

The Herpetofauna of Nallamala Hills, Eastern Ghats, India: An Annotated Checklist, With Remarks on Nomenclature, Taxonomy, Habitat Use, Adaptive Types and Biogeography

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Abstract.- We present an inventory of the herpetofauna of the Nallamala Hills, Eastern Ghats, south-eastern India. The fauna, as currently known, includes 20 species of amphibians belonging to 14 genera in six families and 64 species of reptiles belonging to 42 genera in 15 families. Divided in habitat types, the herpetofauna can be classified into species tolerant of disturbed habitats; exclusively scrub species (and for reptiles, from rocky biotopes); scrub and bordering agricultural fields; and exclusively mesic forest species. For one species, lack of ecological information precludes its allocation to a specific habitat category. Significant diversity of squamates (including gekkonids, scincids, and colubrids) are known from these ranges, several of which endemic or largely restricted to scrub forests of Peninsular India. Mesic forests remain poorly explored, and support hitherto undescribed species among the herpetofauna. Adaptations seen amongst the herpetofauna of the Nallamala Hills include a diversity of dietary and habitat types, including, among amphibians, ant specialists; predators of small vertebrates; folivores; fossorial; terrestrial; aquatic or aquatic-margin; and arboreal forms. Amongst reptiles, adaptive types includes ant- and worm-eaters; predator of crop pests; predator of small or medium-sized vertebrate prey; egg-predators; fish-eaters; frog- and toad-eaters; and one near-exclusive snake-eater. In terms of habitat usage, reptiles exceed amphibians in species richness, on account of their greater capacity of surviving in relatively arid regions.

The Eastern Ghats contributes significantly to both species richness and endemism of the Indian region, including representatives of endemic genera and species. Nonetheless, these hills continue to receive less attention for conservation compared to the relatively better-known Western Ghats.

Keywords.- Amphibians, reptiles, biodiversity, ecology, Nallamala Hills, Eastern Ghats, India.

Introduction

Nallamala Hills (14° 26' – 16° 31' N and 78° 30' – 80° 10' E) are a group of low hill ranges with an average altitude of ca. 500 m in the central Eastern Ghats complex in the state of Andhra Pradesh, south-eastern India (Fig. 1). From the Palnad Basin in the north to the Tirupati Basin in the south, the Nallamala Hills runs for a distance of ca. 430 km with an average width of 30 km (Anon, 1965; Srinivasulu and Nagulu, 2002). An unbroken chain of rugged hills with precipitous cliffs covering an area of ca. 7,640 km², it encompasses six districts (Nalgonda, Mahbubnagar, Kurnool, Cuddapah, Prakasam and Guntur) in Andhra Pradesh State. Running parallel to it in the south-eastern side is the Balapalli and Palakonda Ranges, while on the western side, towards the north, are the Erramala Range. The vegetation is typically of the southern tropical dry deciduous and southern tropical moist deciduous forest types intermingled with scrub (Champion and Seth, 1968), although the Nallamalals show representatives of many

vegetation types known from the Eastern Ghats, including dry deciduous, moist deciduous, dry evergreen, riverine and scrub forest (see R. K. Rao, 1998; R. S. Rao, 1998). Dry deciduous forests are dominant. Common species found here include *Antidesma acidum*, *Canthium parviflorum*, *Cerisoides turgida*, *Cissus pallida*, *Cochlospermum religiosum*, *Colebrookea oppositifolia*, *Dalbergia lanceolaris*, *Dalbergia paniculatum*, *Diospyros melanoxylon*, *Ehretia laevis*, *Lagerstroemia parviflora*, *Pterocarpus marsupium*, *Syzygium alternifolium*, and *Tamilnadia uliginosa*. A forest type with *Boswellia serrata* and *Chloroxylon swietenia* as the dominant species occurs near Chalama, a *Terminalia coriacea* and *Anogeisus latifolia* type occur in eastern Nallamala, a *Phoenix* type with *Phoenix loureivie* as the dominant species forming a pure stand on rocky substrata occur between Ramannapenta and Gundla Brahmeshwaram Metta Wildlife Sanctuary (GBM). Moist deciduous forests are restricted to sheltered sites with high rainfall such as GBM, upper Ahobilam and Iskagundam; common species include: *Careya arborea*,

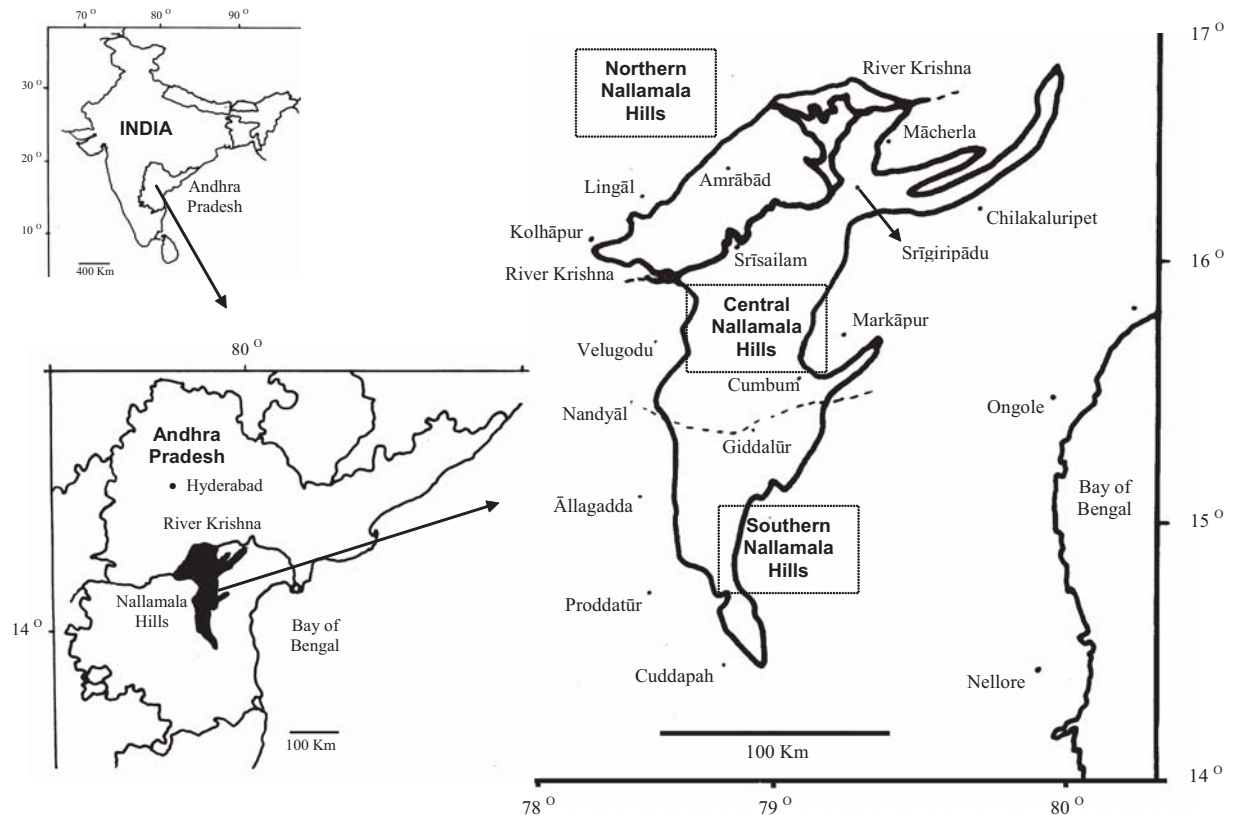


Figure 1. Maps showing the location of the Nallamala Hills, Andhra Pradesh, south-eastern India. On top left, map of India, showing Andhra Pradesh State; on bottom left, map of Andhra Pradesh, showing location of Nallamala Hills; and on right, the Nallamala Hills, with localities mentioned in the text.

Dillenia pentagyna, *Ficus hispida*, *Barleria strigosa*, *Adiantum lunulatum*, *Oroxylon indicum*, *Trema orientalis* and *Pimpinella wallichiana*. The Nallamalas are home to many endemic species of Eastern Ghats including: *Andrographis nallamalayana*, *Ericaulon lushingtonii*, *Dicliptera beddomei*, *Premna hamiltonii*, *Euphorbia linearifolia* var. *nallamalayana*, *Rostellularia vahlii*, *Andrographis beddomei*, *Rostellularia vahlii* var. *rupicola*, *Boswellia ovalifoliata*, *Cycas beddomei*, *Chaemaesyce linearifolia*, *Chaemaesyce senguptae*, *Crotalaria madurensis*, *Crotalaria paniculata nagarjunakondensis*, *Indigofera barberi*, *Pterocarpus santalinus*, *Albizia sikharamensis*, and *Eriolaena lushingtonii*. *Pterocarpus marsupium* and *Cycas beddomii* are well known endemics. Another interesting feature of the flora is the exhibition of gigantism as exemplified by the shrubby climber *Marsdenia tenacissima*, the leaves of which measure up to 32 cm. Other climbers such as *Bauhinia vahlii* and *Enteda pursetha* are dominant over other vegetation. The climate is generally hot and dry with temperatures rising up to 43–45°C during May and dropping to 8–12°C in December. The Nallamala Hills receive on an average 900–1,000 mm rainfall annually.

The Nallamala Hill Range has been conveniently divided into three zones (Fig. 1): i.) the Northern Nallamala Hills (the expanse of hill ranges between the Palnad Basin and the River Krishna that flows approximately 130 km through the hills); ii.) the Central Nallamala Hills (the expanse of hill ranges between the River Krishna and the British railway track between Nandyal and Guntur passing through Chalama, Bogada, and Diguvametta); and iii.) the Southern Nallamala Hills (the expanse of hills between the British railway track and the Tirupati basin near Rajampet (14° 11' N and 79° 10' E). Two contiguous protected areas, the Nagarjunasagar Srisailam Tiger Reserve and the Gundla Brahmeshwaram Metta Wildlife Sanctuary (with a collective area of 4,762 km²) have been set aside to conserve the rich biodiversity of this tract.

The first of the faunal surveys conducted in the Nallamala Hills dates back to 1930 when the ornithologist, Sālim Ali (1896–1987), of the Bombay Natural History Society, collected bird specimens from Mannanur and Farahabad on the Amrabad Plateau in the Northern Nallamala Hills during the Hyderabad State Ornithological Survey (see Lozupone et al., 2004, for a gazetteer of localities; Srinivasulu and Nagulu, 2002).

Subsequently, the Zoological Survey of India conducted two faunistic surveys to collect vertebrate fauna in the vicinity of the area in the Northern Nallamala Hills that was to be submerged due to the construction of the Nagarjunasagar Dam on River Krishna. Between 1980 to present date many surveys and other studies (Agrawal and Bhattacharyya, 1976; Bhushan 1986, 1994; Murthy, 1968, 1986; Nagulu et al., 1998; Rao et al., 1997; Rao et al. 1999; Rao et al., 2005; Rao et al., 2004a,b,c,d; Reddy et al., 2004; Sharma, 1969, 1971, 1976; Srinivasulu and Nagulu, 2002; Srinivasulu and Rao, 1999; Srinivasulu and Rao, 2000; Srinivasulu, 2001b, 2002, 2003) have been conducted documenting the faunal elements found in the Nallamala Hills.

HISTORY OF HERPETOFAUNAL STUDIES

The earliest zoological collections from these hill ranges were made by Thomas Claverhill Jerdon (1811–1872), a member of the Asiatic Society, and also an important contributor to mammalogy, ornithology, and herpetology (see Das, 2004, for a brief biographic account). Jerdon's papers were published in the Journal of the Asiatic Society of Bengal. As Civil Surgeon of Nellore in 1842, Jerdon collected extensively in the then poorly-known region between Madras and Nellore, discovering many novelties amongst the vertebrate fauna, and most famously, the Jerdon's courser, *Rhinoptilus bitorquatus* (see an account in Bhushan, 2003). As a result of his collections during the time, the following now familiar herpetological species were described by Jerdon himself: *Microhyla rubra* (Jerdon, 1854), *Hoplobatrachus crassus* (Jerdon, 1854), *Hemidactylus subtriadrus* Jerdon, 1853, and *Oligodon taeniolatus* (Jerdon, 1853).

The Zoological Survey of India undertook the first herpetological survey of the Nallamala Hills, between 1962 and 1963 (reported by Murthy, 1968; Sharma, 1969; 1971; 1976). As part of the Eastern Ghats Herpetological Survey, Dr. Hem Singh Pruthi (?–1953), Plant Protection Adviser to the Government of India and entomologist with the ZSI (see Lal, 1954, for an obituary), collected herpetofauna from the Nallamala Hills in 1929 which were identified by Dr. Malcolm Arthur Smith. Under the State Faunal Diversity Documentation Project, initiated by the Survey, additional specimens were collected from localities in the Nallamala Hills (Murthy, 1986; Sanyal et al., 1993; Sarkar et al., 1993).

The first author of the present report made observations on the herpetofauna of Northern and Central Nallamala Hills between late 1995 and early 2000. A research team from the Department of Zoology, Osmania University, Hyderabad, also documented the herpetofaunal diversity while executing an Andhra Pradesh Forest Department-sponsored project on the effects of man-made barriers on wildlife in Gundla

Brahmeshwaram Metta Wildlife Sanctuary in the Central Nallamala Hills, between 1998 and 2000. Observations on the herpetofaunal diversity made during these two studies between 1995 and 2000 have been listed in an unpublished document (Srinivasulu, 2001a). The Andhra Pradesh Forest Department, in collaboration with Department of Botany, Sri Krishnadevaraya University, Anantapur (for flora) and Department of Zoology, Osmania University, Hyderabad (for fauna) initiated All Taxa Biodiversity Inventorization Project in 2001 (Rao et al., 2004e) in which the first author was involved. Voucher specimens of amphibians and reptiles collected during this project have been deposited in the State Forest Department's Eco-Resource Monitoring Lab, located in Sunnipenta, Kurnool District. Between 3 – 16 June 2003, CS along with a research scholar from Zoological Survey of India, Hyderabad, and other volunteers visited Nagarjunasagar Srisailem Tiger Reserve to study the voucher specimens of the herpetofauna in Eco-Resource Monitoring Lab, Sunnipenta and collect fresh voucher specimens to be deposited in the National Zoological Collection housed at the Freshwater Biological Station of the Zoological Survey of India, Hyderabad, India (Srinivasulu et al., 2006).

Materials and Methods

Literature review and faunistic surveys by the first author for acquiring voucher specimens, both for the Andhra Pradesh Forest Department (January 2001 to June 2003) and the Zoological Survey of India (June 2003), and records of observations made by the first author between December 1995 to December 2004 in the Nallamala Hills form the basis of the diversity of herpetofauna reported here. Voucher specimens collected following techniques detailed in Heyer et al. (1994), including collections along 100–200 m transects and sampling within 50 sq m quadrats, at elevations between 150–570 m ASL. Vegetation in the area of sampling is dry deciduous and scrub forest types. Several moist deciduous forest patches were also surveyed, including along seasonal streams, particularly for amphibians. Specimens were preserved and were deposited both at the State Forest Department Collection housed at ERM Labs, Sunnipenta, Kurnool District and the National Zoological Collection at the Freshwater Biological Station, Zoological Survey of India, Hyderabad. Certain large-growing (and threatened/protected) species considered easily-identifiable in the field (e.g., *Crocodylus palustris* and *Python molurus*) were not collected. Photographic vouchers were deposited in the Natural History Museum at the Department of Zoology, Osmania University, Hyderabad. All records from the southern Nallamala Hills are based on sight records.

The annotated lists of amphibians and reptiles provided below include information on their distribution in the Nallamala Hills, their habitat and qualitative impressions of abundance. Details of the vouchers are also provided. If the voucher specimen/s and/or photographic voucher are present, they are indicated by [S] or [P] followed by abbreviation of the place where housed. Abbreviations used include: ZSIK (National Zoological Collection, Zoological Survey of India, Kolkata), ZSIH (National Zoological Collection, Freshwater Biological Station, Zoological Survey of India, Hyderabad), ERM (Eco-Resource Monitoring Lab, Andhra Pradesh Forest Department, Sunnipenta), and NHMOU (Natural History Museum, Department of Zoology, Osmania University, Hyderabad). Nomenclatural remarks concerning species are for those names that are different from that generally prevailing in the literature in Indian herpetology, especially the Fauna of British India volumes by Smith (1931–43).

Results

The herpetofauna of the Nallamala Hills, as currently known, includes 20 species of amphibians belonging to 12 genera in four families and 64 species of reptiles belonging to 42 genera in 15 families. Recently, Rao et al. (2005) published an account of herpetofauna of the Nallamala Hills putting on record about 66 species of herpetofauna (including 18 species of amphibians in 11 genera in 4 families and 48 species of reptiles in 34 genera in 12 families) based on collections made from 16 locations between 15° 35'N (Isukagundam) to 16° 37' N (Vijayapuri) and 78° 39'E (Saileshwaram) to 79° 17' E (Vijayapuri) between November 2001 and September 2004. Rao et al.'s (2005) paper suffers from numerous problems (including misidentifications and erroneous nomenclature, in addition to dubious first record claims), and grossly under-represents the herpetofauna of the region, while ignoring to emphasize the endemic reptiles of the Nagarjunasagar area.

Of the herpetofaunal species listed in this work, voucher specimens of 76 species are either at the National Zoological Collection of the Zoological Survey of India, at Kolkata (48 species) and Hyderabad (20 species) or in the Eco-Resource Monitoring Laboratory, Sunnipenta (62 species). Vouchers of 11 species are at Kolkata, and 14 are at Sunnipenta. Eight taxa listed in this report are either based on literature reports or on sightings.

Annotated List of Amphibians

Order: Anura

Family: Bufonidae

1. *Bufo stomaticus* Lütken, 1862

Bufo stomaticus C. F. Lütken. 1862. Vidensk. Meddr. Danske Naturh. Foren. 1862: 305.

Northern (Sarkar et al., 1993; Srinivasulu et al., 2006), Central (Srinivasulu et al., 2006) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIK (A1844, A1141), ZSIH (ZSI/FBS/N/1148, 1150–1153).

2. *Bufo scaber* Schneider, 1799

Bufo scaber J. G. Schneider. 1799. Hist. Nat. Amph.: 222.

Northern (Srinivasulu et al., 2006), Central (Rao et al., 2005; Srinivasulu et al., 2006) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Uncommon. [S] ERM (ERMA–5a); [P] NHMOU (NHMOU.Amph.P.1–03).

Remarks: First record claim from the region by Rao et al. (2005) is erroneous as it has been already reported from the Nallamala Hills by Subba Rao et al. (1994). Dubois and Ohler (1999) showed that *Bufo scaber* Schneider, 1799 has priority over *Bufo fergusonii* Boulenger, 1892.

3. *Duttaphrynus melanostictus* (Schneider, 1799):

Bufo melanostictus J. G. Schneider. 1799. Hist. Nat. Amph.: 216.

Northern (Rao et al., 2005; Sarkar et al., 1993; Srinivasulu et al., 2006), Central (Rao et al., 2005; Sarkar et al., 1993; Srinivasulu et al., 2006) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Abundant. [S] ZSIK (A1144, A1145, A1845, A1997–98, A8373–75, A8377–81), ERM (ERMA–1a).

Family: Dicroglossidae

4. *Euphylyctis cyanophlyctis* (Schneider, 1799)

Rana cyanophlyctis J. G. Schneider. 1799. Hist. Nat. Amph.: 137.

Northern (Rao et al., 2005; Sarkar et al., 1993; Srinivasulu et al., 2006), Central (Rao et al., 2005; Sarkar et al., 1993; Srinivasulu et al., 2006) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Abundant. [S] ZSIK (A6941, A6943, A1948, A8424–26, A1108–13, A1130, A1989, A7810–11, A6947, A1131–32, A1830–34, A1838, A1941–47),

ERM (ERMA-3a); [P] NHMOU (NHMOU.Amph.P.7-03).

Remarks: *Euphylyctis* Fitzinger, 1843 was revived from synonymy of *Rana* Linnaeus, 1758 by Dubois (1992).

5. *Euphylyctis hexadactylus* (Lesson, 1834)

Rana hexadactyla R. P. Lesson. 1834. Voyage Indes-Orient.: 331.

Northern (Rao et al., 2005; Srinivasulu et al., 2006), Central (Rao et al., 2005; Srinivasulu et al., 2006) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Abundant. [S] ERM (ERMA-10a); [P] NHMOU (NHMOU.Amph.P.8-03).

6. *Fejervarya cf. limnocharis* (Gravenhorst, 1829)

Rana limnocharis J. L. C. Gravenhorst. 1829. Rept. Mus. Zool. Vratis. Delic. Mus. Zool: 42.

Northern (Sarkar et al., 1993; Srinivasulu et al., 2006), Central (Rao et al., 2005; Srinivasulu et al., 2006) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIK (A8438-40, A7813-14, A1990, A6946), ERM (ERMA-17a); [P] NHMOU (NHMOU.Amph.P.9-03).

Remarks: *Fejervarya* Bolkay, 1915 was recognized as a subgenus of *Rana* Linnaeus, 1758 by Dubois (1992), and as a genus by Iskandar (1998).

7. *Hoplobatrachus crassus* (Jerdon, 1854) Jerdon's Bull Frog

Rana crassa T. C. Jerdon. 1854. J. Asiatic Soc. Bengal 22(5): 531.

Northern (Sanyal et al., 1993; Srinivasulu et al., 2006), Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Abundant. [S] ZSIK (A1843, A6945, A8409-14), ERM (ERMA-13a); [P] NHMOU (NHMOU.Amph.P.10-03). Remarks: *Hoplobatrachus* Peters, 1863 was revived from synonymy of *Rana* Linnaeus, 1758 by Dubois (1992). See also Grosjean et al. (2004).

8. *Hoplobatrachus tigerinus* (Daudin, 1803)

Rana tigerina F.-M. Daudin. 1803. Hist. Nat.: 64; Pl. XX.

Northern (Sanyal et al., 1993; Srinivasulu et al., 2006), Central (Rao et al., 2005; Sanyal et al., 1993; Srinivasulu et al., 2006) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Abundant. [S] ZSIK (A6944, A8443-45, A1138-39, A1995), ZSIH (ZSI/FBS/N/1145), ERM (ERMA-15a).

9. *Sphaerotheca breviceps* (Schneider, 1799)

Rana breviceps J. G. Schneider. 1799. Hist. Nat. Amph.: 140.

Northern (Srinivasulu et al., 2006), Central (Rao et al.,

2005; Sanyal et al., 1993; Srinivasulu et al., 2006) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Abundant. [S] ZSIK (A8400, A8448, A1940), ZSIH (ZSI/FBS/N/1143, 1144, 11461, 1147, 1155-58), ERM (ERMA-12a); [P] NHMOU (NHMOU.Amph.P.11-03).

Remarks: Rao et al. (2005) included an erroneously identified photograph (image 13 at www.zoosprint.org/), which is, in fact, that of *Sphaerotheca dobsoni*, a taxon that also is present in the Nallamala Hills (see below). In support of long-separated evolutionary lineages, representing distinct monophyletic radiations of the Africa, Madagascar and southern Asia, Vences et al. (2000) argued for the partition of *Tomopterna* into three lineages. Thus, the earliest available name for the Asian species is *Sphaerotheca*.

10. *Sphaerotheca dobsonii* (Boulenger, 1882)

Rana dobsonii G. A. Boulenger. 1882. Cat. Bat. British Mus.: 32; Pl. 3, Fig. 1.

Northern (Srinivasulu et al., 2006), Central (Srinivasulu et al., 2006) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Uncommon. [P] NHMOU (NHMOU.Amph.P.12-03).

11. *Sphaerotheca rolandae* (Dubois, 1983)

Rana (Tomopterna) rolandae A. Dubois. 1983. Alytes: 2(4): 163.

Northern (Srinivasulu et al., 2006), Nallamala Hills. Open forests. Rare. [P] NHMOU (NHMOU.Amph.P.13-03).

Remarks: Rao et al.'s (2005) claim of this taxon (as *Tomopterna rolandae*) as the first record from Andhra Pradesh is based on erroneous identification. The voucher specimen and the photograph included in the report are that of *Sphaerotheca breviceps* (image 14 at www.zoosprint.org/).

Family: Microhylidae

12. *Kaloula taprobanica* Parker, 1934

Kaloula pulchra taprobanica H. W. Parker. 1934. Monogr. Frogs. Microhylidae: 86.

Northern (Rao et al., 2005) and Central (Rao et al., 2005; Srinivasulu et al., 2006) Nallamala Hills. Open forests and scrub areas. Uncommon. [S] ZSIH (ZSI/FBS/N/1159), ERM (ERMA-4a); [P] NHMOU (NHMOU.Amph.P.2-03).

Remarks: The first record of its occurrence in Andhra Pradesh reported by Rao et al. (2005) is erroneous, as Sivakumar et al. (2003) had reported its occurrence in the State from Sriharikota Island Nellore District. Rao et al. (in review, a) puts on record for its occurrence in the Nallamala Hills.

13. *Microhyla ornata* (Duméril and Bibron, 1841)

Engystoma ornatum A.-M.-C. Duméril & G. Bibron. 1841. Erp. Gen. 8: 745.

Northern (Sarkar et al., 1993; Srinivasulu et al., 2006), Central (Rao et al., 2005; Sarkar et al., 1993; Srinivasulu et al., 2006) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIK (A1846–48, A7817, A8451, A1140, A1996), ZSIH (ZSI/FBS/N/1141, 1160), ERM (ERMA–8a); [P] NHMOU (NHMOU.Amph.P.3–03).

14. *Microhyla rubra* (Jerdon, 1854)

Engystoma rubrum T. C. Jerdon. 1854. J. Asiatic Soc. Bengal 22(2): 534.

Northern (Srinivasulu et al., 2006), Central (Rao et al., 2005; Sarkar et al., 1993; Srinivasulu et al., 2006) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Uncommon. [S] ZSIK (A8463–64), ERM (ERMA–6a); [P] NHMOU (NHMOU.Amph.P.4–03).

15. *Ramanella variegata* (Stoliczka, 1872)

Callula variegata F. Stoliczka. 1872. Proc. Asiatic Soc. Bengal 1872(6): 111.

Central (Srinivasulu et al., 2006) and Southern Nallamala Hills. Scrub and open to close forests. Uncommon. No vouchers, based on sightings.

16. *Uperodon globulosus* (Günther, 1864)

Cacopus globulosus A. C. L. G. Günther. 1864. Reptiles British India: 416.

Central (Rao et al., 2005; Srinivasulu et al., 2006; Srinivasulu et al., 2006) Nallamala Hills. Scrub and open forests. Rare. [S] ZSIH (ZSI/FBS/N/1138), ERM (ERMA–7a); [P] NHMOU (NHMOU.Amph.P.5–03).

17. *Uperodon systoma* (Schneider, 1799)

Rana systoma J. G. Schneider. 1799. Hist. Nat. Amph.: 144.

Northern (Rao et al., 2005; Srinivasulu et al., 2006), Central (Rao et al., 2005; Srinivasulu et al., 2006) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIH (ZSI/FBS/N/1142, 1149, 1154), ERM (ERMA–2a); [P] NHMOU (NHMOU.Amph.P.6–03).

Family: Petropedetidae**18. *Indirana leithii* (Boulenger, 1888)**

Rana leithii G. A. Boulenger. 1888. Ann. & Mag. nat. Hist. Ser. 6, 2: 506.

Northern (Srinivasulu et al., 2006) and Central (Srinivasulu et al., 2006) Nallamala Hills. Scrub forests. Rare. [S] ERM (ERM/A24).

Remarks: *Indirana* Laurent, 1986 was revived from synonymy of *Rana* Linnaeus, 1758 by Dubois (1992). This species had been sighted on two occasions near Rollapenta in Central Nallamalla Hills and on one occasion near Ahobilam in Southern Nallamala Hills by the first author (Srinivasulu et al., 2006), who has also studied a single specimen in the collection of ERM Labs (ERM/A24), Sunnipenta that had been identified by Varad Giri of the BNHS.

Family: Ranidae**19. *Hylarana* sp.**

Central (Rao et al., 2005; Rao et al., in review, b) Nallamala Hills. Riparian forest. Rare. [S] ERM (ERMA–14a).

Remarks: The systematic status of the population, referred to *Rana temporalis* (Günther, 1864) by previous workers, is under study by the second author, who assigns it to Dubois' (1992) subgenus *Sylvirana*, elevated to generic rank in Frost et al. (2006). Currently this generic name is a synonym of *Hylarana* (See Frost et al., 2007).

Family: Rhacophoridae**20. *Polypedates maculatus* (Gray, 1834)**

Hyla maculata J. E. Gray. 1834. Ill. Indian Zool.: Pl. LXXXII; Fig. 1.

Northern (Rao et al., 2005; Sanyal et al., 1993; Srinivasulu et al., 2006), Central (Rao et al., 2005; Sanyal et al., 1993; Srinivasulu et al., 2006) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Abundant. [S] ZSIK (A8403), ZSIH (ZSI/FBS/N/1140, 1161), ERM (ERMA–11a); [P] NHMOU (NHMOU.Amph.P.14–03).

Annotated List of Reptiles**Order: Crocodylia****Family: Crocodylidae****1. *Crocodylus palustris* Lesson, 1831**

Crocodylus palustris R. P. Lesson. 1831. Bull. Sci. Nat. Geol. 25: 121.

Northern Nallamala Hills. Under the Central Government sponsored crocodile rehabilitation programme, some crocodiles were reintroduced both at backwaters of Nagarjunasagar Reservoir in Vijaypuri vicinity, Srisailem Reservoir and Ethipothala (described by Srinivas et al., 1999). Their numbers have dwindled due to poaching, but some crocodiles do survive in both these areas. No vouchers, based on the literature and indirect evidence.

Order: Chelonia**Family: Geoemydidae****2. *Melanochelys trijuga* (Schweigger, 1812)**

Emys trijuga A. F. Schweigger. 1812. Prod. Monogr. Chel.: 310.

Northern, Central and Southern Nallamala Hills. Waterbodies, streams and rivers. Uncommon. No vouchers, based on sightings.

Remarks: Assumed, on the basis of locality, to belong to the nominotypical form.

3. *Pangshura tentoria* (Gray, 1834)

Emys tentoria J. E. Gray. 1834. Proc. Zool. Soc. London 1834(2): 54.

Northern, Central and Southern Nallamala Hills. Waterbodies, streams and rivers. Uncommon. No vouchers, based on sightings.

Remarks: Allocated to *Pangshura* Gray, 1869 rather than *Kachuga* Gray, 1856 by Spinks et al. (2004).

Family: Testudinidae: Tortoises**4. *Geochelone elegans* (Schoepff, 1795)**

Testudo elegans J. D. Schoepff. 1795. Hist. Test. 3: 111; Pl. XXV.

Northern (Rao et al., 2005), Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub forests and near agricultural fields. Common. [S] ERM (ERM-5a).

Remarks: First reported from the Nallamala Hills by Subba Rao et al. (1994).

Family: Trionychidae**5. *Nilssonina gangetica* (Cuvier, 1825)**

Trionyx gangeticus G. L. C. F. D. Cuvier. 1825. Recherch Ossemens Foss. 5: 203.

Northern Nallamala Hills (Sharma, 1971). Waterbodies, streams and rivers. Uncommon. [S] ZSIK (R21238).

Remarks: The generic nomen *Aspideretes* Hay, 1904, was revived from the synonymy of *Trionyx* Geoffroy Saint-Hillaire, 1809 by Meylan (1987). Praschag et al. (2007) placed *Aspideretes* in the synonymy of *Nilssonina*, but provided an incorrect (feminine) termination of the species name.

6. *Nilssonina leithii* (Gray, 1872)

Trionyx Leithii J. E. Gray. 1872. Ann. & Mag. nat. Hist. ser. 4 10: 334.

Northern (Sharma, 1971; Sanyal et al., 1993) and Southern Nallamala Hills. Waterbodies, streams and rivers. Uncommon. [S] ZSIK (R21403).

7. *Lissemys punctata* (Bonnaterre, 1789)

Testudo punctata M. Bonnaterre. 1789. Tableau Encycl. Method. Nat.: 30.

Northern (Sanyal et al., 1993), Central and Southern Nallamala Hills. Waterbodies, streams and rivers. Common. [S] ZSIK (Specimen not traceable).

Order: Squamata**Family: Agamidae****8. *Calotes rouxii* (Duméril & Bibron, 1837)**

Calotes rouxii A.-M.-C. Duméril & G. Bibron. 1837. Erp. Gén. 4: 407.

Northern (Rao et al., 2005), Central (Rao et al., 2005) and Southern Nallamala Hills. Rocky outcrops in open and scrub forests, and agricultural fields. Common. [S] ZSIH (ZSI/FBS/N/1172), ERM (ERM-10a); [P] NHMOU (NHMOU.Rep.P.1-03).

9. *Calotes versicolor* (Daudin, 1802)

Agama versicolor F.-M. Daudin. 1802. Hist. nat. Rept. 3: 395; Pl. XLIV.

Northern (Rao et al., 2005; Sharma, 1971; Sanyal et al., 1993), Central (Rao et al., 2005) and Southern Nallamala Hills. Rocky outcrops in open and scrub forests, and agricultural fields. Abundant. [S] ZSIK (R20249-60, R20181-85, R21286-88, R21289, R21431-33, R21367, R21275, R21434-35, R21276, R21422-25, R21277-80, R21368-70, R21281, R21283-85, R24456, R20293, R20214-15), ZSIH (ZSI/FBS/N/1165, 1169), ERM (ERM-12a).

10. *Psammophilus blanfordanus* (Stoliczka, 1871)

Charasia blanfordana F. Stoliczka. 1871. Proc. Asiatic Soc. Bengal 1871(9): 194.

Northern (Sanyal et al., 1993; Sharma, 1971), Central and Southern Nallamala Hills. Rocky outcrops in open and scrub forests. Common. [S] ZSIK (R21436, R24685, R24659).

11. *Psammophilus dorsalis* (Gray in Griffith & Pidgeon, 1831)

Agama Dorsalis J. E. Gray in: E. Griffith & E. Pidgeon. 1831. Class Reptilia 9: 56.

Northern (Rao et al., 2005; Sharma, 1971), Central (Rao et al., 2005) and Southern Nallamala Hills. Rocky outcrops in open and scrub forests. Common. [S] ZSIK (R21291, R20295), ERM (ERM-11a).

12. *Sitana ponticeriana* Cuvier, 1829

Sit. (= Sitana) ponticeriana G. J.-L.-N.-F. D. Cuvier. 1829. Reg. Anim. 2: 43.

Northern (Rao et al., 2005; Sharma, 1971; Sanyal et al.,

1993), Central (Rao et al., 2005; Sanyal et al., 1993) and Southern (Sanyal et al., 1993) Nallamala Hills. Rocky outcrops in open and scrub forests and agricultural fields. Abundant. [S] ZSIK (R20284, R21256, R21270, R21413–15, R2127–72, R21348–50, R21267, R21257, R21419–21, R21258–61, R21253–56, R21269, R21357–64, R24436, R24439, R20178, R20216, R21262–68, R21352, R21416, R21357–62, R24668, R24455, R24462, R20223, R20294, R24684), ZSIH (ZSI/FBS/N/1166, 1170, 1171), ERM (ERM–9a); [P] NHMOU (NHMOU.Rep.P.2–03).

Family: Chamaeleonidae

13. *Chamaeleo zeylanicus* Laurenti, 1768

Chamaeleo zeylanicus J. N. Laurenti. 1768. Syn. Rept.: 46.

Northern (Rao et al., 2005), Central (Rao et al., 2005) and Southern Nallamala Hills. Open and scrub forests, and agricultural fields. Common. [S] ERM (ERM–13a); [P] NHMOU (NHMOU.Rep.P.1–01).

Family: Gekkonidae

14. *Cnemaspis* sp.

Remarks: An unidentified species of *Cnemaspis* was encountered in Central and Southern Nallamala Hills. Three specimens that were collected by the first author, deposited in the Eco-Resources Monitoring Labs, Sunnipenta in March 2002, were lost due to attack by ants. Specimens were collected from the leaf litter in a dry stream near Chinnarutla. Rare. [S] ERM (Lost). *Cnemaspis otai* Das and Bauer (2000) is known from Vellore region, in extreme northern Tamil Nadu State, adjacent to Andhra Pradesh, and the Nallamala specimens may be either this nominal species, or an undescribed species.

15. *Hemidactylus bowringii* (Gray, 1845)

Doryura bowringii J. E. Gray. 1845. Cat. Lizards British Mus.: 156.

Northern (Sanyal et al., 1993) Nallamala Hills. Inhabits human-altered habitats and other dilapidated man-made structure. Rare. [S] ZSIK (R24465).

16. *Hemidactylus brookii* (Gray, 1845)

Hemidactylus brookii J. E. Gray. 1845. Cat. Lizards British Mus.: 153.

Northern (Rao et al., 2005; Sharma, 1971; Sanyal et al., 1993), Central (Rao et al., 2005) and Southern Nallamala Hills. Open forests, old temples, also human commensal, found in houses and other dilapidated man-made structures. Abundant. [S] ZSIK (R21240–44, R24669, R21404–05, R23237, R24435, R20179,

R23687, R23699), ZSIH (ZSI/FBS/N/1174), ERM (ERM–2a).

17. *Hemidactylus flaviviridis* Rüppell, 1835

Hemidactylus flaviviridis E. Rüppell. 1835. Neue Wirbelth.-Fauna Abyss., Amph. 18: Pl. 6; Fig. 2.

Northern, Central (Rao et al., 2005) and Southern Nallamala Hills. Human commensal, found in houses and other man-made structures. Uncommon. [S] ZSIH (ZSI/FBS/N/1173), ERM (ERM–3a).

18. *Hemidactylus frenatus* Duméril & Bibron, 1836

Hemidactylus frenatus A.-M.-C. Duméril & G. Bibron. 1836. Erp. Gén. 3: 366.

Northern (Sanyal et al., 1993), Central (Rao et al., 2005) and Southern Nallamala Hills. Open forests, old temples, also human commensal, found in houses and other dilapidated man-made structures. Common. [S] ZSIK (R23700), ERM (ERM–30a).

19. *Hemidactylus giganteus* Stoliczka, 1871

Hemidactylus giganteus F. Stoliczka. 1871. Proc. Asiatic Soc. Bengal 1871(9): 193.

Northern (Rao et al., 2005; Sanyal et al., 1993), Central (Rao et al., 2005) and Southern Nallamala Hills. Open forests, old temples, and other dilapidated man-made structures. Uncommon. [S] ZSIK (R21411–12), ZSIH (ZSI/FBS/N/1167, 1168), ERM (ERM–1a).

20. *Hemidactylus leschenaultii* Duméril & Bibron, 1836

Hemidactylus leschenaultii A.-M.-C. Duméril & G. Bibron. 1836. Erp. Gén. 3: 364.

Northern (Rao et al., 2005; Sanyal et al., 1993), Central (Rao et al., 2005) and Southern Nallamala Hills. Open forests, old temples, also human commensal, found in houses and other dilapidated man-made structures. Common. [S] ZSIK (R20180, R23693, R24458, R24466, R24660, R24510, R24513), ERM (ERM–4a).

21. *Hemidactylus reticulatus* Beddome, 1870

Hemidactylus reticulatus R. H. Beddome. 1870. Madras Monthly J. Med. Sci. 1: 33.

Northern (Sanyal et al., 1993), Central (Rao et al., 2005) and Southern Nallamala Hills. Rocky outcrops in open and scrub forests. Uncommon. [S] ZSIK (R21245–46, R21247–53, RR21346, R21343–45, R21406–10, R23216), ERM (ERM–17a).

22. *Hemidactylus triedrus* (Daudin, 1802)

Gecko triedrus F.-M. Daudin. 1802. Hist. nat. Rept. 4: 155.

Northern (Rao et al., 2005; Sanyal et al., 1993), Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S]

ZSIK (21239, R24509, R24512), ERM (ERM-7a).

Family: Lacertidae

23. *Ophisops jerdoni* (Blyth, 1853)

Ophisops jerdoni E. Blyth. 1853. J. Asiatic Soc. Bengal 22: 653.

Northern (Rao et al., 2005; Sanyal et al., 1993; Sharma, 1971), Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Abundant. [S] ZSIK (R21302–14, R21381–92, R21440, R24661, R24670), ZSIH (ZSI/FBS/N/1176–1178), ERM (ERM-18a).

24. *Ophisops leschenaultii* (Milne-Edwards, 1829)

Lacerta leschenaultii H. Milne-Edwards. 1829. Ann. Sci. nat. 16: 86; Pl. VI; Fig. 9.

Northern (Sanyal et al., 1993; Sharma, 1971), Central (Murthy, 1986) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Uncommon. [S] ZSIK (R21296–97, R21438–39).

25. *Ophisops minor* (Deraniyagala, 1971)

Cabrita jerdoni minor P. E. P. Deraniyagala. 1971. Ceylon J. Sci. 32(1): 104; Fig. 1.

Northern (Rao et al., 2005; Sanyal et al., 1993; Sharma, 1971), Central (Rao et al., 2005; Sanyal, et al., 1993) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIK (R21298–301, R21377–80, R24440, R24459, R24464), ERM (ERM-8a).

Remarks: Reviewed by Böhme and Bischoff (1991). See also nomenclatural remarks in Arnold (1989).

Family: Scincidae

26. *Lygosoma ashwamedhi* Sharma, 1969

Riopa ashwamedhi R. C. Sharma. 1969. Bull. Syst. Zool., Calcutta 1(2): 73; Fig. 2.

Endemic to Andhra Pradesh, known only from type locality. Northern (Sharma, 1969, 1971; Sanyal et al., 1993) Nallamala Hills. Rocky scrub forests. Rare. [S] ZSIK (R21173–77, R21179).

27. *Lygosoma guentheri* (Peters, 1879)

Eumeces guentheri W. C. H. Peters. 1879. S.-Ber. Ges. Naturf. Freunde Berlin 1879(3): 36.

Central (Rao et al., 2005) Nallamala Hills. Scrub forest. Rare. [S] ERM (ERM-43a).

Remarks: Hitherto known only from the Western Ghats, from Gujarat to Kerala States (Daniel and Shull, "1963"; 1964; Daniel, 1962; Smith, 1935: 322), this is the first record of the species from the Eastern Ghats,

28. *Lygosoma punctata* (Linnaeus, 1758)

Scincus punctatus C. Linnaeus. 1758. Syst. Nat. 10th ed. 1: 209.

Northern (Sanyal et al., 1993; Sharma, 1971), Central and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIK (21294, R21376, R20327, R20318), ZSIH (ZSI/FBS/N/1175); [P] NHMOU (NHMOU.Rep.P.3–03).

29. *Eutropis carinata* (Schneider, 1801)

Scincus carinatus J. G. Schneider. 1801. Hist. Amphib.: 183.

Northern (Rao et al., 2005; Sanyal et al., 1993; Sharma, 1971), Central (Rao et al., 2005; Sanyal et al., 1993) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIK (R21292–93, R21373–75, R21437, R20313, R21437, R24438, R24457, R24463, R23694, R24511), ZSIH (ZSI/FBS/N/1179, 1180), ERM (ERM-15a); [P] NHMOU (NHMOU.Rep.P.4–03).

Remarks: Mausfeld et al. (2002) suggested partitioning the genus *Mabuya* Fitzinger, 1826 into several genera, allocating the Asian species to *Eutropis* Fitzinger, 1843.

30. *Eutropis macularia* (Blyth, 1853)

Euprepes macularius E. Blyth. 1853. J. Asiatic Soc. Bengal 22: 652.

Northern (Sanyal et al., 1993; Rao et al., 2005), Central (Sanyal et al., 1993; Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIK (R24437, R23701), ERM (ERM-16a).

31. *Eutropis nagarjuni* Sharma, 1969

Mabuya nagarjuni R. C. Sharma. 1969. Bull. Syst. Zool., Calcutta 1(2): 71; Fig. 1.

Endemic to Andhra Pradesh. Northern (Sanyal et al., 1993; Sharma, 1969, 1971) Nallamala Hills. Rocky scrub forests. Rare. [S] ZSIK (R21170–72), ZSIH (ZSI/FBS/N/1164); [P] NHMOU (NHMOU.Rep.P.5–03).

Remarks: The photo purported to be of *Mabuya beddomei* (Jerdon, 1870) in Rao et al. (2005; image 30 at www.zoosprint.org/) is that of *Eutropis nagarjuni* (Sharma, 1969), as shown by Srinivasulu et al. (2005).

Family: Varanidae

32. *Varanus bengalensis* (Daudin, 1802)

Tupinambis bengalensis F.-M. Daudin. 1802. Hist. nat. Rept. 3: 67.

Northern (Rao et al., 2005; Sanyal et al., 1993; Sharma, 1971), Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural

al fields. Common. [S] ZSIK (R21315, R21441–42), ERM (ERM–26a).

Remarks: For a history of the name *Varanus monitor* Linnaeus, 1758, a junior synonym of *Tupinambis bengalensis* Daudin, 1802, see Mertens (1946; 1956; 1957) and Sprackland (1982).

Family: Boidae

33. *Eryx conicus* (Schneider, 1801)

Boa conica J. G. Schneider. 1801. Hist. Amphib. 2: 268. Northern (Rao et al., 2005; Sanyal et al., 1993; Sharma, 1971), Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIK (R21331), ERM (ERM–14a).

34. *Eryx johnii* (Russell, 1801)

Boa Johnii P. Russell. 1801. Continuation Account Indian Serpents: 18; Pl. xvi–xvii. Northern (Rao et al., 2005; Sanyal et al., 1993; Sharma, 1971), Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIK (R21332–33), ERM (ERM–22a).

Family: Pythonidae

35. *Python molurus* (Linnaeus, 1758)

Coluber molurus C. Linnaeus. 1758. Syst. Nat. 10th ed. 1: 225. Northern, Central (Rao et al., 2005) and Southern Nallamala Hills. Rocky scrub, open forests and near agricultural fields. Uncommon. No vouchers collected, based on sightings.

Family: Colubridae

36. *Ahaetulla nasuta* (Lacepède, 1789)

Coluber nasuta B.-G.-É. de L. V.-S.-I. Lacepède. 1789. Hist. Nat. Serp. 1: 100. Northern, Central and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ERM (ERM–6a).
Remarks: Rao et al., (2005) did not include this taxon in their catalogue, but provided its picture (image 42 at www.zoosprint.org/). In their list they included the subspecies, *Ahaetulla nasutus isabellinus* (Wall). The single specimen based on which the presence is reported by Rao et al. (2005) requires further studies to confirm the validity of the so-called subspecies, whose correct termination of subspecies nomen should be rendered *isabellina*, to match the gender of the genus.

37. *Amphiesma stolatum* (Linnaeus, 1758)

Coluber stolatus C. Linnaeus. 1758. Syst. Zool. 10th ed.: 219. Northern, Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Uncommon. [S] ERM (ERM–27a).
Remarks: The gender of *Amphiesma* Duméril, Bibron and Duméril, 1854 has been treated erroneously treated as feminine since it was resurrection by Malnate (1960). Toriba (1994) showed that the genus is neuter, and the termination of the species name should therefore be *stolatum* (see also David et al., 1998).

38. *Argyrogena fasciolata* (Shaw, 1802)

Coluber fasciolatus G. Shaw. 1802. Gen. Zool.: 528. Northern, Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ERM (ERM–28a).
Remarks: Revived from the synonymy of *Coluber* for *C. fasciolata* Shaw, 1802, by Wilson (1967).

39. *Atretium schistosum* (Daudin, 1803)

Coluber schistosus F.-M. Daudin. 1803. Hist. Nat. Rept. 6: 132. Northern, Central and Southern Nallamala Hills. Near waterbodies and paddy fields. Common. No vouchers, based on sightings.

40. *Boiga forsteni* (Duméril, Bibron & Duméril, 1854)

Triglyphodon forsteni A.-M.-C. Duméril, G. Bibron & A.-H.-A. Duméril. 1854. Erp. Gén. 7: 1077. Northern, Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Uncommon. [S] ERM (ERM–20a).

41. *Boiga trigonata* (Schneider in Bechstein, 1802)

Coluber trigonatus J. G. Schneider in: J. M. Bechstein. 1802. La Cepede's Nat. Amphib.: 256; Pl. 40; Fig. 1. Northern (Sanyal et al., 1993; Sharma, 1971), Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIK (R21457), ERM (ERM–37a).

42. *Coelognathus helena* (Daudin, 1803)

Coluber helena F.-M. Daudin. 1803. Hist. nat. Rept. 6: 277; Pl. LXXVI. Northern (Rao et al., 2005; Sharma, 1971; Sanyal et al., 1993), Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIK (R21334), ZSIH (ZSI/FBS/N/ 1181), ERM (ERM–32a); [P] NHMOU (NHMOU.Rep.P.6–03).
Remarks: *Coelognathus* Fitzinger, 1843, was revived from the synonymy of *Elaphe* Fitzinger in: Wagler,

1833, by Helfenberger (2001a; b), based on visceral and vertebrae morphology and allozyme variations.

43. *Coluber bholanathi* Sharma, 1976

Coluber bholanathi R. C. Sharma. 1976. Comp. Physiol. Ecol. 1(3): 106; Fig. 1.

Endemic to Andhra Pradesh, known only from type locality. Northern (Sanyal et al., 1993; Sharma, 1976) Nallamala Hills. Scrub and open forests. Rare. [S] ZSIK (R21335–37).

44. *Dendrelaphis tristis* (Daudin, 1803)

Coluber tristis F.-M. Daudin. 1803. Hist. nat. Rept. 6: 430.

Northern (Rao et al., 2005), Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ERM (ERM–25a); [P] NHMOU (NHMOU.Rep.P.2–01).

45. *Enhydris enhydris* (Schneider, 1799)

Hydrus enhydris J. G. Schneider. 1799. Hist. Amphib. 1: 245.

Northern and Central (Rao et al., 2005) Nallamala Hills. Scrub, open forests and near agricultural fields. Uncommon. No vouchers collected, based on sightings.

46. *Liopeltis calamaria* (Günther, 1858)

Cyclophis calamaria A. C. L. G. Günther. 1858. Cat. Colubrine Snakes British Mus.: 250.

Central (Rao et al., 2005) Nallamala Hills. Scrub and open forests. Rare. [S] ERM (ERM–29a).

47. *Lycodon aulicus* (Linnaeus, 1758)

Coluber aulicus C. Linnaeus. 1758. Syst. Nat. 10th ed 1: 220.

Northern, Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ERM (ERM–35a).

48. *Lycodon striatus* (Shaw, 1802)

Coluber striatus G. Shaw. 1802. Gen. Zool.: 527.

Northern, Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Uncommon. [S] ERM (ERM–44a).

Remarks: First record claim from the region by Rao et al. (2005) is erroneous as it has been already reported from the Nallamala Hills by Subba Rao et al. (1994).

49. *Lycodon travancoricus* (Beddome, 1870)

Cercaspis travancoricus R. H. Beddome. 1870a. Madras Monthly J. Med. Sci. 1: 169.

Central (Rao et al., 2005) Nallamala Hills. Scrub and open forests. Rare. [S] ERM (ERM–38a).

50. *Macropisthodon plumbicolor* (Cantor, 1839)

Tropidonotus plumbicolor T. Cantor. 1839. Proc. Zool. Soc. London 1829(7): 54.

Northern, Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ERM (ERM–36a).

51. *Oligodon arnensis* (Shaw, 1802)

Coluber arnensis G. Shaw. 1802. Gen. Zool.: 526.

Northern, Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ERM (ERM–41a).

52. *Oligodon taeniolatus* (Jerdon, 1853)

Coronella taeniolata T. C. Jerdon. 1853. J. Asiatic Soc. Bengal 22(6): 528.

Northern (Rao et al., 2005; Sharma, 1971; Sanyal et al., 1993), Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Uncommon. [S] ZSIK (R21450–51, R24460), ERM (ERM–42a).

53. *Oligodon travancoricus* (Beddome, 1877)

Oligodon travancoricum R. H. Beddome. 1877. Proc. Zool. Soc. London 1877(4): 685.

Northern (Sanyal et al., 1993), Central and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Uncommon. [S] ZSIK (R21338).

54. *Ptyas mucosa* (Linnaeus, 1758)

Coluber mucosus C. Linnaeus. 1758. Syst. Nat. 10th ed 1: 216.

Northern (Rao et al., 2005; Sharma, 1971; Sanyal et al., 1993), Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIK (R21446–47, R21449), ERM (ERM–39a); [P] NHMOU (NHMOU.Rep.P.3–01).

Remarks: David and Das (2004) showed that the correct termination of the species nomen should be *mucosa*, rather than *mucosus*, to match the gender of the generic nomen.

55. *Sibynophis subpunctatus* (Duméril, Bibron & Duméril, 1854)

Oligodon subpunctatum A.-M.-C. Duméril, G. Bibron & A.-H.-A. Duméril. 1854. Erp. Gén. 7: 58.

Central Nallamala Hills. Scrub and open forests. Rare. [S] ERM (ERM–40a).

Remarks: The taxon *Sibynophis subpunctatus* (Duméril, Bibron & Duméril, 1854), has been recently been resurrected from the synonymy of *Sibynophis sagittaria* (Cantor, 1839) by Captain et al. (2004).

56. *Xenochropis piscator* (Schneider, 1799)

Hydrus piscator J. G. Schneider. 1799. Hist. Amphib. 1: 247.

Northern (Sharma, 1971; Rao et al., 2005; Sanyal et al., 1993), Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIK (R21339, R21452, R21454–55).

Family: Elapidae**57. *Bungarus caeruleus* (Schneider, 1801)**

Pseudoboa caerulea J. G. Schneider. 1801. Hist. Amphib. 2: 284.

Northern (Rao et al., 2005; Sanyal et al., 1993; Sharma, 1971), Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIK (R21458–59), ERM (ERM–24a).

58. *Calliophis melanurus* (Shaw, 1802)

Coluber melanurus G. Shaw. 1802. Gen. Zool.: 552.

Northern (Sanyal et al., 1993; Sharma, 1971) Nallamala Hills. Scrub forests. Rare. [S] ZSIK (R21460).

59. *Naja naja* (Linnaeus, 1758)

Coluber naja C. Linnaeus. 1758. Syst. Nat. 10th ed. 1: 221.

Northern (Rao et al., 2005; Sanyal et al., 1993; Sharma, 1971), Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIK (R21461), ERM (ERM–33a); [P] NHMOU.

Family: Typhlopidae**60. *Gryptotyphlops acutus* (Duméril, Bibron & Duméril, 1844)**

Onychocephalus acutus A.-M.-C. Duméril, G. Bibron & A.-H.-A. Duméril. 1844. Érp. Gen. 6: 333.

Northern (Sanyal et al., 1993; Sharma, 1971), Central and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIK (R21330).

Remarks: Wallach (2003) revived *Gryptotyphlops* Peters, 1881 from the synonymy of *Rhinotyphlops* Fitzinger, 1832, to accommodate the present species.

61. *Ramphotyphlops braminus* (Daudin, 1803)

Eryx braminus F.-M. Daudin. 1803. Hist. Nat. Gen. Rept. 7: 279.

Northern (Sanyal et al., 1993; Sharma, 1971), Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S]

ZSIK (R21316–20, R21327–29, R21394–99), ERM (ERM–19a).

Family: Viperidae**62. *Daboia russelii* (Shaw & Nodder, 1797)**

Coluber russelii G. Shaw & F. P. Nodder. 1797. Nat. Misc. 8: Pl. 108.

Northern (Rao et al., 2005; Sanyal et al., 1993; Sharma, 1971), Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIK (R21341), ERM (ERM–34a).

Remarks: Although Obst (1983) revived *Daboia* Gray, 1842 from the synonymy of *Vipera* Laurenti, 1768, his concept of the genus included *Daboia* Gray, 1842, *Macrovipera* Reuss, 1927, *Pseudocerastes* Boulenger, 1896 and the *Vipera xanthina* (Gray, 1849) complex. Hermann et al. (1992) separated these genera from each other, and from *Vipera* Laurenti, 1768, restricting *Daboia* to *Vipera russelii* Shaw & Nodder, 1797. For comments on the spelling of the specific name, see Dowling (1993) and Adler et al. (2000).

63. *Echis carinatus* (Schneider, 1801)

Pseudoboa carinatus J. G. Schneider. 1801. Hist. Amphib. 2: 285.

Northern (Sanyal et al., 1993; Sharma, 1971), Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIK (R21342, R21401–02, R24461) ERM (ERM–23a).

64. *Trimeresurus gramineus* (Shaw, 1802)

Coluber gramineus G. Shaw. 1802. Gen. Zool.: 420.

Northern, Central (Rao et al., 2005) and Southern Nallamala Hills. Scrub, open forests and near agricultural fields. Common. [S] ZSIH (ZSI/FBS/N/1182, 1183), ERM (ERM–31a).

ERRONEOUS OR DOUBTFUL RECORDS

In addition to the records presented in the preceding pages, the following species have been recorded from the Nallamala Hills in the literature. These have been shown to be in error, stemming from the use of incorrect names or from misidentifications.

Bufo hololius Günther, 1876, which had been reportedly collected by Pillai and Murthy (1983) from Nagarjunasagar area (also cited by Sarkar et al., 1993), has not been included in this list as this taxon is known only from type specimen and all other specimens assigned to this nomen need reevaluation, according to Dubois and Ohler (1999).

Polypedates leucomystax (Gravenhorst, 1829), has been recorded from the Nallamala Hills by Rao et al. (2005), and earlier, from the Eastern Ghats, by Pillai and Murthy (1983). The records possibly refers to either *P. maculatus* or another member of this complex, since Gravenhorst's species (type locality: Java) is a mesic area frog, approaching the present study area only in the northeast of the country (see Dutta, 1997).

In a series of papers dealing with the ecology and physiology of squamate reptiles, Subba Rao (1970; 1972) and Subba Rao and Rajabai (1972a; 1972b; 1974) recorded *Calotes nemoricola* from Tirupati, and Subba Rao (1994) recorded this species from the Nallamala Hills. Whitaker and Das (1990) showed this to be erroneous identifications for the widespread *Calotes versicolor* (Daudin, 1802).

Subba Rao et al. (1994) reported *Eutropis beddomei* (Jerdon, 1870) from all districts encompassing the Nallamala Hills range. Recently Rao et al. (2005) also reported it from Vijayapuri and Mallelathiertham in Northern Nallamala Hills. This nominal species is restricted to the Western Ghats of south-western India and south-central Sri Lanka (Smith, 1943). As mentioned earlier, Rao's (2005) image 30 represents *Eutropis nagarjuni* Sharma, 1969.

Rao et al. (2005) listed *Cerberus rynchops* (Schneider, 1799) from Sundipenta/Sikharam, within the Nallamala Range. This is an estuarine/coastal species (see Das, 2002b; Whitaker and Captain, 2004), and its record in the literature from the Eastern Ghats Complex (e.g., Pillai and Murthy, 1983) may be from the plains.

Sibynophis sagittarius (Cantor, 1839) was reported by Rao et al. (2005), based on a specimen collected from Sunnipenta. This taxon was previously reported from the area southeast of the Nallamala Hills, from Sriharikota Island, Nellore District, by Rao and Sekar (1993). *Sibynophis subpunctatus* (Duméril, Bibron & Duméril, 1854) was recently resurrected from the synonymy of *S. sagittarius* (Cantor, 1839) by Captain et al. (2004) for this population. A record of this species from East Godavari District by Sanyal et al. (1993) is erroneous, as the specimen is from Godaveri (27° 34' N and 85° 22' E), 10 km southeast of Kathmandu, central Nepal.

REMARKS ON HABITAT USE

Divided in habitat types, the amphibian fauna of Nallamala Hills can be classified into: 1. Human commensals or otherwise tolerant of disturbed habitats (14 species: *Bufo stomaticus*, *Duttaphrynus melanostictus*, *Kaloula taprobanica*, *Microhyla ornata*, *M. rubra*, *Uperodon globulosus*, *U. systoma*, *Ramanella variegata*, *Euphylyctis cyanophlyctis*, *E. hexadactylus*, *Fejervarya* cf. *limnocharis*, *Hoplobatrachus crassus*, *H.*

tigerinus, and *Polypedates maculatus*); 2. Exclusively scrub forest species (four species: *Bufo scaber*, *Sphaerotheca breviceps*, *S. dobsonii*, and *S. rolandae*); and 3. Exclusively mesic forest species (two species: *Hylarana* sp. and *Indirana leithii*). Corresponding classification for reptiles include: 1. Human commensals or taxa otherwise tolerant of disturbed habitats (seven species: *Calotes versicolor*, *Hemidactylus bowringii*, *H. brookii*, *H. flaviviridis*, *H. frenatus*, *H. leschenaultii*, and *Ptyas mucosa*); 2. Exclusively scrub forest species or from rocky biotope (21 species: *Geochelone elegans*, *Psammophilus blanfordanus*, *P. dorsalis*, *Sitana ponticeriana*, *Hemidactylus reticulatus*, *H. triedrus*, *Ophisops jerdoni*, *O. leschenaultii*, *O. minor*, *Lygosoma ashwamedhi*, *L. guentheri*, *L. punctata*, *Eutropis macularia*, *Varanus bengalensis*, *Eryx conicus*, *E. johnii*, *Python molurus*, *Coluber bholanathi*, *Liopeltis calamaria*, *Sibynophis subpunctatus*, and *Calliophis melanurus*); 3. Scrub and bordering agricultural fields (22 species: *Hemidactylus giganteus*, *Chamaeleo zeylanicus*, *Eutropis carinata*, *Ahaetulla nasuta*, *Amphisma stotatum*, *Argyrogena fasciolata*, *Boiga forsteni*, *B. trigonata*, *Coelognathus helena*, *Dendrelaphis tristis*, *Lycodon aulicus*, *L. striatus*, *Oligodon arnensis*, *O. taeniolatus*, *O. travancoricus*, *Bungarus caeruleus*, *Naja naja*, *Grypotyphlops acutus*, *Ramphotyphlops braminus*, *Daboia russelii*, *Echis carinatus*, and *Trimeresurus gramineus*); 4. Exclusively mesic forest species (three species: *Calotes rouxii*, *Cnemaspis* sp., and *Lycodon travancoricus*); 5. Wetland species (10 species: *Crocodylus palustris*, *Melanochelys trijuga*, *Pangshura tentoria*, *Nilssonina gangetica*, *N. leithii*, *Lissemys punctata*, *Aretium schistosum*, *Enhydryis enhydryis*, *Macropisthodon plumbicolor*, and *Xenochropis piscator*); and 6. Habitat category unknown (one species: *Eutropis nagarjuni*).

In summary, all six microhylids, two bufonids, five ranids, one rhacophorid, in addition to one agamid, five gekkonids and one colubrid are human commensals. Human activities may promote creation or maintenance of certain habitats conducive for these species (e.g., perennial water sources, in the form of wells, drainage areas, etc.). Low amphibian diversity characterize scrub forests, where community members are such as *Bufo scaber*, *Sphaerotheca breviceps*, *S. dobsonii* and *S. rolandae* show xeric-region and/or fossorial adaptations (e.g., thickened skins and burrowing adaptations, such as enlarged metatarsal tubercles on pes) and adaptations for retaining moisture.

All turtles and crocodylians reported from the Nallamala Range are associated with wetlands. The sole non-aquatic species (*Geochelone elegans*) is a scrub forest dweller. Significant diversity of gekkonids (*Hemidactylus reticulatus* and *H. giganteus*), scincids

(*Lygosoma ashwamedhi*, *L. guentheri*, *L. punctata*, and *Eutropis macularia*) and colubrids (*Coluber bholanathi*, *Liopeltis calamaria*, and *Sibynophis sagittaria*) are known from the ranges, several of these endemic (*L. ashwamedhi* and *C. bholanathi*) or largely restricted to scrub forests of Peninsular India. All lacertids (*Ophisops jerdoni*; *O. leschenaultii*, and *O. minor*) and all boids (*Eryx conicus*, *E. johnii*, and *Python molurus*) reported from the Nallamalla Hills are restricted to this biotope. Nonetheless, mesic forests remain poorly explored, perhaps for which reason both unidentified species from the Nallamala Ranges of amphibian (*Hylarana*) and reptile (*Cnemaspis*) may represent taxa undescribed by science.

REMARKS ON ADAPTIVE TYPES

Adaptations seen amongst the amphibians of the Nallamala Hills include a diversity of dietary and habitat types. Representatives of ant specialists include all the microhylid and most bufonid species locally represented. Additional categories include: predators of small vertebrates (*Polypedates maculatus*) and folivores (*Euphlyctis hexadactylus* and some *E. cyanophlyctis*). In terms of gross habitat usage are the fossorial (*Kaloula taprobanica*, *Microhyla ornata*, *M. rubra*, *Uperodon globulosus*, and *U. systoma*), terrestrial (*Duttaphrynus melanostictus*, *B. scaber*, and *B. stomaticus*), aquatic or aquatic-margin (*Euphlyctis cyanophlyctis*, *E. hexadactylus*, *Fejervarya* cf. *limnocharis*, *Hoplobatrachus crassus*, and *H. tigerinus*) and arboreal (*Polypedates maculatus* and sometimes *Ramanella variegata*) species. At least three species enter bathrooms of human dwellings (*Ramanella variegata*, *Kaloula taprobanica*, and *Polypedates maculatus*) and one (*Polypedates maculatus*) is known to apply a coat of protein on the surface of its body prior to emerging for foraging, to prevent evaporative water loss. Skittering on the water surface is known for two species (*E. cyanophlyctis* and juvenile *E. hexadactylus*).

Adaptive types among the reptiles, when classified by diet, include eaters of soft-bodied (e.g., ant- and worm) prey (*Grypotyphlops acutus* and *Ramphotyphlops braminus*); predators of crop pests, such as rodents (*Argyrogena fasciolata*, *Ptyas mucosa*, and *Varanus bengalensis*); predator of small or medium-sized vertebrate prey (*Python molurus*, *Crocodylus palustris*, *Ptyas mucosa*, *Daboia russelii*, *Trimeresurus gramineus*, and *Echis carinata*); egg-predators (*Oligodon arnensis*, *O. taeniolatus* and *O. travancoricus*); primarily fish-eaters (*Crocodylus palustris*, *Nilssonina gangetica*, *N. leithii*, *Atrietium schistosum*, *Enhydryis enhydryis*, and *Xenochrophis piscator*); frog- and toad-eaters (*Macropisthodon plumbicolor* and *Dendrelaphis tristis*) and near-exclusive snake-eaters (*Bungarus caeruleus* and *Calliophis melanurus*).

In terms of habitat usage, reptiles exceed amphibians in species richness, on account of their greater capacity of surviving in relatively arid regions. The regional gekkonid diversity, within the genus *Hemidactylus* includes arboreal (*H. bowringii*, *H. brookii*, *H. flaviviridis*, *H. frenatus*, and *H. leschenaultii*), terrestrial (*H. triedrus*) and semi-fossorial (*H. reticulatus*) types. Usage of specific habitat types include walls of houses (*Hemidactylus bowringii*, *H. brookii*, *H. flaviviridis*, *H. frenatus*, and *H. leschenaultii*), rupicolous habitats such as rocky boulders (*Psammophilus blanfordanus* and *P. dorsalis*); fossorial habits in terms of usage of soft substratum for burrowing (*Grypotyphlops acutus* and *Ramphotyphlops braminus*); and arboreal species, utilizing trees or some sort of vegetation (*Ahaetulla nasuta*, *Boiga forsteni*, *B. trigonata*, *Dendrelaphis tristis*, *Lycodon aulicus*, *Calotes rouxii*, *Chamaeleo zeylanicus*, and *Lycodon travancoricus*); the typhlopoid *Ramphotyphlops braminus* is also known to occasionally ascend trees in search of prey). Other adaptive types shown by the fauna include vegetation mimics (*Chamaeleo zeylanicus* and *Ahaetulla nasuta*); Batesian mimicry is shown by *Sibynophis subpunctatus* (for which the model presumably is *Calliophis melanurus*); bipedal locomotion (*Sitana ponticeriana*); and side-winding (*Echis carinata*, when moving on sand or other loose substrate).

BIOGEOGRAPHY OF THE EASTERN GHATS

The Eastern Ghats remain the poor sister of the more well-known Western Ghats, a recognized global hotspot of biological species diversity (e.g., Ward, 2002). Inger (1999) lamented about the low species richness of the amphibian fauna of the Eastern Ghats (21 species), while Das (1996) reported 84 species of reptiles, both significantly different from the known diversity of the Western Ghats, which has seen an explosion of new as well as spectacular species discoveries in recent years (see Biju, 2001; Biju and Bossuyt, 2003). Nonetheless, enough documentation exists to reveal a highly diverse biota of the hill ranges that run approximately parallel to the east coast of India.

The range itself is a weathered relict of the peninsular plateau, characterized by a series of low hills that extend from the Khondmal Hills of Orissa State, south to the Shevaroy of central Tamil Nadu, where they meet the Western Ghats in the Nilgiris region (descriptions in Das, 1996; Mani, 1995). The northern and southern sections of the Eastern Ghats are separated by the delta of the River Godavari, which is approximately 130 km in width. Other important breaks are formed by the drainages of the rivers Mahanadi and Krishna. The Billigirirangan Hills, at 1,750 m, is the highest range in the Eastern Ghats. Moisture regimes show a general gra-

dient, from a relatively mesic northern range, with dry and moist deciduous forests, to a relatively dry southern subzone, with dry deciduous and thorn scrub (vegetational analysis in Legris and Meher-Homji, 1983). Detailed analysis of faunal relationships along these hill ranges, including comparative diversity of lineages as an effect of breaks in the continuity of the ranges, humidity, and elevational effects remain to be conducted.

We adopt Wikramanayake et al.'s (2002) ecoregional approach to interpreting the distribution of the regional herpetofauna. These workers have classified the Indo-Pacific Region (stretching from Afghanistan in the west to New Guinea and the Solomons to the east), recognizing 129 ecoregions on the basis of vegetation, geology and geological history. Within this framework, the Nallamala Range falls within the Deccan Thorn Scrub zone (Ecoregion 23), abutting (and being influenced by) Ecoregions 21 (Central Deccan Plateau Dry Deciduous Forest); Ecoregion 22 (South Deccan Plateau Dry Deciduous Forest); and Ecoregion 6 (East Deccan Dry-Evergreen Forest). Although the Nallamala Hills also are adjacent to Ecoregion 34 (the Godavari-Krishna mangroves), herpetofaunal influences are absent, on account of geological-vegetational differences.

The herpetofauna of the Eastern Ghats has a long history of exploration, commencing with Patrick Russell (1727–1805), the first Western herpetologist in India, and medical doctor and naturalist with the British East India Company, based at Vizagapatam (at present Visakhapatnam). Russell explored the herpetofauna, primarily snakes, of that region and produced a two volume folio of water colors of snakes (also including *Barkudia melanosticta* (Schneider, 1801), which was published in 1796 and 1801–1802.

Collections for faunistic inventories within the Eastern Ghats complex have also been made by McCann (1945), Pillai and Murthy (1983), Daniels and Ishwar (1993), besides the contributions of the Zoological Survey of India in the Nallamala Hills referred to earlier. Rao and Rao (1998) studied the ecology of *Barkudia melanosticta* (as *B. insularis*); Bauer and Das (2000) studied the ecology of *Calodactylodes aureus* in Vellore; Das and Chanda (1998) described a new species of *Philautus* from the Visakhapatnam region; Dutta (2003) described a new *Philautus* from Simlipal Hills; and Das and Bauer (2000) described two new species of gekkonid lizards of the genus *Cnemaspis* from the Eastern Ghats.

Although less species rich than the more mesic adjacent regions, Ecoregion 23 supports a distinctive herpetofauna, including arid region representatives whose relatives are Eurasian and Afro-Ethiopian (e.g., *Chamaeleo*, *Ophisops*, *Eryx*, and *Echis*) and the region also supports lineages that may be termed distinctly

autochthonous (i.e., Indian lineages, such as the genera *Uperodon*, *Ramanella*, *Indirana*, *Sphaerotheca*, *Melanochelys*, *Pangshura*, *Nilssonina*, *Psammophilus*, *Sitana*, *Argyrogena*, *Atretium*, and *Grypotyphlops*). The presence of representatives of Indo-Malayan elements represented here (e.g., *Kaloula*, *Hylarana*, *Calliophis*, and *Trimeresurus*) are explainable using Hora's (1949) Satpura Hypothesis model, of emigration of the biota of the Indo-Malayan region westwards. Alternative models are available to explain the presence of these taxa in the Eastern Ghats, including a more mesic climate in the Indian Subcontinent up to the Eocene (van der Hammen, 1983). The climatic changes were perhaps accelerated by widespread agriculture, specifically through the cultivation of graminaceous crops (Misra, 1983), helping further in the conversion of what was once tropical sub-humid and dry deciduous forests into savannas.

Within the Eastern Ghats herpetofauna, endemic genera include the limbless skinks, *Barkudia* (with two species, *B. insularis* and *B. melanostictus*; see Das, 2000) and *Sepsophis* (a monotypic genus, containing *S. punctatus*). A number of species hitherto considered endemic to the Western Ghats have in recent years been found within the Eastern Ghats complex, including *Indirana leithii* (this report), *Hylarana malabarica* (Tschudi, 1838) by Daniel and Selukar (1963), a member of the genus *Hylarana* (this report) and *Lygosoma guentheri* (Peters, 1879) (this report). Balachandran and Pittie (2000) reported the occurrence of *Draco* from these hills, that they allocated to *D. dussumieri* Duméril & Bibron, 1837, a Western Ghats species. Eastern Ghat endemics found in the Nallamala Range include *Hemidactylus reticulatus*, *Eutropis nagarjuni*, *Lygosoma ashwamedhi*, and *Coluber bholanathi*. New species have been described from these ranges in recent years, including the geckos *Cnemaspis otai* and *C. yercaudensis* (see Das and Bauer, 2000).

Several species known from the Eastern Ghats have not (yet) been recorded from the Nallamala Ranges. Some may be regional endemics or appropriate habitats may be missing on the site under study, although the absence of some (e.g., *Calodactylodes aureus*), that are known from both north and south of the range here reinforce the argument for more sampling of the fauna. Other Eastern Ghat endemics (e.g., *Barkudia*, with two species, the monotypic *Sepsophis*, and *Hemiphyllodactylus aurantiacus*) among the reptiles, and *Philautus terebrans* and *Ichthyophis peninsularis* occur in adjacent ranges of the Ghats (see Das and Chanda, 1998; Pillai and Murthy, 1983), and with further collection, may prove their presence here, or be represented by hitherto unknown sister species.

CONSERVATION AND MANAGEMENT

Parts of the Nallamala Range are within the Protected Areas System, the levels of protection for each component varying from Forest Reserves, that lie within the jurisdiction of the Andhra Pradesh Forest Department, to National Park, that are gazetted and their protection implemented by the Central (= Federal) Government. The most well-known of the protected areas is the Nagarjunasagar Srisailem Tiger Reserve and the recently gazetted Gundla Brahmeshwaram Metta Wildlife Sanctuary.

Conservation of amphibians and reptiles represent special challenges, for which reason, arguments have been made to move away from species-based conservation strategies, to that addresses entire landscapes. Given the large number of known components of the biodiversity of these Protected Areas, especially non-homoeothermous members (or non-mammal and bird species), and the general lack of expertise to identify, let alone understand, conservation requirements, this is apparently a safer approach to the conservation of biodiversity. The situation is not unique to the Eastern Ghats: in the Indo-Pacific region, centinelan extinction (or species loss even before their formal description) is known for both amphibians and reptiles (Das, 2002a; Erdelen, 2002).

A handful of the recorded species from the Nallamala Range are human commensals, or so-called 'weed-species', including, amongst amphibians: *Duttaphrynus melanostictus*, *B. stomaticus*, *Kaloula taprobanica*, *Microhyla ornata*, *M. rubra*, *Uperodon globulosus*, *U. systoma*, *Ramanella variegata*, *Euphylyctis cyanophlyctis*, *E. hexadactylus*, *Fejervarya* cf. *limnocharis*, *Hoplobatrachus crassus*, *H. tigerinus*, and *Polypedates maculatus*. Scrub species of amphibians include: *Bufo scaber*, *Sphaerotheca breviceps*, *S. dobsonii*, and *S. rolandae*). Human-commensals among the reptiles include: *Melanochelys trijuga*, *Lissemys punctata*, *Calotes versicolor*, *Hemidactylus bowringii*, *H. brookii*, *H. flaviviridis*, *H. frenatus*, *H. giganteus*, *H. leschenaultii*, *Lygosoma punctata*, *Eutropis carinata*, *Amphiesma stolatum*, *Dendrelaphis tristis*, *Lycodon aulicus*, *Ptyas mucosa*, *Naja naja*, and *Ramphotyphlops braminus*. Scrub species of reptiles include: *Geochelone elegans*, *Sitana ponticeriana*, *Chamaeleo zeylanicus*, *Hemidactylus reticulatus*, *H. triedrus*, *Ophisops jerdoni*, *O. leschenaultii*, *O. minor*, *Lygosoma ashwamedhi*, *L. guentheri*, *Eutropis nagarjuni*, *Coluber bholanathi*, *Liopeltis calamaria*, *Calliophis melanurus*, *Daboia russellii*, and *Echis carinatus*. Two species are exclusively rupicolous (*Psammophilus blanfordanus* and *P. dorsalis*). And only two species are considered mesic region taxa, in that their respective congeners are exclusively distributed in such areas (e.g., *Hylarana* and *Cnemaspis*).

Human-commensals generally refer to species tolerant of environments altered by humans. However, many still have life histories intimately dependent on certain habitat features, such as ponds or other standing bodies of water, substrates that serve as burrowing refugia, etc. Changes from rural to urban environments are known to cause local extinction of amphibian species (including *Sphaerotheca*), through the removal of such habitats, as observed in the Chennai region (Das, unpubl.).

Three herpetofaunal species from the Nallamala Hills are recognised as threatened, under the Red List categories of the IUCN (World Conservation Union; see Hilton-Taylor, 2000). These include the turtles, *Nilssonina gangetica* and *N. leithii*, and the crocodylian, *Crocodylus palustris* (all in the 'Vulnerable' category).

In the end, species protection in countries such as India, where the pressure on land and water are large, can only be assured in areas within protected areas. It is therefore imperative to bring additional areas of these hills with high diversity and/or faunal endemism into the country's protected areas system.

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Literature Cited

- Adler, K., H. M. Smith, S. H. Prince, P. David and D. Chiszar. 2000. Russell's viper, *Daboia russellii*, not *Daboia russellii*, due to classical Latin rules. *Hamadryad* 25(2):83–85.
- Agrawal, V. C. and T. P. Bhattacharyya. 1976. Report on a collection of mammals from Nagarjunasagar, Andhra Pradesh. *Newsletter of the Zoological Survey of India*. 2(5):212–216.
- Anonymous. 1965. The gazetteer of India. Volume One. Country and people. Ministry of Information and Broadcasting, Government of India, Faridabad. 652

- pp., folding map.
- Arnold, E. N. 1989. Towards a phylogeny and biogeography of the Lacertidae: relationships within an Old-World family of lizards derived from morphology. *Bulletin of the British Museum of Natural History (Zoology)* 55:209–257.
- Balachandran, S. and A. Pittie. 2000. Occurrence of *Draco* or flying lizard *Draco dussumieri* in Chittoor District, Andhra Pradesh. *Journal of the Bombay Natural History Society* 97(1):147–148.
- Bauer, A. M. and I. Das. 2000. A review of the gekkonid genus *Calodactylodes* (Reptilia: Squamata) from India and Sri Lanka. *Journal of South Asian Natural History* 5(1):25–35.
- Bhushan, B. 1986. The G.B.M. Plateau Sanctuary. *Hornbill* 1986(3):18–22.
- Bhushan, B. 1994. Ornithology of the Eastern Ghats. Unpublished Ph.D. dissertation submitted to University of Bombay, Bombay.
- Bhushan, B. 2003. Rediscovery of the Jerdon's or double-banded courser *Rhinoptilus bitorquatus* (Blyth). Pp. 67–80; Pl. 1. In: J. C. Daniel and G. W. Ugra (eds.), *Petronia. Fifty years of post-independence ornithology in India. A centenary dedication to Dr. Sálím Ali 1896–1996*. Bombay Natural History Society/Oxford University Press, Mumbai.
- Biju, S. D. 2001. A synopsis to the frog fauna of the Western Ghats, India. *Occasional Paper of the Indian Society for Conservation Biology, Thiruvananthapuram* 1:1–24.
- Biju, S. D. and F. Bossuyt. 2003. New frog family from India reveals an ancient biogeographical link with the Seychelles. *Nature* 425:711–714.
- Böhme, W. and W. Bischoff. 1991. On the proper denomination of *Cabrita jerdonii* Beddome, 1870 (Reptilia: Lacertidae). *Amphibia-Reptilia* 12(2):220–221.
- Captain, A. S., D. J. Gower, P. David and A. M. Bauer. 2004. Taxonomic status of the colubrid snake *Sibynophis subpunctatus* (Duméril, Bibron & Duméril, 1854). *Hamadryad* 28(1 & 2):90–94.
- Champion, H. G. and S. K. Seth. 1968. A revised survey of forest types in India. Manager of Publications, Government of India, New Delhi. 404 pp.
- Daniel, J. C. 1962. Extension of range of the skink *Riopa guentheri* (Gray). *Journal of the Bombay Natural History Society* 59(3):965.
- Daniel, J. C. and T. G. Selukar. 1963. Occurrence of the fungoid frog *Rana malabarica* (Bibron) at Jagdalpur, Bastar District, M. P. *Journal of the Bombay Natural History Society* 60(3):743–744.
- Daniel, J. C. and E. M. Shull. “1963” 1964. A list of the reptiles and amphibians of the Surat Dangs, south Gujarat. *Journal of the Bombay Natural History Society* 60(3):737–743.
- Daniels, R. J. R. and N. M. Ishwar. 1993. Herpetofauna of the wetlands of the Eastern Ghats- A status survey. Report to the Asian Wetland Bureau, Kuala Lumpur. (2) + 50 pp.
- Das, I. 1996. Biogeography of the reptiles of South Asia. Krieger Publishing Company, Malabar, Florida. 16 pl. + vii + 87 pp.
- Das, I. 2000. *Anguis melanostictus* Schneider, 1801, a valid species of *Barkudia* (Sauria: Scincidae) from southeastern India. *Asiatic Herpetological Research* 8:13–17.
- Das, I. 2002a. Amphibians of the Indo-Pacific region: conservation of neglected biodiversity. Pp. 47–49. In: E. Wikramanayake, E. Dinerstein, C. Loucks, D. M. Olson, J. Morrisson, J. Lamoreux, M. McKnight and P. Hedao (eds), *Terrestrial ecoregions of the Indo-Pacific. A conservation assessment*. Island Press, Washington, D.C.
- Das, I. 2002b. A photographic guide to the snakes and other reptiles of India. New Holland Publishers (U.K.) Ltd., London. 144 pp.
- Das, I. 2004. Herpetology of an antique land: the history of herpetological explorations and knowledge in India and south Asia. In: *Herpetological expeditions and voyages*. A. M. Bauer (ed.), *Bonner Zoologische Beiträge* 52(2):215–229.
- Das, I. and A. M. Bauer. 2000. Two new species of *Cnemaspis* (Sauria: Gekkonidae) from Tamil Nadu, southern India. *Russian Journal of Herpetology* 7(1):17–28.
- Das, I. and S. K. Chanda. 1998. A new species of *Philautus* (Anura: Rhacophoridae) from the Eastern Ghats, south-eastern India. *Journal of South Asian Natural History* 3(1):103–112.

- David, P. and I. Das. 2004. On the grammar of the gender of *Ptyas* Fitzinger, 1843 (Serpentes: Colubridae). *Hamadryad* 28(1&2):113–116.
- David, P., G. Vogel, and O. S. G. Pauwels. 1998. *Amphiesma optatum* (Hu & Djao, 1966) (Serpentes, Colubridae): an addition to the snake fauna of Vietnam, with a list of the species of the genus *Amphiesma* and a note on its type species. *Journal of the Taiwan Museum* 51(2):83–92.
- Dowling, H. G. 1993. The name of Russel's viper. *Amphibia–Reptilia* 14:320.
- Dubois, A. 1992. Notes sur la classification des Ranidae (Amphibiens Anoures). *Alytes* 61(10):305–352.
- Dubois, A. and A. Ohler. 1999. Asian and Oriental toads of the *Bufo melanostictus*, *Bufo scaber* and *Bufo stejnegeri* groups (Amphibia, Anura): a list of available names and redescription of some name-bearing types. *Journal of South Asian Natural History* 4(2):133–180.
- Dutta, S. K. 1997. Amphibians of India and Sri Lanka (checklist and bibliography). Odyssey Publishing House, Bhubaneswar. (4) + xiii + 342 + xxii pp.
- Dutta, S. K. 2003. A new species of rhacophorid frog from Simlipal Biosphere Reserve, Orissa, India. *Russian Journal of Herpetology* 10(1):25–32.
- Erdelen, W. 2002. Reptile diversity in the Indo–Pacific region. Pp. 49–54. In: E. Wikramanayake, E. Dinerstein, C. Loucks, D. M. Olson, J. Morrisson, J. Lamoreux, M. McKnight and P. Hedao (eds.), *Terrestrial ecoregions of the Indo–Pacific. A conservation assessment*. Island Press, Washington, D.C.
- Frost, D. R. 2007. Amphibian species of the world: online reference. Version 5.1. <http://research.amnh.org/herpetology/amphibia/The American Museum of Natural History>. Accessed on 14 January 2008.
- Frost, D. R., T. Grant, J. Faivovich, R. H. Bain, A. Haas, C. F. B. Haddad, R. O. De Sá, A. Channing, M. Wilkinson, S. C. Donnellan, C. J. Raxworthy, J. A. Campbell, B. L. Blotto, P. Moler, R. C. Drewes, R. A. Nussbaum, J. D. Lynch, D. M. Green and W. C. Wheeler. 2006. The amphibian tree of life. *Bulletin of the American Museum of Natural History* (297):1–370.
- Grosjean, S., M. Vences and A. Dubois. 2004. Evolutionary significance of oral morphology in the carnivorous tadpoles of tiger frogs, genus *Hoplobatrachus* (Ranidae). *Biological Journal of the Linnean Society* 81:171–181.
- Helfenberger, N. 2001a. Phylogenetic relationships of Old World ratsnakes based on visceral organ topography, osteology, and allozyme variation. Unpublished Ph. D. Dissertation, Zoological Museum, University of Zürich, Zürich. 106 pp.
- Helfenberger, N. 2001b. Phylogenetic relationships of Old World ratsnakes based on visceral organ topography, osteology, and allozyme variation. *Russian Journal of Herpetology, Supplement* 2001:1–62.
- Hermann, H.-W., U. Joger and G. Nilsson. 1992. Phylogeny and systematics of viperine snakes. III. Resurrection of the genus *Macrovipera* (Reuss, 1927) as suggested by biochemical evidence. *Amphibia–Reptilia* 13:375–392.
- Heyer, W. R., M. A. Donnelly, R. W. McDiarmid, L.-A. Hayek and M. S. Foster. 1994. *Measuring and monitoring biological diversity: standard methods for amphibians*. Smithsonian Institution Press, Washington, D.C. xix + 364 pp.
- Hilton-Taylor, C. 2000. 2000 IUCN Red List of threatened species. IUCN, Gland and Cambridge. xviii + 61 pp.
- Hora, S. L. 1949. Satpura Hypothesis of the distribution of the Malayan fauna and flora to Peninsular India. *Proceedings of the National Institute of Science, India* 15:207–422.
- Inger, R. F. 1999. Distribution of amphibians in southern Asia and adjacent islands. Pp. 445–482. In: W. E. Duellman (ed.), *Patterns of distribution of amphibians. A global perspective*. The Johns Hopkins University Press, Baltimore and London.
- Iskandar, D.T. 1998. *Amfibi Jawa dan Bali*. Puslitbang Biologi- LIPI and GEF- Biodiversity Collections Project, Bogor. xviii + 117 pp; 26 pl. English edition, 1998, *The Amphibians of Java and Bali*. Research and Development Centre for Biology–LIPI and GEF– Biodiversity Collections Project, Bogor. xviii + 117 pp; 26 pl.
- Lal, K. B. 1954. Dr. Hem Singh Pruthi. *Current Science* 23(1): 5.

- Legris, P. and V. M. Meher-Homji. 1983. The Eastern Ghats: vegetation and bioclimatic aspects. Pp. 1–17. In: Proceedings of the National Seminar on Resource Development and Environment. Eastern Ghats. Andhra University Press, Waltair.
- Lozupone, P., B. M. Beehler, and S. D. Ripley. 2004. Ornithological gazetteer of the Indian Subcontinent. Center for Applied Biodiversity Science, Conservation International, Washington, D.C. (2) + 190 pp.
- McCann, C. 1945. Reptiles and amphibians of Vizagapatam and neighbouring Ghats. Journal of the Bombay Natural History Society 45:435–436.
- Malnate, E. 1960. Systematic division and evolution of the colubrid snake genus *Natrix*, with comments on the subfamily Natricinae. Proceedings of the Academy of Natural Sciences of Philadelphia 112:41–71.
- Mani, M. S. 1995. Biogeography in India. Surya Publications, Dehra Dun. 130 pp.
- Mausfeld, P., A. Schmitz, W. Böhme, B. Misof, D. Vrcibradic and C. F. D. Rocha. 2002. Phylogenetic affinities of *Mabuya atlantica* Schmidt, 1945, endemic to the Atlantic Ocean Archipelago of Fernando de Noronha (Brazil): necessity of partitioning the genus *Mabuya* Fitzinger, 1826 (Scincidae: Lygosominae). Zoologischer Anzeiger 241:281–293.
- Mertens, R. 1946. Über *Lacerta monitor* Linnaeus. Senckenbergiana 27 (4/5):188.
- Mertens, R. 1956. Die Gültigkeit der Namen *Varanus bengalensis* (Daudin 1802) und *Varanus salvator* (Laurentus 1768). Senckenbergiana Biology 37(5/6):395–398.
- Mertens, R. 1957. Opinion 540. Protection under the plenary powers of the specific names “*bengalensis*” Daudin (1802) as published in the combination “*Tupinambis bengalensis*” and “*salvator*” Laurenti 1768, as published in the combination “*Stellio salvator*” (Class Reptilia). Opin. Decl. International Commission of Zoological Nomenclature 20(7):77–86.
- Meylan, P. A. 1987. The phylogenetic relationships of soft-shelled turtles (Family Trionychidae). Bulletin of the American Museum of Natural History 186(1):1–101.
- Misra, R. 1983. Indian savannas. Pp. 151–166. In: F. Bourlière (ed.), Ecosystems of the world. 13. Tropical savannas. Elsevier Scientific Publishing Company, Amsterdam, Oxford and New York.
- Murthy, T. S. N. 1968. Notes on collection of amphibians from Nagarjun Valley (Andhra) with one new record. Journal of the University of Poona 34:63–71.
- Murthy, T. S. N. 1986. Lizards of Kurnool district. Bulletin of the Maryland Herpetological Society 22(3):134–143.
- Murthy, T. S. N. and T. Venkateswarlu. “1979” 1980. Record of the rock-lizard, *Psammophilus blanfordanus* (Stoliczka) (Sauria: Agamidae) in Araku Valley, Eastern Ghats (Andhra Pradesh), India. Journal of the Bombay Natural History Society 76(3):524.
- Nagulu, V., V. V. Rao and C. Srinivasulu. 1998. Biodiversity of select habitats in Eastern Ghat regions of Andhra Pradesh. Pp. 6–35. In: Anon. (ed.), The Eastern Ghats: Proceedings of the National Seminar on Conservation of Eastern Ghats. Environment Protection Training and Research Institute, Hyderabad.
- Obst, F. J. 1983. Zur Kenntnis der Schlangengattung *Vipera* (Reptilia: Serpentes: Viperidae). Zoologische Abhandlungen Staatliches Museum Tierkunde, Dresden 38(13):229–235.
- Pillai, R. S. and T. S. N. Murthy. 1983. Herpetofauna of Eastern Ghats. Pp. 81–84. In: Proceedings of the Seminar on Resources Development and Environment in the Eastern Ghats. Andhra University Press, Waltair.
- Praschag, P., A., K. Hundsdörfer, A. H. M. A. Reza and U. Fritz. 2007. Genetic evidence for wild-living *Aspideretes nigricans* and a molecular phylogeny of South Asian softshell turtles (Reptilia: Trionychidae: *Aspideretes*, *Nilssonina*). Zoologica Scripta 2007:1–10.
- Rao, K. T., D. Sudhakar, V. V. Rao, V. Nagulu, and C. Srinivasulu. 1999. Rusty-spotted cat *Prionailurus rubiginosus* (I. Geoffroy Saint-Hillaire, 1871)– A new record for Nagarjunasagar Srisailem Tiger Reserve, Andhra Pradesh. Journal of the Bombay Natural History Society 96(3):463–464.

- Rao, K. T., C. Srinivasulu, R. Prudhvi Raju, S. M. M. Javed and I. Siva Rama Krishna. 2004a. Second record of *Rhinolophus beddomei* in Eastern Ghats, India. *Zoos' Print Journal* 19(4):1446 + web supplement.
- Rao, K. T., M. Prudhvi Raju, I. Siva Rama Krishna, S. M. M. Javed, Manju Siliwal and C. Srinivasulu. 2004b. Record of *Poecilotheria regalis* Pocock, 1899 from Nallamala Hills, Eastern Ghats, Andhra Pradesh. *Zoos' Print Journal* 19(10):1668 + web supplement.
- Rao, K. T., B. E. Yadav, M. Prudhvi Raju, S. M. M. Javed and I. Siva Rama Krishna. 2004c. Some species of praying mantids (Insecta: Mantodea) from Nagarjunasagar-Srisaïlam Tiger Reserve, Andhra Pradesh. *Zoos' Print Journal* 19(11):1691–1692 + web supplement.
- Rao, K. T., M. Prudhvi Raju, S. M. M. Javed and I. Siva Rama Krishna. 2004d. Checklist of butterflies of Nagarjunasagar Srisaïlam Tiger Reserve, Andhra Pradesh. *Zoos' Print Journal* 19(12):1713–1715 + web supplement.
- Rao, K. T., M. Prudhvi Raju, I. Siva Rama Krishna, S. M. M. Javed and C. Srinivasulu. 2004e. Preliminary report on the status survey of biodiversity of Nagarjunasagar Srisaïlam Tiger Reserve, Andhra Pradesh. Pp. 187–190. In: K. Shankaraiah (ed.), *Proceedings of the National Symposium on Bioresources, Biotechnology and Bioenterprise*, held at Department of Zoology, Osmania University, Hyderabad, India between 19–21 November, 2003. Department of Zoology, Osmania University, Hyderabad.
- Rao, K. T., H. V. Ghate, M. Sudhakar, S. M. M. Javed and I. Siva Rama Krishna. 2005. Herpetofauna of Nallamala Hills with eleven new records from the region including ten new records for Andhra Pradesh. *Zoos' Print Journal* 20(1):1737–1740 + web supplement.
- Rao, K. T., M. Prudhvi Raju, S. M. M. Javed, I. Siva Rama Krishna and C. Srinivasulu. In review, a. Occurrence of painted kaloula *Kaloula taprobanica* (Amphibia: Microhylidae) in Nagarjunasagar Srisaïlam Tiger Reserve, Andhra Pradesh. *Journal of the Bombay Natural History Society*
- Rao, K. T., M. Prudhvi Raju, S. M. M. Javed, I. Siva Rama Krishna and C. Srinivasulu. In review, b. First record of the bronzed frog *Rana (Hylorana) temporalis* (Günther, 1864) (Amphibia: Ranidae) from Andhra Pradesh. *Journal of the Bombay Natural History Society*
- Rao, P. and A. G. Sekar. 1993. Occurrence of Cantor's blackheaded snake *Sibynophis sagittarius* in Sriharikota, Andhra Pradesh. *Journal of the Bombay Natural History Society* 90(1):114.
- Rao, R. K. 1998. Nallamalai Hills: among world centers of plant diversity. Pp. 317–321. In: *Proceedings of the National seminar on Conservation of Eastern Ghats*. Environment Protection Training and Research Institute, Hyderabad.
- Rao, R. S. 1998. Vegetation and valuable plant resources of the Eastern Ghats with specific reference to Andhra Pradesh and their conservation. Pp. 59–86. In: *Proceedings of the National Seminar on Conservation of Eastern Ghats*. Environment Protection Training and Research Institute, Hyderabad.
- Rao, V. V., V. Nagulu, M. Anjenuylu, Bhargavi Srinivasulu, C. Srinivasulu and J. V. Ramana Rao. 1997. Status of avifauna of Rajiv Gandhi National Park, Andhra Pradesh. *Pavo, Indian Journal of Ornithology* 35(1&2):85–100.
- Reddy, H. S., C. Srinivasulu, and K. T. Rao. 2004. Prey selection by the Indian tiger (*Panthera tigris tigris*), in Nagarjunasagar Srisaïlam Tiger Reserve, India. *Mammalian Biology* 69(6):384–391.
- Russell, P. 1796. *An account of Indian serpents collected on the coast of Coromandel; containing descriptions and drawings of each species; together with experiments and remarks on their several poisons*. George Nicol, London. viii + 90 pp + Pl. I–XLVI.
- Russell, P. 1801, 1802, 1807. *A continuation of an account of Indian serpents; containing descriptions and figures, from specimens and drawings, transmitted from various parts of India, to the Hon. The Court of Directors of the East India Company, and published by their order, under the superintendence of Patrick Russell, M.D.F.R.S. G. and W. Nicol*, London. v + 53 + (4) + Pl. I–XLII.
- Sanyal, D. P., B. Dattagupta and N. C. Gayen. 1993. Reptilia. Pp. 1–63. In: A. K. Ghosh (ed.), *Fauna of Andhra Pradesh, Part 1. (Reptilia, Amphibia, Fishes)*. Zoological Survey of India, Calcutta.

- Sarkar, A. K., P. K. Chandra and S. Ray. 1993. Amphibia. Pp. 65–87. In: A. K. Ghosh (ed.), Fauna of Andhra Pradesh, Part 1. (Reptilia, Amphibia, Fishes). Zoological Survey of India, Calcutta.
- Sharma, R. C. 1969. Two new lizards of the genera *Mabuya* Fitzinger and *Riopa* Gray (Scincidae) from India. Bulletin of Systematic Zoology, Calcutta 1(2):71–75.
- Sharma, R. C. 1971. The reptile fauna of the Nagarjunasagar Dam area (Andhra Pradesh, India). Records of the Zoological Survey of India 63(1–4):77–93.
- Sharma, R. C. 1976. Some observations on ecology and systematics of *Coluber bholanathi*, a new species of snake (Reptilia: Squamata: Colubridae) from India. Comparative Physiology and Ecology 1(1):105–107.
- Sivakumar, S., R. Manakadan, And V. Giri. 2003. Record of the painted kaloula *Kaloula taprobanica* in Andhra Pradesh. Journal of the Bombay Natural History Society 100(2&3):631.
- Smith, M. A. 1931. The fauna of British India, including Ceylon and Burma. Vol. I. Loricata, Testudines. Taylor and Francis, London. xxviii + 185 pp + 2 pl. Reprinted 1970 Ralph Curtis Books, Hollywood, Florida and 1980 Today and Tomorrow's Publishers, Dehradun.
- Smith, M. A. 1935. The fauna of British India, including Ceylon and Burma. Reptilia and Amphibia. Vol. II.–Sauria. Taylor and Francis, London. xiii + 440 pp + 1 pl. Reprinted 1970 Ralph Curtis Books, Hollywood, Florida and 1980 Today and Tomorrow's Publishers, Dehradun.
- Smith, M. A. 1943. The fauna of British India, Ceylon and Burma, including the whole of the Indo-Chinese region. Vol. III. Serpentes. Taylor and Francis, London. xii + 583 pp. + 1 map. Reprinted 1970 Ralph Curtis Books, Hollywood, Florida and 1980 Today and Tomorrow's Publishers, Dehradun.
- Spinks, P. Q., H. B. Shaffer, J. B. Iverson and W. P. McCord. 2004. Phylogenetic hypotheses for the turtle family Geoemydidae. Molecular Phylogenetics and Evolution 32:164–182.
- Sprackland, R. G. 1982. *Varanus* “monitor”: an invalid name for *Varanus bengalensis*. Herpetological Review 13(4):117.
- Srinivas, B., K. Vara Prasad, and B. C. Choudhury. 1999. Status of crocodiles in Andhra Pradesh. In: Indian crocodilians. B. C. Choudhury (ed.), Envis. Wildlife & Protected Areas 2(1):33–37.
- Srinivasulu, C. 2001a. Vertebrate diversity of the Nallamala Hills– checklists of herpetofauna, birds and mammals. Unpublished document, Department of Zoology, Osmania University, Hyderabad.
- Srinivasulu, C. 2001b. Chital (*Axis axis* Erxleben, 1777) herd composition and sex ratio on the Nallamala Hills of Eastern Ghats, Andhra Pradesh, India. Zoos' Print Journal 16(12):655–658.
- Srinivasulu, C. 2002. Sight record of the little pied flycatcher *Ficedula westermanni* Sharpe in Andhra Pradesh. Journal of the Bombay Natural History Society 99(3):534.
- Srinivasulu, C. 2003. Site records of yellow-throated bulbul *Pycnonotus xantholaemus* (Jerdon, 1844) in the Nallamala Hills, Eastern Ghats, Andhra Pradesh, India. Zoos' Print Journal 18(3):1051–1052.
- Srinivasulu, C. and V. Nagulu. 2002. Mammalian and avian diversity of the Nallamala Hills, Andhra Pradesh. Zoos' Print Journal 17(1):675–684.
- Srinivasulu, C. and V. V. Rao. 1999. Butterflies of Gundla Brahmeshwaram Wildlife Sanctuary of Andhra Pradesh. Zoos' Print Journal 14(2):6–7.
- Srinivasulu, C. and V. V. Rao. 2000. Occurrence of the yellowthroated bulbul *Hypsipetes indicus* (Jerdon) in the Nallamala Hills, Andhra Pradesh. Journal of the Bombay Natural History Society 97(1):144–145.
- Srinivasulu, C., B. Srinivasulu and C. A. Nageswara Rao. 2006. Amphibia of Nagarjunasagar Srisailem Tiger Reserve, Andhra Pradesh. Records of the Zoological Survey of India, Occasional Paper Number 245:1–57; 4 pl.
- Srinivasulu, C., B. Srinivasulu and C. A. Nageswara Rao. 2005. Present status of *Eutropis nagarjuni* (Sharma, 1969) (Reptilia: Scincidae) – an endemic skink from Andhra Pradesh, India. Zoos' Print Journal 20(5):1865–66.

- Srinivasulu, C., M. Siliwal, A. Rajesh, P. Venkateshwarulu, I. Siva Rama Krishna, C. A. N. Rao and K. Thulsi Rao. 2006. First record of *Uperodon globulosus* (Günther, 1864) (Anura: Microhylidae) from Andhra Pradesh, India. *Hamadryad* 30(1):197–199.
- Subba Rao, M. V. 1970. Studies on the biology of two selected lizards of Tirupati. *British Journal of Herpetology* 4(6):151–154.
- Subba Rao, M. V. 1982. Studies on the population structure, density and sex-ratio in the garden lizard, *Calotes nemoricola* Jerdon. *Proceedings of the Indian Science Congress* 59(3):415 (Abstract.)
- Subba Rao, M. V. and B. N. Rao. 1998. Diet of the limbless skink, *Barkudia insularis* Annandale, 1917 (Sauria: Scincidae). *Hamadryad* 22(2):120.
- Subba Rao, M. V., K. Kameswara Rao, P. Appala Raju, P. S. Rajashekar, P. V. S. V. Ramachandraiah, A. V. V. S. Swamy, S. Subba Lakshmi Devi, and V. V. Subba Rao. 1994. Management and conservation of herpetofaunal resources of the Eastern Ghats, Andhra Pradesh. Pp. 173–207. In: M. V. Subba Rao (ed.), *Forest, wildlife and environment*, Proceedings of the National Level Symposium, Andhra University, Vishakapatnam.
- Subba Rao, M. V. and B. S. Rajabai. 1972a. Ecological aspects of the agamid lizards *Sitana ponticeriana* and *Calotes nemoricola*. *Herpetologica* 28(3):285–289.
- Subba Rao, M. V. and B. S. Rajabai. 1972b. Circadian rhythms in the garden lizard *Calotes nemoricola*. *Proceedings of the International Union of Physiological Sciences*, Sydney 3(2):180.
- Subba Rao, M. V. and B. S. Rajabai. 1974. Influence of thermal acclimation oxygen consumption in the agamid lizard, *Calotes nemoricola* with reference to size, sex, temperature, season and climatic condition. *Proceedings of the Indian Academy of Science* 89(1):1–15.
- Toriba, M. 1994. Gender of the genus *Amphiesma* Duméril, Bibron and Duméril. *The Snake* 26(2):145. (In Japanese, with English abstract)
- Van der Hammen, T. 1983. The palaeoecology and palaeogeography of savannas. Pp. 19–35 In: F. Bourlière (ed.), *Ecosystems of the world. 13. Tropical savannas*. Elsevier Scientific Publishing Company, Amsterdam, Oxford and New York.
- Vences, M. F. Glaw, J. Kosuch, I. Das and M. Veith. 2000. Polyphyly of *Tomopterna* (Amphibia: Ranidae) based on sequences of the mitochondrial 16S rRNA genes, and ecological biogeography of Malagasy relict amphibian groups. In: W. R. Lourenço & S. M. Goodman (eds.), *Diversité et endémisme à Madagascar*. *Mémoires de la Société de Biogéographie*: 229–242.
- Wallach, V. 2003. *Scolecophidia Miscellanea*. *Hamadryad* 27(2):222–240.
- Ward, G. C. 2002. India's Western Ghats. *National Geographic* 201(1):90–109.
- Whitaker, R. and A. S. Captain. 2004. *Snakes of India. The field guide*. Draco Books, Chennai, India. xiv + 481 pp.
- Whitaker, R. and I. Das. 1990. Scrubland *Calotes nemoricola*? *Hamadryad* 15(1):29–30.
- Wikramanayake, E., E. Dinerstein, C. Loucks, D. M. Olson, J. Morrisson, J. Lamoreux, M. McKnight and P. Hedao (Eds.). 2002. *Terrestrial ecoregions of the Indo-Pacific. A conservation assessment*. Island Press, Washington, D.C.
- Wilson, L. D. 1967. Generic reallocation and review of *Coluber fasciolatus* Shaw (Serpentes: Colubridae). *Herpetologica* 23(4): 260–275.