

A new species of dwarf gecko of the genus *Cnemaspis* Strauch, 1887 (Reptilia: Sauria: Gekkonidae) from the Nicobar archipelago with an expanded description of *Cnemaspis andersonii* (Annandale 1905) of the Andaman Islands

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ABSTRACT

A new species of gekkonid lizard of the genus *Cnemaspis* is described from the southern group of Nicobar Islands. It is distinguished from the Andaman endemic *C. andersonii* and the species of the adjacent Mentawai archipelago by: small body size (27.64 - 31.08 mm SVL); presence of four enlarged conical tubercles on the flanks; 2 post-mentals separated from each other by a single scale; presence of 2-3 internasals; presence of 6-7 supralabials; 8 infralabials; 16-18 subdigital lamellae under toe IV; smooth pectoral, abdominal and femoral scales; presence of 3 femoral pores on each thigh; absence of precloacal pores and irregularly shaped, small sized subcaudal scales. The description of *C. andersonii*, endemic to the Andaman archipelago is expanded based on new material along with several new, specific distribution records that are mapped. Conservation status of these geckos is discussed.

Key words: Gekkonid, *Cnemaspis*, Nicobar Islands, endemic species

INTRODUCTION

The Gekkonid genus *Cnemaspis* Strauch, 1887 spans across tropical Asia and Africa with over 140 species known till now (Uetz *et al.*, 2019). Distributions of most of the Asian species are concentrated around the Western Ghats of peninsular India, Sri Lanka, hills of the Burmese peninsula, Malay Peninsula and the Sundaland (Uetz *et al.*, 2019). Of these, the Andaman and Nicobar archipelago, situated to the south of the Burmese peninsula and to the northwest of Sumatra is known to harbor only three species of *Cnemaspis* namely *C. andersonii* (Annandale, 1905), *C. wicksii* (Stoliczka, 1873) and a hitherto taxonomically unresolved species that had been referred to as *Cnemaspis kandiana* (Kelaart, 1852) (Stoliczka, 1873; Annandale, 1905; Manamendra-Arachchi *et al.*, 2007; Biswas and Sanyal, 1977; Biswas and Sanyal, 1980). Manamendra-Arachchi *et al.* (2007) redescribed *Cnemaspis kandiana* and restricted its distribution to Sri Lanka and revalidated Annandale's (1905) name *C. andersonii* based solely on its holotype collected from Narcondam in the Andaman archipelago and revived *C. wicksii* of the Preparis Island in the Andaman archipelago that currently falls within the political boundary of Myanmar. This leaves the Nicobarese species of *Cnemaspis* unnamed. Herein, based on extensive surveys throughout the Andaman and Nicobar Islands, the distribution of *C. andersonii* is expanded to several islands of the Andaman archipelago and the Nicobarese population is described and named as a new species.

MATERIALS AND METHODS

Gekkonids of the genus *Cnemaspis* encountered in the field were gently restrained, measured, scored for morphological characters, photographed and released at the site of capture. Three dead specimens of *Cnemaspis* from Great Nicobar and one of *C. andersonii* from South Andaman, were collected from in and around human habitations between May and Nov 2017 and preserved in 70% ethanol, and are deposited in the collections of the Department of Ocean Studies and Marine Biology (DOSMB) Pondicherry University, Brookshabad, Port Blair. Holotype specimen of the new species described here has been deposited in the collections of the Zoological Survey of India, Port Blair. The following measurements in mm were recorded with vernier calipers and characters of pholidosis and colouration were scored. Snout-vent length (SVL), tail length (TAL), trunk length (AG), head length (HL), head width (HW), head depth (HD), horizontal eye diameter (ED), eye-nostril distance (EN), snout length (ES), distance from eye to tympanum (ETY), tympanum diameter (TYD), upper arm length (UAL), lower arm length (LAL), palm length (PAL), thigh length (FEL), tibia length (TBL), foot length (FOL), length of fingers (F1-F5) and toes (T1-T5) measured from the fork till the tip excluding claw. Supralabials and -infralabials were counted along the upper and lower lips between rostral and mental till the gape, respectively. Ventrals were counted along a transverse series across the underside at

mid-body; internasals were counted between the nasal scales; subdigital lamellae were counted on the ventral surface of digits on fingers and toes. Geo-coordinates of the localities where the individuals were encountered were recorded with a Garmin GPS MAP 78s and mapped with ARC MAP v. 10. The new species described here from Great Nicobar is compared with those of the '*C. kandiana* group' from the Sundaic Islands of Sumatra and the Mentawai Archipelago which are situated immediately southwards, across the Great Channel and the adjacent region of the Isthmus of Kra. As the faunal affinities between the Nicobar Islands and the Sundaic Islands are well-known (Das, 1999), comparisons are restricted only to the *C. kandiana* group members of this region and for distinction in nomenclatural sense, with *C. kandiana* of Sri Lanka. Similarly, for the Andaman endemic *C. andersonii*, comparisons are made with the Indo-Chinese *Cnemaspis* species of the *C. kandiana* group (after Lee *et al.* 2019).

TAXONOMY

Cnemaspis nicobaricus sp. nov. (Figures 1 – 5)

Cnemaspis kandiana (non Kelaart, 1852) – Biswas and Sanyal (1977; 1980); Das (1999)

Holotype: ZSI/ANRC/T/10928, collected from human habitation at Campbell Bay (7.019N, 93.923E, 12 m asl.), Great Nicobar Island on 20 July 2017.

Paratopotypes: DOSMB05106 and DOSMB05107, adult females collected from human habitation from the same locality on 18 and 22 July 2017.

Diagnosis:

A species of *Cnemaspis* restricted to Great and Little Nicobar Islands in the Nicobar archipelago, characterized by: small body size (27.64 – 31.08 mm SVL); presence of four enlarged conical tubercles on the flanks; 2 post-mentals separated from each other by a single scale; presence of 2-3 internasals; presence of 6-7 supralabials; 8 infralabials; 16-18 subdigital lamellae under toe IV; smooth pectoral, abdominal and femoral scales; presence of 3 femoral pores on each thigh; absence of preloacal pores and irregularly shaped, small sized subcaudal scales.

Description of the Holotype: (Figures 1 & 2)

An adult male, measuring 27.64 mm SVL, with a 35.47 mm long, cylindrical tail (SVL:TaL 0.78) and an elongated trunk (AG:SVL 0.44). Head fairly short (HL:SVL 0.28); longer than broad (HL:HW 1.72) and broader than deep (HW:HD 1.51); with a fairly elongate and acutely pointed snout in both dorsal and lateral views. Eyes large (ED:HL 0.2) with a large, circular pupil. Nostrils situated dorso-laterally, closer to the snout tip than to the eyes (EN:ES 0.71). Tympanic orifice small and vertically elongated; located 1.91 mm posterior to the eye. Limbs relatively slender; upper arms short (UAL:SVL 0.16); lower arms shorter than the upper arms (LAL:SVL 0.14); palm shorter (PAL:SVL 0.13). Thighs relatively long (FEL:SVL 0.21); tibia shorter than the thighs (TBL:SVL 0.18); feet shorter (FOL:SVL 0.15). Rostral broader than long; followed by three small scales between the nasals;

7 supralabials; 8 infralabials. Mental wedge-shaped; followed by a single pair of small, trapezoidal post-mentals, separated from each other by a single scale. Supralabials separated from the orbit by two rows of small scales. Dorsal scales not uniform; intermixed with larger, carinate scales oriented postero-laterally. Four enlarged conical, spine-like tubercles present on the sides of the body. Pectoral, ventral, gular and femoral scales smooth and imbricate with an obtusely pointed posterior vertex. Ventrals across the belly 24. Subcaudals irregular in shape; not elongated horizontally. A pair of visible enlarged triangular cloacal spurs present on the lateral sides at the beginning of the tail. Original tail nearly complete; sub-cylindrical, with eight rows of mildly enlarged, spinular tubercles. Hemipenial bulge evident, hemipenes not everted. Three femoral pores present on the ventral surface of posterior edge of the thighs on slightly enlarged scales; preanal pores absent. Toes long, curved and slender, lacking dilated subdigital lamellae; dermal fringes between toes or fingers absent; 16 subdigital lamellae under toe IV; the first four from the base of the digit relatively larger, fourth largest; the rest till the toe-tip smaller. Relative lengths of fingers IV>III>V>II>I; toes IV>V>III>II>I.



Figure 1. Holotype of *Cnemaspis nicobaricus* sp. nov. in dorsal (above) and ventral (below) views.

Colouration in life: Overall dorsal colouration uniform dark brown with small feeble darker spots on the dorsum with a pale yellow linear vertebral stripe extending from the neck till the anterior portion of the tail. Pearly white coloured ventrally. A dark stripe along the canthal region; continuing as post-ocular stripes, passing through the tympana on to the dorso-lateral regions along the trunk, where they converge at some points to form 4 – 5 'X' shaped markings.

Table 1. Measurements and scale counts of *Cnemaspis nicobaricus* sp. nov. and *C. andersonii*

Species	<i>Cnemaspis nicobaricus</i> sp. nov.			<i>Cnemaspis andersonii</i>		
	Catalogue No:	ZSI/ANRC/ T/10928	DOSMB05106	DOSMB05107	Mean	Mean (range; n = 7)
SVL (mm)		27.64	31.08	29.37	29.36	37.1 (33.2 – 38.6)
Trunk length		12.07	15.41	12.17	13.22	20.6 (18.3 – 22.4)
Tail		35.47	30.23	31.14	32.28	36.7 (34.0 – 39.1)
Head length		7.81	7.7	7.97	7.83	14.7 (12.3 – 15.6)
Head width		4.55	4.6	4.72	4.62	7.7 (5.8 – 8.2)
Head depth		3.01	3.47	3.41	3.3	6.2 (5.5 – 7.2)
Eye dia		1.54	1.21	1.28	1.34	4.5 (3.8 – 5.2)
Eye- nostril		2.09	2.66	2.27	2.34	5.6 (4.6 – 5.9)
Eye - snout		2.96	3.65	3.49	3.37	6.4 (5.5 – 6.7)
Eye - tympanum		1.91	1.6	1.89	1.8	5.5 (4.6 – 5.8)
Supalabials		7	7	6	-	6-7
Infralabials		8	8	8	-	6-7
Post-mentals		2	2	2	-	2
Internasal		2	2	3	-	3
Upper arm length		4.34	4.5	3.8	4.21	7.2 (6.8 – 7.6)
Lower arm length		3.92	4.33	4.3	4.18	6.4 (5.7 – 6.9)
Palm length		3.52	3.71	4.3	3.84	6.1 (5.9 – 6.3)
Femur length		5.67	5.41	5.36	5.48	8.0 (7.3 – 8.6)
Tibia length		4.86	5.49	5.3	5.22	8.2 (7.8 – 8.5)
Foot length		4.09	4.72	5.12	4.64	8.4 (7.9 – 8.7)
T4 lamellae		16	18	16	-	17 – 18
F1		1.11	1.37	1.01	-	-
F2		1.32	1.56	2.07	-	-
F3		1.58	1.62	2.42	-	-
F4		2.07	1.9	2.61	-	-
F5		1.53	1.45	1.68	-	-
T1		1.32	1.23	1	-	-
T2		1.6	1.72	1.99	-	-
T3		2.35	2.4	2.75	-	-
T4		3.41	3.27	3.63	-	-
T5		2.48	2.61	2.41	-	-
Sex		m	f	f	-	-

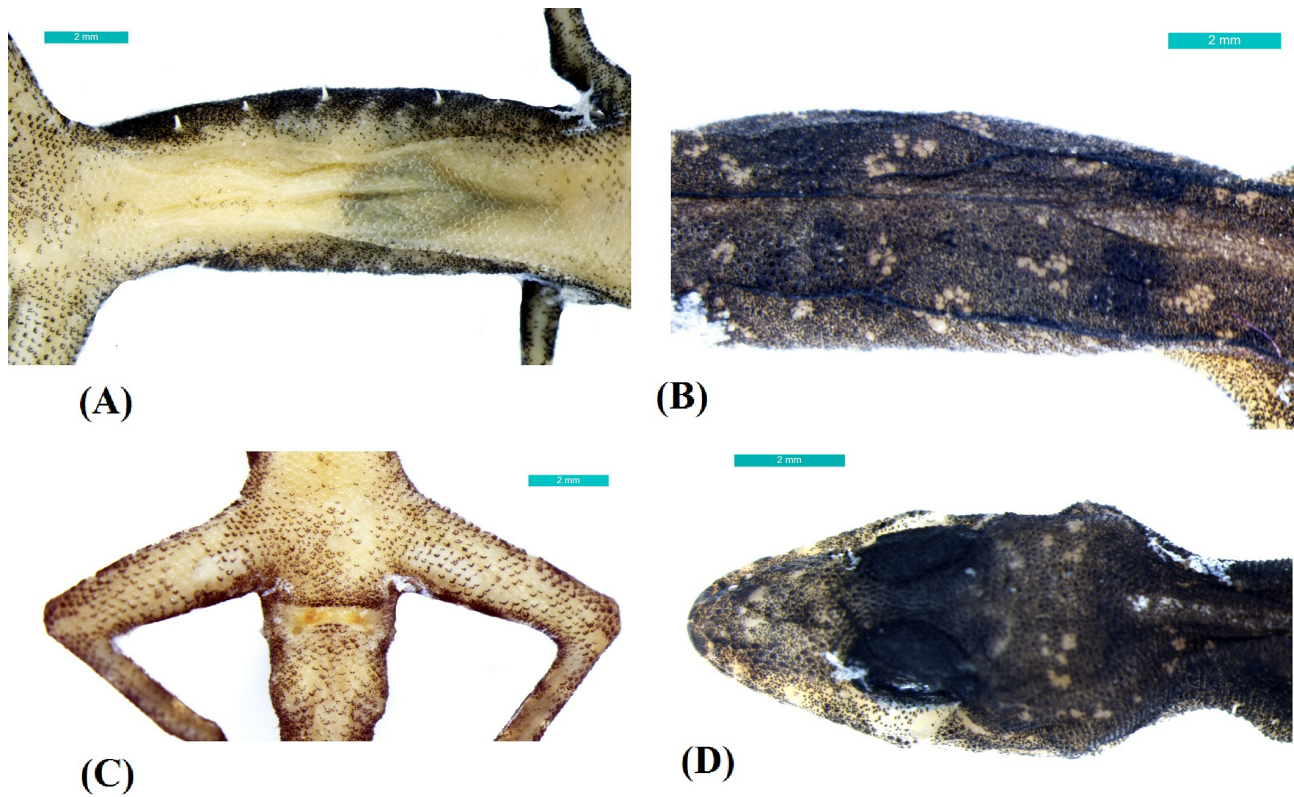


Figure 2. (A) Ventral body, (B) dorsal body, (C) precloacal-femoral region and (D) dorsal head of the holotype of *Cnemaspis nicobaricus* sp. nov. (scale-bars – 2 mm)

Variation: The two female paratypes generally agree with the holotype in most of the characters except: the yellow vertebral line broken into short fragments rather than being a single line; dark spots on the flanks more legible than in the holotype. Variations in scale counts and measurements are summarized in Table 1. Apart from the collected specimens, the consistency of these scalation characters was verified in living individuals that were examined in the field but not collected (Figures 3 & 4).

Distribution: Recorded from Campbell Bay (7.019°N, 93.923°E, 12 m asl.), Govind Nagar (7.002°N, 93.881°E, 82 m asl.), Gandhi Nagar (6.832°N, 93.889°E, 9 m asl.), Shastri Nagar (6.808°N, 93.886°E, 0 m asl.), Navy Dera (7.135°N, 93.884°E, 0 m asl.) and Afra Bay (7.184°N, 93.737°E, 24 m asl.) in Great Nicobar Island and Makachua (7.406°N, 93.714°E, 9 m asl.) in Little Nicobar Island (Figure 7).

Ecological notes: Most of the individuals of this species observed in the field were seen on tree trunks at heights below 2 m from the ground, and on buttresses and shrubs. Some were seen along the culverts along roadsides. Individuals were seen active both during the day and at night. A juvenile was observed in July. This species was observed in evergreen forests, human habitation and plantations.

Etymology: The specific epithet *nicobaricus* is a toponym referring to the geographic distribution of the new species.

Comparisons:

The new species described here is compared with members of the *C. kandiana* group from the Andaman Islands (*C. andersonii* Annandale, 1905 and *C. wicksi* (Stoliczka, 1873)), Isthmus of Kra region and the Mentawai archipelago. *C. nicobaricus* sp. nov. differs from *C. andersonii*, *C. wicksi*, *C. tanintharyi* Lee, Miller, Zug and Mulcahy, 2019, *C. thayawthadangyi* Lee, Miller, Zug and Mulcahy, 2019, *C. dezwaani* Das, 2005, *C. modiglianii* Das, 2005, *C. whittendorum* Das, 2005, *C. andalas* Iskander McGurie and Amarasinghe, 2017, *C. minang* Iskander McGurie and Amarasinghe, 2017, *C. pagai* Iskander McGurie and Amarasinghe, 2017 and *C. tapanuli* Iskander McGurie and Amarasinghe, 2017 in lacking precloacal pores (vs. present in all of the above species); presence of three femoral pores on each thigh (vs. absent in *C. phuketensis* Das and Leong, 2004 and *C. jacobsoni* Das, 2005; 4 in *C. thayawthadangyi*, 4-5 in *C. tanintharyi*, 6 in *C. whittendorum*); in having four keeled spinular tubercles on the lateral body (vs. 6) it differs from *C. aceh* and *C. andalas* of the Mentawai Islands. Ventrals smooth in *C. nicobaricus* sp. nov. vs. keeled gular, pectoral and abdominal scales in *C. andersonii*, *C. wicksi*, *C. aceh*, *C. dezwaani*, *C. tanintharyi*, *C. jacobsoni*, *C. modiglianii*, *C. whittendorum* and *C. pagai*. Subcaudals not elongate horizontally in *C. nicobaricus* sp. nov. vs. elongate in *C. aceh*, *C. andalas*, *C. minang*, *C. pagai* and *C. tapanuli*; enlarged in *C. dezwaani*, *C. jacobsoni*, *C. tanintharyi*, *C. thayawthadangyi* and *C. whittendorum* (Das, 2005; Manamendra-Arachchi *et al.*, 2007; Iskander *et al.*, 2017; Lee *et al.*, 2019). In addition, from *C. kandiana* of

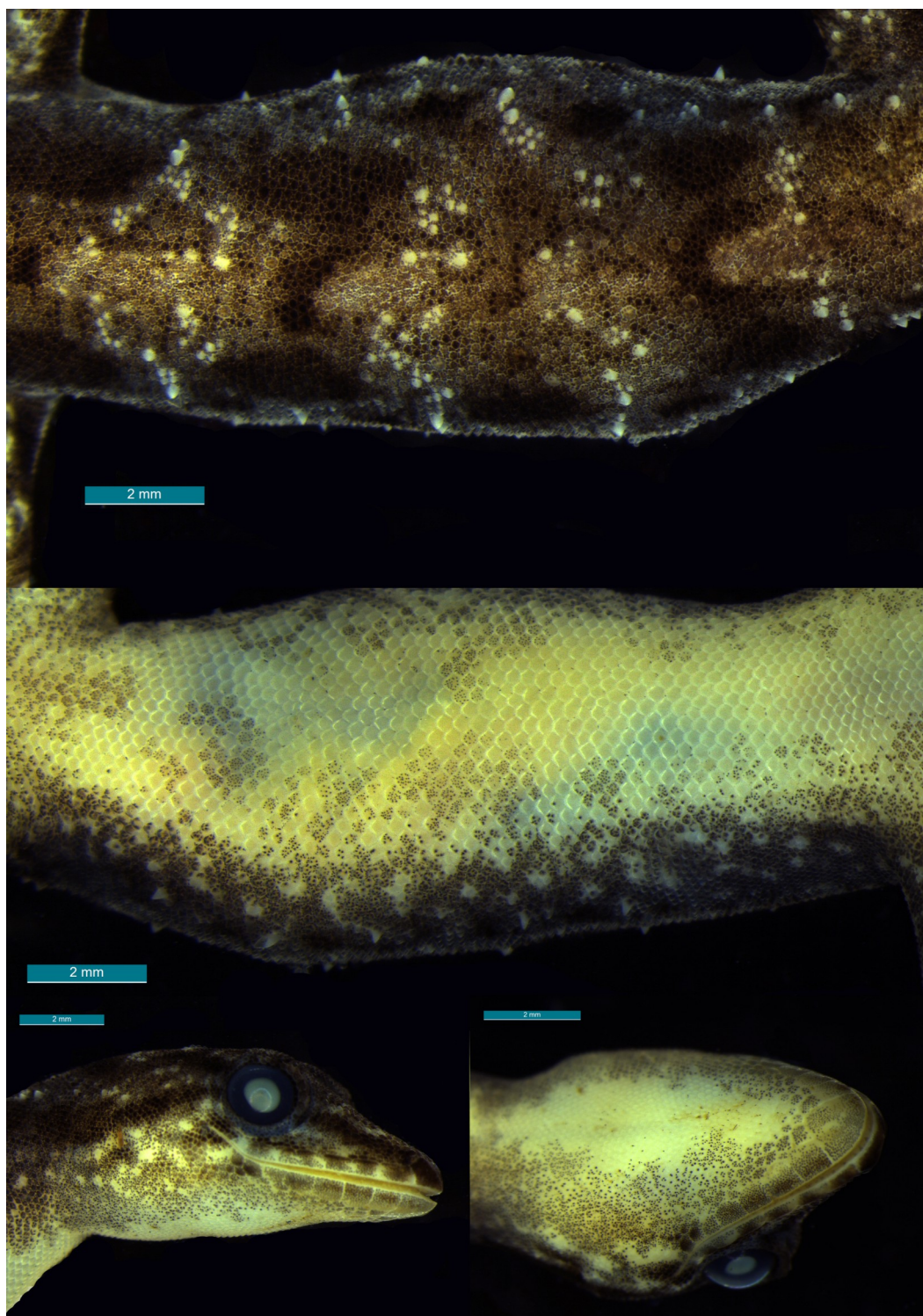


Figure 3. Dorsal (top) and ventral (middle) views of the trunk; lateral (bottom left) and ventral (bottom right) views of the head of the paratype DOSMB05106 of *Cnemaspis nicobaricus* sp. nov. (scale-bars – 2 mm)

Sri Lanka, the new species can be distinguished by the absence of preloacal pores (vs. present in *C. kandiana*); four spiny tubercles on the flanks (vs. 6 in *C. kandiana*).

***Cnemaspis andersonii* (Annandale, 1905)** (Figure 6)

Gonatodes andersonii Annandale, 1905
Cnemaspis kandiana (non Kelaart, 1852) – Smith (1935) part
Cnemaspis andersonii – Manamendra-Arachchi *et al.* (2007)

Holotype: ZSI15012, collected from Narcondam Island, Andaman archipelago.

Material studied: DOSMB05113, collected from Hope town, South Andaman.

Diagnosis: See Manamendra-Arachchi *et al.* (2007) for detailed diagnosis, comparisons with congeners and a redescription of the holotype of this species. *C. andersonii* is defined only based on the holotype collected from Narcondam till now. Living individuals encountered in the field and a voucher specimen studied here are described below to expand the morphological characterization and geographic distribution of this poorly known species.



Figure 4. Dorsal (top) and ventral (middle) views of a living individual, lateral view of the head (bottom left), and precloacal region of a male (bottom right) of *Cnemaspis nicobaricus* sp. nov. (not collected)

Description: (based on one preserved and six live individuals)

A small sized species of *Cnemaspis* (SVL 30.28 – 37.17 mm); tail nearly as long as the body (mean SVL:TAL 1.01). Head relatively long (mean HL:SVL 0.38) and longer than broad (mean HL:HW 1.84), with an acutely pointed snout tip. Eyes fairly large (mean ED:HL 0.32) with a round pupil. Nostrils located dorso-laterally, much closer to the snout tip (mean EN:ES 0.88), Inter orbital space wider than the distance between the nares; nostrils separated from each other by three internasals. Tympanum sunk; located about 5 mm from the posterior edge of the eye. Supralabials 7-8; infralabials 7-8; mental triangular; two small post-mentals separated from each other by a single scale. Gular and ventral scales imbricate with a feeble median keel. Flanks with five spiny conical tubercles. Upper arms short (mean UAL:SVL 0.2); lower arms longer than upper arms (mean LAL:SVL 0.17); palm as long as the lower arm. Thighs

relatively long (mean FEL:SVL 0.2); tibia as long as thighs (mean TBL:SVL 1); feet a little longer (mean FOL:SVL 0.23). Toes long, lacking dilations; toe IV with 13-15 subdigital lamellae. Preanal pores 3; femoral pores 4 on each thigh. Subcaudals not elongated horizontally. Relative lengths of fingers IV>III>V>II>I; toes IV>V>III>II>I.

Colouration in life: Overall dorsal colouration variable from light to dark brown, with or without a creamy yellow, broken vertebral stripe running through the mid-dorsum till the sacral region. Intensity of the pattern on the body variable. Venter uniform creamy white without any distinct pattern. Tail feebly annulated. Two dark post-ocular stripes converging behind the head and a feeble inter-orbital stipe present. Limbs with dark bars. Intensity of pattern variable.

Ecological notes: Individuals were observed foraging on tree trunks and shrubs, at both day and night in evergreen

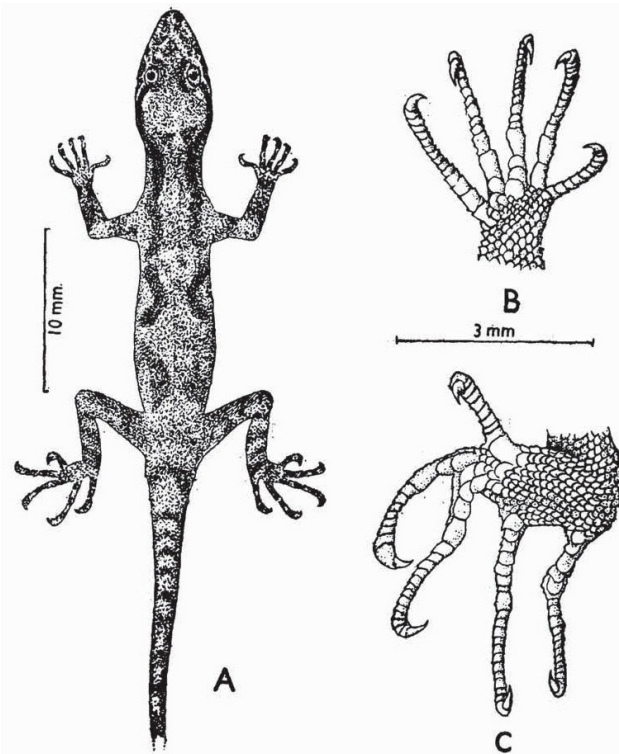


Figure 5. Drawing of a specimen of *Cnemaspis nicobaricus* sp. nov. illustrated by Biswas and Sanyal (1977)

forests, stunted, hilltop forests on peaks and secondary forests throughout the year. Commonly seen on buttresses of large trees.

Distribution: Recorded during the present study from the following localities: South Andaman: Mount Harriet (11.723°N, 92.733°E, 379 m asl.), Chidiyatapu (11.524°N, 92.721°E, 28 m asl.) and Wandoor (11.615°N, 92.613°E, 42 m asl.); Rutland (11.422°N, 92.637, 38 m asl.); Middle Andaman: Cutbert Bay (12.63°N, 92.957°E, 14m asl.), Tugapur (12.828°N, 92.858°E, 5 m asl.); Interview Island (12.9°N, 92.72°E, 9 m asl.); North Andaman: Saddle Peak (13.16°N, 93.022°E, 370 m asl.); Havelock (12.011°N, 92.955°E, 65 m asl.) and Little Andaman (10.713°N, 92.537°E, 48 m asl.) (Figure 7).

DISCUSSION

This *Cnemaspis* described here as a new species has been known since Biswas and Sanyal (1977), but had remained hidden under the glorified concept of *Cnemaspis kandiana*. Several authors such as Biswas and Sanyal (1980) and Das (1999) followed the same concept and included *C. kandiana* in their lists of reptiles from the Nicobar Islands. Vijayakumar (2005) listed this species as an unidentified, but a potentially new species of *Cnemaspis*. This view was also followed by Harikrishnan *et al.* (2014) but yet, this species still remained taxonomically unresolved. The present study has provided evidences for distinction of the Nicobarese species from *C. kandiana* based on morphology and allopatric geographic distribution. *C. kandiana* was redefined and restricted to Sri Lanka by Manamendra-Arachchi *et al.* (2007). They also revalidated *C. andersonii* of the

Andaman archipelago from the synonymy of *C. kandiana* based on its holotype from Narcondam. However, but for the redescription of its holotype provided by them, *C. andersonii* had remained largely unknown till now. The present study has filled in this lacuna by providing an expanded description of *C. andersonii* based on field observations and new material. This has also resulted in a considerable expansion of the geographic distribution range of *C. andersonii* which was originally described from Narcondam Island. The conservation statuses of both these species have not been assessed by the IUCN. Based on the criteria B1 (Extent of occurrence less than 5000 km²) and B2 (Area of occupancy estimated to be less than 500 km²), it would be ideal to regard *C. andersonii* as a vulnerable species, which occurs on at least seven islands of the Andaman archipelago, including the relatively large ones. On the other hand, *C. nicobaricus* sp. nov. should be considered as an endangered species, as it is restricted only to the southern Islands of Nicobar with a geographic distribution range not exceeding 1500 km².

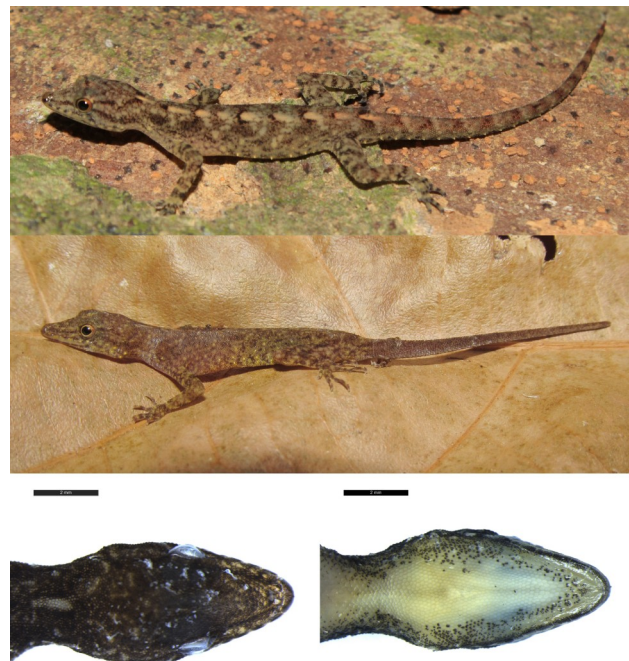


Figure 6. Living individuals of *Cnemaspis andersonii* from South Andaman (top) and Interview Island (middle) (not collected); dorsal and ventral views of the head of *C. andersonii* (DOSMB05113) from South Andaman (scale-bars – 2 mm)

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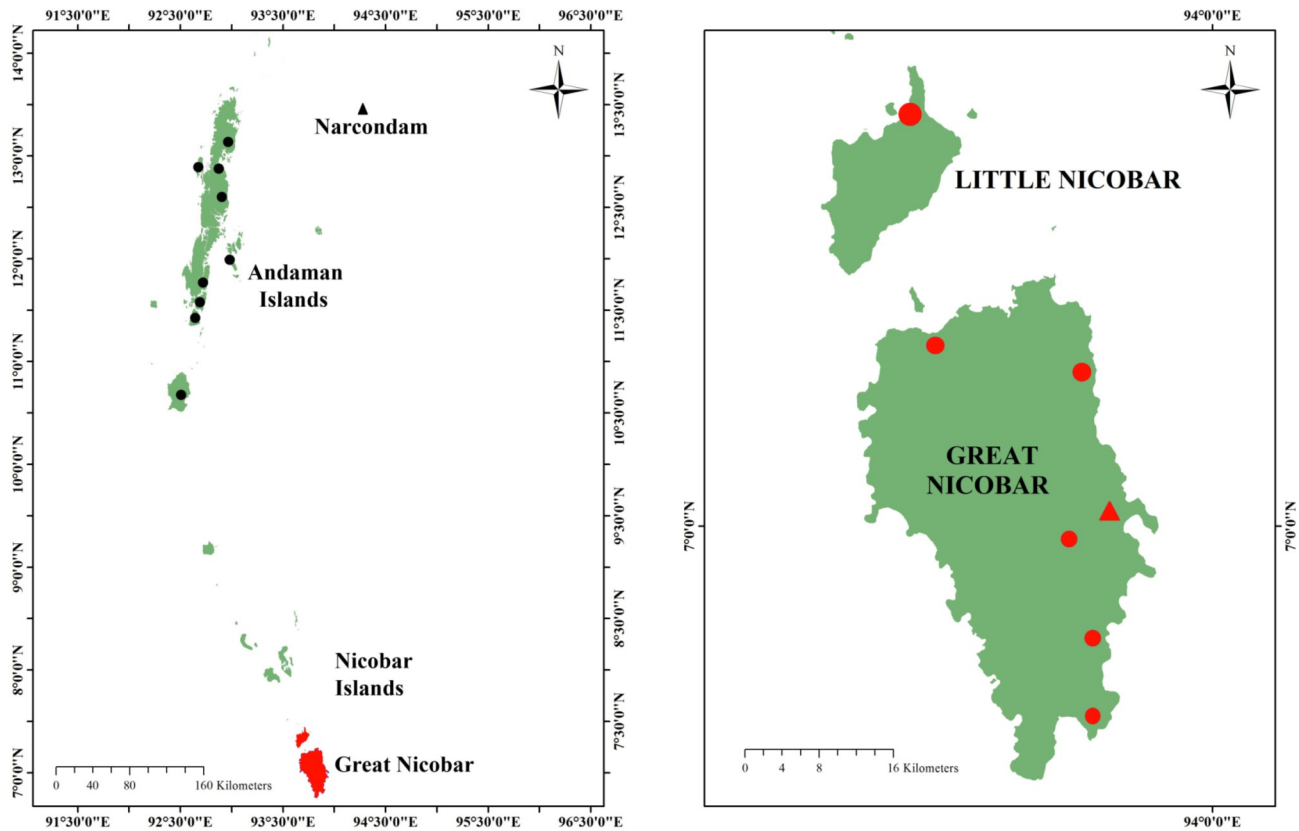


Figure 7. Map of the Andaman and Nicobar Islands showing the distribution (black dots) and type locality (black triangle) of *Cnemaspis andersonii* in the Andaman Islands (left panel) and the type locality (red triangle) and distribution (red dots) of *Cnemaspis nicobaricus* sp. nov. (right panel)

REFERENCES

- Annandale, N. 1905. Contributions to Oriental herpetology I. The lizards of the Andamans, with the description of a new gecko and a note on the reproduced tail in *Ptychozoon homalocephalum*. Proc. Asiat. Soc. Bengal, 73 (suppl.): 12-22.
- Biswas S. and Sanyal D. P. 1977. Notes on the Reptilia collection from the Great Nicobar Island during the Great Nicobar Expedition in 1966. Rec. Zool. Surv. India 72: 107 – 124.
- Biswas S. and Sanyal D. P. 1980. A report on the reptilia fauna of Andaman and Nicobar Islands in the collection of Zoological Survey of India. Rec. Zool. Surv. India 71: 255 – 292.
- Das, I. 1999. Biogeography of the amphibians and reptiles of the Andaman and Nicobar Islands, India. In: Ota, H. (Ed.) Tropical Island herpetofauna. Origin, current diversity and current status, Elsevier, pp. 43-77.
- Das, I. 2005. Revision of the Genus *Cnemaspis* Strauch, 1887 (Sauria: Gekkonidae), from the Mentawai and Adjacent Archipelagos off Western Sumatra, Indonesia, with the Description of Four New Species. Journal of Herpetology 39 (2): 233-247.
- Harikrishnan, S., Vasudhwan, K. Das, A., Choudhury, B.C., Dutta, S.K. and I. Das. 2014. Macroecology of Terrestrial Herpetofauna in Andaman & Nicobar Archipelago. Project Report, Wildlife Institute of India: 49.
- Iskandar, D.T., McGuire, J.A. and A.A.T. Amarasinghe. 2017. Description of Five New Day Geckos of *Cnemaspis kandiana* Group (Sauria: Gekkonidae) from Sumatra and Mentawai Archipelago, Indonesia. Journal of Herpetology 51 (1): 142-153.
- Lee, J. L., Miller, A. H., Zug, G. R. and D.C. Mulcahy. 2019. The discovery of Rock Geckos *Cnemaspis* Strauch, 1887 (Squamata: Gekkonidae) in the Tantharyi Region, Myanmar with the description of two new species. Zootaxa 4661 (1): 40-64.
- Manamendra-Arachchi, K., Batuwita, S. & Pethiyagoda, R. 2007. A taxonomic revision of the Sri Lankan day-geckos (Reptilia: Gekkonidae: *Cnemaspis*), with description of new species from Sri Lanka and southern India. Zeylanica 7 (1): 9-122
- Smith, M.A. 1935. The Fauna of British India including Ceylon and Burma. Vol. II Sauria. Taylor & Francis Ltd. London: 440 pp.
- Stoliczka, F. 1873. Note on some Andamanese and Nicobarese reptiles, with the description of three new species of lizards. Journal of Asiatic Society of Bengal, 92: 162-169.
- Vijayakumar, S.P. 2005. Status and distribution of Amphibians and Reptiles of the Nicobar Islands, India. Final Report. Rufford Foundation / Madras Crocodile Bank / Wildlife Institute of India: 48.
- Uetz, P., Freed, P. & Hošek, J. (eds.). 2019. The Reptile Database, <http://www.reptile-database.org>, accessed on 09 Dec 2019.

