

***Nessia gansi*: a Second Three-toed Snake-Skink (Reptilia: Squamata: Scincidae) from Sri Lanka with the Designation of a Neotype for *Nessia burtonii* Gray**

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Abstract. A new species of *Nessia* is described from Sri Lanka. *Nessia gansi* sp. n. is distinguished from its sister species (*N. burtonii*) based on the morphological and meristic data. The new species differs from all other congeners except *N. burtonii* Gray, by a combination of following characters: presence of four limbs; all limbs bearing three digits; interparietal broader than frontal. It distinguishes from *N. burtonii* by having five (vs. six) supraciliaries; one (vs. two) pretemporal/s; two (vs. one) primary temporal/s; three (vs. four) infralabials; 93-105 (vs. 110-124) paravertebral scale rows; 103-114 (vs. 117-121) ventral scales; two (vs. three) subdigital lamellae under each digit of manus; mental as wide as postmental (vs. mental wider than postmental); and nostrils visible when viewed ventrally (vs. not visible). Two closely related species show a discrete distribution in Sri Lanka: *N. gansi* sp. n. is recorded from Kanneliya, Rumaswala, Kottawa, Panagula, Ambalangoda and Imaduwa in the first and second peneplains (~100 m), whereas *N. burtonii* records (here corrected) are reported from Alagalla, Ambagamuwa, Gampola, Hiniduma and Kandy within the third peneplain (from ~500 m). The identity of *N. burtonii* is stabilized through the designation of a neotype, and here it is re-described.

Key words: Central Hills, new species, peneplain, scincid lizards, snake-skink.

INTRODUCTION

Taxonomy of semi-fossorial snake-skinks in the genus *Nessia* Gray are poorly known in Sri Lanka. For the time being, in Sri Lanka, the genus is known through eight species: *N. bipes* Smith, *N. burtonii* Gray, *N. deraniyagalae* Taylor, *N. didactyla* (Deraniyagala), *N. hikanala* (Deraniyagala), *N. layardi* Kelaart, *N. monodactyla* (Gray) and *N. sarasinorum* (Müller). Species of the genus *Nessia* distributed in all climatic-physiographic zones, i.e., lowland wet zone, central hills, dry zone, knuckles range and semi-arid zone (Deraniyagala, 1931, 1940, 1953, 1954, 1964; Taylor, 1950; Gans, 1995; Somaweera & Somaweera, 2009).

After the classic papers on the genus *Nessia* by Deraniyagala (1934, 1940, 1953, 1954, 1964) and Taylor (1950), no significant contribution has been made to assess their taxonomy. Gans (1995) collected ample specimens of skinks including *Nessia* from Sri Lanka during his visits to Sri Lanka to fulfil his passion of collecting Uropeltid snakes. His collections (skinks) are now lodged in various museums around the world and indeed brought forth several new species (e.g., Greer, 1991) and obviously valuable for the future studies.

Although several new species of skinks described from Sri Lanka (Greer, 1991; Wickramasinghe et al., 2007; Batuwita & Pethiyagoda, 2007; Das et al., 2008),

the lack of studies on evaluation of the data deficient species (IUCN, 2007). However, Batuwita and Pethiyagoda (2007) rediscovered and clarified the taxonomy of a data deficient species, '*Sphenomorphus dorsicatenatus* Deraniyagala, by giving a new combination as *Lankascincus dorsicatenatus*, and also Das et al. (2008) provided evidence for paraphyly of '*Eutropis macularia*'. Meanwhile, Karunarathna et al. (2008) recorded *Chalcides* cf. *ocellatus* from Western Province of Sri Lanka. This record appeared to be due to the pet trade because it was re-identified as *C. ocellatus* (see Lavin & Papenfuss, 2012). Somaweera & Somaweera (2009) also provided an overview of Scincidae of Sri Lanka. Recently, Amarasinghe et al. (2016a, b) re-described the *Eutropis beddomei* (Jerdon) and *E. bibronii* (Gray), and they removed *E. bibronii* from Sri Lankan skink list. Batuwita (2016) resolved the paraphyly of '*Eutropis macularia*', update the taxonomy of *Eutropis* Fitzinger of Sri Lanka by providing a key to all the congeners and confirmed the previous records of *Eutropis bibronii* from Sri Lanka.

During museum reference work, we discovered a distinct species of *Nessia* in the collections of the National Museum Sri Lanka and the Wildlife Heritage Trust of Sri Lanka. This new species was previously confused with *Nessia burtonii*. The purpose of this account is to describe the new species found in the on-going study of review of scincid lizards of Sri Lanka.

MATERIALS AND METHODS

Scalation definitions follow Andreone & Greer (2002); mensural data were taken with the aid of a dial Vernier caliper to the nearest 0.1 mm, following the methods described by Batuwita & Pethiyagoda (2007). Comparisons were made with preserved material in the collections of the National Museum of Sri Lanka, Colombo (NMSL), and the Wildlife Heritage Trust of Sri Lanka (WHT) now in NMSL. Additional sources of information include Deraniyagala (1934, 1940, 1953, 1954, 1964) and Taylor (1950). Altitudes are given in metres above mean sea level; geographic coordinates were taken using topographic maps (1 inch: 1 mile, Survey Department, Colombo).

RESULTS

Nessia gansi sp. n. (Figs 1-3, tab. 1)

Material examined. Holotype: NMSL WHT 7585 (adult male), 60.0 mm SVL, Mount Rumaswala, near Galle, 06°01'N, 80°14'E, ~10 m (elevation). *Paratypes:* NMSL WHT 2018, (1 male), 62.0 mm SVL, Panagula, 06°02'N, 80°23'E, 60 m; NMSL WHT 2329 (1 sub-adult female), 42.0 mm SVL, Richmond Hill, Galle, 06°03'N, 80°12'E; 15 m; NMSL WHT 7649 (1 female), 67.0 mm SVL, Imaduwa, 06°02'N, 80°23'E, 60 m; NMSL WHT 7650 (1 male) 68.0 mm SVL, Kanneliya Forest Reserve, Udugama, 06°25'N, 80°27'E, 150 m; NMSL WHT 7651, (1 male), 64.0 mm SVL, same location data as above; NMSL WHT 7652, (1 male), 65.0 mm SVL, Ambalangoda, 06°02'N, 80°23'E, 20 m.

Comparative material examined.

Chalcidoseps thwaitesii: NMSL uncatalogued, Sri Lanka, 53.0 mm SVL.

Nessia bipes: NMSL WHT 9448, Corbett's Gap, Knuckles Range, 07°22'N, 80°51'E, 1000 m, 68.0 mm SVL.



Fig. 1 – *Nessia gansi* sp. n., not preserved, from Atweltota in the Lowland wet zone (Photo courtesy: D. M. S. S. Karunaratna).

Nessia burtonii: NMSL WHT 7648, Sinharaja Forest reserve, 06°22'N, 80°28'E, 550 m, 71.5 mm SVL.

Nessia didactyla: NMSL uncatalogued, no locality, 82.0 mm SL (probably from type series).

Nessia monodactyla: NMSL WHT 2330, 7653-7655, Gannoruwa forest, 07°17'N, 80°36'E, 700 m, 74.0-82.0 mm SVL.

Nessia sarasinorum: NMSL WHT 1627 (2 examples), Wasgamuwa National Park, 07°43'N, 80°59'E, 60 m, 56.0, 92.0 mm SVL.

Diagnosis.

Nessia gansi sp. n. differs from all other congeners except *N. burtonii*, by the combination of the following characters: presence of four limbs (vs. no limbs in *N. deraniyagalae*, *N. hikanala* and *N. layardi*; in having two hind-limbs in *N. bipes*, *N. sarasinorum*); three digits in each forelimb and hind-limb (vs. no digits in each forelimb and hind-limb in *N. monodactyla*, two digits in each forelimb and hind-limb in *N. didactyla*); interparietal broader than frontal (vs. interparietal narrower than frontal in *N. sarasinorum*). It distinguishes from *Nessia burtonii* by having five (vs. six) supraciliaries; one (vs. two) pretemporal/s; two (vs. one) primary temporal/s; three (vs. four) infralabials; 93-105 (vs. 110-124) paravertebral scale rows; 103-114 (vs. 117-121) ventral scales; two (vs. three) subdigital lamellae under each digit of manus; mental as wide as postmental (vs. mental wider than postmental), and nostrils visible when viewed ventrally (vs. not visible). *Nessia gansi* sp. n. is distinguished from *Chalcidoseps thwaitesii* (Günther) by having three digits in each forelimb and in hind-limb (vs. four digits in each forelimb and hind-limb), first pair of chin shields separated medially by a single scale (vs. in contact medially) and interparietal broader than frontal (vs. interparietal narrower than frontal).

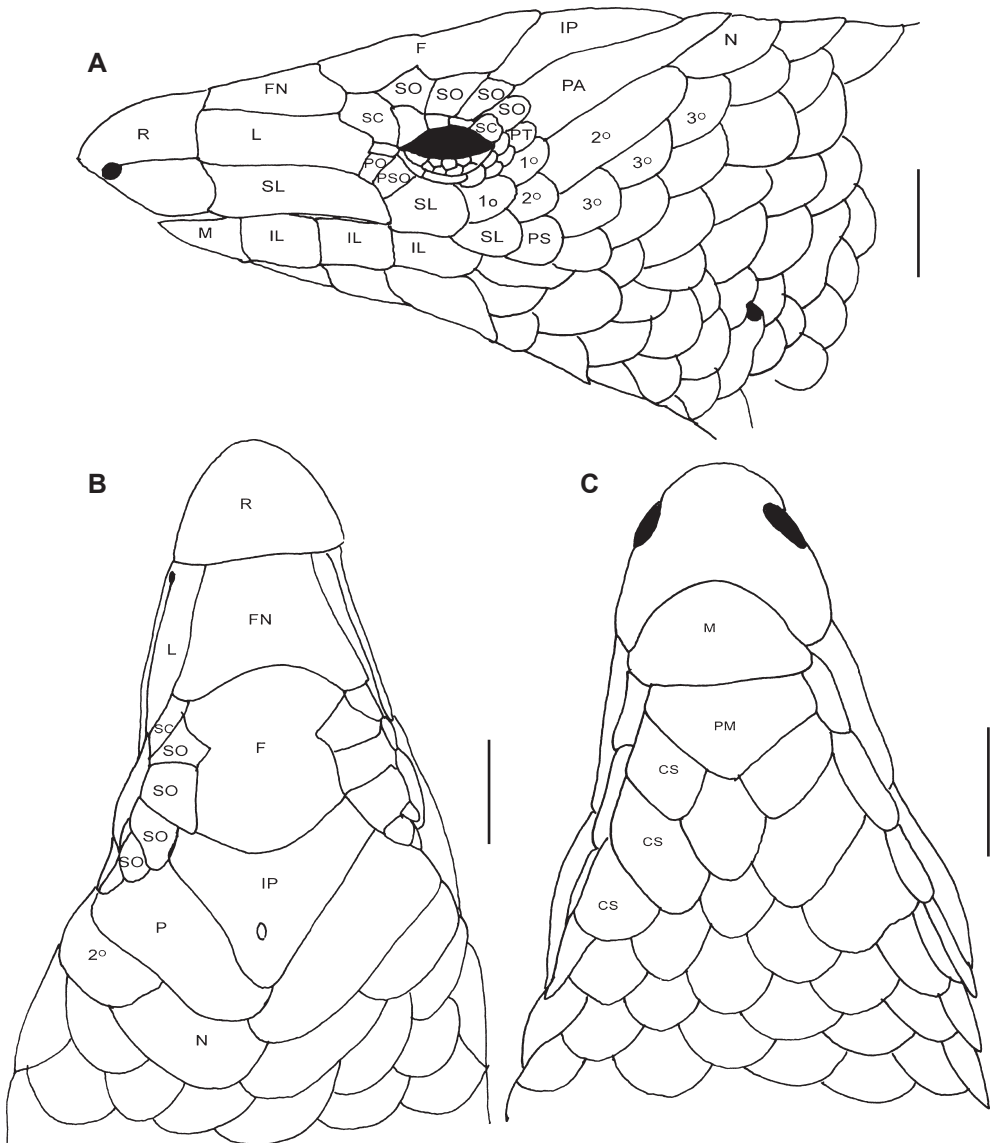


Fig. 2 – *Nessia gansi* sp. n. (holotype, adult male, NMSL WHT 7585): A, head lateral view; B, dorsal view; C, ventral view (Scale bars: 1 mm). (R, rostral; FN, frontonasal; F, frontal; IP, interparietal; P, parietal; N, nuchal; L, loreal; SL, supralabials; PS, postsupralabial; SC, supraciliaries; SO, supraoculars; PO, preocular; PSO, postsubocular; PT, pretemporal; 1°, primary temporals; 2°, secondary temporals; 3°, tertiary temporals; IL, infralabials; M, mental; PM, postmental; CS, chin shields).

Description (data for the paratypes given in brackets; for measurements, see table 1).

Maximum snout-vent length (SVL) 60.0[42.0–67.0] mm; head relatively short (length 10.5[9.5–11.7]% of SVL); snout acutely pointed; rostral about one third as long

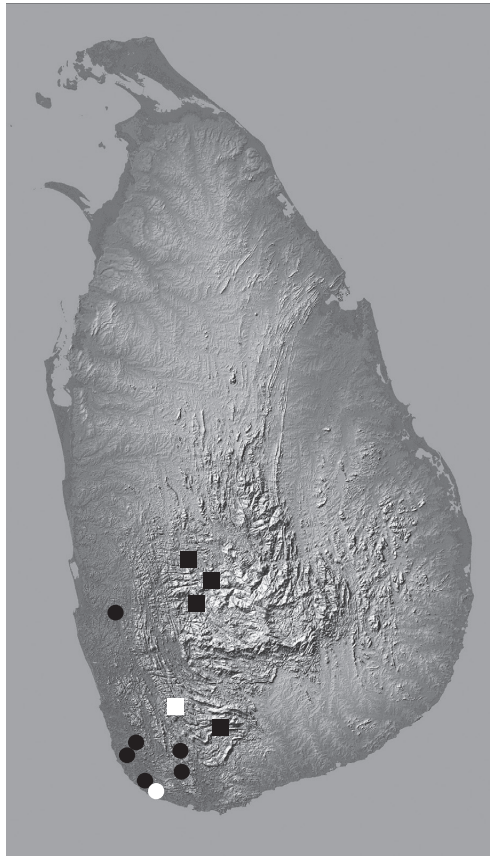


Fig. 3 – Records of *Nessia gansi* sp. n. (circles, open circle- holotype locality) and *Nessia burtonii* (squares, open square- neotype locality) in Sri Lanka.

as snout length; loreal as long as first supralabial; frontonasal longer than wide; frontal longer than wide, medially notched on each side by first supraocular; supraoculars four, first and second in contact with frontal; interparietal present, as wide as frontal; frontoparietal absent; parietals completely separated by interparietal; nuchals one pair; eye relatively small (eye diameter 12.7[9.7–14.8]% of head length); two primary temporals in both sides; six supraciliaries in both sides, first supraciliary distinctly enlarged; one pretemporal in each side, in contact with parietal; two secondary temporals in each side, in contact each other, the upper longer than the lower; three supralabials in both sides, second in subocular position; one postsupralabial in each side; external ear opening rudimentary; nostrils visible when viewed ventrally; mental wider than long; mental as wide as postmental; postmental wider than long, in contact with first infralabial; three infralabials in each side; three pairs of enlarged chin shields, first two pairs separated medially by a single median scale and the third pair separated medially by three scales; enlarged chin shield scales laterally in contact with infralabial row; body relatively long (trunk length 75.8[72.6–79.7]% of SVL); scales cycloid, striae on ventral scales; paravertebral scales 103[93–104];

Table 1

Merristic and mensural data of, type series of *Nessia gansi* sp. n. and *Nessia burtonii*, respectively.

Locality	<i>Nessia gansi</i> sp. n.							<i>N. burtonii</i>	
	Rumassawala	Panagula	Richmond Hill, Galle	Imaduwa	Kanneliya	Kanneliya	Ambalangoda	Haycock	Sinharaja Forest Reserve
Catalogue number	Holotype, NMSL WHT 7585	Paratype, NMSL WHT 2018	Paratype, NMSL WHT 2329	Paratype, NMSL WHT 7649	Paratype, NMSL WHT 7650	Paratype, NMSL WHT 7651	Paratype, NMSL WHT 7652	Neotype, NMSL WHT 1573	Other material, NMSL WHT 7648
Mid Body	25	25	24	26	25	22	24	26	25
Ventrals	108	105	103	107	114	110	105	117	121
Paravertebrals	103	104	93	103	105	103	102	124	110
SVL	60.0	62.0	42.0	67.0	68.0	64.0	65.0	71.0	71.5
Tail length	35.0	40.0 (regenerated)	22.5	23.5 (regenerated)	25.0 (broken)	40.0	4.0 (broken)	20.0 (broken)	15.0 (broken)
Trunk length	45.5	45.0	31.5	52.0	52.0	51.0	51.0	54.0	56.0
Snout length	2.9	2.9	2.5	3.4	3.0	3.0	2.8	2.8	3.2
Head length	6.3	6.2	4.9	6.8	6.1	6.4	6.2	6.4	6.8
Eye Diameter	0.8	0.8	0.7	1.0	0.9	0.8	0.6	1.0	0.7
Fore limb length	2.5	2.0	2.0	3.0	2.0	2.5	2.5	2.5	2.5
Hind-limb length	4.0	3.5	3.0	4.0	4.0	4.0	3.0	3.5	3.5

ventral scales 108[103–114]; longitudinal scale rows at midbody 25[22–26]; SVL 60.0[42.0–68.0] mm ($n = 7$), SVL 9.5[9.0–11.7] times in head length; un-regenerated tail length 35.0[22.5–40.0] mm (in 3 specimens, in NMSL WHT 2329, NMSL WHT 7585, NMSL WHT 7651), un-regenerated tail length 0.6[0.5–0.6] times in SVL. Four limbs present, rudimentary, each limb tridactyl; three subdigital lamellae under each digit of manus and three subdigital lamellae under each digit of pes. Forelimb length as % of SVL 4.2[2.9–4.8]% and hind-limb length as % of SVL 6.7[4.6–7.1]%.

Colouration.

In live, general body colour dark brown, each dorsal scale with a distinct dark spot at posterior end; ventral side dusky brown. In preservative, body colour dark brown and ventral side light brown.

Etymology.

The species name is a patronym in the Latin genitive singular, in honour of Carl Gans (September 7, 1923 - November 30, 2009), for his enormous contributions to herpetology.

Distribution and natural history.

The new species is recorded from Atweltota (D. M. S. S. Karunarathna, pers. comm.), Kanneliya, Rumaswala, Kottawa, Panagula, Ambalangoda and Imaduwa within the first and second peneplains (see Wadia, 1945) of Sri Lanka. This species is found in loose soil, in leaf debris, close to rubbish heaps in home gardens. It prefers damp forests or home gardens (Fig. 3).

Nessia burtonii Gray, 1839 (Figs. 3-5, tab. 1)

Material examined. Neotype (here designated, ICZN (1999), Art. 75.3. and 75.3.1-4., 75.3.6): WHT 1573, Haycock Mountain, near Hiniduma, 06°20'N, 80°18'E, ~660 m (elevation), 71.0 mm SVL.

Description of neotype (data for other recent material given in brackets; for measurements, see Tab. 1).

Maximum snout-vent length (SVL) 71.0[71.5] mm; head relatively short (head length 9.0[9.5]% of SVL); snout obtusely pointed; rostral about little more than one third as long as snout length; loreal as long as first supralabial; frontonasal broader than long; frontal as long as wide, medially notched on each side by first supraocular; supraoculars four, first and second in contact with frontal; interparietal present, wider than frontal; frontoparietal absent; parietals completely separated by interparietal; nuchals one pair; eye relatively small (eye diameter 15.6[10.3]% of head length); single primary temporal in both sides; five supraciliaries in both sides, first supraciliary distinctly enlarged; two pretemporals in each side, in contact with parietal; two secondary temporals in each side, in contact each other, the upper longer than the lower; four supralabials in both sides, second in subocular position; one postsupralabial in each side; external ear opening rudimentary; nostrils laterally oriented; mental wider than long; mental little broader than postmental; postmental wider than long, in contact with first infralabial; three infralabials in each side; three pairs of enlarged chin shields, first two pairs separated medially by a single median



Fig. 4 – *Nessia burtonii*, NMSL WHT 7648, from Sinharaja Forest reserve.

scale and third pair separated medially by three scales; enlarged chin shield scales laterally in contact with infralabial row; body relatively long (trunk length 76.1[78.3]% of SVL); scales cycloid, striae on ventral scales; paravertebral scales 124[110]; ventral scales 117[121]; longitudinal scale rows at midbody 26[25]; SVL 71.0[71.5] mm, SVL 11.1[10.5] times in head length; tail broken 20.0[15.0 mm]. Four limbs present, rudimentary, each limb tridactyl; two subdigital lamellae under each digit of manus and three subdigital lamellae under each digit of pes. Forelimb length as a % of SVL 3.5% (in two specimens) and hind-limb length as % of SVL 4.9% (in two specimens).

Colouration.

In live, general body colour is olive brown or light brown, each scale with a distinct dark spot at posterior end; ventral side dusky brown. In preservative, body colour dark brown and ventral side light brown.

Etymology.

Gray (1839) named *Nessia burtonii* in honour of Major Edward Burton of the Museum of Chatham (1790-1867) (Beolens et al., 2011). Etymology of *Nessia burtonii* as mentioned by Batuwita & Edirisinghe (2015) is incorrect.

Distribution.

Nessia burtonii is recorded from Alagalla, Ambagamuwa, Gampola, Hiniduma, Kandy and Sinharaja World Heritage Site (Fig. 3).

DISCUSSION

Gray (1839) described *Nessia burtonii* from Sri Lanka, but without a specific locality ('Ceylon'). His description limiting the true identity of *N. burtonii* because the characters given by Gray (op. cit.) are common to the new species and to *Nessia burtonii*. Hence, we look for the subsequent records of *Nessia burtonii* in the 19th century. However, all but Kelaart's (1852) records had no specific locality (i.e., Ceylon)

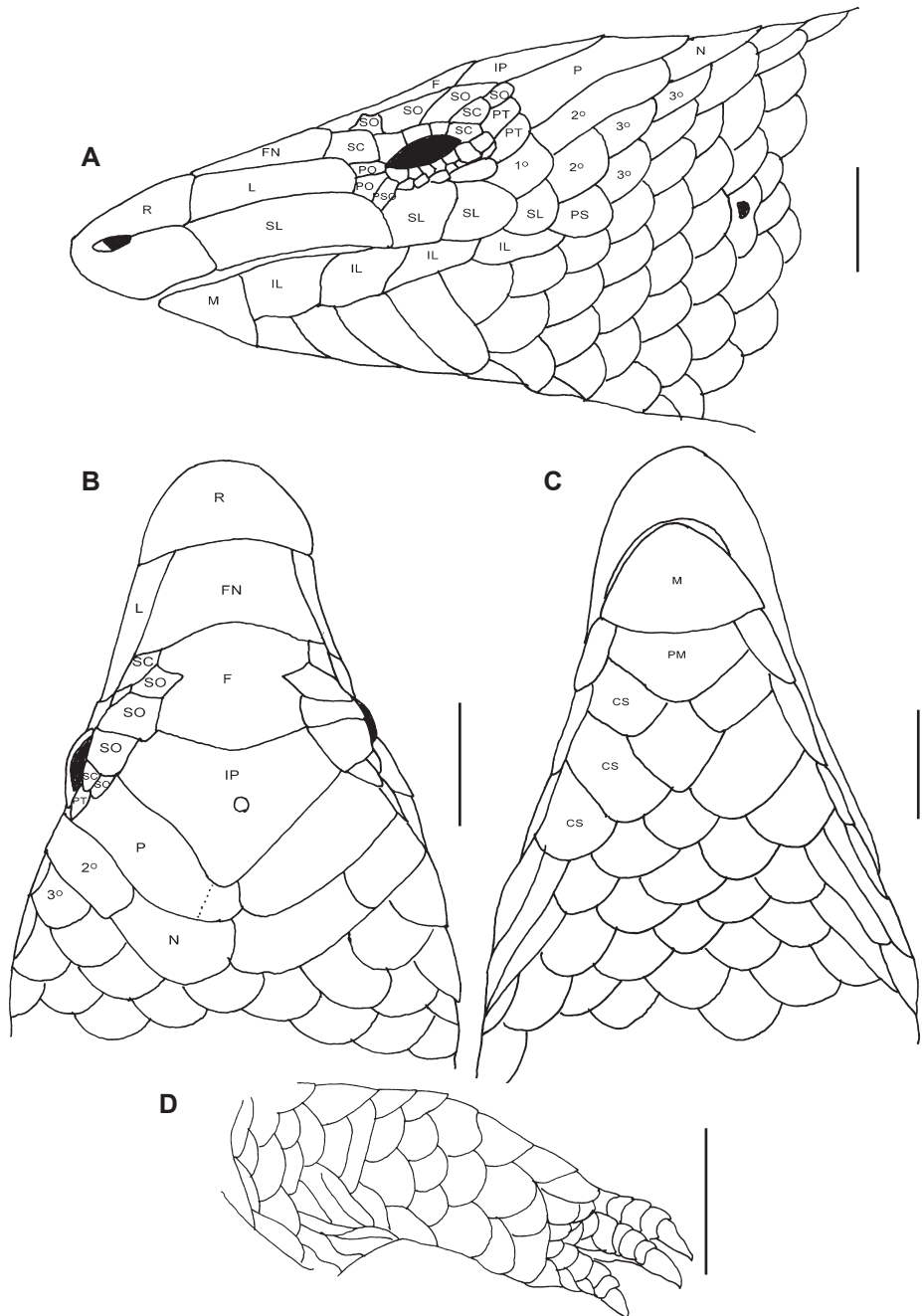


Fig. 5 – *Nessia burtonii* (neotype, WHT 1573): A, head lateral view; B, dorsal view; C, ventral view (Scale bars: 1 mm) and D, left manus (Scale bar: 1 mm). (R, rostral; FN, frontonasal; F, frontal; IP, interparietal; P, parietal; N, nuchal; L, loreal; SL, supralabials; PS, postsupralabial; SC, supraciliaries; SO, supraoculars; PO, preoculars; PSO, postsubocular; PT, pretemporals; 1°, primary temporal; 2°, secondary temporals; 3°, tertiary temporals; IL, infralabials; M, mental; PM, postmental; CS, chin shields).

(Günther, 1864; Boulenger, 1887). In addition, Günther (op. cit) and Boulenger (op. cit.) might have not seen the type/s of the *Nessia burtonii* (they had not stated the examined specimens as types). Kelaart (1852) reported that it was common at Ambagamuwa (07°01'N, 80°29'E, ~760 m elevation, within the third peneplain). Hence, being a common skink in the Central Hills in the mid-19th century, specimens referred to *Nessia burtonii* were obviously secured in the collections, in mid-1800s in Central Hills. Besides, the lizards which had been described in the mid-19th century were very unlikely to be made from the first and second peneplains (including the coastal belt) because almost all lizard species were known to be from remote inland locations (e.g., *Chalcidoseps thwaitesii*, *Ceratophora stoddartii*, *C. tennentii*, *Cyrtodactylus fraenatus*, *Cyrtodactylus (Geckoella) triedrus*, *Calotes liocephalus* etc., from the collections of E. H. Kelaart, G. H. K. Thwaites, W. Ferguson and R. H. Beddome). It is further supported by Kelaart's description of *Nessia burtonii* from Ambagamuwa and Alagalla (a location in the Central Province, 07°15'N 80°26'E, ~900 m). Thus, we are confident that *Nessia burtonii* was, in fact, collected from Central Hills (> 500 m elevation).

Given that its holotype is lost and there is no type locality (Smith, 1935; Uetz et al., 2016, P. Campbell, pers. comm., 25 July 2014), it is desirable that its identity be stabilized through the designation of a neotype. Subsequent specimens had been collected and assigned to *Nessia burtonii* (Kelaart, 1852; Günther, 1864, Boulenger, 1887) according to the neotype, we here designated from Haycock Mountain (~660 m a.s.l.): frontonasal as long as frontal, interparietal broader than frontal and frontal as broad as long. We therefore designate the 71.0 mm SVL specimen NMSL WHT 1573 as neotype of *Nessia burtonii* Gray, 1839. A description of the neotype is provided, above, which is consistent with the brief original description of this species and the descriptions provided by subsequent authors (Günther, 1864; Boulenger, 1887). The neotype is from Haycock Mountain (~660 m a.s.l.), in the third peneplain (> 500 m a.s.l.), which lies within the elevation, in which *Nessia burtonii* commonly occurs in the mid-19th century (see Kelaart, 1852).

Nessia gansi sp. n. and *N. burtonii* are discrete species based on their external morphology, meristic data and as well as in geography. They are geographically separate based on altitudinal difference of their habitats. *Nessia burtonii* collected from Haycock Mountain (~660 m a.s.l.), whereas *Nessia gansi* sp. n. (holotype) collected from Rumaswala (~10 m) close to the sea. Likewise, *Nessia sarasinorum* and *N. bipes* show similar discrete geographic distribution in Sri Lanka. The two localities of the species are ~50 km straight-line distance: *N. sarasinorum* recorded from Dambulla (Inamaluwa, 07°56'N, 80°41'E, ~100 m) and *N. bipes* distributed in the Knuckles Range (Corbett's Gap, 07°22'N, 80°51'E, ~900 m). The altitudinal difference and geographical barriers (i.e., an example of vicariance) might have caused allopatric speciation of these small semi-fossorial vertebrates.

The present study is part of a review series of the scincid lizard individuals of Sri Lanka (*Lankascincus*: Batuwita & Pethiyagoda, 2007; *Eutropis*: Batuwita, 2016). These, together with Greer (1991) and Das et al., (2008) have helped to highlight a high degree of cryptic diversity within the various genera. Recently, Miralles et al. (2011, 2016) showed that reduction of number of scales on the anteriormost part of the head might have contributed to high species diversity in fossorial skinks. They also recognized convergent evolution of *Nessia* of Sri Lanka with three other Scincidae genera and another single genus of family Dibamidae.

We here conclude the type/s of *Nessia burtonii* had not been collected from the lowland wet zone area of Sri Lanka (first and second peneplains) where the *N. gansi* sp. n. inhabits. Thus, we here re-define the previous records of three-toed *Nessia* from lowland areas of Sri Lanka which, in fact, belongs to *Nessia gansi* sp. n. Moreover, within the same climatic-physiographic zone (i.e., Lowland wet zone, Central Hills, Knuckles Range, Dry zone and Semi-arid zone), in the same peneplain, the same species of *Nessia* may harbour, although the localities are well distant from each other (see also Deraniyagala, 1964; Gans, 1995).

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