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A new species of *Dendrelaphis* Boulenger, 1890 (Reptilia: Colubridae) from an isolated misty mountain in the South Eastern intermediate zone of Sri Lanka

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***Abstract.*—We describe a new species of *Dendrelaphis* that is morphologically close to *D. caudolineolatus*, however the new species is readily distinguished from it by having an undivided anal plate, as well as other characters. This species is only known from a single female collected from Maragala Mountain in Monaragala District, Uva Province of Sri Lanka. The new species is likely adapted to an arboreal lifestyle and its color is similar to that of the tree branches it inhabits. Currently, eight species of *Dendrelaphis* inhabit Sri Lanka (including the new species), six of which are endemic, and most of them are threatened. The Maragala Mountain is a biodiversity rich area in Sri Lanka because of its habitat heterogeneity and favorable climatic conditions. Currently, 67 species of reptiles (30 endemics), and 18 amphibians (five endemics) are known to inhabit this mountain. Various habitats on Maragala Mountain have been heavily influenced and modified by humans. Therefore, urgent conservation measures are needed to conserve this isolated forest and its resident species.**

Keywords. Asia, Isolated hill forest, reptile hotspot, snake diversity, speciation, systematics

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Introduction

The Indian Oceanic tropical island of Sri Lanka is a global biodiversity hotspot (Mittermeier et al. 1999) that is particularly rich in reptile diversity and endemism (Bossuyt et al. 2004). The remarkable Sri Lankan reptile fauna includes 108 species of snakes, 60 (55%) of which are endemic species (De Silva and Ukuwela 2020), and most of them are threatened due to habitat loss, killing due to mythical beliefs, and climate change (Gibson et al. 2020; Dayananda et al. 2021). The environmental diversity of Sri Lanka is particularly attributable to its high habitat heterogeneity, geographic complexity, climatic variations, and altitude-associated environmental gradients; and it has most likely contributed to the formation of biogeographic barriers leading to the isolation and subsequent speciation of reptiles (Karunarathna et al. 2023; Sampaio et al. 2023). In the past decade, taxonomic studies on Sri Lankan snakes have been numerous, several new species have been described, their nomenclature revised, and various taxonomic issues have been sorted out based on type

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material, all of which have established a great baseline for future research (e.g., Bandara et al. 2022; Amarasinghe et al. 2022, 2023). Morphological conservatism may have substantially obscured the true taxonomic richness of the Sri Lankan snake fauna, but the addition of several new species in the last decade underscores the need for further taxonomic studies of snakes in Sri Lanka (Wickramasinghe 2016; Danushka et al. 2020).

The semi-arboreal colubrid genus *Dendrelaphis* Boulenger, 1890 (bronze backs) is geographically widespread throughout central, South, and Southeast Asia, including southern China, New Guinea, and Australia (Vogel and van Rooijen 2011; Jiang et al. 2020). Currently, more than 48 species are recognized and most of them are restricted to India or Indonesia (Uetz et al. 2024). However, some taxonomic issues remain unresolved, and many more new species from Southeast Asia are awaiting description (van Rooijen and Vogel 2012). Currently, seven *Dendrelaphis* species are known to inhabit Sri Lanka, five of which are endemic (Danushka et al. 2020), and most are threatened due to deforestation and habitat loss (Gibson et al. 2020). Two endemic species, *D. effrenis* (Werner, 1909) and *D. wickrorum* Danushka et al., 2020, occur in the wet zone. Interestingly, two other endemic species, *D. caudolineolatus* (Günther, 1869) and *D. schokari* (Kuhl, 1820), have been recorded from the wet, intermediate, and dry zones, but are not found in India (Fig. 1). However, the dry zone endemic species, *D. oliveri*

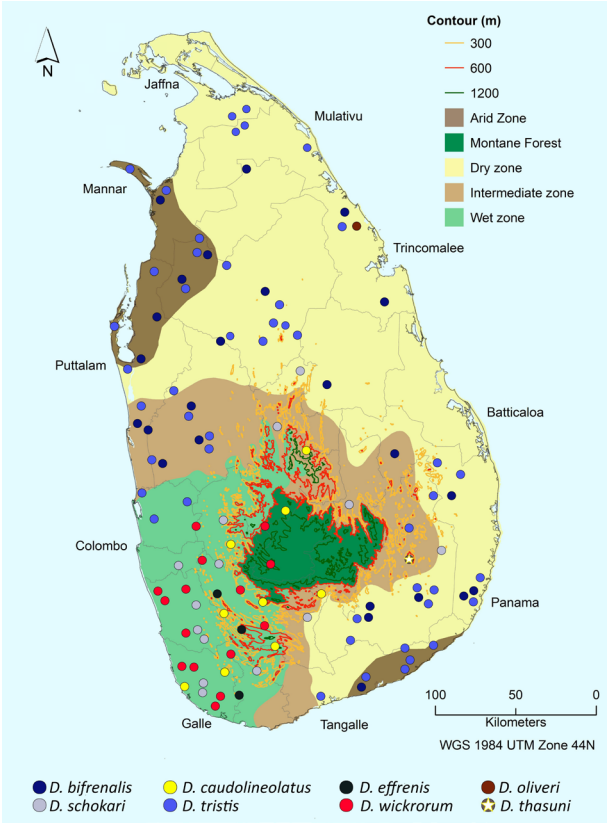

Fig. 1. Current known distribution map of the eight species of *Dendrelaphis* in Sri Lanka with bioclimatic zones and elevation. *D. effrenis*, *D. oliveri*, *D. wickrorum*, and *Dendrelaphis thasuni* **sp. nov.** are restricted to individual zones, and *D. tristis* can be found in all the bioclimatic zones except the wet zone montane (WZ-M).

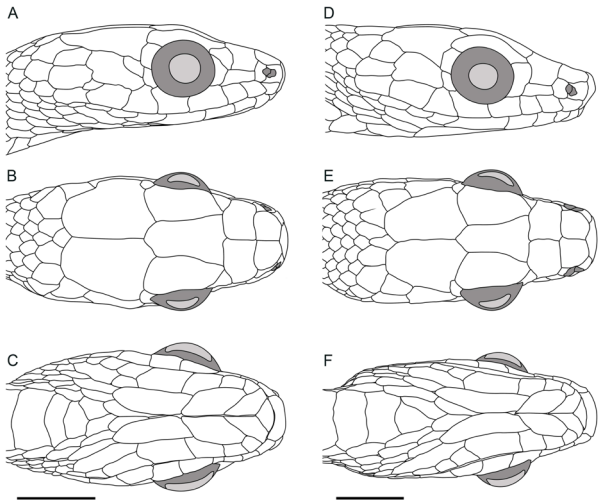

Fig. 2. Head scalation of *Dendrelaphis caudolineolatus* syntype, male (NHMUK 68.2.17.19)**. (A)** Lateral aspect of head on left side, **(B)** dorsal aspect of head, **(C)** ventral aspect of head. Head scalation of *Dendrelaphis thasuni* **sp. nov.**, holotype, **(D)** lateral aspect of head on left side, **(E)** dorsal aspect of head, **(F)** ventral aspect of head.

(Taylor, 1950), whose species status is doubtful, might also occur in India. The remaining two non-endemic species, *D. bifrenalis* (Boulenger, 1890) and *D. tristis* (Daudin, 1803), are distributed in the intermediate, dry, and arid zones of Sri Lanka as well as in Southern India (De Silva 1980; Aengals et al. 2022).

Of the seven species, *Dendrelaphis caudolineolatus* is a medium-sized species that can be easily distinguished from its congeners by the combination of having of 13 dorsal scale rows at midbody, a thin blackish line between the subcaudals, a single loreal scale, and blackish V-shaped crossbars on the anterior one-half of the body (De Silva 1980; De Silva and Ukuwela 2020). This species was described by Günther (1869) based on two specimens (syntypes) collected by Barnes and Higgins from Ceylon (Sri Lanka) (Fig. 2). Nineteen years later, Haly (1888) described *D. gregorii* from Ceylon, however Boulenger (1890) synonymized *D. gregorii* with *D. caudolineolatus* in a decision that was widely followed (Boulenger 1894; Wall 1921; Meise and Henning 1932; Smith 1943; Deraniyagala 1955; Leviton 1970; De Silva 1980). However, after a critical comparison of the *D. caudolineolatus* populations in Sri Lanka, we realized two of the populations are morphologically distinct from one another. One population is distributed only in the South Western wet and intermediate zones, while the other occurs at a single location in the South Eastern intermediate zone of Uva Province, Sri Lanka. The South Eastern intermediate zone population is hypothesized to be a new species here based on a single female specimen.

Materials and Methods

Field sampling and specimens. Field surveys were conducted at different locations distributed across several bioclimatic regions in Sri Lanka (e.g., semi-arid zone, dry zone, intermediate zone, and wet zone) to collect data.

Specimens were caught by hand and photographed in life. The holotype is deposited in the Department of National Museum, Colombo, Sri Lanka. Additional specimens were examined from the collections of the Natural History Museum, London, United Kingdom (NHMUK); Field Museum of Natural History, Chicago, IL, USA (FMNH); National Museum of Natural History, Leiden, The Netherlands (RMNH); Senckenberg Forschungsinstitut und Naturmuseum, Frankfurt am Main, Germany (SMF); National Museum of Sri Lanka, Colombo, Sri Lanka (NMSL); and Giritale Wildlife Museum, Sri Lanka (DWC). Specimens that formerly belonged to the Wildlife Heritage Trust (WHT) collection, which bear WHT numbers, are currently deposited at the NMSL, and were catalogued under their original numbers in Appendix I. Museum acronyms follow Uetz et al. (2019). Additional information on the morphology and natural history of Sri Lankan *Dendrelaphis* species was obtained from

Table 1. Some important morphological characters and the distributions used to diagnose the currently known species in the genus *Dendrelaphis*. Sources: Vogel and van Rooijen, 2011; van Rooijen and Vogel, 2012; Danushka et al. 2020; Uetz et al. 2024; and our unpublished data.

Species	Main distribution	Loreal scales	Supralabials (touching the eye)	Midbody scales	Ventrals	Anal plate	Subcaudals
Dendrelaphis bifrenalis	India, Sri Lanka	2	9 (5–6)	15	153–173	Divided	137–166
Dendrelaphis caudolineolatus	Sri Lanka	1	8–9 (4–5)	13	149–164	Divided	119–128
Dendrelaphis effrenis	Sri Lanka	0	8–9 (4–5)	13	174–175	Divided	129–139
Dendrelaphis oliveri	Sri Lanka	0	9 (5–6)	15	173	Divided	134
Dendrelaphis schokari	Sri Lanka	1	9 (5–6)	15	155–177	Divided	105–127
Dendrelaphis tristis	India, Sri Lanka	1	9 (5–6)	15	178–198	Divided	121–136
Dendrelaphis wickrorum	Sri Lanka	2	9–10 (5–6)	15	162–174	Divided	137–157
Dendrelaphis thasuni **sp.nov.**	Sri Lanka	1	8 (4,5)	13	153	Undi-vided	117–118
Dendrelaphis andamanensis	Andamans	1	9 (5,6)	15	176–196	Divided	125–146
Dendrelaphis ashoki	India	1	8–9 (usually 4,5,6, sometimes 5,6 or 4,5)	15	164–180	Divided	151–162
Dendrelaphis biloreatus	India, China	1–2	8–9 (4,5 rarely 5.6 or 4.5.6)	13	190–203	Divided	137–152
Dendrelaphis calligaster	Indonesia, Australia	1	8 sometimes 9 (4–5, rarely 5,6 or 4,5,6)	13	167–193	Divided	134–156
Dendrelaphis caudolineatus	Malaysia, Indonesia, Thailand, Singapore	1	9 (5,6)	13	171–185	Divided	101–113
Dendrelaphis chairecacos	India	1	9 (5,6 rarely 4,5)	15	165–177	Divided	121–132
Dendrelaphis cyanochloris	India, Bangladesh, Singapore, China	1	9, rarely 7,8,10 (4,5,6 or 5,6,7)	15	181–193	Divided	135–157
Dendrelaphis flavescens	Philippines	1	9 (5,6)	13	171–181	Divided	104–110
Dendrelaphis formosus	Indonesia, Singapore, Malaysia, Thailand	1	9 (4,5,6 or 5,6 or 4,5)	15	173–182	Divided	97–114
Dendrelaphis fuliginosus	Philippines	1	9 (5,6)	13	173–182	Divided	97–114
Dendrelaphis gastrostictus	Indonesia	1	8–9 (4,5 or 4,5,6)	13	162–174	Divided	139–165
Dendrelaphis girii	India	2	9, rarely 7 or 8 (5,6)	15	166–173	Divided	140–147
Dendrelaphis grandoculis	India	1	9 (4.5.6)	15	167–189	Divided	117–124
Dendrelaphis grismeri	Indonesia	1	9 (5,6 or 4,5,6)	15	176–193	Divided	151–174
Dendrelaphis haasi	Indonesia, Malaysia	1	9, rarely 8,10 (5,6 or 4,5,6, rarely 4,5)	15	161–173	Divided	126–153
Dendrelaphis hollinrakei	China	1	9 (4,5,6,)	15	171	Divided	130
Dendrelaphis humayuni	Nicobar, India	1	9 or 10 (5,6 or 5,6,7 or 4,5,6)	15	171–178	Divided	137–148
Dendrelaphis inornatus	Indonesia	1	9–10 (5,6)	15	190–194	Divided	145–147
Dendrelaphis keiensis	Indonesia	1	8–10 (5,6 rarely 4,5)	13	211–213	Divided	142
Dendrelaphis kopsteini	Indonesia, Singapore, Malaysia, Thailand	1	8–9 (5,6 or 4,5)	15	167–181	Divided	140–154
Dendrelaphis levitoni	Philippines	1	9 (5,6)	13	175–189	Divided	101–116
Dendrelaphis lineolatus	New Guinea	1	9 (4,5,6 rarely 5,6 or 5,6,7)	13	179–193	Divided	144–151
Dendrelaphis lorentzii	New Guinea, Indonesia	1	8 rarely 9 (4,5 rarely 4,5,6)	13	161–179	Divided	119–132

Table 1 (continued). Some important morphological characters and the distributions used to diagnose the currently known species in the genus *Dendrelaphis*. Sources: Vogel and van Rooijen, 2011; van Rooijen and Vogel, 2012; Danushka et al. 2020; Uetz et al. 2024; and our unpublished data.

Species	Main distribution	Loreal scales	Supralabials (touching the eye)	Midbody scales	Ventrals	Anal plate	Subcaudals
Dendrelaphis luzonensis	Philippines	1	9 (5,6)	13	176–187	Divided	100–117
Dendrelaphis macrops	New Guinea	1	8 or 9 (4,5 or 5,6)	13	188–202	Divided	141–157
Dendrelaphis marenae	Philippines, Indonesia	1	9 rarely 8, 10, (5,6 or 4,5,6)	15	159–191	Divided	136–167
Dendrelaphis modestus	Indonesia	1	9 (5,6)	13	180–197	Divided	114–125
Dendrelaphis ngansonensis	Vietnam, Thailand, China	1	9 (4,5,6)	15	165–199	Divided	132–153
Dendrelaphis nigroserratus	Thailand, Myanmar	1	9 rarely 7,8,10 (4,5,6)	15	197–204	Divided	148–152
Dendrelaphis papuensis	New Guinea	1	8 (4,5)	13	185–190	Divided	120–126
Dendrelaphis philippinensis	Philippines	1	9 (5,6)	13	161–179	Divided	94–108
Dendrelaphis pictus	Indonesia, Singapore, Malaysia, Thailand	1	9, rarely 8 or 10 (4,5,6 rarely 3,4,5 or 5,6,7)	15	173–198	Divided	138–156
Dendrelaphis proarchos	India, Bangladesh, Myanmar, China	1	9, rarely 8 or 10 (4,5,6 rarely 3,4,5 or 5,6,7 or5,6)	15	173–198	Divided (35%) or Undivided (65%)	138–156
Dendrelaphis punctulatus	New Guinea, Australia	1	8, rarely 7 (4,5)	13	197–213	Divided	121–139
Dendrelaphis striatus	Indonesia, Malaysia, Thailand	1	8–9 (4,5; 5,6 or 4,5,6)	15	149–167	Divided	120–145
Dendrelaphis striolatus	New Guinea	1	9, rarely 8 (5,6 rarely 4,5 or 4,5,6)	13	171–187	Divided	133–147
Dendrelaphis subocularis	Thailand, Myanmar, Indonesia, China, Vietnam, Laos	1	8, rarely 7 (5, sometimes 4)	15	167–172	Divided	74–91
Dendrelaphis terrificus	Indonesia	1	9 (5,6)	13	174–181	Divided	94–102
Dendrelaphis underwoodi	Indonesia	1	9 (4,5,6)	15	183–189	Divided	126–133
Dendrelaphis vogeli	Thailand, China	1	9 (4,5,6)	15	193–197	Divided	130–135
Dendrelaphis walli	Myanmar	1	8 (4,5)	13	203–213	Undivided	145–163

relevant literature (Wickramasinghe 2016; Danushka et al. 2020), and morphological data were extracted for the entire genus (Table 1). An eTrex 10 GPS (Garmin) was used (map datum WGS1984) to record elevation and georeference the specimen locations.

Morphometric data. The characters listed below were measured with a Mitutoyo digital vernier calliper to the nearest ±0.1 mm. Each measurement was taken from the left side of the body three times, and the mean values are presented here. Detailed observations and measurements were made through Leica EZ4 dissecting microscopes. The snout–vent length (SVL) and tail length (TAL) were measured on the ventral surface to the nearest 1 mm, using a flexible measuring tape. Abbreviations of the measurements are as follows: rostral depth (RD, maximum depth of rostral); rostral width (RW, maximum width of rostral); eye diameter (ED, horizontal diameter of eye); eye–nostril length (EN, distance between anterior most point of eye and middle of nostril); snout length (ES, distance between anteriormost point of eye and tip of snout); snout–nostril distance (SN, distance between anteriormost point of snout and middle of nostril); nostril diameter (ND, horizontal diameter of nostril); internarial distance (IN, least distance between nostrils); mandible–anterior eye distance (MAE, distance between posterior edge of mandible and anteriormost edge of eye); mandible–posterior eye distance (MPE, distance between posterior edge of mandible and posteriormost edge of eye); interorbital width (IO, least distance between upper margins of orbits); head length (HL, distance between posterior edge of mandible and tip of snout); head depth (HD, maximum depth of head measured at eye level); head width (HW, maximum width of head close to the mandible); body depth (BD, measured dorsal to ventral at midbody); body width (BW, measured between lateral sides at midbody); ventral scale width (VSW, between two ventral keels); tail base depth (TD, measured dorsal to ventral at anal area); tail base width (TW, measured between lateral sides at anal area); snout–vent length (SVL, measured from tip of snout to anterior margin of vent); and tail length (TAL, measured from anterior margin of vent to tail tip).

Meristic data. Detailed observations of scales and other structures were made through a Leica Wild M3Z dissecting microscope on the left/right sides of the body. Meristic characters were taken as follows: supralabials and infralabials (SUP and INF, first labial scale to last labial scale bordering gape); costal scales (COS, counted around the body from one side of ventrals to the other in three positions, at one head length behind neck, at mid

body and at one head length prior to anal plate—but only the latter was used in the MFA analysis); vertebral scales (VB, counted from the first enlarged dorsal scale behind the neck to the last enlarged dorsal scale above the vent), ventral scales (VEN), and preventral scales (PVEN, counted according to the method described by Dowling 1951). Paired subcaudal scales (SUB) were counted from the first scale under the tail meeting its opposite subcaudal scale, to the scale before the tip of the tail. The numbers of loreals (LOR), preoculars (PRE), postoculars (POS), temporal scales (TEM), and scales touching (or surrounding scales) each scale on the head were counted. Sex was determined by ventral tail incision of adult specimens followed by the checking for the presence or absence of hemipenes. Color characters and patterns were taken from digital images of living specimens (using a Canon 70D camera with a Canon 100 mm macro lens) and also in the field.

Categorical data. Additional evaluations included texture (smooth or keeled) of the ventral and dorsal scales, pattern of the anal plate (AP, divided or single), shape of the snout (SS, broad/flat or narrow/pointed), color of the neck area (NC, blue or brown), size of temporal stripe (TS, narrow or broad), size of the anterior chin shield (ACS, small or large), largest supralabial (SL-Lrg), largest infralabial (IL-Lrg), supralabial at eye-level (SL-Eye), flank bars wide or narrow (FB); level of anterior chin shield to anterior margin of the eye (ACC), subcaudal stripe present or absent (SCS), scales between transverse dorsolateral bars (TBS: black color), and ecological zone (ECOL, dry or wet).

Statistical analyses. All statistical analyses were conducted using R Core Team (2018). The small sample size of the new population (n = 1) precluded the use of univariate statistical analyses. Therefore, morphospatial clustering and positioning among the new population and its putative closest relative, *Dendrelaphis caudolineolatus,* was analyzed using a multiple factor analysis (MFA) on a data set comprised of 41 characters, including 11 meristic, 20 morphometric, and 10 categorical characters, in a near total evidence data set (Appendix II). The MFA was implemented using the *mfa*() command in the R package *FactorMineR* (Husson et al. 2017) and visualized using the *Factoextra* package (Kassambara and Mundt 2017). MFA is a global, unsupervised, multivariate analysis that incorporates qualitative and quantitative data (Pagès 2015), making it possible to analyze different data types simultaneously in a nearly total evidence environment (Table 2). In an MFA, each individual is described by a different set of variables (i.e., characters) which are structured into different data groups in a global data frame. In this case that data frame was quantitative data (i.e., meristics and normalized morphometrics) and categorical data (i.e., AP, VSW,SS, TS, ACS, NC, FB, SL-Eye, Ecol, and SCS). In the first phase of this analysis, separate multivariate analyses were carried out for each set of variables—principal component analyses (PCA) for each quantitative data set and a multiple correspondence analysis (MCA) for the categorical data. The data sets were then normalized separately by dividing all their elements by the square root of their first eigenvalues. For the second phase of the analysis, these normalized data sets were concatenated into a single matrix for a global PCA of the normalized data. Standardizing the data in this manner prevents one data type from overleveraging another. In other words, the normalization of the data in the first phase prevents data types with the greatest number of characters or the greatest amount of variation from outweighing the other data types in the second phase. Thus, the contribution of each data type to the overall variation in the data set is scaled to define the morphospatial distance between individuals as well as calculating each data type's contribution to the overall variation in the analysis (Pagès 2015; Kassambara and Mundt 2017). In order to successfully remove the effects of allometry in the morphometric characters (Chan and Grismer 2022), size was normalized using the following equation: $X_{adj} = \log(X)-\beta[\log(SVL)-\log(SVL_{mean})]$, where X_{adj} is adjusted value; X is measured value; β is the unstandardized regression coefficient for each population; and SVL_{mean} is the overall average SVL of all populations (Thorpe 1975, 1983; Turan 1999; Lleonart et al. 2000). This equation is accessible in the R package *GroupStruct*, which is available at https://github.com/chankinonn/GroupStruct.

A principal component analysis (PCA) implemented by the *prcomp()* command in R was employed on the adjusted morphometric data in order to ascertain differences of head and body shape between the samples. PCA is a dimension reducing analysis that decreases the complexity of a dataset by finding a subset of input variables that contain the most relevant information (i.e., the greatest variance in the data) while de-emphasizing those characters that do not, thus increasing the overall accuracy of the model by eliminating noise and the potential for overfitting (Agarwal et al. 2017; Karunarathna et al. 2019). This unsupervised analysis (i.e., where data points are not *a priori* assigned to species) recovers morphospatial relationships among the sampled individuals (i.e., data points) and how well they form clusters.

Results

Statistical analysis. The MFA recovered the new population plotting far outside that of *Dendrelaphis caudolineolatus* along the ordination of dimensions 1 and 2 (Fig. 3A). Dimension 1 accounted for 63.0% of the variation and loaded most heavily for the categorical and morphometric characters (Fig. 3B). Dimension 2 accounted for an additional 12.5% of the variation and loaded most heavily for the meristic characters (Fig. 3C). The PCA analysis demonstrated the notable

Table 2. Morphometric variables and corresponding principal component score loadings for the holotype of *Dendrelaphis thasuni* **sp. nov.** and *D. caudolineolatus* from Sri Lanka. Abbreviations are defined in the Materials and Methods.

Character	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9
Standard deviation	3.075599	1.917774	1.607248	1.106307	1	0.987604	0.799871	0.663712	1.08E-14
Proportion of variance	0.47297	0.18389	0.12916	0.0612	0.05	0.04877	0.03199	0.02203	0
Cumulative proportion	0.47297	0.65686	0.78602	0.84722	0.89722	0.94598	0.97797	1	1
Eigen value	9.459311	3.677858	2.583247	1.223915	1	0.975362	0.639793	0.440514	1.17E-28
SVL	-1.40E-09	-2.80E-09	1.53E-10	-3.07E-08	1	3.96E-07	-1.53E-08	-1.52E-08	2.40E-09
ED	-0.11807	0.315695	0.006779	-0.54525	-1.52E-07	0.346638	-0.17537	0.040453	-0.24564
EN	0.289178	-0.01921	-0.18759	-0.22981	2.76E-09	-0.00813	0.229995	0.203055	-0.23944
ES	0.292147	-0.03383	-0.25753	-0.02882	-3.84E-08	0.115816	0.0668	0.019052	-0.09483
SN	0.234678	-0.33236	0.072729	0.014608	3.70E-08	-0.07716	0.092091	0.328793	-0.00867
RW	-0.0165	0.373715	-0.36284	0.283118	-5.05E-08	0.144905	0.194382	0.045293	0.322082
RD	0.285068	-0.04771	0.214423	-0.17699	5.00E-08	-0.14115	-0.22189	0.18384	0.145004
ND	0.063107	-0.31464	-0.33936	-0.3068	8.64E-08	-0.27277	-0.41983	-0.02126	0.412634
IN	-0.2805	0.002439	0.152426	0.098688	-1.03E-07	0.254601	-0.36868	0.276072	0.137299
MAE	-0.26383	-0.10375	0.080081	-0.18168	-1.15E-07	0.308573	0.186208	0.543177	0.355596
MPE	-0.28095	-0.02258	-0.17188	0.121593	1.53E-07	-0.33314	-0.16948	0.262916	-0.27185
IO	-0.22958	0.315564	-0.00161	-0.10331	1.33E-07	-0.35092	0.040139	0.046619	-0.02076
HL	-0.2186	0.002905	0.458185	0.006092	-1.97E-08	0.040331	-0.00658	-0.09507	-0.04968
HD	-0.2798	-0.16375	-0.06389	-0.00901	8.19E-08	-0.19792	0.394522	0.167677	-0.26029
HW	-0.29736	-0.03802	-0.16358	0.232328	4.98E-08	-0.09654	0.000462	-0.17822	0.29452
TAL	-0.13017	-0.32831	-0.2363	-0.16475	-1.78E-07	0.438372	0.177614	-0.36347	0.038779
BD	-0.24368	-0.2539	-0.18203	0.053662	-5.47E-08	0.102942	-0.38147	-0.14013	-0.39299
BW	-0.21929	0.109271	0.027401	-0.53451	1.06E-07	-0.3086	0.213651	-0.24998	0.184457
TD	0.239753	0.281796	0.21952	0.060835	-2.16E-09	0.019238	-0.16493	-0.19893	0.058126
TW	0.013286	0.380386	-0.40308	-0.03887	-2.07E-08	0.049275	-0.18328	0.216974	-0.0911

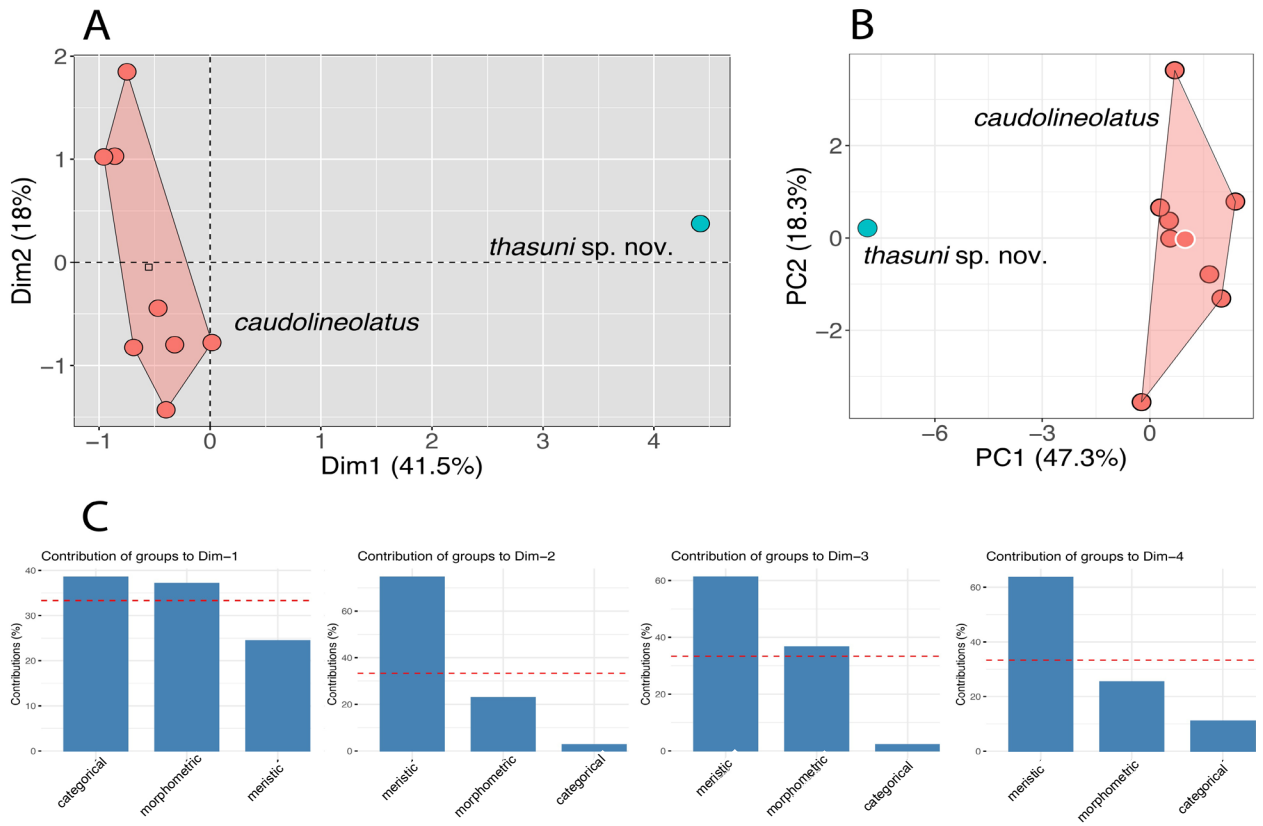

Fig. 3. (A) Global multiple factor analysis (MFA) of the morphometric characters showing the complete separation between *Dendrelaphis caudolineolatus* and *Dendrelaphis thasuni* **sp. nov. (B)** PCA analysis with notable differences in head shapes between the above two species. **(C)** The percent contribution of each data type to the first four dimensions of the MFA.

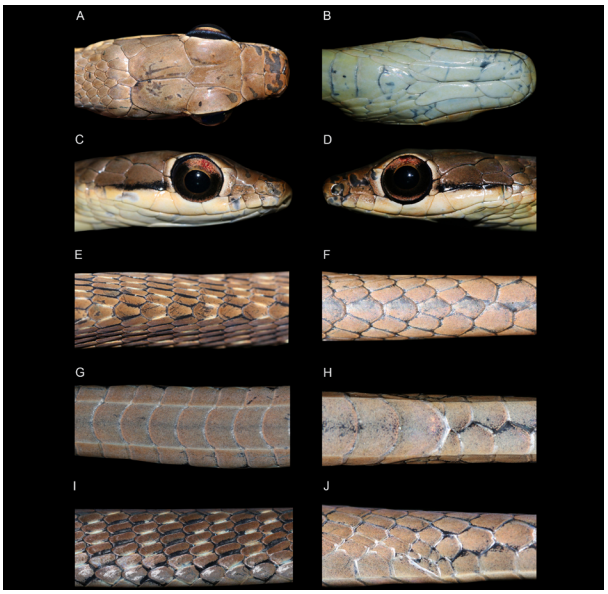

Fig. 4. Morphological characters of *Dendrelaphis thasuni* **sp. nov.** female holotype. **(A)** Dorsal aspect of head, **(B)** ventral aspect of head, **(C)** lateral aspect of head on left side with narrow temporal stripe, **(D)** lateral aspect of head on right side, **(E)** dorsal aspect of trunk with slightly enlarged vertebral scales, **(F)** dorsal aspect of tail base with large scales, **(G)** ventral side of trunk with narrow ventral scales, **(H)** ventral side of tail base with undivided anal plate, **(I)** lateral aspect of trunk with narrow blackish transverse dorsolateral bars, **(J)** lateral aspect of tail base with dorsolateral black line.

Fig. 5. Holotype of *Dendrelaphis thasuni* **sp. nov.** in life (above) and uncollected *D. caudolineolatus* (below) together to compare scalation, color pattern, and eye size.

Fig. 6. (A) Ventral aspect of *Dendrelaphis thasuni* **sp. nov.** female holotype in life with narrow ventrals, **(B)** ventral aspect of uncollected *D. caudolineolatus* female with broad ventrals.

Fig. 7. (A) Dorsal aspect of *Dendrelaphis thasuni* **sp. nov.** female holotype in life with narrow blackish transverse dorsolateral bars, **(B)** dorsal aspect of uncollected *D. caudolineolatus* female with broad blackish transverse dorsolateral bars.

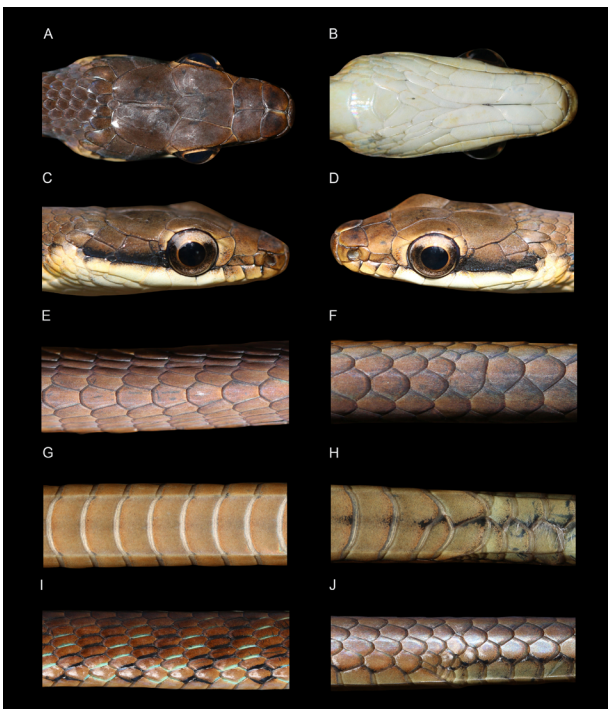

Fig. 8. Morphological characters of an uncollected *Dendrelaphis caudolineolatus* female. **(A)** Dorsal aspect of head, **(B)** ventral aspect of head, **(C)** lateral aspect of head on left side with broad temporal stripe, **(D)** lateral aspect of head on right side, **(E)** dorsal aspect of trunk with enlarged vertebral scales, **(F)** dorsal aspect of tail base with extra-large scales, **(G)** ventral side of trunk with broad ventral scales, **(H)** ventral side of tail base with divided anal plate, **(I)** lateral aspect of trunk with broad blackish transverse dorsolateral bars, **(J)** lateral aspect of tail base with dorsolateral black line.

differences, mostly in head shape, between the two sample populations. Principal component 1 (PC1) accounted for 47.3% of the variation in the dataset and loaded most heavily for EN, ES, RD, IN, MPE, HD, and HW (Table 2). PC2 accounted for an additional 18.3% of the variation and loaded most heavily for RW and TW (Appendix II).

Systematics

Dendrelaphis thasuni **sp. nov.**

Thasun's Bronzeback

urn:lsid:zoobank.org:act:545D550B-54D6-44C2-A551-249292E649A1

Holotype. An adult female (NMSL 2025.01.01), SVL 462 mm, TAL 237 mm, collected from Maragala mountain, Monaragala District, Uva Province, Sri Lanka (6°53'26.12" N, 81°22'52.15" E, WGS1984; elevation 741 m asl, around 1600 hrs) on 25 October 2024 by Suranjan Karunarathna and Anusha Atthanagoda.

Diagnosis. The head is distinct from the slender body; two internasals, snout broad and flat, equal to eye diameter; large eye with round pupil; one preocular and one loreal; two postoculars; 1+2 temporal scales bearing a very narrow black stripe (Figs. 4 and 5); V-shaped blackish transverse dorsolateral bars on anterior half of body; distance between transverse bars in forebody is equal to the eye diameter, with 2–3 lateral scales between two transverse dorsolateral bars; 151 enlarged vertebral scales and no vertebral stripe; dorsal scale rows one head length behind neck (~20 mm) 13, at midbody 13, one head length anterior to vent (~20 mm) 9; apical pits 1–3 on dorsal scales; 153 ventral scales, very narrow between lateral keels of both sides compared to *D. caudolineolatus*; anal plate undivided, large; tail long with 117 or 118 divided subcaudals; a thin blackish line between subcaudals; subcaudals with strong lateral keels. *Dendrelaphis thasuni* **sp. nov.** is most similar to *D. caudolineolatus* in Sri Lanka, which is its presumed closest relative. It can be easily distinguished from all species of Sri Lankan *Dendrelaphis* by having an undivided anal plate (Fig. 6).

Description of holotype. Adult female, SVL 462.0 mm (Table 3); tail length 237.0 mm, nearly half of the body length (TAL 51.3% of SVL; TAL 33.9% of total length); head elongate (HL 4.2% of SVL), twice as long as wide (HW 45.4% of HL), slightly flattened, distinct from neck; snout short (ES 24.5% of HL), moderate, flattened in dorsal and lateral profiles, being square in shape, rather depressed (HD 33.7% of HL). Rostral shield large, triangular, slightly visible from above, flattened posteriorly, width greater than height (RD 44.1% of RW), with rostral groove; nostrils relatively large; nasal divided, elongate, in anterior contact with rostral and internasal dorsally, 1st and 2nd supralabials ventrally, posterior contact with loreal and prefrontal; internasals paired, quadrangular, slightly shorter than prefrontals; equivalent in size to loreal; prefrontal large, broader than long, and subrectangular; frontal large, subtriangular, elongate posteriorly and longer than wide, equal in size to supraocular; interorbital broad (IO 82.0% of HW), twice that of internarial distance (IN 53.4% of IO); supraoculars wide, elongate, subrectangular, posteriorly wider and pointed, equal to frontal length, equal to total length of internasal and prefrontal.

Table 3. Selected morphometric (in mm), meristic, and morphological characters of the holotype of *Dendrelaphis thasuni* **sp. nov.** and *D. caudolineolatus* from Sri Lanka.

Morphometric characters	*D. thasuni* sp. nov.	*D. caudolineolatus* (*n*=8)	Meristic characters	*D. thasuni* sp. nov.	*D. caudolineolatus* (*n*=8)
Eye diameter (ED)	4.3	3.9–4.5	Supralabials (SUP)	8/8	7–9
Eye–nostril length (EN)	3.8	4.2–4.8	Supralabials touching the eye	4,5/4,5	4,5 or 5,6
Snout length (ES)	4.8	5.3–5.9	Largest supralabial	7/7	7 or 8
Snout–nostril distance (SN)	2.1	2.2–2.4	Infralabials (INF)	9/9	9 or 10
Rostral width (RW)	3.4	3.2–3.5	Largest infralabial	5/5	5 or 6
Rostral depth (RD)	1.5	1.7–1.8	Nasal scales	2	2
Nostril diameter (ND)	1.6	1.5–1.8	Apical pits in a scale	1–3	1
Internarial distance (IN)	3.9	3.2–3.6	Loreal (LOR)	1/1	1
Mandible–anterior eye distance (MAE)	13.2	11.8–12.8	Preocular (PRE)	1/1	1
Mandible–posterior eye distance (MPE)	8.9	8.2–8.5	Postoculars (POS)	2/2	2 or 3
Interorbital width (IO)	7.3	5.9–6.7	Snout shape in dorsal	broad, flat	narrow, pointed
Head length (HL)	19.6	14.9–18.5	Temporal scales (TEM)	1+2/1+2	1+3 or 2+3
Head depth (HD)	6.6	5.4–5.8	Temporal stripe	narrow	broad
Head width (HW)	8.9	6.7–7.8	Costal scales (COS)	13, 13, 9	13, 13, 9 or 11
Snout–vent length (SVL)	462	344–512	Vertebral scales (VB)	151	145–160
Tail length (TAL)	237	168–281	Scales between transverse dorsolateral bars	1–3	4–6
Body depth (BD)	8.4	7.6–8.2	Ventral scales (VEN)	153	149–176
Body width (BW)	8.5	7.1–7.9	Preventral scales (PVEN)	2	2 or 3
Tail base depth (TD)	3.7	4.1–4.9	Anal plate (AN)	single	divided
Tail base width (TW)	3.6	3.4–3.8	Divided subcaudal scales (SUB)	118/117	115–135

Parietals large, subrectangular in shape, elongate, shorter than snout length (PL 91.7% of SN), bordered by frontal, supraoculars, upper postocular anteriorly, anterior and posterior temporals, and five nuchal scales posteriorly; one rectangular loreal scale (each side), in contact with prefrontal dorsally, 2nd and 3rd supralabials ventrally, preocular posteriorly and nasals anteriorly; one preocular (each side), vertically elongate, rectangular, in contact with prefrontal and loreal anteriorly, supraocular dorsally, and 4th supralabial ventrally; eye large (ED 21.9% of HL), greater than eye–nostril length (ED 113.2% of EN), less than snout length (ED 89.6% of ES), pupil round; two postoculars, upper postocular larger, rectangular, vertically elongate, in contact with supraocular and parietal, in point contact with anterior temporal; lower postocular rectangular in contact with 5th and 6th supralabials ventrally, anterior temporal posteriorly; temporals 1+2, anterior temporal elongate, broadly in contact with parietal dorsally, broadly in contact with 6th–8th supralabials ventrally; posterior temporals short, quadrangular and similar in size, in contact with parietal dorsally, three nuchal scales posteriorly, 8th supralabial ventrally.

Supralabials eight (each side), 4th–8th larger in size, 7th being the largest; 1st supralabial in contact with rostral anteriorly, both nasals dorsally and 2nd supralabial posteriorly; 2nd supralabial in contact with 1st supralabial anteriorly, loreal and postnasal dorsally, 3rd supralabial posteriorly; 3rd supralabial with loreal and preocular dorsally, 4th supralabial posteriorly; 4th supralabial with preocular and orbit dorsally, 5th supralabial posteriorly; 5th supralabial with orbit and postocular dorsally; 6th supralabial with lower postocular and anterior temporal dorsally; 7th supralabial with anterior temporal dorsally; 8th supralabial with anterior and posterior temporals dorsally, body scales posteriorly. Mental small, triangular, wider than long, with a very small mental groove; 1st infralabials larger than mental and in broad medial contact, in contact with anterior chin shields posteriorly; nine infralabials (each side), 1st–4th in contact with anterior chin shield, 5th infralabial in broad contact with posterior chin shield, 6th infralabial not in contact with posterior chin shield or gular scales; two smaller anterior chin shields in broad contact, and two elongate posterior chin shields in broad contact; posterior chin shields bordered posteriorly by eight gular scales.

Body thin, elongate and subcylindrical, somewhat dorsolaterally flattened; 151 fairly large vertebrals; dorsal scale rows 13-13-9, smooth, elongate and bluntly pointed; anterior dorsals with 1–3 apical pits at the tip, slightly shorter than vertebrals; two preventral scales, 153 laterally keeled narrow ventrals (width of a ventral scale between keels ~160% of its length); preanal plate undivided, anal plate large, undivided. Tail long (TAL 51.3% of SVL), thin and thick, dorsal caudals smooth, 118/117 paired subcaudals excluding the terminal scale, strongly keeled laterally.

Coloration in life. General dorsal color is brownish (Fig. 7), but the forebody has dark patches, interstitial skin bright blue, visible when inflated (Fig. 5); 26–29 prominent V-shaped blackish transverse dorsolateral bars on the anterior one-fourth of body, afterwards fading gradually; absence of a vertebral stripe and of ventrolateral stripes on the forebody. A faded black line on dorsal part of the tail, and one on both sides of the tail that ends at the tip, thin blackish mid-ventral subcaudal stripe. Top of head grey-brown with faded dark makings, especially at the internasals and parietals, cream white ventrally with irregular dark markings; a narrow black stripe (mostly between lower temporals, 7th and 8th supralabials) extending from lower postocular to the 8th supralabial, after which it disappears; 1st–3rd supralabials light brown, followed by scales dusted with light orange. Both sides of the neck are orange in color, and the tongue is bluish-black with tiny light blue dots.

Coloration in preservative. Dorsally greyish brown; forebody with dark patches, and dark 'V' shaped transverse dorsolateral bars on anterior half of body clearly visible; dorsal head olive green; a narrow dark stripe starting from lower postocular reaches the 8th supralabial. Ventrals, subcaudals, and supralabials dirty white with a thin blackish mid-ventral subcaudal stripe.

Etymology. The specific epithet is a Latinized eponym in the masculine genitive singular, honoring Dr. Amarasinghe Achchige Thasun Amarasinghe—a renowned systematic biologist, ecologist, and conservationist—for his remarkable contributions to the field of taxonomy and systematic herpetology in Asia, especially in Sri Lanka, Indonesia, and India, and for his friendship. He has also helped to popularize wildlife conservation and management in Sri Lanka through science-based education awareness programs.

Comparison. The new species, *Dendrelaphis thasuni* **sp. nov.**, is most similar to *D. caudolineolatus* (Figs. 3 and 8), however, it is distinguished from the latter by having an undivided anal plate (*vs* divided), ventral scales very narrow between keels (*vs* wider), snout broad and flat (*vs* narrow and pointed), a narrow temporal stripe (*vs* broad), distance between lateral transverse bars in forebody is equal to the eye diameter (*vs* larger), 2–3 lateral scales between two transverse dorsolateral bars (*vs* 5–6), rostral much wider than mental (*vs* subequal), and anterior chin shield very small and its length about 50% of posterior chin shield (*vs* large and 83–91% of posterior chin shield). *Dendrelaphis thasuni* **sp. nov.** is distinguished from all the species of the genus *Dendrelaphis* except for *D. proarchos* (Wall, 1909) and *D. walli* Vogel and van Rooijen, 2011 (Table 1) by having an undivided anal plate (*vs*. divided anal plate); it is distinguished from *D. proarchos* by having costals in 13 rows at mid body (*vs* 15), 153 ventrals (*vs*

173–198), and 117 or 118 subcaudals (*vs* 138–156); from *D. walli* by having 153 ventrals (*vs* 203–213) and 117 or 118 subcaudals (*vs* 145–163). *Dendrelaphis thasuni* **sp. nov.** further differs from the other Sri Lankan species as follows: from *D. bifrenalis* by having one loreal scale (*vs* two), costals in 13 rows at mid body (*vs* 15), eight supralabials with 4th and 5th touching the eye (nine supralabials with 5th and 6th touching the eye) and 117 or 118 subcaudals (*vs* 137–166); from *D. effrenis* by having one loreal scale (*vs* no loreal), temporal stripe present (*vs* absent), undivided anal plate (*vs*. divided), 153 ventrals (*vs* 174–175), and 117 or 118 subcaudals (*vs* 129–139); from *D. oliveri* by having one loreal scale (*vs* no loreal), eight supralabials with 4th and 5th touching the eye (nine supralabials with 5th and 6th touching the eye), costals in 13 rows at mid body (*vs* 15), 153 ventrals (*vs* 173), 117 or 118 subcaudals (*vs* 134), and undivided anal plate (*vs*. divided); from *D. schokari* by having costals in 13 rows at mid body (*vs* 15), undivided anal plate (*vs*. divided), both dorsal and ventrolateral stripes absent on the body (*vs* distinct dorsal and ventrolateral stripes present), and eight supralabials with 4th and 5th touching the eye (nine supralabials with 5th and 6th touching the eye); from *D. tristis* by having costals in 13 rows at mid body (*vs* 15), undivided anal plate (*vs*. divided), 153 ventrals (*vs* 178–198), eight supralabials with 4th and 5th touching the eye (nine supralabials with 5th and 6th touching the eye), no interparietal bright spot (*vs* present), both dorsal and ventrolateral stripes absent on the body (*vs* distinct dorsal and ventrolateral stripes present); from *D. wickrorum* by having one loreal scale (*vs* two), costals in 13 rows at mid body (*vs* 15), 153 ventrals (*vs* 162–174), and 117 or 118 subcaudals (*vs* 137–157), undivided anal plate (*vs* divided), and eight supralabials with 4th and 5th touching the eye (nine supralabials with 5th and 6th touching the eye).

Habitat and ecology. In the Maragala isolated mountain ranges (6.842525°–6.922392° N 81.336822°–81.413719° E; altitude ranges from 350–850 m), the upper elevations are characterized by dry tropical mixed semi-evergreen forest (Gunatilleke and Gunatilleke 1990) and the lower elevations contain mixed cultivation with anthropogenic habitats of tea, coffee, cocoa, and rubber plantations (Fig. 9). It is approximately 4,100 ha in size, situated in Monaragala District, Uva Province, within the lowland intermediate bioclimatic zone in Sri Lanka (Karunarathna et al. 2019). The mean annual rainfall varies, ranging from 1,500–2,500 mm, which comes mostly during the northeast monsoon season (November–February). The mean annual temperature is 26.8–28.9 °C. The new species was found near the summit at 741 m asl, at approximately 1600 hrs. The microhabitat was riparian, near a stream with closed canopy cover. The surrounding environment at the top of the mountain was undisturbed with no human habitation, but it had the characteristic of being a very cool lowland wet zone forest (Herath and Patabandi 2023). This snake was adept at moving fast through the trees, but its movement shifted awkwardly when on the forest floor. When inflated, the bright blue interstitial skin appeared on the anterior one-fourth of the body (Fig. 6), and the expanded V-shaped, blackish, transverse, dorsolateral bars could be seen.

Fig. 9. View of Maragala Mountain in Monaragala, Sri Lanka, taken **(A)** from Kotiyagala site and **(B)** from Kahambana site. *Photos by Ashan Geeganage and Nayana Sanjeewa*.

Discussion

In the absence of a molecular phylogeny, we cannot be sure whether *Dendrelaphis thasuni* **sp. nov.** is the sister species to *D. caudolineolatus.* However, because they are morphologically more similar to each other than either is to any other species, this is the hypothesis under which we are operating—notwithstanding the fact that *Dendrelaphis thasuni* **sp. nov.** is morphologically diagnosable from all other species. The weakness of this hypothesis is that *Dendrelaphis thasuni* **sp. nov.** is known from only a single specimen which precludes univariate statistical analyses. However, both multivariate analyses (PCA and MFA) place the specimen well outside *D. caudolineolatus.* When additional specimens become available, some of the morphometric and meristic characters may prove not to be diagnostic just as others may emerge as diagnostic. The discrete categorical characters of AP, VSW, SS, TS, ACS, ACC, NC, FB, SCS, and SL-Eye that separate the species are the best diagnostic characters at this point. Even though there is only one specimen of *Dendrelaphis thasuni* **sp. nov.**, these characters are invariable in all other species and thus highly likely to be invariable in *Dendrelaphis thasuni* **sp. nov.** as well.

Albert Günther (1869) described *Dendrophis caudolineolata* based on two specimens (syntypes) at the British Museum (NHMUK 68.2.17.19, male, collected by B.H. Barnes, and NHMUK 1946.1.23.21, collected by Higgins), without exact location, but mentioning they originated from Ceylon (=Sri Lanka). However, he did not mention the scalation of the second

Fig. 10. (A) Lateral aspect of *Dendrelaphis caudolineatus* with five distinct blackish lines along the body, and clearly visible blackish lines between subcaudals along the tail, from West Malaysia. **(B)** Dorsal aspect *D. caudolineatus* showing distinct dark lines along the body, from Indonesia.

(smaller) specimen collected by Higgins. He believed that these two specimens represent a Sri Lankan version of *D. caudolineata* (Fig. 10). Although *D. caudolineata* is a very distinct species, it is distinguished from *D. caudolineolata* by having five blackish longitudinal stripes along the body (*vs* V-shaped blackish transverse dorsolateral bars on anterior half of body), 171–185 ventrals (*vs* 149–164), and 101–113 subcaudals (*vs* 119–128). In his description, Günther clearly stated that *D. caudolineolata* has a divided anal plate with divided subcaudals. Subsequently, 19 years later, Amyrald Haly (1888) described *D. gregorii* also from Dikmukalana in Ballangodda (=Balangoda), Ceylon (=Sri Lanka) (holotype, NHMUK 69.7.24.13) without any comparison with related species. However, Boulenger (1890) synonymized *D. gregorii* with *D. caudolineolatus* due to the morphological similarity and the divided anal plate. Thereafter, most authors followed Günther (1869) and repeatedly cited the same description (Boulenger 1894; Wall 1921; Meise and Henning 1932; Smith 1943; Deraniyagala 1955; Leviton 1970; De Silva 1980).

We examined Günther's specimen (syntype NHMUK 68.2.17.19) and noted 2+3 temporals on each side, a broad dark temporal stripe, five or six scales between two transverse dorsolateral bars, the distance between two transverse bars larger than the eye diameter, and a divided anal plate (*vs* 1+2 temporals, narrow stripe, two or three scales between two transverse dorsolateral bars, the distance between two transverse bars equal to the eye diameter, and undivided anal plate in *Dendrelaphis thasuni* **sp. nov.**). Also, Günther (1869) described the second snake in the same publication as *Dipsas barnesii* (*Boiga barnesii*) collected by R.H. Barnes. The current distribution pattern of *Boiga barnesii* is limited to the lowland wet zone below 700 m asl, and they are very rare in that habitat (Wall 1921; Deraniyagala 1955; De Silva 1980; Das and De Silva 2005; De Silva and Ukuwela 2020; Somaweera et al. 2023). Therefore, we surmise that the syntype was collected from the lowland wet zone in the South Western quarter of Sri Lanka. During a recent field trip at Wewalthalawa, Yatiyantota (~600 m asl), we were able to photograph a live snake similar to the syntype (NHMUK 68.2.17.19) (Fig. 8).

According to its current distribution, *D. caudolineolatus* is found mainly in the lowland and submontane wet zone (usually at elevations of 100–700 m asl with a cooler climate), and rarely in the intermediate zone with the wet climatic conditions (like the Knuckles area and Balangoda area). However, De Silva (1980) mentioned a single specimen that came from Mulativu in Northern Province and was deposited at the National Museum of Sri Lanka. That is a rather unusual locality for *D. caudolineolatus*, because Mulativu is a dry forested area in the dry zone. We failed to locate this specimen in the museum collection, and it is apparently lost. Thus, we restrict the distribution of *D. caudolineolatus* to the wet zone of Sri Lanka based on recent and historical publications (Günther 1869; Haly 1888; Wall 1921; Deraniyagala 1955; De Silva 1980; Somaweera 2006; De Silva and Ukuwela 2020). However, the new species *Dendrelaphis thasuni* **sp. nov.** is known only from a single locality in the South Eastern intermediate zone bordered by the dry zone, Uva Province, Sri Lanka. The exact location is at Maragala, an isolated misty mountain with wet conditions similar to a lowland wet zone forest (Herath and Patabandi 2023).

Of the eight species of *Dendrelaphis*, 66.6% of Sri Lanka's endemic species (*D. caudolineolatus*, *D. effrenis*, *D. schokari* and *D. wickrorum*) can be found in the wet zone area, and 50% are confined to individual zones (*D. effrenis*, *D. oliveri*, *D. wickrorum*, and *Dendrelaphis thasuni* **sp. nov.**). Another 50% (*D. bifrenalis*, *D. caudolineolatus*, *D. schokari* and *D. tristis*) can be found in all the bioclimatic zones (Table 4), but no *Dendrelaphis* occur in the wet zone montane region (WZ-M). When considering the overall distribution of *Dendrelaphis* species, the wet zone lowland, intermediate zone lowland, and dry zone lowland represent 20% each. Of the eight species, *D. tristis* is the most widely distributed species in Sri Lanka, and the next most widely distributed species are *D. bifrenalis* and *D. schokari* (Appendix IV). Future studies of their ecology and their distribution will surely reveal many interesting aspects of their natural history. According to the research herein, the Knuckles population of *D. caudolineolatus* may represent a new species. However, molecular analyses are needed to ascertain the correct relationships of *Dendrelaphis thasuni* **sp. nov.**

The Maragala Mountain is a forest with high biodiversity because of its habitat heterogeny and

Table 4. Distribution patterns of *Dendrelaphis* species in eight different bioclimatic zones of Sri Lanka. Zone abbreviations: WZ-L (wet zone lowland), WZ-S (wet zone submontane), WZ-M (wet zone montane), IZ-L (intermediate zone lowland), IZ-M (intermediate zone mountain), DZ-L (dry zone lowland), DZ-M (dry zone mountain), AD (arid zone). Distribution codes: very rare (1), rare (2), uncommon (3), common (4), very common (5), and not recorded (0).

Species	Bioclimatic zone							
	WZ- L	WZ-S	WZ-M	IZ-L	IZ-M	DZ-L	DZ-M	AD
Dendrelaphis bifrenalis	0	0	0	4	3	4	3	2
Dendrelaphis caudolineolatus	3	3	0	0	2	1*	0	0
Dendrelaphis effrenis	1	0	0	0	0	0	0	0
Dendrelaphis oliveri	0	0	0	0	0	1	0	0
Dendrelaphis schokari	5	1	0	3	2	2	0	0
Dendrelaphis tristis	2	0	0	5	2	5	1	2
Dendrelaphis wickrorum	3	1	0	0	0	0	0	0
Dendrelaphis thasuni **sp. nov.**	0	0	0	0	1	0	0	0

* We failed to trace this specimen which was mentioned in De Silva (1980). It may be lost or misplaced from the museum collection in Sri Lanka.

favorable climatic conditions. We recorded 67 reptile species, including 30 (45%) that are endemic and 17 (25%) that are threatened, as well as 18 amphibian species including five (28%) endemics and a single threatened species from this isolated misty mountain in Monaragala (Appendix III). Within the last decade, three new geckos (*Cnemaspis hitihamii* Karunarathna et al., 2019, *C. kumarasinghei* Wickramasinghe and Munindradasa, 2007, and *Cyrtodactylus vedda* Amarasinghe et al., 2022) have been described which are restricted to this isolated misty mountain. A fourth, the new species *Dendrelaphis thasuni* **sp. nov.,** is the newest addition to this remarkable mountain. The granitic rock outcrop habitats have been heavily impacted and modified by deforestation, man-made fires, illegal forest encroachment, timber felling, unplanned farming activities such as rubber and tea cultivation, quarrying, and road construction (Herath and Patabandi 2023). Thus, urgent conservation measures are required to conserve this forest and its species.

Identification key for the *Dendrelaphis* species on Sri Lanka (based on Wickramasinghe 2016; Danushka et al. 2020, and currently examined specimens):

1. (a) Midbody scales in 13 rows ….....2
   (b) Midbody scales in 15 rows ……..…4

2. (a) Loreal and temporal stripe present ……..3
   (b) Loreal and temporal stripe absent ……..*D. effrenis*

3. (a) Anal plate divided…….....*D. caudolineolatus*
   (b) Anal plate undivided…….....*D. thasuni* **sp. nov.**

4. (a) Loreal present…..…..5
   (b) Loreal absent……..*D. oliveri*

5. (a) A single loreal scale…….....6
   (b) Two loreal scales…….....7

6. (a) Interparietal spot absent and 155–177 ventral.....*D. schokari*
   (b) Interparietal spot present and 178–198 ventrals.....*D. tristis*

7. (a) Temporal stripe continuing behind neck, ventrolateral stripe ending at the level of anal plate….....*D. bifrenalis*
   (b) Temporal stripe stopping just beyond the neck, ventrolateral stripe continuing up to the tail…..…..*D. wickrorum*

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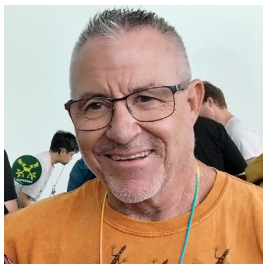

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Appendix I. Specimens examined for this study.

D. bifrenalis **(4 ex.): Sri Lanka:** NHMUK 1946.1.6.4 (lectotype), NHMUK 1946.1.10.19 (paralectotype), and two uncatalogued specimens in NMSL.
D. caudolineatus **(4 ex.): Batjan:** RMNH 887, **Halmaheira** RMNH 514, **Sumatra** RMNH 40206, and **Sulawesi** RMNH 40177.
D. caudolineolatus **(12 ex.): Sri Lanka:** NHMUK 68.2.17.19, and NHMUK 1946.1.23.21, and NHMUK 1858.2.17.19 (syntypes), NMW 23725.3, WHT 1989, WHT 6502, NMW 23725, SMF 68226, and four uncatalogued specimens in NMSL.
D. effrenis **(1 ex.): Sri Lanka:** NMSL 2016.06.01 (neotype).
D. oliveri **(1 ex.): Sri Lanka:** FMNH 123726 (holotype).
D. schokari **(3 ex.): Sri Lanka:** RMNH 842 (neotype), NHMUK 1969.2781, and one uncatalogued specimen in NMSL.
D. tristis **(6 ex.): India:** SMF 58442 (neotype), **Sri Lanka:** NHMUK 1955.1.9.80, and four uncatalogued specimen in NMSL.
D. wickrorum **(3 ex.): Sri Lanka:** NHMUK 1905.3.25.98 (holotype), NHMUK 1946.1.10.20 (paratype), and one uncatalogued specimen in NMSL.

Appendix II. Characters used in the mutliple factor analysis (MFA). The abbreviations are defined in the Materials and Methods.

Species	SVL	ED	EN	ES	SN	RW	RD
thasuni	2.664642	0.63425	0.580734	0.682881	0.321584	0.531937	0.177094
caudolineolatus (1)	2.658965	0.623657	0.633964	0.725131	0.361397	0.505389	0.255795
caudolineolatus (2)	2.70927	0.594788	0.676623	0.771239	0.377187	0.533663	0.235225
caudolineolatus (3)	2.686636	0.655444	0.655924	0.745044	0.34061	0.545377	0.233312
caudolineolatus (4)	2.593286	0.608862	0.676475	0.747647	0.383397	0.516213	0.250241
caudolineolatus (5)	2.640481	0.590254	0.622264	0.730693	0.362387	0.531003	0.229409
caudolineolatus (6)	2.536558	0.625806	0.653448	0.75478	0.348646	0.539574	0.220621
caudolineolatus (7)	2.666518	0.613689	0.644553	0.742262	0.379476	0.505681	0.23161
caudolineolatus (8)	2.692847	0.615425	0.675307	0.761415	0.359583	0.533028	0.233837
Species	**ND**	**IN**	**MAE**	**MPE**	**IO**	**HL**	**HD**
thasuni	0.206317	0.58826	1.121773	0.949711	0.864137	1.291096	0.81897
caudolineolatus (1)	0.231594	0.542606	1.08341	0.924447	0.819968	1.266567	0.740064
caudolineolatus (2)	0.265739	0.518121	1.081259	0.930948	0.796267	1.167663	0.753142
caudolineolatus (3)	0.182364	0.548297	1.096845	0.919994	0.828398	1.232218	0.730756
caudolineolatus (4)	0.219424	0.51922	1.097787	0.922669	0.808831	1.231127	0.766306
caudolineolatus (5)	0.173812	0.546977	1.085116	0.923946	0.805336	1.261274	0.748783
caudolineolatus (6)	0.233737	0.532635	1.085156	0.926273	0.81157	1.201697	0.745985
caudolineolatus (7)	0.232994	0.553055	1.108599	0.91945	0.771794	1.25151	0.762764
caudolineolatus (8)	0.211544	0.495676	1.075934	0.914898	0.808929	1.210926	0.74625
Species	**HW**	**TAL**	**BD**	**BW**	**TD**	**TW**	**SUP**
thasuni	0.951663	2.384392	0.923559	0.930045	0.56953	0.556047	8
caudolineolatus (1)	0.840034	2.25054	0.897252	0.897953	0.681934	0.543935	8
caudolineolatus (2)	0.862087	2.32697	0.905055	0.860315	0.629578	0.566984	8
caudolineolatus (3)	0.832564	2.25284	0.884435	0.882601	0.693989	0.579054	8.5
caudolineolatus (4)	0.827443	2.277951	0.884426	0.888954	0.646546	0.54535	7
caudolineolatus (5)	0.866873	2.252447	0.892842	0.850609	0.679863	0.544333	7.5
caudolineolatus (6)	0.869814	2.354189	0.904685	0.880355	0.649736	0.570706	8
caudolineolatus (7)	0.853891	2.452078	0.91298	0.869957	0.614323	0.531183	8.5
caudolineolatus (8)	0.840189	2.329246	0.884058	0.89421	0.676587	0.555439	8
Species	**SL-Lrg**	**INF**	**IL-Lrg**	**POS**	**COS**	**VB**	**TBS**
thasuni	7	9	5	2	9	151	2
caudolineolatus (1)	8	9	5	3	11	158	5.5
caudolineolatus (2)	7	9	5	2.5	9	151	4.5
caudolineolatus (3)	7	8.5	5	3	9	149	5
caudolineolatus (4)	7.5	9.5	5.5	3	9	160	5.5
caudolineolatus (5)	8	10	6	2.5	11	155	5.5
caudolineolatus (6)	8	9.5	5.5	2.5	9	145	5.5
caudolineolatus (7)	7.5	9	5.5	2.5	9	148	6
caudolineolatus (8)	7	8.5	6	2.5	9	159	5
Species	**VEN**	**PVEN**	**SUB**	**AP**	**VSW**	**SS**	**TS**
thasuni	153	2	117.5	single	narrow	broad/flat	narrow
caudolineolatus (1)	162	3	128.5	divided	wide	narrow/pointed	broad
caudolineolatus (2)	171	2	134.5	divided	wide	narrow/pointed	broad
caudolineolatus (3)	149	2	119.5	divided	wide	narrow/pointed	broad
caudolineolatus (4)	155	3	122.5	divided	wide	narrow/pointed	broad
caudolineolatus (5)	161	3	115.5	divided	wide	narrow/pointed	broad
caudolineolatus (6)	176	2	132.5	divided	wide	narrow/pointed	broad
caudolineolatus (7)	172	3	130.5	divided	wide	narrow/pointed	broad
caudolineolatus (8)	168	2	128.5	divided	wide	narrow/pointed	broad
Species	**ACS**	**ACC**	**NC**	**FB**	**SL Eye**	**ECOL**	**SCS**
thasuni	small	level	blue	thin	5th	EDZ	present
caudolineolatus (1)	large	posterior	not blue	wide	5th	SWZ	absent
caudolineolatus (2)	large	posterior	not blue	wide	6th	SWZ	absent
caudolineolatus (3)	large	posterior	not blue	wide	6th	SWZ	absent
caudolineolatus (4)	large	posterior	not blue	wide	6th	SWZ	absent
caudolineolatus (5)	large	posterior	not blue	wide	6th	SWZ	absent
caudolineolatus (6)	large	posterior	not blue	wide	5th	SWZ	absent
caudolineolatus (7)	large	posterior	not blue	wide	6th	SWZ	absent
caudolineolatus (8)	large	posterior	not blue	wide	6th	SWZ	absent

Appendix III. Checklist of amphibians and reptiles of Maragala mountain. Abbreviations: LC – Least Concern, VU – Vulnerable, EN – Endangered, CR – Critically Endangered, DD – Data Deficient.

Family	Species name	Common name	Species status	IUCN status
Reptiles				
Bataguridae	*Melanochelys trijuga*	Flat-Backed Turtle	Indigenous	LC
Testudinidae	*Geochelone elegans*	Star Tortoise	Indigenous	VU
Trionychidae	*Lissemys ceylonensis*	Sri Lanka Flapshell Turtle	Endemic	VU
Agamidae	*Calotes calotes*	Green Garden Lizard	Indigenous	LC
	Calotes ceylonensis	Painted-Lip Lizard	Endemic	LC
	Calotes liolepis	Whistling Lizard	Endemic	LC
	Calotes versicolor	Common Garden Lizard	Indigenous	LC
	Lyriocephalus scutatus	Hump-Snout Lizard	Endemic	VU
	Otocryptis nigristigma	Dryzone Kangaroo Lizard	Endemic	LC
Gekkonidae	*Calodactylodes illingworthorum*	Lankan Golden Gecko	Endemic	VU
	Cnemaspis hitihamii	Hitihami's Day Gecko	Endemic	CR
	Cnemaspis kumarasinghei	Kumarasinghe's Day Gecko	Endemic	EN
	Cnemaspis podihuna	Dwarf Day Gecko	Endemic	VU
	Cyrtodactylus vedda	Vedda's Bowfinger Gecko	Endemic	EN
	Gehyra mutilata	Four-Claw Gecko	Indigenous	LC
	Hemidactylus depressus	Kandyan Gecko	Endemic	LC
	Hemidactylus frenatus	Common House Gecko	Indigenous	LC
	Hemidactylus hunae	Spotted Giant Gecko	Endemic	EN
	Hemidactylus triedrus	Termite-Hill Gecko	Indigenous	LC
	Hemidactylus leschenaultii	Bark Gecko	Indigenous	LC
	Hemidactylus parvimaculatus	Spotted House Gecko	Indigenous	LC
Scincidae	*Dasia haliana*	Haly's Treeskink	Endemic	VU
	Eutropis lankae	Common Skink	Endemic	LC
	Eutropis madaraszi	Spotted Skink	Endemic	LC
	Lygosoma punctatus	Dotted Skink	Indigenous	LC
	Nessia didactylus	Two Toe Snake Skink	Endemic	EN
Ristellidae	*Lankascincus fallax*	Common Lanka Skink	Indigenous	LC
	Lankascincus taylori	Taylor's Lanka Skink	Endemic	VU
Varanidae	*Varanus bengalensis*	Land Monitor	Indigenous	LC
	Varanus salvator	Water Monitor	Indigenous	LC
Pythonidae	*Python molurus*	Indian Python	Indigenous	LC
Cylindrophiidae	*Cylindrophis maculatus*	Sri Lanka Pipe Snake	Endemic	VU
Colubridae	*Ahaetulla nasuta*	Green Vine Snake	Endemic	LC
	Ahaetulla pulverulenta	Brown Vine Snake	Endemic	LC
	Amphiesma stolatum	Buff Striped Keelback	Indigenous	LC
	Aspidura brachyorrhos	Boie's Roughside	Endemic	VU
	Atretium schistosum	Olive Keelback Watersnake	Indigenous	LC
	Rhabdophis plumbicolor	Green Keelback	Indigenous	LC
	Boiga beddomei	Beddome's Cat Snake	Endemic	LC
	Boiga ceylonensis	Sri Lanka Cat Snake	Endemic	LC
	Boiga forsteni	Forsten's Cat Snake	Indigenous	LC
	Boiga trigonatus	Gamma Cat Snake	Indigenous	LC
	Chrysopelea ornata	Ornate Flying Snake	Indigenous	LC
	Coeloganthus helena	Trinket Snake	Indigenous	LC
	Dendrelaphis bifrenalis	Boulenger's Bronze-Back	Indigenous	LC
	Dendrelaphis thasuni **sp. nov.**	Thasun's Bronze-Back	Endemic	CR
	Dendrelaphis tristis	Common Bronze-Back	Indigenous	LC

Appendix III (continued). Checklist of amphibians and reptiles of Maragala mountain. Abbreviations: LC – Least Concerne, VU – Vulnerable, EN – Endangered, CR – Critically Endangered, DD – Data Deficient.

Family	Species name	Common name	Species status	IUCN status
	Dryocalamus nympha	Bridal Snake	Indigenous	LC
	Gongylosoma calamaria	Reed Snake	Indigenous	LC
	Lycodon aulicus	Wolf Snake, House Snake	Indigenous	LC
	Lycodon fasciolatus	Flowery Wolf Snake	Indigenous	LC
	Lycodon striatus	Shaw's Wolf Snake	Indigenous	LC
	Oligodon arnensis	Common Kukri Snake	Indigenous	LC
	Oligodon sublineatus	Dumeril's Kukri Snake	Endemic	VU
	Oligodon taeniolatus	Variegated Kukri Snake	Indigenous	LC
	Ptyas mucosa	Rat Snake	Indigenous	LC
	Sibynophis subpunctatus	Jerdon's Polyodent	Indigenous	LC
	Fowlea asperrima	Banded Keelback	Endemic	LC
	Fowlea unicolor	Checkered Keelback	Endemic	LC
Elapidae	*Bungarus caeruleus*	Common Krait	Indigenous	LC
	Calliophis melanurus	Sri Lanka Coral Snake	Indigenous	LC
	Naja naja	Indian Cobra	Indigenous	LC
Uropeltidae	*Rhinophis oxyrynchus*	Schneider's Shieldtail	Endemic	DD
	Rhinophis saffragamus	Large Shieldtail	Endemic	VU
Viperidae	*Daboia russelii*	Russell's Viper	Indigenous	LC
	Hypnale hypnale	Merrem's Hump Nose Viper	Indigenous	LC
	Peltopelor trigonocephalus	Green Pit Viper	Endemic	LC
Amphibians				
Bufonidae	*Duttaphrynus melanostictus*	Common House Toad	Indigenous	LC
	Duttaphrynus scaber	Schneider's Toad	Indigenous	LC
Dicroglossidae	*Euphlyctis mudigere*	Mudigere Skipper Frog	Indigenous	LC
	Euphlyctis hexadactylus	Six Toe Green Frog	Indigenous	LC
	Hoplobatrachus crassus	Jerdon's Bull Frog	Indigenous	LC
	Minervarya agricola	Common Paddy Field Frog	Indigenous	LC
	Sphaerotheca pluvialis	Banded Sand Frog	Indigenous	DD
	Sphaerotheca rolandae	Marbled Sand Frog	Endemic	LC
Microhylidae	*Microhyla mihintalei*	Red Narrow Mouth Frog	Endemic	LC
	Microhyla ornata	Ornate Narrow Mouth Frog	Indigenous	LC
	Uperodon systoma	Marbled Balloon Frog	Indigenous	LC
	Uperodon taprobanicus	Painted Globular Frog	Indigenous	LC
Ranidae	*Hylarana gracilis*	Sri Lanka Wood Frog	Indigenous	LC
Rhacophoridae	*Polypedates cruciger*	Common Hour-Glass Tree Frog	Endemic	LC
	Polypedates maculatus	Indian Tree Frog	Indigenous	LC
	Pseudophilautus fergusonianus	Ferguson's Shrub Frog	Endemic	LC
	Pseudophilautus regius	Polonnaruwa Shrub Frog	Indigenous	LC
Ichthyophiidae	*Ichthyophis glutinosus*	Common Yellow Band Caecilian	Endemic	VU

Appendix IV. Sri Lankan *Dendrelaphis* species distributions according to bioclimatic zones, along with their diversity and abundance. Zone abbreviations: WZ-L (wet zone lowland), WZ-S (wet zone submontane), WZ-M (wet zone montane), IZ-L (intermediate zone lowland), IZ-M (intermediate zone mountain), DZ-L (dry zone lowland), DZ-M (dry zone mountain), and AD (arid zone). Species abbreviations: *D. bifrenalis* (DB), *D. caudolineolatus* (DC), *D. effrenis* (DE), *D. oliveri* (DO), *D. schokari* (DS), *D. tristis* (DT), *D. wickrorum* (DW), and *D. thasuni* **sp. nov.** (DA).