
Recorded from: Tada, Rajampet, Lankamalai, Venkatagiri, Rapur Ghats, Udayagiri.
Field Notes: A semi-fossorial species associated with areas in and around wetlands and marshes. A fairly common species, with 56 sightings.

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22. Jerdon's burrowing frog *Sphaerotheca pluvialis* (Jerdon, 1853)
Material Examined: ERMA-12a from Gundla Brameshwaram.
Recorded from: Tada, Venkatagiri, Udayagiri, Ahobilam, Palkonda, Tirumalai.
Field Notes: A semi-fossorial species, often found in and around water bodies and on grasslands including in hilly undulating country. Nocturnal. A fairly common species, with 58 sightings. Tadpoles of many larval stages sighted in ponds.
Remarks: This species has been reported precisely from Chengelpet and Tadoba in India apart from Sri Lanka (Dahanukar et al., 2017; Ganesh et al., 2018; Dandekar et al., 2020). The current reports from intervening areas fill up gaps in its Indian geographic range.

Ranidae Batsch, 1796

23. Unidentified stream frog *Indosylvirana* sp.
Recorded from: Tirumalai.
Field Notes: A range-restricted aquatic species. Found only in hill streams and rivulets. Rare in streams with human impacts and pollutions. Total of 62 sightings in all.
Remarks: Deuti et al. (2014) reported this species from the same region. The genus *Indosylvirana* consists of frogs that are morphologically highly conservative, yet showing genetic divergence resulting in a multitude of species having smaller, allopatric distribution ranges (Biju et al., 2014; Oliver et al., 2015). Therefore, pending genetic studies of the central Eastern Ghats population here mentioned as unidentified species.

24. Slender stream frog *Hydrophylax* cf. *gracilis* (Gravenhorst, 1829)
Material Examined: BLT042 from Tirumalai.
Recorded from: Tirumalai.
Field Notes: An uncommon, range-restricted species, sometimes locally numerous in certain streams. Aquatic, found near flowing water. A total of 38 sightings obtained.
Remarks: This is the first record of this complex from Indian peninsula, as the nominotypical form is known only from Sri Lanka (Biju et al., 2014; Deuti et al., 2014).

Reptilia Laurenti, 1768
Squamata Oppel, 1811
Gekkonidae Gray, 1825

25. Avasabin's day gecko *Cnemaspis avasabinae* Agarwal, Bauer and Khandekar, 2020
Recorded from: Rajampet (Kandaleru Dam).
Field Notes: A rare and range-restricted species, with 14 sightings. Rupicolous, found only on rocky habitats, active at day. Seen in lower slopes and foothills.
Remarks: Our record is from the Rapur Ghats, a slightly southern (13 km) area situated, at a higher elevation (240 m a.s.l.) than that of the type locality Penchalakona (Agarwal et al., 2020).

26. Unidentified day gecko *Cnemaspis* sp.
Recorded from: Tirumalai, Tada hills.
Field Notes: A fairly common species, represented by 46 sightings. Rupicolous, and diurnal. All sightings of active lizards were obtained during daytime from on rock surfaces, building walls and tree trunks. Individuals were seen sleeping at night, at 1–2 m above ground. Gravid females and juveniles observed in early October.
Remarks: This is the first record of the genus *Cnemaspis* from these hill ranges. Agarwal et al. (2020) described *C. avasabinae* from parts of this massif and also reported the presence of unidentified *C. mysoriensis*-group geckoes inhabiting the central Eastern Ghats. As their identities have not been resolved yet, we allocated this species to an unidentified species.

27. Asian house gecko *Hemidactylus frenatus* Dumeril and Bibron, 1826
Material Examined: ERMR-30a from Chinnarutla.
Recorded from: Rajampet, Ahobilam, Udayagiri, Nallamalai, Tirumalai, Lankamalai.
Field Notes: A common, anthropophilic species, represented by 97 sightings. Eclectic in habitat associations, but often seen on building walls and tree trunks.

28. Spotted house gecko *Hemidactylus parvimaculatus* Deraniyagala, 1953
Material Examined: MAD no number from Udayagiri and Nallamalai; ERMR-2a from Mannanur.
Recorded from: Ahobilam, Lankamalai, Rajampet, Tirumalai, Nallamalai.
Field Notes: An abundant, anthropophilic species, with 148 sightings. Sighted mainly on tree trunks, building walls and on large stones.

29. Bark gecko *Hemidactylus leschenaultii* Dumeril and Bibron, 1836
Material Examined: BLT 22 from Kapilatheertham; ERMR-4a from Pedda Dornal.
Recorded from: Nallamalai, Rajampet, Tirumalai, Ahobilam, Lankamalai, Udayagiri.
Field Notes: A common, anthropophilic, arboreal species found on tree trunks and sometimes on building walls. Uses the same microhabitat both day and night. Nocturnal. Represented here by 104 sightings.

30. Northern house gecko *Hemidactylus flaviviridis* Ruppell, 1842
Material Examined: ERMR-3a from Sikharam.
Recorded from: Nallamalai.
Field Notes: A locally range-restricted, anthropophilic species. Individuals sighted on building walls and sometimes on tree trunks, with 24 sightings. Juveniles observed during December.

31. Giant rock gecko *Hemidactylus* cf. *giganteus* Stoliczka, 1871
Material Examined: ERMR-1a from Vijayapuri; MAD 1913 from Udayagiri.
Recorded from: Ahobilam, Udayagiri, Tada, Palkonda, Tirumalai, Venkatagiri.

Field Notes: An abundant, though habitat-specific rupicolous gecko. Found only in rocky habitats and crevices. Represented by 166 sightings. Largest gecko of this region.
Remarks: Smith (1935) reported different dorsal scale morphology in the Cudappah hills population of *H. giganteus*, a species having its type locality in a far more northern region in Telangana State. As this morphological diversity remains unresolved, we allocate this population to *H.* cf. *giganteus*.

32. Termite-hill gecko *Hemidactylus triedrus* (Daudin, 1802)
Material Examined: MAD no number from Udayagiri; MAD 1924 from Kanigeri, Nallamalai, Kurnool; BLT 20 from Mamandur; ERMR-7a from Vijayapuri.
Recorded from: Ahobilam, Palkonda, Rajampet, Tirumalai, Udayagiri, Nallamalai.
Field Notes: An abundant, terrestrial to semi-fossorial species, associated with termitaria, mounds, rubble piles and rarely, on building walls. Represented by 120 sightings.

33. Gleadow's gecko *Hemidactylus* cf. *gleadowi* Murray, 1884
Material Examined: MAD 1915, from Nallamalai, Kurnool.
Recorded from: Tirumalai, Palkonda, Lankamalai, Nallamalai.
Field Notes: A common species that is terrestrial, with individuals seen most often on rocky surfaces or bare ground at night. Represented by 98 sightings.
Remarks: The nominotypical population is from Pakistan and North West Indian Frontier (Mahony, 2011). Therefore, we represent our sightings as *H.* cf. *gleadowi*.

34. Reticulated gecko *Hemidactylus reticulatus* Beddome, 1870
Material Examined: MAD no number from Nallamalai, Kurnool; MAD 1923 from Sathyavedu; ERMR-17a from Pangidi Vagu.
Recorded from: Rajampet, Tada, Tirumalai, Palkonda, Venkatagiri, Lankamalai
Field Notes: An uncommon, terrestrial species. Represented by 34 sightings.

35. Rishivalley gecko *Hemidactylus rishivalleyensis* Agarwal, Thackeray and Khandekar, 2020
Recorded from: Tada, Tirumalai, Venkatagiri, Lankamalai.
Field Notes: An abundant, habitat-specific, rock-dwelling gecko. Represented by 112 sightings. Gravid females and juveniles sighted during October-November.

36. Treutler's gecko *Hemidactylus* cf. *treutleri* Mahony, 2009
Recorded from: Nalalamlai, Palkonda, Udayagiri.
Field Notes: An abundant, habitat-specific species represented by 111 sightings, almost all of which were in rock crevices, caves and rocky hillocks.
Remarks: Recent phylogenetic study revealed cryptic diversity in *H. treutleri* clade (Lajmi et al., 2016). Since, the population we deal here, is not topotypical (type locality: Hyderabad, Telangana, fide Mahony, 2009), we identify it as *H.* cf. *treutleri*.

37. Golden gecko *Calodactylodes aureus* (Beddome, 1870)
Material Examined: BLT 21 from Rudra kala theertham (in Tirumalai); MAD no number from Cudappah hills.
Recorded from: Tirumalai.
Field notes: A rather restricted, highly habitat-specific species. Found only in rocky caves and dwellings. Large patches of egg clusters seen in rock crevices that are oviposition sites. A common species represented by 103 sightings, including gravid females and young ones. Oviposition sites recorded.
Remarks: This species has a naturally patchy distribution range in the study area, being found only in the southeastern edge of the study area (Tirumalai), but again, however, reappearing in northerly massifs across the Krishna-Godavari valleys (Javed et al., 2007; Sreekar et al., 2010).
Recorded from: Tirumalai.

38. Unidentified slender gecko *Hemiphyllodactylus* sp.
Recorded from: Tirumalai.
Field Notes: A very rare and range-restricted species, with three sightings obtained on building walls, at 2 m above ground situated within large forest tract. Active at night.
Remarks: This was the first record of the genus *Hemiphyllodactylus* from these hills (Javed et al., 2010). Agarwal et al. (2019) most likely represented this population as *Hemiphyllodactylus* sp. IN 6, also from Tirupati hills. This is likely to be an undescribed species.

39. Rishivalley ground gecko *Cyrtodatylus rishivalleyensis* Agarwal, 2016
Material Examined: MAD 1928 from Chittoor hills (Horsley Konda).
Recorded from: Tirumalai, Rajampet hills.
Field Notes: A very rare and range-restricted lizard, represented by three sightings, all roadkills. Terrestrial, nocturnal. The habitats present on either sides of the road where kills were detected, consisted on mixed deciduous and riparian forests.
Remarks: This species was first described from a much westerly hill range – Horsley Konda (Agarwal, 2016), though later recorded from Tirumalai (Agarwal and Bauer, 2017).

Agamidae Gray, 1827

40. Cuvier's fan-throated lizard *Sitana ponticeriana* Cuvier, 1829
Material Examined: MAD no number from Udayagiri.
Recorded from: Tada hills, Udayagiri.

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Field Notes: A common species represented by 95 sightings. Terrestrial and diurnal, actively moving about on open ground and sparsely-vegetated low grasslands.

41. Western fan-throated lizard *Sitana* cf. *laticeps* Deepak and Giri, 2016

Material Examined: BLT 18 from Bramadevaguntam; ERMR-9a from Mallelatheertham.

Recorded from: Tirumalai, Palkonda, Venkatagiri and Lankamala hills.

Field Notes: A fairly common species that inhabits, open stony ground and rocky landscapes. Represented by 97 sightings overall.

Remarks: The nominotypical species is known from much northern parts of Andhra Pradesh / Telangana States (Deepak et al., 2016). This population is yet to be taxonomically verified, but our preliminary finds indicate that it is closest to *S. laticeps* (Deepak et al., 2016). Hence we here allocate this population to *S.* cf. *laticeps*.

42. Nallamalai fan-throated lizard *Sitana thondalu* Deepak, Khandekar, Chaitanya and Karanth, 2018

Recorded from: Nallamalai (Anupu, Vijayapuri).

Field Notes: A range-restricted and habitat-specific species. Fairly common species, represented by 44 sightings. Sighted only on large open rocky plains and gravel. *Sitana thondalu* was found to be thermophilic, often sighted basking during morning and forenoon (7:00–10:30 h). Microhabitat associations of active lizards sighted during daytime, include bare ground, small rocks and near edges of rock pools at ground level. On three occasions, resting lizards were found sleeping in rock crevices and on plant base of scrub thickets. Adult males sighted in late December were with bluish tinge in their dewlaps.

Remarks: This is a recently described and poorly-known species (Deepak et al., 2018).

43. Garden lizard *Calotes versicolor* (Daudin, 1803)

Material Examined: MAD no number from Nallamalai; ERMR-12a from Sikharam.

Recorded from: Ahobilam, Rajampet, Tada, Tirumalai, Nallamalai, Udayagiri.

Field Notes: An abundant, common and anthropophilic species. Found on shrubs and trees. Represented by 162 sightings. Gravid females, juveniles and roadkills sighted.

44. Blanford's rock agama *Psammophilus* cf. *blanfordanus* (Stoliczka, 1871)

Material Examined: MAD no number from Udayagiri and Nallamalai; BLT 19 from Mamandur; ERMR-10, 11a from Mallelatheertham.

Recorded from: Tirumalai, Nallamalai, Udayagiri, Ahobilam.

Field Notes: An abundant, habitat-specific agamid species, represented by 195 sightings, all from in and around rocky hillocks and boulders. Gravid females and juveniles seen.

Remarks: *Psammophilus* cf. *blanfordanus* following Ganesh et al. (2018). Our perusal of the record of *Calotes rouxi* (sic) by Srinivasulu and Das (2008) from "rocky outcrops and open scrub forests and agricultural fields" indicate that it is *Psammophilus* cf. *blanfordanus*, based on both the morphology of their example mentioned and by their published habitat notes. The species alleged, *Monilesaurus rouxi* is typically arboreal and chiefly occurs in well-wooded areas at least in the Eastern Ghats (Ganesh and Arumugam, 2016; Ganesh et al., 2018).

45. Flying lizard *Draco* cf. *dussumieri* Dumeril and Bibron, 1837

Recorded from: Tirumalai (Talakona).

Field Notes: A rare, highly habitat-specific species. Found only in the old growth riparian forests in one site, from where it was previously reported. Represented by 12 sightings, all on tree trunks, as high as 5 m above ground.

Remarks: Known from the Southern Eastern Ghats (Ganesh and Arumugam, 2016; Ganesh et al., 2018) and was re-sighted at the same site (Talakona) in central Eastern Ghats, where it was last seen nearly two decades ago (Blachandran and Pittie, 2000). This probably reflects either true elusiveness of this species in the region or lack of surveys.

Varanidae Merrem, 1820

46. Indian monitor lizard *Varanus bengalensis* (Daudin, 1803)

Material Examined: BLT045 from Tirupati.

Recorded from: Tirumalai.

Field Notes: An uncommon species, represented by 10 sightings. Eclectic in habitat use, sightings were obtained in rock crevices, on tree trunks, in water bodies, on tar road and inside burrows. A juvenile and a roadkill were sighted.

Remarks: A threatened species, often poached by the indigenous people illegally.

Chamaeleonidae Rafinesque, 1815

47. South Asian chamaeleon *Chamaeleo zeylanicus* (Laurenti, 1768)

Material Examined: ERMR-13a from Saileshwaram

Recorded from: Rajampet, Palkonda, Tirumalai.

Field Notes: An uncommon, highly camouflaged, arboreal species, represented by 14 sightings. Diurnal, individuals were seen sleeping on bushes during night at 1–2 m height.

Scincidae Gray, 1825

48. Allapally skink *Eutropis allapallensis* (Schmidt, 1926)

Recorded from: Venkatagiri, Ahobilam, Gundla Brameshwaram, Nallamalai.

Field Notes: An abundant species that is habitat specific. Inhabits dense forest floor with thick leaf-litter within moist hill tracts. A total of 93 sightings obtained. Gravid females and juveniles sighted.

Remarks: Ours is the first report of this species from the central Eastern Ghats (Rao et al., 2005; Srinivasulu and Das, 2008), as previous sightings are from the Southern Eastern Ghats (Ganesh and Arumugam, 2016; Ganesh et al., 2018), apart from Central India.

49. Keeled skink *Eutropis carinata* (Schneider, 1801)
Material Examined: BLT 23 from Talakona; ERMR-15a from Thummalabailu.
Recorded from: Rajampet, Ahobilam, Tirumalai, Gundla-Brameshwaram.
Field Notes: An abundant species, with 104 sightings obtained from bare ground, grasslands and stony ground. Anthropophilic species, often seen near human settlements. Gravid females, juveniles and roadkills recorded.

50. Bronze skink *Eutropis* cf. *macularia* (Blyth, 1851)
Material Examined: ERMR-16a from Thummalabailu.
Recorded from: Tada, Rajampet, Gundla-Brameshwaram, Tirumalai, Nallamalai.
Field Notes: An abundant species represented by 108 sightings, largely from thinly vegetated and open forest floor and grasslands, in the low plains country. Roadkills recorded. Courtship and male combats observed. Juveniles sighted frequently. The nominotypical population is restricted to northeastern India (Ganesh et al., 2021).

51. Beddome's skink *Eutropis beddomei* (Jerdon, 1870)
Material Examined: BLT 48 from Kalyani Dam.
Recorded from: Tirumalai, Tada, Venkatagiri, Udayagiri, Nallamalai.
Field Notes: An abundant species represented by 95 sightings, largely from rocky and stony ground and open grassland /scrub vegetation in low hills. Juveniles sighted.
Remarks: This species has not been accurately identified and reported from the central Eastern Ghats (Amarasinghe et al., 2016a). Ours is the first record for the whole of Central Eastern Ghats. Surprisingly, *Eutropis beddomei* was common in many parts of these hill ranges.

52. Nagarjunsagar skink *Eutropis nagarjunensis* (Sharma, 1976)
Material Examined: ERMR-21a from Vijayapuri, Mallelatheertham.
Recorded from: Nallamalai.
Field Notes: A range-restricted but frequently sighted species, with 44 sightings on stony ground. Habitat specific, associated only with open rocky landscapes. Juveniles with bluish tails, sighted. A young one was observed to actively chase and feed on spiders. Microhabitats of active individuals sighted in the day were on bare ground, small stones and rocks and near rock pools. On one occasion, an adult was found sleeping under a large stone at night. Mature males were observed in late December were with red throat and sides of neck.
Remarks: This species was recently redescribed (Amarasinghe et al., 2016b).

53. Spotted snake-skink *Riopa punctata* (Linnaeus, 1758)
Recorded from: Ahobilam, Rajampet, Tirumalai, Gundla Brameshwaram, Nallamalai.
Field Notes: A rather common species, represented by 74 sightings, associated with leaf litter, rocky areas, under stones and debris. Sometimes anthrophilic.

54. White-dotted snake-skink *Riopa albopunctata* (Gray, 1846)
Recorded from: Ahobilam, Venkatagiri, Rajampet, Tirumalai.
Field Notes: An uncommon elusive, leaf-litter dwelling skink represented by 29 sightings. Associated with debris, leaf litter and under rocks and logs. Juveniles observed.

55. Günther's snake-skink *Riopa guentheri* (Peters, 1879)
Material Examined: ERMR-43a from Srisailam.
Recorded from: Tirumalai.
Field Notes: A rare species, represented by five sightings. Specimens were found in thick grass clumps near wetland and under strewn logs within bamboo patches. A gravid female sighted.

Lacertidae Oppel, 1811

56. Leschenault's lacertid *Ophisops leschenaultii* (Milne-Edwards, 1829)
Material Examined: MAD no number from Udayagiri; ERMR-18a from Isukagundam.
Recorded from: Udayagiri, Tirumalai, Ahobilam, Nallamalai, Palakonda and Tada hills.
Field Notes: A common species, represented by 92 sightings. A fast-moving, alert lizard associated with rocky areas and open rock sheet landscapes. Juveniles, with distinctly reddish tails, are seen more frequently than adults.

57. Blinking lacertid *Ophisops nictans* Arnold, 1989
Material Examined: MAD no number from Nallamalai; ERMR-8a from Pedda Dornal.
Recorded from: Venkatagiri (Mamandur, Balapalle), Udayagiri, Rapur Ghats.
Field Notes: A common species, represented by 91 sightings. Associated with open less-vegetated low grasslands and scrub meadows, this alert and agile lizard is partial to open, dry areas. Juveniles, subadults and gravid females sighted.

58. Jerdon's lacertid *Ophisops* cf. *jerdonii* (Blyth, 1853)
Material Examined: MAD no number from Nallamalai.
Recorded from: Nallamalai.
Field Notes: A fairly common species, represented by 39 sightings. This species has habitat associations with open, grassy or rocky areas. Especially common near the Dam sites, including on cemented floor structures.
Remarks: *Ophisops jerdonii* was shown to be a species complex, requiring taxonomic revision (Agarwal and Ramakrishnan, 2017).

Typhlopidae Merrem, 1820

59. Common worm snake *Indotyphlops braminus* (Daudin, 103)
Material Examined: MAD no number from Nallamalai; ERMR-19a from Rollapenta.
Recorded from: Gundla Brameshwaram, Udayagiri, Tirumalai, Nallamalai.
Field Notes: A common and widespread species, represented by 20 sightings. Fossorial. Sighted underneath stones and fallen logs.

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60. Beaked worm snake *Grypotyphlops acutus* (Dumeril and Bibron, 1844)

Material Examined: BLT 15 from Kapilatheertham.
Recorded from: Tirumalai
Field Notes: A very rare species, once sighted under a rock in Tirumalai foothills within a patch of deciduous forests.

Gerrhopilidae Vidal, Wynn, Donnellan, and Hedges, 2010

61. Unidentified worm snake *Gerrhopilus* sp.

Field Notes: A fairly common species, often seen under fallen logs and stones in dense moist forest tracts in the hills. Represented by 22 sightings.
Recorded from: Ahobilam, Rajampet, Udayagiri, Venkatagiri, Tada, Tirumalai.
Remarks: Records of *Gerrhopilus* sp. exist from Southern Eastern Ghats (Ganesh and Arumugam, 2016; Ganesh et al., 2018) and Northern Eastern Ghats (Smith, 1943). These are the first reports of the genus from the intervening area, i.e. the central Eastern Ghats. Smith (1943) reported *Gerrhopilus beddomei* (type locality in Anaimalai), from Kimedy Hills, Vizagapatnam, in the Northern Eastern Ghats. Since this population is not taxonomically verified, we here note it as an unidentified species of *Gerrhopilus*.

Uropeltidae Müller, 1832

62. Elliot's shieldtail *Uropeltis* cf. *ellioti* (Gray, 1858)

Material Examined: BLT 11 from Talakona.
Recorded from: Tirumalai.
Field Notes: A very rare species represented by two sightings. A fossorial and predominantly nocturnal species.
Remarks: This species, *U. ellioti* is reported to be a species complex (Pyron et al., 2016).

Erycidae Bonaparte, 1840

63. Common sand boa *Eryx conicus* (Schneider, 1799)

Material Examined: BLT 12 from Kapilatheertham; ERMR-15a from Appapur.
Recorded from: Ahobilam, Udayagiri, Tirumalai, Rajampet.
Field Notes: A fairly common snake species represented by five sightings. Roadkills recorded. Nocturnal and fossorial, constrictor. Gravid females and juveniles sighted. One adult was sighted at night, near abandoned buildings, actively foraging.

64. Red sand boa *Eryx johnii* (Russell, 1801)

Material Examined: ERMR-14a from Appapaur.
Recorded from: Udayagiri, Nallamalai.
Field Notes: A fairly common, fossorial, constricting snake represented by six sightings. A subadult was once recorded. Roadkills recorded. One adult was sighted resting under a rock in the day, while the others were seen active on ground at night.

Pythonidae Fitzinger, 1826

65. Indian rock python *Python molurus* (Linnaeus, 1758)

Material Examined: BLT044 from Kapilatheertham (roadkill).
Recorded from: Tirumalai.
Field Notes: A threatened species, decimated by historical poaching and skin trade, rare and represented by two sightings. One juvenile was sighted crossing the ghat road at dawn.

Viperidae Oppel, 1811

66. Russell's viper *Daboia russellii* (Shaw and Nodder, 1797)

Material Examined: ERMR-34a from Rampur Penta.
Recorded from: Ahobilam, Venkatagiri, Tirumalai, Nallamalai.
Field Notes: A fairly common venomous snake, represented by five sightings. Roadkill recorded. Juvenile recorded. Sightings obtained in thick brush and ground vegetation.

67. Saw-scaled viper *Echis carinatus* (Schneider, 1801)

Material Examined: BLT 13 from Mamandur; ERMR-23a from Chinnarutla.
Recorded from: Udayagiri, Tada, Tirumalai, Palkonda, Venkatagiri, Nallamalai.
Field Notes: A common venomous snake, represented by 16 sightings. The commonest of all venomous snakes in the region, as per our observations. Roadkills recorded. Sightings obtained on rocky / gravely ground, sparse scrub intermixed with grasslands, crossing tar roads at night, under rocks and stones during daytime.

68. Bamboo pit viper *Trimeresurus gramineus* (Shaw, 1802)

Material Examined: BLT 16 from Tirumalai; ERMR-31a from Sikharam.
Recorded from: Nallamalai, Tirumalai.
Field Notes: A fairly common species, associated only with moist, hill forest vegetation. Represented by five sightings. Individuals were encountered at a perching height of 1–2.5 m above ground, at night.

Elapidae Boie, 1827

69. Slender coral snake *Calliophis melanurus* (Gray, 1834)

Material Examined: BLT001from Kapilatheertham.
Recorded from: Tirumalai.
Field Notes: A rare species that was recorded just two times, both near deciduous vegetation of a foothill slope. Seen under fallen logs and debris, respectively.

70. Common krait *Bungarus caeruleus* (Schneider, 1801)

Material Examined: ERMR-24a from Rollapadu.
Recorded from: Ahobilam, Rapur Ghats, Venkatagiri, Tirumalai, Nallamalai.
Field Notes: A common species, represented by eight sightings, including a few road kills. Specimens sighted largely at night, inside wells, in human habitations and crossing tar roads. One juvenile recorded.

71. Spectacled cobra *Naja naja* (Linnaeus, 1758)

Material Examined: ERMR-33a from Sundipenta.
Recorded from: Udayagiri, Tirumalai, Palkonda, Rajampet, Nallamalai.
Field Notes: A common species, with nine sightings associated with open scrub vegetation. Individuals seen actively foraging by afternoon and dusk. Two subadults sighted, including one roadkill.

Lamprophiidae Fitzinger, 1843

72. Indian sand snake *Psammophis condanarus* (Merrem, 1820)

Material Examined: BLT77 from Kapilateertham.
Recorded from: Tirumalai.
Field Notes: A very rare species, that was recorded once based on an adult sighted near deciduous forests along foothills (see Ganesh et al., 2017b for details).

73. Stout sand snake *Psammophis longifrons* Boulenger, 1890

Recorded from: Nallamalai.
Field Notes: A very rare species. One subadult was reported from near a human habitation that was surrounded by forest area, in mid-elevation deciduous belts.
Remarks: The only *Psammophis* previous reported from Nallamalai, is *P. condanarus* (Beddome, 1863 as *Psammophis indicus*). Subsequent works could not record the genus in these hills (Rao et al., 2005; Srinivasulu and Das, 2008).

Natricidae Bonaparte, 1838

74. Striped keelback *Amphiesma stolatum* (Linnaeus, 1758)

Material Examined: ERMR-27a from Rollapadu.
Recorded from: Ahobilam, Udayagiri, Tirumalai, Venkatagiri, Nallamalai.
Field Notes: A common species, represented by 19 sightings. Associated with open grasslands, thick scrub vegetation mainly in the lower slopes and the foothills. Young ones sighted. Roadkills recorded. Sightings obtained during early mornings and evenings.

75. Checkered keelback *Fowlea piscator* (Schneider, 1799)

Material Examined: BLT 003 from Mamandur.
Recorded from: Ahobilam, Rapur Ghats, Rajampet, Udayagiri, Tirumalai, Nallamalai.
Field Notes: A common species, with 21 sightings. Individuals were sighted in wetlands and water bodies, except on rainy nights when a few were seen crossing roads. A few roadkills were sighted. Young ones and gravid females were recorded. One snake was seen feeding on a *Hydrophylax* cf. *gracilis* (in Japalitheertham, Tirumalai), wherein the snake was seen biting the hindlimb of the frog that was heard producing a distress call.

76. Olive keelback *Atretium schistosum* (Daudin, 1803)

Recorded from: Ahobilam, Tada, Rajampet, Venkatagiri, Lankamalai.
Field Notes: A common snake represented by 18 sightings. Snakes were seen inside wells, in large lakes and in inundated fields and grasslands. Juveniles were sighted.

77. Green keelback *Rhabdophis plumbicolor* (Cantor, 1839)

Material Examined: BLT 008 from Tirumalai; ERMR-29a from Sikharam.
Recorded from: Ahobilam, Venkatagiri, Rajampet, Tirumalai, Nallamalai.
Field Notes: A common species with eight sightings. Individuals were sighted in thick leaf litter, at night crossing roads, under fallen logs in deciduous forest covered hill slopes.

Colubridae Oppel, 1811

78. Indian bronzeback *Dendrelaphis tristis* (Daudin, 1803)

Material Examined: BLT 007 from Balapalle; ERMR-25a from Rollapadu.
Recorded from: Ahobilam, Rapur Ghats, Udayagiri, Tirumalai.
Field Notes: A common species with 13 sightings. Arboreal and diurnal. Most sightings were at night, when sleeping individuals were sighted coiled up on branches, at 1–2.5 m height. Juveniles were sighted.

79. Unidentified bronzeback *Dendrelaphis* sp.

Recorded from: Tada-Kambakkam hills (Ubbalamadugu).
Field Notes: A very rare species, represented by a single sighting.
Remarks: This population has also reported from the Southern Eastern Ghats (Ganesh and Arumugam, 2016; Ganesh et al., 2018). Danushka et al. (2020) clarified the status of *D. bifrenalis* (Günther, 1864) group in Sri Lanka, which the current population resembles. Collection-based taxonomic study is underway to clarify the status of this population.

80. Ceylon flying snake *Chrysopelea taprobanica* Smith, 1943

Material Examined: BLT-076 from Talakona.
Recorded from: Tirumalai (Talakona).
Field Notes: A rare species, represented by two sightings, one live and a roadkill (see Guptha et al., 2015 for more details).

81. Common wolf snake *Lycodon aulicus* (Linnaeus, 1758)

Material Examined: BLT 004 from Mamandur; ERMR-38a from Rollapadu.
Recorded from: Ahobilam, Udayagiri, Tirumalai.
Field Notes: A common species, with eight sightings. Specimens were sighted near building walls in isolated and dilapidated buildings. Roadkills seen. Individuals recorded crossing tar roads during rainy nights. Juveniles recorded.

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82. Slender wolf snake *Lycodon fasciolatus* (Shaw, 1802)

Material Examined: ERMR-35a from Sikharam.
Recorded from: Ahobilam, Udayagiri, Nallamalai, Tirumalai.
Field Notes: A common species represented by 11 sightings. Individuals were associated with debris, stone piles, under rocks and a few were sighted at night crossing tar roads.
Remarks: The nomenclature of this recently-defined species (Ganesh and Vogel, 2018), has been updated again (Deepak et al., 2021).

83. Barred wolf snake *Lycodon* cf. *striatus* (Shaw, 1802)

Material Examined: BLT 005 from Mamandur; ERMR-44a from Rollapadu.
Recorded from: Ahobilam, Rapur Ghats, Nallamalai, Tirumalai.
Field Notes: A common species, with nine sightings from under debris, rock / stone piles.
Remarks: This southerly population differs from the nominotypical form in morphology.

84. Yellow-collared wolf snake *Lycodon flavicollis* Mukherjee and Bhupathi, 2007

Recorded from: Tirumalai.
Field Notes: A rare species. Three sightings obtained. One was sighted near a building wall surrounded by forests. One was a subadult sighted crossing the ghat road at night. Another was a roadkill (also see Guptha et al., 2014; Ganesh et al., 2017c).

85. Deccan wolf snake *Lycodon deccanensis* Ganesh, Deuti, Punith, Achyuthan, Mallik, Adhikari and Vogel, 2020

Recorded from: Tirupati, Chittoor hills.
Field Notes: A very rare species, represented only by two sightings, both subadults. Individuals were sighted at night on crevices of building walls and near roadside bushes.
Remarks: This recently described species is known from some parts of the Eastern Ghats and the westerly, Bangalore uplands (Ganesh et al., 2020b).

86. Indian bridal snake *Dryocalamus nympha* (Daudin, 1803)

Recorded from: Ahobilam, Venkatagiri, Palkonda.
Field Notes: A rare species, represented by three sightings. Individuals were seen at night near bushy patches, on tar roads within forests areas and in rubble piles.
Remarks: Some works classify this species under the genus *Lycodon* (e.g. Figueroa et al., 2016).

87. Banded kukri snake *Oligodon arnensis* (Shaw, 1802)

Material Examined: MAD no number from Nallamalai; ERMR-41 from Rollapadu.
Recorded from: Rapur Ghats, Venkatagiri, Udayagiri, Nallamalai.
Field Notes: A fairly common species, with six sightings; most were sighted in deciduous forest belts, near human settlements; roadkills noted.

88. Variegated kukri snake *Oligodon taeniolatus* (Jerdon, 1853)

Material Examined: BLT 006 from Mamandur; ERMR-42a from Appapur.
Recorded from: Ahobilam, Rajampet, Lankamalai, Nallamalai, Tirumalai.
Field Notes: A common species that was associated with a wide variety of microhabitats. Specimens seen in high elevation ghat roads as well as in foothills and the surrounding plains. Roadkill and young ones sighted. A total of 14 sightings recorded.

89. Black-headed snake *Sibynophis subpunctatus* (Dumeril, Bibron and Dumeril, 1854)

Material Examined: MAD no number from Udayagiri; BLT 10 from Kapilatheertham; ERMR-40a from Sikharam.
Recorded from: Tirumalai, Rajampet, Palkonda, Udayagiri, Nallamalai.
Field Notes: A common snake represented by nine sightings. Associated with stone piles, under rocks, fallen logs and were also seen crossing tar roads in twilight hours. Roadkills recorded.

90. Indian reed snake *Liopeltis calamaria* (Gunther, 1858)

Material Examined: MAD1928 from Kambakkam; ERMR-29a from Sikharam.
Recorded from: Tada hills.
Field Notes: A rare species, represented by two sightings. Both were from under rocks, within mid-elevation deciduous forest belts in riverine tracts.
Remarks: Recently, this species was redescribed by Amarasinghe et al. (2020).

91. Banded racer *Platyceps plinii* (Merrem, 1820)

Material Examined: ERMR-28a from Sikharam.
Recorded from: Palkonda.
Field Notes: Rare species. Three adults seen on grassland and stony grounds of hillocks.
Remarks: The nomenclature of this long-stable species was recently emended (Deepak et al., 2021).

92. Bholanath's racer *Platyceps bholanathi* (Sharma, 1976)

Material Examined: BLT 14 from Kapilatheertham; ERMR-49a, b.
Recorded from: Tirumalai, Palkonda.
Field Notes: A rare species with three sightings. One adult sighted on tree branch 3 m above ground; two more were sighted on stony ground, all were active during daytime.
Remarks: This species was re-sighted after a gap of decades, in Tirumalai (Guptha et al., 2012). Curiously, this species was never reported from its type locality Nallamalai, in any subsequent works from that region (Rao et al., 2005; Srinivasulu and Das, 2008), but was recorded elsewhere close by (Seetharamaraju and Srinivasulu, 2013).

93. Rat snake *Ptyas mucosa* (Linnaeus, 1758)

Material Examined: ERMR-39a from Srisailam.
Recorded from: Widespread. Seen in all study sites.
Field Notes: A common species, represented by 14 sightings. Associated with several habitat types including low plains country, the foothills and the higher reaches of the hills (> 1,000 m asl). Also sighted near human habitation, regularly. Juveniles seen.

94. Indian trinket snake *Coleognathus helena helena* (Daudin, 1802)

Material Examined: BLT09 from Anjanaeyapuram; ERMR-32a from Mallelatheertham.
Recorded from: Ahobilam, Venkatagiri, Tirumalai, Rapur Ghats.
Field Notes: A common species, represented by eight sightings. Associated with rubble piles, under debris, stones and rocks. Seen in twilight hours. Roadkills and juveniles recorded.

95. Black-necked trinket snake *Coelgnathus helena nigriangularis* Mohapatra, Schulz, Helfenberger, Hoffman and Dutta, 2016

Recorded from: Rapur Ghats.
Field Notes: A very rare species, represented by the roadkill of an adult snake.
Remarks: This subspecies was recently described based on specimens from the Northern Eastern Ghats and Central Indian Hills (Mohapatra et al., 2016). Ganesh and Arumugam (2016) reported the first record of this subspecies in the Southern Eastern Ghats, from Jawadi hills. Our second finding from an intermediate place bolsters the southern record.

96. Common vine snake *Ahaetulla oxyrhynca* (Bell, 1825)

Material Examined: BLT002 from Mamandur.
Recorded from: Tirumalai, Rapur Ghats, Gundla Brameshwaram, Ahobilam, Nallamalai.
Field Notes: A common species represented by 18 sightings. Gravid females and juveniles recorded. Roadkills recorded. Arboreal and diurnal. Sleeping snakes sighted on branches at night. Associated with fairly thinly-wooded forests and open scrub tracts.
Remarks: The taxonomy and nomenclature of this common and widespread species was recently studied (Mallik et al., 2020).

97. Variable vine snake *Ahaetulla* cf. *anomala* (Annandale, 1906)

Material Examined: BLT003 from Kapilatheertham.
Recorded from: Tirumalai.
Field Notes: A rare species, with only one sighting, on bushes, in lower slopes covered by mixed deciduous forests.
Remarks: The nominotypcial population is known from parts of Odisha and West Bengal, in India, apart from Bangladesh (Mohapatra et al., 2017). This southerly population is yet to be taxonomically verified and hence referred to as *A.* cf. *anomala*.

98. Laudankia vine snake *Ahaetulla laudankia* Deepak, Narayanan, Sarkar, Dutta and Mohapatra, 2019

Material Examined: ERMR-6A from Mallelatheertham
Recorded from: Nallamalai.
Field Notes: The record of this species is based on the collection by Rao et al. (2005).
Remarks: The Nallamalai specimen reported by Rao et al. (2005) is the southernmost record of this species (Deepak et al., 2019; Sengupta and Chandramouli, 2020; Purkayastha et al., 2021).

99. Common cat snake *Boiga trigonata* (Daudin, 1802)

Material Examined: ERMR-37a from Chinnarutla.
Recorded from: Nallamalai, Rapur Ghats, Venkatagiri, Lankamalai.
Field Notes: A fairly common species, represented by four sightings. Individuals were sighted at night actively moving around on arboreal situations and juveniles were seen crossing tar roads.

100. Yellow-green cat snake *Boiga flavivirdis* Vogel and Ganesh, 2013

Material Examined: MAD 1913 from Udayagiri (paratype)
Recorded from: Palkonda, Nallamalai.
Field Notes: A rare species, represented by two sightings.
Remarks: This species is not known from some of the areas from where it was precisely recorded in this work. The specimen from Udayagiri is the paratype of this species (Ganesh and Asokan, 2010; Vogel and Ganesh, 2013).

101. Forsten's cat snake *Boiga forsteni* (Dumeril, Bibron and Dumeril, 1854)

Material Examined: ERMR-20a from Thummalabailu; BLT 047 From Ubbalamadugu.
Recorded from: Lankamalai, Tada.
Field Notes: A fairly common species, represented by four sightings. Juveniles and roadkills sighted. A juvenile was sighted near abandoned human settlement near; another subadult was sighted on Tamarind tree thickets at 0.3 m above ground actively foraging at night. These were all gray or ash-colored morphs.

Testudines Batsch, 1788
Trionychidae Fitzinger, 1826

102. Indian flapshell turtle *Lissemys punctata* (LaCepede, 1789)

Recorded from: Rajampet (Somasila catchment), Lankamalai, Ahobilam.
Field Notes: A fairly common, represented by six sightings. Sighted in shallow stagnant water bodies. Roadkills sighted.

103. Leith's softshell turtle *Nilssonia leithii* (Gray, 1872)

Material Examined: MAD 1939 from the Tungabadra River, Kurnool.
Recorded from: Nallamalai

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Field Notes: Recorded based on a historical specimen mentioned above. No direct sightings of this species obtained during the study.
Remarks: This specimen of *N. leithii* was inadvertently excluded in the work of Ganesh and Asokan (2010) herpetological catalogue of the Madras Govt. Museum.

Geoemydidae Theobald, 1868

104. Black pond turtle *Melanochelys trijuga* (Schweigger, 1812)

Recorded from: Ahobilam, Tada.
Field Notes: A fairly common species, represented by four sightings. Sighted in ponds and near riparian settings, near streams.

Testudnidae Batsch, 1788

105. Indian star tortoise *Geochelone elegans* (Schoepff, 1795)

Recorded from: Palkonda, Udayagiri, Tirumalai.
Field Notes: A fairly common species represented by six sightings, from stony hill slopes and scrub lands.

Discussion

During the course of the present study, several range-restricted or endemic taxa were found and also, many new range records were unearthed. New records involve all the three taxa (amphibians, lizards, snakes) and all the hill blocks (Tada-Tirumalai-Venkatagiri, Ahobilam-Udayagiri, Gundla Brameshwaram-Nallamalai). Our findings attest to the lacuna in our knowledge on the distribution of this fauna in this region. Chelonians were also recorded during field work and were catalogued during our pre-existing museum specimen examination exercises. Three species of chelonians namely *Geochelone elegans*, *Melanochelys trijuga* and *Lissemys punctata* were recorded during our fieldwork. Particularly noteworthy is our note of the specimen MAD no number *Nilssonia leithii* from Thungabadra river, Kurnool that is a part of the Nallamalai hills, just south of the Krishna river system. This specimen was could not be noticed during the work of Ganesh and Asokan (2010). Nevertheless, the prime focus of this work were amphibians and squamates that are separately dealt with below.

Among amphibians, the most important finding is the rediscovery of the caecilian *Ichthyophis* cf. *bombayensis* that was re-sighted after 70 years in Tada falls subsequent to Ramaswami (1947). The only subsequent collections are those reported on by Ganesh and Asokan, (2010). Unfortunately, collection history is unavailable for this entry. Our specimen is in conformity with that reported by Gower et al. (2007). This apart, a few taxa belonging to the genus *Minervarya* (formerly *Fejervarya* partim, fide Sanchez et al., 2018) were represented by unidentified taxa, including those not previously known from the central Eastern Ghats (see Ganesh and Arumugam, 2016; Ganesh et al., 2018; Rao et al., 2005; Srinivasulu and Das, 2008). However, recent works have resulted in the synonymy of some previously described forms (Phuge et al., 2020). Studies still remain to be conducted to fully clarify their taxonomic status.

New precise records of amphibians include the record of the dicroglossid *Sphaerotheca pluvialus* (Jerdon, 1853) a species that is so far known from parts of Southern Eastern Ghats, Coromandel Coast and Sri Lanka (Dahanukar et al., 2017; Ganesh et al., 2018) and recently reported from near Central India (Dandekar et al., 2020). Some observations were made on range-restricted, potentially endemic frogs from this region including that of the ranids *Indosylvirana* sp., *Hydrophylax* sp. and the rhacophorid *Raorchestes* sp. by us during the current study, though these were previously reported from Tirumalai (Deuti et al., 2014). We made a focused search for *Indirana* frogs, especially in Rollapenta from where it was purportedly reported (Srinivasulu and Das, 2008). Based on our extensive surveys throughout this region, we hypothesize its absence in Nallamalai. In fact, the only place outside the Western Ghats that has *Indirana* population is Sirumalai – the far south of Eastern Ghats (Ganesh and Arumugam, 2016). Also, the balloon frog *Uperodon globulosus* that was reported from Amarabad Plateau, north of Krishna River, was not recorded in the present study (Srtinivasulu et al., 2006).

Among lizards, many new records were obtained. In geckoes, new records of *Hemidactylus* cf. *gleadowii*, from Nallamalai (also see Ganesh and Asokan, 2010) and sightings of roadkills of *Cyrtodactylus* cf. *rishivalleyensis* in Tirumalai Ghat roads (also see Agarwal and Bauer, 2017) were obtained. We sighted *Hemiphyllodactylus* sp. in Tirumalai (also see Agarwal et al., 2019), a first for this region, where its occurrence was confirmed only from the northerly Gundla Brameshwaram by Javed et al. (2010a). The species of *Cnemaspis* that we recorded from Tirumalai hills, forms the first record of the genus within this landscape. A new species *C. avasabinae* was recently described from Penchalakona by Agarwal et al. (2020). Srinivasulu and Das (2008) whilst writing about an unidentified *Cnemaspis* from Rollapenta in Nallamalai, opined that it would either be related to or even conspecific with *Cnemaspis otai* of Vellore in the Southern Eastern Ghats (see Das and Bauer, 2002; Ganesh et al., 2018). Our report is from a region in between that of Srinivasulu and Das (2008) and Das and Bauer (2002). Taxonomic works are needed to resolve the status of these populations.

Other significant outcomes include our finding of *Draco* cf. *dussumieri* that was previously reported from Talakona falls near Tirumalai hills (Balachandran and Pittie, 2000). This species was sighted in Thirumalai temple forest complex in the year 2000 (I. Das unpub. data). Some records such as those of *Hemidactylus* cf. *treutleri*, *Eutropis*

allapallensis, *E. beddomei* were not unexpected, being found in the surrounding regions, but nevertheless form precise regional reports for the central Eastern Ghats (Ganesh et al., 2018). A few species like *Eutropis ashwamedhi* (Sharma, 1969) and *E. innotata* (Blanford, 1870) known from this landscape (Rao et al., 2010; Srinivasulu et al., 2016) could not be recorded by us in this study, despite efforts. It is noteworthy to mention here that *E. nagarjunensis*, *E. ashwamedhi*, *R. vosmaeri* and *Sitana thondalu* are some of the India's most poorly-known, point endemic lizards (Amarasinghe et al., 2016; Deepak et al., 2018; Rao et al., 2005; Seetharamaraju et al., 2009; Srinivasulu et al., 2005, 2016) that are from this landscape – the central Eastern Ghats.

Among lizards, *Hemidactylus* (Gekkonidae), *Eutropis* (Scincidae) and *Sitana* (Agamidae) were with highest congeneric diversity. It is also noteworthy to mention about the diversity of *Ophsiops* (Lacertidae). Except *Hemidactylus*, other congeneric taxa of the genera stated above under the respective families have more or less similar microhabitat associations. Thus, habitat associations and niche partitioning between the many congeneric species of the aforesaid genera are of interest. *Eutropis* skinks: *E. carinata* group are rock-dwelling while *E.* cf. *macularia* group is leaf-litter dwelling. Some *Hemidactylus* species are large-bodied and rupicolous forms (e.g. *H.* cf. *giganteus*), while some are small, strictly terrestrial forms (*H. reticulatus*). Many of them are medium-sized rupicolous species belonging to the *H. brookii* clade. *Sitana* species and *Ophisops* species are totally ecologically similar among their congeners. As this study aimed primarily to inventory the herpetofauna, specific attention to a certain genera or groups were not paid, so as to not distort the on-going generalized surveys.

For snakes, our long-term fieldwork enabled us to record most species known from this landscape. Significant findings include the shieldtail snake *Uropeltis* cf. *ellioti*, the pitviper *Trimeresurus gramineus*, colubrid snakes such as *Liopeltis calamaria*, *Lycodon flavicollis* and *L. deccanensis*, *Chrysopelea taprobanica*, *Sibynophis subpunctatus*, *Platyceps bholanathi*, *Boiga forsteni* and *Boiga flaviviridis* as well as the sand snakes *Psammophis condanarus* and *P. longifrons* (also see Srinivasulu and Das, 2008; Guptha et al., 2012; Vogel and Ganesh, 2013; Ganesh et al., 2017c). It is noteworthy to mention here that none of the snake species listed above have a pan-Indian distribution, but are found only in hills of peninsular India, including in parts of the Western Ghats, the Eastern Ghats and, the Central Indian hills and the adjacent island of Sri Lanka.

On the one hand these genuine additions to the Eastern Ghats snake fauna are of interest. On the other hand, there have been some unfortunate cases of misidentification-mediated reports (Srinivasulu and Das, 2008; Guptha et al., 2013) of a few snakes that are characteristic of the wet forests of the Western Ghats, such as *Ahaetulla pulverulenta*, *Lycodon travancoricus* and *Oligodon travancoricus* that were later reidentified (Ganesh and Chandramouli, 2011; Deepak and Harikrishnan, 2013; this work). With five species of *Lycodon*, the Eastern Ghats is found to have an equal diversity of wolf snakes as that of the Western Ghats (*L. travancoricus* instead of *L. deccanensis*; and *L. flavomaculatus* in the Northern Western Ghats). Ecological interactions and niche partitioning patterns among these *Lycodon* species that cohabit in this region is a promising topic for future research. In fact, *Lycodon* has now become the most species-rich snake genus in the central Eastern Ghats, despite the recognition of *Dryocalamus*.

The earliest of snakes described from this region were *Psammophis*, *P. condanarus* (as *P. indicus*) by Beddome (1863) from Nullay Mullay hills and *P. longifrons* by Boulenger (1890) from Cudappah hills. Till date, the later species has never been found near its type locality (Visvanathan et al., 2017). However, in June 2014, a juvenile *P. longifrons* was sighted and photographed (see Fig. 6F) in Srisailam, the first-ever nearly topotypical documentation that is the closest to type locality of this species. Also, we concur with Srinivasulu and Das (2008) in that the frog *Polypedates leucomystax*, the reptiles *Calotes nemoricola* and *Cerberys rynchops* do not occur in the central Eastern Ghats. We, however, differ from Srinivasulu and Das (2008) in that *Duttaphrynus hololius* and *Eutropis beddomei* indeed occur in this landscape. Contrarily, their records of *Calotes rouxii* are incorrect, representing *Psammophilus* cf. *blanfordanus* as clarified herein.

Taken together, a large land area of nearly 300 km comprising two, parallel linear stretches of hill ranges that were subjected to 1,000 man hours of fieldwork, revealed a lot of new insights and information on the herpetological diversity of the central Eastern Ghats. The southern regions (Tirumalai hills) were especially under-researched, compared to the northerly Nallamalai (Rao et al., 2005; Srinivasulu and Das, 2008). Some species such as the skinks *Riopa vosmaerii*, *Eutropis ashwamedhi*, *E. innotata* could not be observed by us, in spite of our targeted surveys. We additionally hypothesize the presence of other rare species here, such as *Boiga westermanni* (Reinhardt,1863). Apart from providing new distribution records for many species, this study also provides further records of some range-restricted forms such as the Tirumalai population of bush frogs *Raorchestes* (Deuti et al., 2014), Tada hills caecilian *Ichthyophis* (Ramaswami, 1947), Talakona population of flying lizard *Draco* (Balachandran and Pittie, 2000) and even some better-studied endemic taxa such as *Eutropis nagarjunensis*. Our work

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stresses the importance of long-term, large-scale bioinventory that will continue to be the most fundamental factor in documenting the biodiversity of little-known tropical forest regions such as the Eastern Ghats.

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Conflict of interest

The authors declare that there are no conflicting issues related to this research article.

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