Rec. zool. Surv. India: Vol. 121(3)/363–374, 2021
DOI: 10.26515/rzsi/v121/i3/2021/154296

ISSN (Online) : 2581-8686
ISSN (Print) : 0375-1511

Taxonomic reassessment of *Eutropis macularia* (Blyth, 1853) complex in the Western Ghats of India: Resurrection of *Eutropis brevis* (Günther, 1875), *Eutropis dawsoni* (Annandale, 1909) and synonymisation of *Eutropis gansi* (Das, 1991) (Reptilia: Squamata: Scincidae)

S. R. Ganesh[1], Kaushik Deuti[2*], N. S. Achyuthan[3], Patrick Campbell[4], Sujoy Raha[2], Probhat Bag[2] and Sudipta Debnath[2]

[1]Chennai Snake Park, Rajbhavan Post, Chennai – 600022, Tamil Nadu, India
[2]Zoological Survey of India, Herpetology Division, 27 JL Nehru Road, Kolkata – 700016, West Bengal, India; Email: kaushikdeuti@gmail.com
[3]Center for Ecological Sciences, Indian Institute of Science, Bangalore – 560012, Karnataka, India
[4]Department of Life Sciences, Darwin Centre, Natural History Museum, Cromwell Road, South Kensington, London SW7 5BD, England

Abstract

Against the backdrop of published cryptic genetic diversity and partly resolved taxonomy of the *Eutropis macularia* complex of skinks in the Indian Peninsula, we reassess the taxonomic status of the Western Ghats populations. Based on our examination of name-bearing types of two synonymised nomina (*Euprepes brevis, Lygosoma dawsoni*) and a valid (*Mabuya gansi*) nomen, we recognise two species: *E. brevis* and *E. dawsoni*, with *E. gansi* being the synonym of the latter. We characterise and distinguish these southwest Indian taxa from the allopatric *E. macularia* s. str. In keeping with studies on the nearby island of Sri Lanka, cryptic diversity within the peninsular Indian *E. macularia* complex has resulted in the resurrection of these long-synonymised nominal taxa.

Keywords: Bengal, *Eutropis brevis*, *E. dawsoni*, Junior Synonym, Nomenclature, Western Ghats

Introduction

Studies on the skink genus *Eutropis* Fitzinger, 1843 have recently resolved some evolutionary questions (Datta-Roy *et al*., 2012; Barley *et al*., 2014) and clarified the status of many obscure nominal taxa in South Asia (Amarasinghe *et al*., 2016a,b; Batuwita, 2016; Batuwita *et al*., 2020; Das *et al*., 2008; Srinivasulu *et al*., 2016). One of the most persisting issues in this group is the murky taxonomy of the *Eutropis macularia* (Blyth, 1853) complex. Though recent studies on this topic from the island of Sri Lanka (Das *et al*., 2008; Batuwita, 2016) have clarified the situation resulting in new species descriptions, the scenario in the Indian peninsula still stands unresolved. Datta-Roy *et al*. (2012) and Barley *et al*. (2014), in their molecular phylogenies clearly showed cryptic diversitywithin the *E. macularia* complex from multiple locations from India (and elsewhere), with species-level genetic signatures in discrete geographic zones. Historically prevailing "specific" (Boulenger, 1887) / "infraspecific" (Smith, 1935) taxonomic boundaries clearly indicate morphologically-diagnosable allopatric populations in this complex. Despite subsequent attempts to resolve this complex elsewhere (e.g. Taylor & Elbel, 1958), many taxa are still left concealed under a single catch-all nomen *Eutropis macularia* (Blyth, 1853) in India (Uetz *et al*., 2021 and references therein).

Blyth (1853) described a new skink species *Euprepes macularius* from Rangpur in Bangladesh (25.74˚N 89.27˚E). Subsequently, many generic transfers and

** Author for correspondence*

Article Received on: 12.08.2020 Accepted on: 22.06.2021

partim descriptions happened with this taxon (Boulenger, 1887, as *Mabuya macularia*). Günther (1875) described *Euprepes brevis* based on three syntypes, a sub-adult from Anamallays and two adults from Travancore, all from the Western Ghats of southern India. Boulenger (1887) maintained this as a valid species, but under the genus *Mabouia*, as *Mabouia brevis* (Günther, 1875). Later, Boulenger (1890) synonymised *M. brevis* under *M. macularia*. Aside from other taxonomic activities elsewhere in India, Annandale (1909) described *Lygosoma dawsoni* based on four syntypes collected by him from many sites in Travancore, Southern India. Smith (1935), without comments, synonymised *Lygosoma dawsoni* under *Mabuya macularia* (now *Eutropis macularia*). Subsequently, Das (1991) described *Mabuya gansi* based on three specimens he collected from Kalakkad-Mundanthurai Tiger Reserve in the Southern Western Ghats. Das (1991) differentiated *Eutropis gansi* from *E. macularia* based on size ofear-hole compared to that of lateral body scale and auricular lobule configuration. This species continues to be recognised (e.g. Aengals *et al*., 2018) and was subsequently transferred to the genus *Eutropis*, after the partition of *Mabuya s. lat*. by Mausfeld *et al*. (2002).

Within the framework of our studies on Indian skinks, we studied many specimens representing this species complex from the Western Ghats. This included the name-bearing types of *Euprepes macularius, Euprepes brevis* and two nomina, one currently synonymised and one recognised–*Lygosoma dawsoni* and *Mabuya gansi*. Thereby we were able to distinguish the Western Ghats populations from those inhabiting other adjacent regions of the Indian peninsula and recognise two species endemic to the Western Ghats: *Euprepes brevis* Günther, 1875 and *Lygosoma dawsoni* Annandale, 1909 (with *Mabuya gansi* Das, 1991 as its synonym). In this work, we circumscribe and characterise these two taxa as distinct species of *Eutropis* and provide morphological and natural history notes in addition to depicting and redescribing their name-bearing types.

Material and Methods

This study is based on the examination of both preserved and live materials, including the type specimens of the synonyms and related congeners deposited with the Natural History Museum London, United Kingdom and the Zoological Survey of India, Kolkata, India. Morphological and morphometric details were scored from the preserved voucher specimen using Mitutoyo™ digital callipers (L.C. 0.01 mm). Magnifying hand lens (10X zoom) was used for scale counting.

Our morphological terminology and abbreviations are as follows (Deuti *et al*., 2020): PVERT: paravertebral scales; MV : mid ventral scales; MBSR: midbody scale rows; 4TL: 4th toe subdigital lamellae; SVL: snout to vent length; TlL: tail length; HL: head length; HW : head width; SL: snout length; END: eye to nostril distance; ESL: eye to snout length SND: snout to nostril distance; EYD: eye diameter (horizontal); TYD: tympanum diameter (horizontal); ETD: eye to tympanum distance; IND: internarial distance; IOD : interorbital distance; BRL: brachial length; ABL: antebrachial length; AGD: axilla-groin distance; ThL: thigh length; ShL: shank length. Meristic characters were scored as follows: midbody scale row count; supralabial count; infralabial count; supralabial count at midpoint of orbit; subdigital lamellae count of Fingers I–Vand Toes I–V; ventrals (in a line between post gular and preanal scales); paravertebral scale row count (between postnuchals to presacral scales in a dorsal / vertebral line). For more information on our nomenclature and definitions of morphological terminologies, Deuti *et al*. (2020). For our multivariate analysis (Figure 1 and Table 1), we selected near topotypical representatives of *E. macularia*, since its holotype is a damaged specimen. We included data from the types of *E. brevis, E. macularius, E. gansi* and *E. dawsoni*, apart from other specimens of the aforementioned species (all adults). We conducted a Principal Component Analysis using the morphometric data from our study (all mature adult individuals) to understand the morphological separation between the taxa and assess the major loading components SVL, HL, HW, ESL, OD, ETD, AGD, ThL, ShL, MBSR & MV were the major loading components recovered. These contributing characters were then plotted using a multivariate analysis; the differences were tested comparing *Eutropis brevis*, *E. dawsoni* and *E. gansi* specinmens (Including the name-bearing types). The statistical analysis was carried out using a normalised dataset using PAST v3.14 for Macintosh.

Photographs of the specimens and habitat were taken using high-resolution digital cameras. Geographic coordinates are given in decimal degrees, up to two decimals places.

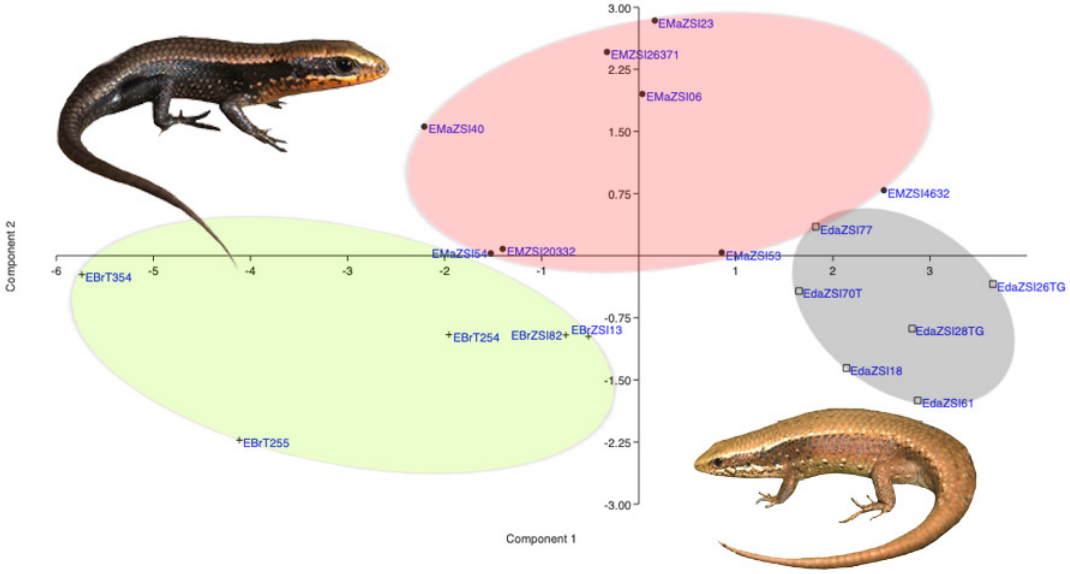

Figure 1. Principal component analysis plot showing distinct clustering in *Eutropis dawsoni* near topotypical *E. macularia* and *E. brevis*.

Results

Our Principal Component Analysis (Figure 1) focusing on Western Ghats *E. macularia* group (including *E. macularia* s. str., *E. brevis* as well as *E. gansi* + *E. dawsoni*; Tables 1 and 2) specimens extracted three factors with cumulative eigenvalues above one. Table 1 shows the principal components and the corresponding characters which explain the variation in them. Snout-vent length, head length and head width contributed to maximum loading factors. The principal components PC1 (SVL), PC2 (HL) and PC3 showed 56%, 17.6% & 9.4% of the total variance (Figure 1) respectively. Our analysis shows the distinction between *E. macularia* from Bengal (Ema), *E. brevis* (Ebr) and *E. dawsoni* (Eda). It also supports the synonymy of *E. gansi* with *E. dawsoni*. SVL and HL were expectedly large loading factors in this case due to the stark difference in SVL between these three species. The allocation of these populations to these names is unambiguous since the represented specimen series also has the name-bearing type, referred by the suffix 'T', and 'TG' that refers to the type specimen of a synonym *E. gansi*. In the following, we redescribe the name-bearing types and synthesise species accounts for the two species we recognise by formally resurrecting *E. brevis* and *E. dawsoni* from the synonymy of *E. macularia* and synonymising *E. gansi* under *E. dawsoni* (Figure 6).

Taxonomy

Eutropis brevis (Günther, 1875)

Euprepes brevis Günther, 1875

Mabouia brevis – Boulenger, 1887

Mabuya macularia – Boulenger, 1890 part

Mabuya macularia – Inger *et al.*, 1984 part

Mabuya macularia var. 1 – Smith, 1935 part

Eutropis macularia 3 (Western Ghats) – Datta-Roy *et al.*, 2012 part

Eutropis macularia (Blyth, 1853) – Batuwita, 2016 part

Syntypes: NHMUK 1874.4.29.254-55 two adults from Travancore, NHMUK 1874.4.29.354 (re-reg. NHMUK 1946.8.19.14)a subadult from Anamallays, coll. R.H. Beddome (Günther, 1875; Boulenger, 1887).

Etymology: Apparently named after its short body form (Günther, 1875).

Type locality: Travancore and Anamallays [Western Ghats, South India].

Diagnosis: (Günther, 1875; Boulenger, 1887, 1890; Smith, 1935; Datta-Roy *et al*., 2012): A relatively small species of *Eutropis* (adult SVL 37 mm; adult males in nuptial colouration seen in individuals from ~27mm) restricted to the Western Ghats, belonging to *E. macularia* clade, characterised by: 27-30 midbody scale rows, nuchal and dorsal scales with 3-5 keels on each scale, with no pointed spurs projecting behind or mucronate structures; postnasals absent; supranasals and prefrontals separated; 2 distinctly divided frontoparietals; interparietal fully separating parietals; one pair of broad nuchals; temporal scales with 3-4 keels; ear-hole as large as a lateral scale without anterior lobules; lower eyelids scaly with a series of opaque scales; ventrals: 41-45; fourth toe subdigital lamellae: 14-16; dorsum uniform fawn brown with a wide dark grey-brown lateral wash extending fromneartemporal to inguinal region.

Redescription of the Syntypes

Habitus: A rather small and stout skink with a fairly cylindrical body. Head indistinct from neck. Snout obtusely pointed, its length exceeding eye-tympanum distance. Torso short and fairly thick, a little longer than hind limb length. Limbs well-developed, with the hind limbs distinctly larger than forelimbs. Adpressed ipsilateral fore and hind limbs touch each other. Relative length of fingers IV>III>II>V>I and toes IV>III>V>II>I. Ear-hole as large as lateral scale, round; tympanum deeply sunk, without anterior lobules. Eyes large, eyelids well-developed. Lower eyelids scaly with a series of opaque scales. Tail thick but gradually becomes pointed at the tip. Tail is slightly longer than the body.

Scalation: Dorsal, lateral and ventral scales of torso almost equal in size. Dorsal scales with 3-5 strong keels without pointed spurs or mucros projecting behind. Lateral scales with 3 weak keels without any pointed spurs projecting behind. Ventral scales hexagonal with 3 weak keels. Paravertebrals: 33-34. Midventrals: 41-45. Midbody scale rows: 27-30. Nostril in posterior part of nasal. Postnasal absent. Rostral over twice as high as wide; curving up onto dorsum of head, its posterior margin semicircular; in contact with 1st supralabial, nasal, supranasal and frontonasal. Supranasals small and widely separated; in contact with rostral, nasal, frontonasal and anterior loreal. Frontonasal as wide as long and forming a broad margin with rostral anteriorly and frontal posteriorly; in contact with rostral, supranasal, anterior loreal, prefrontal and frontal. Prefrontals not in contact with each other; in contact with frontonasal, both loreals (anterior and posterior), frontal, 1st supraocular and 1st supraciliary. Frontal arrow-shaped, large, larger than frontoparietal and interparietal together; in contact with frontonasal, prefrontal, second supraocular and frontoparietal; posteriorly rounded. Frontoparietals larger than interparietal; in contact with each other and with frontal, 2nd-4th supraoculars, parietal and interparietal. Interparietal longer than wide; completely separating parietals. Parietal in contact with frontoparietal, 4th supraocular, temporal, nuchal and interparietal. One pair of broad nuchals, with 8-9 keels on each scale. Supraoculars 4, 2nd the largest. Loreals 2 on each side of head. Anterior loreal higher than wide, much higher than the posterior. Posterior loreal 2.5 times wider than anterior. Anterior loreal in contact with 1st supralabial slightly, 2nd supralabial broadly, supranasal, frontonasal, prefrontal and posterior loreal. Posterior loreal in contact with 2nd, 3rd and 4th supralabial, anterior loreal, prefrontal, 1st supraciliary and preocular.One preocular and one presubocular. Postoculars 3. Supraciliaries 5-6, 1st the largest, 3rd the longest. Temporal scales with 3-4 keels. Supralabials 6, 5th the largest, situated below eye. Infralabials 6. Mental wider than longin contact with 1st infra-labial. Post-mental wider than long, in contact with 1st-2nd infralabials. First chin shields divided by a single row of ventral scales, in contact with 2nd-3rd infralabials. Second chin shields divided by a single row of ventral scales, in contact with 3rd-4th infralabials. Third chin shields divided by 3-4 rows of ventral scales, in contact with 4th-5th infralabials. Scales on limbs are with 2-3 keels dorsally, smooth ventrally. Subdigital lamellae of 4th toe: 14-16. Precloacal scales not enlarged. Subcaudals not enlarged.

Colouration in preservative: Forehead, dorsum of body and tail uniform, unpatterned drab brown. A thick, wide, dark grey-brown lateral stripe from posterior corner of eye to a little behind hind limb insertion. A pale yellow margin below the dark stripe from the upper lip passing below the ear opening and extending upto the area above the forelimb. This stripe feeble though discernable in adult specimens but evident in the sub-adult (NMHUK 1874.4.29.354). Venter off-white, with darker scale margins.

Colouration in life (based on live, uncollected individuals encountered in situ): Dorsum golden to fawn brown; this ground colour extending from snout tip to tail tip.

Laterally, sandwiched by a dark, wide black or coffee brown band passing from loreal and preocular region till the tail base, across both the fore and hind limbs. Dorsolateral colour demarcation effected by a thin black and yellow series of spots forming a stripe, distinct till mid trunk. A second such stripe passes from supra-labials below tympanum and across the laterals till the mid trunk. A dense group of black and yellow spots starting beyond temporals extending across the axillary region till mid trunk. Nuptial males with a distinct scarlet red wash on chin and the sides of throat. Ventrally cream to yellowish-white, with darker brownish speckles near throat in both sexes and scale borders (Figures 2&3).

Distribution and natural history: *Eutropis brevis* is a diurnal, fast-moving, leaf litter-dwelling, insectivorous skink inhabiting evergreen and moist deciduous forests of the Western Ghats. Judging by literature records (Günther, 1875; Boulenger, 1887, 1890; Smith, 1935; Inger *et al.*, 1984) as well as the examined series of materials, this species appears to be endemic to the Western Ghats. It is known from the southernmost range the Ashambu, Agasthyamalai, northwards across Cardamom hills, Travancore, High Wavys, High Ranges, Munnar, Anaimalai and Parambikulam hills. It is possible that *Eutropis brevis* is a common and well-distributed skink inhabiting the wet mountainous forest tracts of southwestern India.

Figure 2. *Eutropis brevis* from Valparai, Anaimalai (Photo S.R.Ganesh).

Figure 3. *Eutropis brevis* from Parambikulum (Photo: N.S. Achyuthan).

Comparisons: A species belonging to the *E. macularia* clade (Datta-Roy *et al.*, 2012; Barley *et al.*, 2014), distinguished from peninsular Indian members of the *E. macularia* clade as follows, only opposing character suites listed: *E. dawsoni* (larger SVL upto 61 mm; dorsal body scales 5-6 keels; each scale with projecting spurs behind; tympanum larger than or at least equal to a lateral body scale with 3-4 visible anterior tympanic lobules; head longer than its width; fore-arm longer than lower arm; shank longer than thigh); *E. clivicola* (larger SVL upto 55 mm; dorsal body scales with 5-7 feeble keels; each scale without projecting spurs behind; tympanum with 2-3 visible anterior tympanic lobules, a distincthalf vertebral stripe on trunk; prefrontals in narrow contact with each other; interparietal in broad contact with nuchal; lower eyelid scaly with the central scale not enlarged than surrounding ones); *E. allapallensis* (frontoparietals fused; dorsal scale rows as low as 26); *E. macularia* (larger SVL upto 70 mm; dorsal body scales 5-9 keels; each scale without projecting spurs behind; tympanum larger than or at least equal to a lateral body scale with 2-3 indistinguishable anterior tympanic lobules, much lower 4th toe subdigital scale count 12–14; paravertebrals scale count much higher: 39–41; midventral scale count much higher: upto 51). Additionally, *E. brevis* is distinct from the geographically-proximate Sri Lankan members of the *E. macularia* clade namely, *E. madraszi, E. austini*and *E. greeri* by: pretemporals in contact with parietal; first pair of chin shields separated by a median scale; *E. tammanna*: prefrontals in contact with each other.

Eutropis dawsoni (Annandale, 1909)

Lygosoma (*Keneuxia*) *dawsoni* Annandale, 1909

Mabuya gansi Das, 1991

Eutropis gansi – Mausfeld *et al.*, 2002; Das *et al.*, 2008

Lectotype: ZSI 16170 and paralectotypes ZSI 16140, 16171 of *Lygosoma dawsoni* Annandale, 1909 from Maddathorai, Shashthamcottah and Tenmalai, Kerala.

Referred Material: Holotype ZSI 24826 and paratype ZSI 24828 of *Mabuya gansi* Das, 1991 from 2 km north-west of Muthalar Road Cross off Sengaltheri-Thalayani road (towards Moolakasam), Kalakkad-Mundanthurai Range, and Tirunelveli District, Tamil Nadu, coll. Indraneil Das on 30.viii.1990.

Table 1. Main morphological characters of the type specimens of *Eutropis brevis* and *Eutropis dawsoni* (and its synonym *Eutropis gansi*). Measurements in mm (R: regenerated tail)

Characters of the type specimens	NHMUK 1874.4. 29.254	NHMUK 1874.4. 29.255	NHMUK1874.4. 29.354	ZSI 16170	ZSI 16140	ZSI 24826	ZSI 24828
Taxa name	*brevis*	*brevis*	*brevis*	*dawsoni*	*dawsoni*	*gansi*	*gansi*
PVERT	34	33	33	34	34	34	34
MV	44	41	44	42	45	41	41
MBSR	29	27	28	28	28	30	30
4TL	15	15	18	14	15	15	16
SVL	32.9	30.7	17.2	51.6	27.2	60.3	61.5
TlL	33.3	10.1 (R)	Broken	60.98	Broken	Broken	73.2
HL	11.5	10.0	6.5	8.2	4.3	11.2	10.8
HW	7.1	6.9	3.9	8.1	4.3	10.0	9.6
SL	3.4	3.3	2.1	5.8	2.7	5.1	5.5
END	2.1	2	1.3	4.0	1.9	3.5	3.9
SND	1.1	1	0.6	1.9	0.8	2.0	1.9
EYD	2.4	1.5	1.6	3.7	1.8	3.8	3.6
TYD	0.9	0.8	0.7	1.4	0.7	1.1	1.3
ETD	2.6	2.0	1.9	4.4	2.5	5.0	4.3
IND	2.2	1.9	1.3	2.9	1.5	3.4	3.1
IOD	3.9	4.6	2.9	2.1	1.4	1.8	1.6
BRL	4.8	4.6	3.8	6.6	2.8	6.3	6.1
ABL	3.8	3.7	2.3	7.7	2.8	6.9	7.0
AGD	15.2	8.3	7.9	22.0	11.7	30.3	30.2
ThL	4.7	4.1	3.0	7.4	4.1	10.0	7.1
ShL	4.7	4.1	2.9	7.9	4.3	6.8	9.1

Etymology: Patronym, honouring Lieut.-Col. F.W. Dawson, the then Director of Trivandrum Museum, with whom Annandale conducted the expedition on which he found this species.

Type locality: Madathorai (=Madathara, Kerala, India), after lectotype designation by Das *et al.* (1998).

Diagnosis: A relatively larger species of *Eutropis* (adult SVL 61 mm) from the Southern Western Ghats, characterised by: a fairly robust and cylindrical body with well-developed limbs; dorsal scales with 5-6 strong keels with 3 pointed spurs projecting behind; post-nasal absent; supra-nasals and pre-frontals separated; fronto-parietals are in contact with each other; inter-parietal completely separating parietals; one pair of broad nuchals; temporal scales with 3-4 keels; ear-hole as large as lateral scale with 3-4 short, pointed anterior lobules; lower eyelids scaly with a series of opaque scales; mid-ventrals: 39-45; 4th toe subdigital lamellae: 14-16; dorsum dark grey-brown without any spots; dark grey-brown lateral stripe extending from posterior corner of eye to a little behind hind limbs.

Description and Variation: A fairly robust skink with an elongated and cylindrical body. Head indistinct from neck. Snout not depressed but obtusely pointed. Snout length exceeding eye-tympanum distance. Limbs well-developed. Fore and hind limbs touch each other. Dorsal, lateral and ventral scales almost equal in size. Dorsal scales with 5-6 strong keels with 3 pointed spurs projecting behind. Lateral scales with 5-6 strong keels with 3 pointed spurs projecting behind. Ventral scales

hexagonal with 3 weak keels. Paravertebrals: 32-34. Ventrals: 39-45. Midbody scale rows: 27-30. Nostril in posterior part of nasal. Postnasal absent. Rostral more than twice as high as wide, curving up onto the dorsal surface of head, its posterior margin semicircular. Rostral is in contact with first supralabial, nasal, supranasal and frontonasal. Supranasals small and widely separated. Supranasal is in contact with rostral, nasal, frontonasal and anterior loreal. Frontonasal as wide as long and forming a broad margin with rostral anteriorly and with frontal posteriorly. Frontonasal in contact with rostral, supranasal, anterior loreal, prefrontal and frontal. Prefrontals not in contact with each other. Prefrontal in contact with frontonasal, both loreal (anterior and posterior), frontal, first supraocular (broadly) and first supraciliary (narrowly). Frontal large and arrow-shaped, posteriorly rounded. Frontal larger than frontoparietal and interparietal together, in contact with frontonasal, prefrontal, 2nd supraocular and frontoparietal. Frontoparietals in contact with each other, larger than interparietal. Frontoparietal in contact with frontal, 2nd supraocular narrowly, 3rd and 4th supraocular broadly, parietal and interparietal. Interparietal longer than wide, completely separating parietals. Parietal in contact with frontoparietal, 4th supraocular, temporal, nuchal and interparietal. One pair of broad nuchals. 8-9 keels on each nuchal. 4 supraoculars, 2nd the largest. Anterior loreal higher than wide but much higher than the posterior. Posterior loreal is 2.5 times wider than anterior. Anterior loreal in contact with 1st supralabial slightly, 2nd supralabial broadly, supranasal, frontonasal, prefrontal and posterior loreal. Posterior loreal in contact with 2nd, 3rd and 4th supralabial, anterior loreal, prefrontal, 1st supraciliary and preocular. One preocular and one presubocular. 3 postoculars. 5-6 supraciliaries, 1st the largest but 3rd the longest. Temporal scales with 3-4 keels. 6 supralabials, the 5th is the largest and situated below eye. Earhole is round, as large as lateral scale and tympanum is deeply sunk, with 3-4 short, pointed anterior lobules. Eyelids well-developed and movable. Lower eyelids scaly with a series of opaque scales. 6 infralabials. Mental wider than long. Postmental is wider than long. Post-mental is in contact with 1st and 2nd infralabials. First chin shields divided by a single row of ventral scales. First chin shield in contact with 2nd and 3rd infralabials; 2nd chin shields divided by a single row of ventral scales, in contact with 3rd and 4th infralabials; 3rd chin shields divided by 3-4 rows of ventral scales, in contact with 4th and 5th infralabials. Forelimbs long, dorsally covered with 2-3 keels, ventrally smooth. Relative length of fingers IV>III>II>V>I. Hind limbs are long. Scales on dorsal surface of hind limbs with 2-3 keels. Scales on ventral surface of hind limbs are smooth. Scales on palm and sole rounded. Relative length of toes IV>III>V>II>I. Number of lamellae under 4th toe: 14-16. Precloacal scales not enlarged. Tail thick but gradually becomes pointed at the tip. Tail slightly longer than the body. Subcaudals not enlarged.

Colouration: Forehead, dorsum of body and tail grey-brown without any spots. A dark grey-brown lateral stripe from posterior corner of eye to a little behind the insertion of the hind limb. A pale yellow margin below the dark stripe from the upper lip passing below the ear opening and extending uptothe area above the fore-limb. A pink wash on the side of the throat. Ventrally cream (Figures 4 and 5). Nuptial males with scarlet red gular wash and bright black lateral bands.

Figure 4. *Eutropis dawsoni* from Meghamalai (Photo: Avrajjal Ghosh).

Figure 5. *Eutropis dawsoni* from Srivilliputhur (Photo: S.R. Ganesh).

Figure 6. Profile photographs comparing the dorsal scales of **(1)** *Eutropis macularia,* **(2)** *Eutropis brevis,* and **(3)** *Eutropis dawsoni.* Note the differences in keel projections and scale differences. Images of type specimens – **(A)** *Eutropis macularia* (Holotype – ZSI 2344) **(B, C & D)** *Eutropis brevis* (Syntypes – NHMUK 1874.4.29.254-55 & 354) **(E)** *Eutropis gansi* (Holotype – ZSI 24826), and **(F)** *Eutropis dawsonii* (Lectotype – ZSI 16170).

Table 2. Main morphological characters of topotypical specimens of *E. macularia* sensu stricto, from West Bengal, Eastern India. Measurements (in millimetres)

Characters	ZSI 4632	ZSI 20332	ZSI 26371
Para-Vertebral scales	40	39	44
Ventral scales	46	43	51
Mid-body scale rows	28	28	30
Lamellae on 4th toe	14	12	13
Snout-vent Length	69.5	43.7	42.9
Tail Length	Broken	Broken	58.2
Head Length	9.6	7.3	7.8
Head Width	9.2	6.5	6.5
Snout Length	5.4	3.9	4.0
Eye-Nostril Distance	3.9	2.6	3.2
Nostril-Snout tip Distance	1.3	1.3	1.3
Eye Diameter	2.5	2.0	2.7
Tympanum Diameter	1.2	1.0	1.3
Eye-Tympanum Distance	4.9	3.6	4.4
Inter-narial Distance	2.4	2.1	2.0
Inter-orbital Distance	5.7	4.3	4.3
Brachium Length	5.4	3.9	4.6
Antebrachium Length	6.3	4.4	4.8
First Finger Length	1.6	1.5	1.8
Second Finger Length	2.1	2.0	2.1
Third Finger Length	3.5	2.9	2.7
Fourth Finger Length	3.8	3.2	2.8
Fifth Finger Length	1.8	1.6	1.8
Axilla-Groin Distance	36.5	20.3	19.5
Thigh Length	6.6	4.9	6.1
Shank Length	8.8	5.8	7.0
First Toe Length	1.9	1.5	1.9
Second Toe Length	3.2	2.2	2.9
Third Toe Length	4.3	4.0	3.7
Fourth Toe Length	5.6	4.6	4.1
Fifth Toe Length	3.6	2.7	3.0

Distribution and natural history: This species is known from the far south of the Western Ghats, in the Agasthyamalai. Annandale (1909) first noted it from Maddathorai (=Madathara), Kulathupuzha, Tenmalai and Shasthamcotta near about the Sencottah Gap, on the slopes of Shendurney and Achenkovil. Subsequently, Das (1991) noted this species (as *Mabuya gansi*) from much more southeastern localities – Sengaltheri-Thalayanai Road, near Moolaksam that are just north of Mahendragiri range, within the Kalakkad-Mundanthurai Hills. Judging by both their records (Annandale, 1909; Das, 1991) it appears that *E. dawsoni* occurs in both the windward and leeward slopes of the Agasthyamalai Hills. Additionally, Annandale's record from Shasthamcotta implies its potential presence in the Travancore Coastal Plains, farther than the Western Ghats foothills, and also

in Punalur, Ranni-Konni ranges as well as its easterly versant the Devarmalai-Sivagiri Hills. Das (1991) reported this species as having fed on cockroaches and crickets, and that it laid two eggs measuring 12.2-12.6 x 7.4-7.8 mm (l x b). Probably a diurnal, leaf-litter dwelling skink, ecologically similar to *E. clivicola*. Natural history poorly known.

Remarks: Three of the type series of *Lygosoma dawsoni* were thought to have been lost in ZSI, Kolkata and hence the adult syntype from Maddathorai (ZSI 16170) was designated as the lectotype by Das *et al*. (1998). We subsequently located two more juvenile paralectotypes from Shashthamcottah (ZSI 16171) and Tenmalai (ZSI 16140) in the ZSI Kolkata Reptilia collections. However, the one from Kulathupuzha still remains untraced.

Comparisons: A species belonging to the *E. macularia* clade (Datta-Roy *et al*., 2012; Barley *et al*., 2014), distinguished from other peninsular Indian members of the *E. macularia* clade as follows, only opposing character suites listed: *E. brevis* (smaller SVL not exceeding 37 mm; dorsal body scales with only 3-5 keels; each scale without spurs behind; tympanum smaller a lateral body scale without any anterior tympanic lobules; head length subequal to its width; fore-arm length subequal to lower arm length; shank length subequal to thigh length); *E. clivicola* (Smaller SVL upto 55 mm; dorsal body scales 5-7 feeble keels; each scale without projecting spurs behind; tympanum with 2-3 visible anterior tympanic lobules, a distinct half vertebral stripe on trunk; prefrontals in narrow contact with each other; interparietal in broad contact with nuchal; lower eyelid scaly with the central scale not enlarged than surrounding ones; dorsal scales feebly pentacarinate); *E. allapallensis* (frontoparietals fused; dorsal scale rows as low as 26); *E. macularia* (larger SVL upto 70 mm; dorsal body scales 5-9 keels; each scale without projecting spurs behind; tympanum larger than or at least equal to a lateral body scale with 2-3 indistinguishable anterior tympanic lobules, much lower 4th toe subdigital scale count 12–14; para-vertebrals scale count much higher: 39–41; midventral scale count much higher: upto 51). Additionally, *E. dawsoni* is distinct from the geographically proximate Sri Lankan members of the *E. macularia* clade, namely, *E. madraszi, E. austini* and *E. greeri* by: pretemporals in contact with parietal; first pair of chin shields separated by a median scale; *E. tammanna*: prefrontals in contact with each other.

Discussion

Drawing on the published evidence of genetic heterogeneity in this complex in peninsular India (Datta-Roy *et al*., 2012), the sample from the Western Ghats (Ponmudi, see supp. mat.) is genetically different from northern Indian samples, one topotypical from Bengal and the other from Pakistan, that together form a related cluster. This entire clade is, in turn, recovered as a sister to a clade containing other peninsular Indian species such as *E. allapallensis* and *E. clivicola*. Because a topotypical sample (from Bengal, Blyth, 1953; Taylor & Elbel, 1958) has been sequenced in the phylogeny, and it shows sufficient genetic differentiation from Western Ghats sample (now attributable to the nomen *brevis*), it is evident that the two taxa *E. macularia* and *E. brevis* are genetically divergent. *Eutropis brevis* is allopatric with *E. macularia s. str.* but cooccurs with other congeners of the same group – *E. dawsoni* and *E. clivicola*.

After Günther's description of *E. brevis*, Boulenger (1887) maintained this species as valid, in the combination *Mabouia brevis*. Boulenger (1887) stated that each scale of *E. brevis* has four strong keels, a statement that he used to support the distinction of *E. brevis* from other forms of *E. macularia* that has five to seven sharp keels. In the same publication, Boulenger recognised the "remarkably short" body form, and the fact that *E. brevis* lacks the anterior tympanic lobules, that are present, yet small and almost indistinguishable in *E. macularia*. But three years later, Boulenger (1890) placed *E. brevis* in the synonymy of *E. macularia*. It is noteworthy to mention here that Boulenger (1887) stated that specimens from Travancore, Anaimalai, Sivagiri, Waynaad and Ceylon were referrable to *E. brevis*. In his account on *E. macularia*, he mentioned specimens from Madras, Balarangams, Godavary Valley, Ellore, Bhundara, as representatives from Indian peninsula, but none from the Western Ghats. Similarly, Smith (1935) too states that the Deccan tablel and form is quite distinct from the southern Indian forms that inhabit India south of 12˚N lat., extending up to 16˚N on the western side (i.e. Western Ghats). Whether populations in the Central Western Ghats are *E. brevis* is a matter of further research. Smith (1935) also synonymised *E. dawsoni* along with *E. macularia* and also included Ceylon under the range of his "var. 1" (with 5 to 7 keels), stating that he has not examined any Sri Lankan material. Newer studies in Sri Lanka (Batuwita, 2016) reveal the absence of these forms

from the island. At the same, he noted that the *E. macularia* from Bengal (near-topotypical specimens, in present-day Bangladesh and West Bengal in India), Odisha, Assam and Bihar (essentially the eastern part of India without the eastern Himalayas) also possess 7-9 keels unlike other forms of from Peninsular and Central India.

A complete taxonomic revision of the *Eutropis macularia* complex is outside the scope of the present work. This would necessarily involve a range-wide sampling and analysis of characters and exploration of evidence across multiple lines. In this work, though *E. macularia* is not fully resolved the status of the nominal taxa represented by subjective synonyms of *E. macularia* is fixed. For now, we provisionally refer the peninsular Indian population, except the Western Ghats (*E. brevis*) and northeast India (*E. macularia* s. str.) to *Eutropis* cf. *macularia*. We reassessed the taxonomic status of the Western Ghats populations because of existing nominal descriptions, subsequent synonymization and published genetic evidence. It must also be noted here that we did not erect any new nomina here without a thorough investigation of related, synonymised nomina but judiciously made use of available nomina to represent cryptic, species-level taxonomic units. Prior to this study, three species of the *E. macularia* group were known from the Southern Western Ghats (Datta-Roy *et al.*, 2012) namely, *E. macularia* s. auct., *E. gansi* and *E. clivivola*. After this study their nomenclature changes to *E. brevis* and *E. dawsoni,* respectively, while *E. clivicola* remains the same. Further studies are recommended to better understand the biology and distribution (Smith, 1935) of the Western Ghats endemic species *Eutropis brevis* and *E. dawsoni*.

Acknowledgements

The authors are grateful to the Director, Zoological Survey of India for providing necessary facilities for this study. We thank our respective institution heads. SRG thanks the Executive Chairman and Trustees, Chennai Snake Park. We are grateful to Dr. Aaron Bauer and anonymous referees for his insightful review comments.

References

Amarasinghe, A.A.T., Campbell, P.D., Chandramouli, S.R., Deuti, K., Raha, S., Karunarathna, D.M.S.S. and Ineich, I. 2016a. Taxonomy and natural history of *Eutropis beddomei* (Jerdon, 1870) (Reptilia: Scincidae), including a redescription of the holotype. *Zootaxa*, **4132**(4): 509-520. https://doi.org/10.11646/zootaxa.4132.4.3. PMid:27395689.

Amarasinghe, A.A.T., Campbell, P.D., Chandramouli, S.R., Deuti, K., Raha, S., Karunarathna, D.M.S.S. and Ineich, I. 2016b. Taxonomy of two endemic Indian skinks, *Eutropis bibronii* (Gray, 1838) and *E. nagarjunensis* (Sharma, 1969) (Reptilia: Scincidae), including redescriptions of their types. *Zootaxa*, **4154**(2): 155-168. https://doi.org/10.11646/zootaxa.4154.2.3. PMid:27615831.

Annandale, N. 1909. Report on a small collection of lizards from Travancore. *Rec. Indian Mus.*, **3**:253-257.

Barley, A.J., Datta-Roy, A., Karanth, K.P. and Brown, R.M. 2014. Sun skink diversification across the Indian-Southeast Asian biogeographical interface. *J. Biogeo.*, **42**(2): 292-304. https://doi.org/10.1111/jbi.12397.

Batuwita, S. 2016. Description of two new species of Eutropis (Reptilia: Scincidae) from Sri Lanka with a redescription of *Eutropis madaraszi* (Méhely). *J. Herpet.*, **50**(3): 486-496. https://doi.org/10.1670/15-093.

Batuwita, S., Udugampala, S. and Edirisinghe, U. 2020. Description of a new species of Eutropis (Sauria: Scincidae) from the Central Hills of Sri Lanka with the resurrection of *Eutropis lankae* (Deraniyagala). *J. Ani. Div.*, **2**(2): 36-55. https://doi.org/10.29252/JAD.2020.2.2.5.

Blyth, E. 1853. Notices and descriptions of various reptiles, new or little-known. *Part I. J. Asiatic Soc. Bengal*, **22**(1853): 639-655.

Boulenger, G.A. 1887. Catalogue of Lizards in the British Museum. III. Lacertidae, Gerrhosauridae, Scincidae, Anelytropsidae, Dibamidae, Chamaeleontidae. Printed by the order of Trustees of British Museum, London.

Boulenger, G.A. 1890. *The Fauna of British India, including Ceylon and Burma*: Reptilia and Batrachia. British Museum (Natural History). Taylor & Francis, London.

Das, I. 1991. A new species of Mabuya from Tamil Nadu State, Southern India (Squamata: Scincidae). *J. Herp.*, **25**(3): 342-344. https://doi.org/10.2307/1564594.

Das, I., De Silva, A. and Austin, C.C. 2008. A new species of Eutropis (Squamata: Scincidae) from Sri Lanka. *Zootaxa*, **1700**(1): 35-52. https://doi.org/10.11646/zootaxa.1700.1.3.

Datta-Roy, A., Singh, M., Srinivasulu, C. and Karanth, K.P. 2012. Phylogeny of the Asian Eutropis (Squamata: Scincidae) reveals an 'into India' endemic Indian radiation. *Mol. Phy. Evo.*, **63**(3): 817-824. https://doi.org/10.1016/j.ympev.2012.02.022. PMid:22406530.

Deuti, K., Raha, S., Bag, P., Debnath, S., Srikanthan, A.N. and Chandra, K. 2020. Skinks of India. Zoological Survey of India, Kolkata; p. 1-398.

Günther, A.C.L.G. 1875. Second report on collections of Indian Reptiles obtained by the British Museum. *Proc. Zool. Soc. London*, **1875**: 224-234.

Hammer, Ø., Harper, D.A.T. and Ryan, P.D. 2006. PAST-Palaeontological Statistics, ver. 1.81. Software documentation, 69 pp.

Inger, R.F., Shaffer, H.B., Koshy, M. and Bakde, R. 1984. A report on a collection of amphibians and reptiles from the Ponmudi, Kerala, South India. *J. Bombay Nat. Hist. Soc.*, **81**(3): 551-570.

Mausfeld, P., Schmitz, A., Böhme, W., Misof, B., Vrcibradic, D. and Rocha, C.F.D. 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). Zool. *Anz.-A Journal of Comparative Zoology*, **241**(3): 281-293. https://doi.org/10.1078/0044-5231-00081.

Smith, M.A. 1935. *The Fauna of British India*. Reptilia and Amphibia. Vol. 2-Sauria, Taylor & Francis, London.

Taylor, E.H. and Elbel, R.E. 1958. Contribution to the Herpetology of Thailand. Uni. *Kansas Sci. Bull.*, **38**(13): 1033-1189. https://doi.org/10.5962/bhl.part.10972.

Uetz, P., Hellerman, J and Freed, P. 2021. *Eutropis macularia*. The EMBL Reptile Database. Accessed on 3rd April 2021. https://reptile-database.reptarium.cz/species?genus=Eutropis&species=macularia.