



Lygosoma megalops Annandale, 1906 (Squamata, Scincidae): a junior synonym of *Lankascincus fallax* (Peters, 1860)

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Abstract

Annandale (1906) described *Lygosoma megalops*, now in the genus *Lankascincus*, based on two syntypes collected from Kitulgala and Puttalam in Sri Lanka. These syntypes have not been recognized since the original description. In 2019, Batuwita designated a neotype, WHT 6545, for *Ly. megalops* from Kitulgala. The number WHT ‘6545’ does not exist in the registers of either WHT or NMSL. The neotype designation also fails to conform to several Articles of the *Code*: 75.3.1, 75.3.3, 75.3.5 and 75.3.7. Given that it does not appear to exist, it makes the designation of ‘WHT 6545’ as the neotype of *Ly. megalops* void *ab initio*. Further, based on the description provided in Batuwita (2019), it is clear that the species he conceived as *Ly. megalops* was in fact morphologically similar to several other *Lankascincus* species. We show that, as characterized by Annandale (1906), *Ly. megalops* cannot be assigned to any scincid species in Sri Lanka. The locality data Annandale disclosed for *Ly. megalops*—Puttalam and Kitulgala—make it almost certain that the two syntypes belonged to different species or to *La. fallax*. Therefore, unless resolved, the nomen *La. megalops* will continue to threaten the nomenclatural stability in the genus *Lankascincus*, as well as in the genus *Eutropis*. In order to address this problem, we invalidate the neotype designated by Batuwita (2019) and show that *Ly. megalops* is a synonym of *La. fallax*.

Key words

Code, neotype, objective synonym, *Sphenomorphus*, Sri Lanka, taxonomy.

Introduction

Greer (1991) erected the genus *Lankascincus* [hereafter, *La.*] to encompass most Sri Lankan species of small litter-dwelling skinks previously included in the genus *Sphenomorphus* Fitzinger, 1843. He also described three new species, *La. taylori*, *La. deraniyagalae* and *La. gansi*, while providing redescriptions of three other species, *La. taprobanensis* (Kelaart, 1854), *La. fallax* (Peters, 1860) and *La. deignani* (Taylor, 1950). Unfortunately, all six of these descriptions and redescriptions are brief and provide few diagnostic characters. Greer (1991) did not consider the remaining species of Sri Lankan *Sphenomorphus* and *Lygosoma* Hardwicke & Gray, 1828 [hereafter, *Ly.*] in his publication: *S. dorsicatenatus* Deraniyagala, 1953, *Ly. dussumieri* Duméril & Bibron, 1839 and *Ly. megalops* Annandale, 1906. Subsequently, based on morphological affinities, Batuwita & Pethiyagoda (2007) and Batuwita (2019) transferred *S. dorsicatenatus* and *Ly. megalops* to the genus *Lankascincus*. Somaweera & Somaweera (2009) restricted *S. dussumieri* to Southern India, removing it from the Sri Lankan checklist. Currently, ten species of *Lankascincus* are known from Sri Lanka (Batuwita 2019; Wickramasinghe *et al.* 2020; Kanishka *et al.* 2020).

Annandale (1906) described *Ly. megalops* based on two syntypes collected from Kitulgala and Puttalam, Sri Lanka. These syntypes have not been reported as still in existence by subsequent authors since their original description. Batuwita (2019) recently assigned this nomen to the genus *Lankascincus* and designated a neotype, WHT 6545, from Kitulgala. Our surveys show that only a single species of *Lankascincus* skink occurs at both Puttalam, in the island's dry zone, and Kitulgala, in the wet zone, namely, *La. fallax* (Peters, 1860) (Greer *et al.* 1991; Batuwita 2019). *Lankascincus fallax* is a widespread species, occurring throughout the island including all bioclimatic zones (wet, dry and intermediate) from sea level up to 1,200 m a.s.l. (Batuwita 2019). Its original description is based on two syntypes (ZMB 3762 and 64361) with a single label indicating that they had been collected from two localities: Ratnapura (wet zone) and 'Trinkomalie' (Trincomalee; dry zone, a highly seasonal, relatively dry region in northeast Sri Lanka, with an annual rainfall of ~ 1.2 m/y).

Based on the redescription provided by Batuwita (2019), it is clear that the species he conceived as *Ly. megalops* was in fact a mixture of *Lankascincus* species occurring in Kitulgala, such as *La. dorsicatenatus*, *La. gansi* and *La. fallax* (Danushka *et al.* in press). Deraniyagala (1953) described *S. dorsicatenatus* based on a holotype and three paratypes. All these specimens were believed to be lost until Batuwita & Pethiyagoda (2007) rediscovered one of the misplaced paratypes at NMSL. We here revisit the taxonomic status of '*La. megalops*' and help shed light on the identities of *La. dorsicatenatus*, *La. gansi* and *La. fallax*.

Material and methods

Specimens were examined in the collections of the Natural History Museum, London, UK (NHMUK); National Museum of Sri Lanka, Colombo, Sri Lanka (NMSL); Wildlife Heritage Trust, Sri Lanka (WHT, currently deposited at NMSL but retaining their former WHT registration numbers); Museum für Naturkunde, Berlin, Germany (ZMB); and Zoologisches Museum Hamburg,

Germany (ZMH). Museum abbreviations follow Uetz *et al.* (2019). Examined specimens are listed in Appendix 1. Natural history data were taken from our own field observations, as well as the published literature.

Results

Given that the types of most scincid species described by Thomas Nelson Annandale (1876–1924) are deposited in it, it is likely that the syntypes of *Ly. megalops* too, were deposited at the Indian Museum (now the Zoological Survey of India, ZSI). The syntypes of *Ly. megalops* were not examined by Deraniyagala (1953), most likely because he too failed to locate them. Our recent attempts to trace these syntypes at NMSL, ZSI and NHMUK were unsuccessful. The senior curator of the ZSI collection (herpetology) confirmed that if they were indeed deposited in ZSI, these specimens have since been lost or destroyed (Kaushik Deuti, ZSI, personal communication to the first author on 24 August 2020).

Although it seems certain that the syntypes of *Ly. megalops* are lost, the designation of a neotype for this nominal species by Batuwita (2019) is problematic. The NMSL registration number WHT 6545 declared for this specimen does not appear in the registers of either the WHT or NMSL. Further, there are no skink specimens with the specific epithet ‘*megalops*’ in the registers or accessions of the NMSL and WHT. Nor does a specimen matching the data provided by Batuwita (2019) exist in the skink collection of NMSL. On 31 July 2021, Lankani Somarathna (Assistant Director for Zoology, NMSL) sent an e-mail to Sudesh Batuwita at his given email address in Batuwita (2019), with a copy to the first author, asking for the whereabouts of the neotype. The first author also sent a reminder email on 2 September 2021 to the same email address which was still active to that date. Neither of these communications received a response. Because of the absence of the specimen and any evidence of its existence, we conclude that the neotype designated by Batuwita (2019) was never based on a specimen.

In addition to this, the neotype was credited with a dubious registration number that does not appear in the specimen accession registers of any of the mentioned institutions: the Wildlife Heritage Trust of Sri Lanka or the National Museum of Sri Lanka. We do not wish to speculate here on the motives of the author, but it is clear that the designation of ‘WHT 6545’ as the neotype of *Ly. megalops* has to be declared void *ab initio* and the designation fails to conform to the provisions of the *International Code of Zoological Nomenclature* (Anonymous 1999; hereafter, the *Code*).

Based on the information provided in Batuwita (2019), it appears that the species he conceived as *Ly. megalops* was in fact of a mixture (chimera) of unique specific features and characters of *La. dorsicatenatus*, *La. gansi* and *La. fallax*, combined to form the specimen he called the neotype (Kanishka *et al.* 2020; Danushka *et al.* in press). We show that, as characterized by Annandale (1906), the locality data disclosed for *Ly. megalops*—Puttalam (arid zone, a highly seasonal, arid region in northwest Sri Lanka, annual rainfall ~ 1.2 m/y) and Kitulagala (wet zone, a perhumid rainforested region in central Sri Lanka, annual rainfall > 2.5 m/y)—make it almost certain that his two syntypes belonged to *La. fallax*, the only species of *Lankascincus* to occur in both climatic zones. Therefore, unless resolved, the nomen *La. megalops* will continue to threaten the taxonomic stability of some species of *Lankascincus*, as well as *Eutropis* Fitzinger, 1843 (see Table 1). In order to remedy this problem, we first invalidate the neotype designated by Batuwita (2019), and argue that Annandale’s nomen, *Ly. megalops* was in fact *La. fallax*.

Below, we respond clause-by-clause to the conditions for validly designating a neotype as set out in Articles 75.3.1, 75.3.3, 75.3.5 and 75.3.7 of the *Code*.

TABLE 1. Skink species occurring in Puttalam and Kitulgala which agree with the characters listed in the original description of *Lygosoma megalops* Annandale, 1906.

Information provided by Annandale (1906)		Possible genera or species							
		<i>Lygosoma</i> & <i>Sphenomorphus</i> sp.	<i>Eutropis</i> sp.	' <i>La. megalops</i> ' neotype (fide Batuwita 2019)	<i>La. fallax</i> (n = 34)	<i>La. dorsicatenatus</i> (n = 15)	<i>La. cf. gansi</i> (n = 3)	<i>La. deignani</i> (n = 3)	<i>La. cf. taylori</i> (live, n = 5)
1	Distributed in Puttalam	+	+		+				
2	Distributed in Kitulgala	+	+	+	+	+	+	+	+
3	Habit lacertiform; length from snout to fore-limb contained about 1, 1/2 times in the length from axilla to groin; limbs well developed, pentadactyl; snout short, obtusely pointed; eye large, diameter of orbit as great as length of snout; ear opening much smaller than eye, circular, without denticulations; rostral much broader than deep; no supranasals, nasal undivided; no distinct nuchals; four large, subequal supraoculars; no enlarged scale on the heel	+	+	+	+	+	+	+	+
4	Dorsal and lateral scales smooth	+		+	+	+	+	+	+
5	Limbs overlapping when adpressed	+	+	+		+		+	
6	Distance from orbit to ear-opening much longer than snout	+	+						+
7	Rostral forming a straight suture with the frontonasal; six upper and five lower labials	+		Does not agree with any other					
8	Ventrals feebly carinate			Does not agree with any					
9	Anal and caudals not enlarged	+	+	+	+	+	+	+	+
10	Frontal nearly as long as the frontoparietals and the interparietal together	+	+	+		+	+	+	
11	Interparietal completely separating the parietals	+	+	Does not agree with any other					
12	Seven or eight supraciliaries	+	+		+				+
13	Body scales subequal, imbricate, in 24 to 26 rows around body	+	+	+	+	+	+		+
14	Middle toe [toe III] with 12 to 14 subdigital plates	+	+	+	+	+	+	+	
15	Colour almost uniform dark brown	+	+		+			+	
16	Length of head and body [SVL] 2 inches [50.8 mm]; length of tail [TL] 2, 3/8 inches [60.3 mm]	+	+		+			+	
17	Relative tail length [TL/SVL ratio 118.7%]	+	+		+				+
Total values agreed (out of 17 characters above)		16	14	8	11	8	7	9	8

[1] A statement that the neotype is designated with the express purpose of clarifying the taxonomic status or the type locality of a nominal taxon (Article 75.3.1). • Batuwita (2019) wrote: “This species has long been treated as data deficient because of the lack of identified specimens (IUCN, 1999, 2007, 2012); hence, its identity is here stabilized through the designation of a neotype”. Here we question this action using “a statement that it is designated with the express purpose of clarifying the taxonomic status” of *Ly. megalops*. The lack of “identified specimens” is not the same as the “lack of clarity in taxonomic status”. Batuwita’s (2019) statement does not validate that the neotype is “designated with the express purpose of clarifying the taxonomic status” of *Ly. megalops*. However, Batuwita (2019) did make it clear that there is a problem with regard to the identity of *Ly. megalops*: that Annandale’s (1906) description does not allow it to be separated from other extant skinks either

from Puttalam or Kitulgala. However, the *Code* calls for a ‘statement’, not an inference, and Batuwita (2019) did not make such a statement.

[2] Data and description sufficient to ensure recognition of the specimen designated as neotype (Article 75.3.3). • Batuwita (2019) stated that the “WHT 6545, neotype, here designated (ICZN, 1999; Article 75.3. and 75.3.1., 75.3.2., 75.3.2.3), (adult male), 45.5 mm SVL Pitawala, near Kitulgala (Sabaragamuwa Province), 068590N, 808270E, 800 m”, apparently satisfied Article 75.3.3. However, all our attempts to trace this specimen, the neotype, at the WHT and NMSL collections were unsuccessful. As the number WHT 6545 does not appear in the registers of either WHT or NMSL, it is assumed that this specimen as described by Batuwita (2019) does not exist. The diagnosis and the re-description provided by Batuwita (2019) are not sufficient to ensure recognition of Annandale’s (1906) species, *Ly. megalops*, now *La. megalops* (see Kanishka *et al.* 2020; Danushka *et al.* in press). The diagnosis of Batuwita (2019) given under *La. megalops* matches *La. gansi*, *La. dorsicatenatus*, *La. fallax*, and obviously the missing ‘*La. megalops*’. For an example, in the fifth line of the diagnosis under ‘*La. megalops*’ (on page 224 of Batuwita 2019), he stated that *La. megalops* has “subequal supraoculars” but just two lines below he stated again, it has “second supraocular narrow”—see Danushka *et al.* (in press). The rest of the combination of scale characters given for ‘*La. megalops*’ is well suited for its sympatric congeners *La. dorsicatenatus*, *La. deignani* and *La. fallax*. On the other hand, the only available four voucher specimens that he assigned to ‘*La. megalops*’ were clearly identified by us as individuals of *La. dorsicatenatus*.

[3] Evidence that the neotype is consistent with what is known of the former name-bearing type from the original description and from other sources; however, a neotype may be based on a different sex or life stage, if necessary or desirable to secure stability of nomenclature (Article 75.3.5). • The term ‘evidence’ used in the *Code* is vague, and the overall wording of Batuwita (2019) implies that he has in fact provided such evidence. However, after a detailed analysis comparing each sentence of the original description of *Ly. megalops* with other skinks known to occur in both Puttalam and Kitulgala (see Table 1), it is obvious that the two syntypes which Annandale (1906) had to hand were either [a] members of the genera *Lygosoma* or *Sphenomorphus* (or both)—as they are the best matching genera according to the data included in the original description; or [b] a mixed features of two different species, one of which being *Lygosoma* / *Sphenomorphus* or a juvenile of any Sri Lankan *Eutropis* species (most probably *E. tammanna* Das, de Silva & Austin, 2008), the other being possibly *La. fallax*. Although the probability of *Ly. megalops* being a *Lankascincus* is low (see Table 1), this taxonomic predicament is irreversible, therefore we have no other option but to accept the combination proposed by Batuwita (2019). However, here we prove (see Table 1) that the neotype Batuwita (2019) designated is not consistent with *Ly. megalops* known of the former name-bearing type from the original description provided by Annandale (1906).

[4] A statement that the neotype is, or immediately upon publication has become, the property of a recognized scientific or educational institution, cited by name, that maintains a research collection, with proper facilities for preserving name-bearing types, and that makes them accessible for study (Article 75.3.7). • In the case of *La. megalops*, Batuwita (2019) published a photo of the neotype in life but with no acknowledgement of the photographer, which suggests that he was the photographer and hence the collector of the specimen.

Batuwita (2019) clearly stated that the neotype was in the collection of WHT, which is cited by name and which, for a decade prior to Batuwita (2019) had been part of the NMSL collection. Technically, the work of Batuwita (2019) is deficient in that it does not include “a statement [...] [that WHT] maintains a research collection, with proper facilities for preserving name-bearing types, and that makes them accessible for study”. Note that the *Code* calls only for “a statement”: it does not require that the statement be factually correct. Along with the designated neotype, Batuwita (2019) listed 13 specimens as *La. megalops*; however, only four (about 30 %) of them are traceable in WHT or NMSL collections (see also Danushka *et al.* in press), and the remaining nine specimens,

including the neotype, were never deposited at NMSL. Although Batuwita (2019) cited a catalogue number for his neotype (WHT 6545), this number does not appear in the registers of either the WHT or NMSL. It has been more than three years since its publication (29 March 2019), but the designated type specimen has never been deposited in any recognized scientific or educational institution which would make them accessible for study.

Discussion

Article 75.3.7 of the *Code* requires that a neotype is, or immediately upon publication has become, the property of a recognized scientific or educational institution. According to this statement, it implies that, at least by the time the publication has become available, the neotype must have been deposited at a recognized scientific or educational institution. We suspect that the *Code*'s authors intended to say so, because grammatically 'has become' makes no sense written in combination with 'immediately'. It is a common fact that some delay occurs before a specimen (in case of a holotype) gets deposited in its intended repository following publication. Normally, specimens do end up where they were stated in the publication to have been deposited (Amarasinghe 2020). However, regarding neotypes, the *Code* seems clear that the specimen must exist and be deposited in a collection, and the specimen must be accessible [because it is a replacement of a previously existing (but currently lost or destroyed) name-bearing type], but the neotype designated by Batuwita (2019) has been inaccessible for nearly three years since publication. Although Batuwita intended to deposit the neotype in the future, the authenticity of the specimen is questionable as there was no such catalogue number (WHT 6545) or such specimen at the time of the WHT collection transfer to the NMSL. The WHT collection has been in the NMSL since ca. 2009, and no new accession numbers have been issued by the WHT since then (Rohan Pethiyagoda, trustee of WHT, personal communication to the first author on 2 September 2021). Moreover, the present instance is not the first in which types designated by Batuwita have been problematic. Sudasinghe *et al.* (2018: *Rasboroides*, *CYPRINIDAE* fishes) and Sudasinghe & Pethiyagoda (2019: *Devario*, *CYPRINIDAE* fishes) also showed that several of fish types designated by Batuwita are lost or are mixed up. Among the reptiles, the holotype and several voucher specimens of *Eutropis resetarii* Batuwita *et al.*, 2020 were also never deposited at a museum or are considered lost (Amarasinghe *et al.* in preparation).

It is obvious that Batuwita (2019) did not intend to upset the taxonomic stability of any other *Lankascincus*. However, if he had the desire to combine *Ly. megalops* with the genus nomen *Lankascincus*, then *La. fallax* should have been the first preference based on the characters given in the original description of Annandale (1906) (see Table 1). He could have simply considered the nomen *Ly. megalops* as a junior subjective (or even objective) synonym of *La. fallax* rather than designating a neotype for a dubious and ill-defined species. The *Code*'s "principle of priority" is to be used to promote stability and it is not intended to be used to disrupt a long-accepted name by the introduction of a nomen that is its senior synonym or homonym (Anonymous 1999).

The current taxonomic predicaments have a direct impact on the conservation of *Lankascincus* species; and they especially create identification confusion among the ecologists, field biologists, conservation managers, IUCN red listing assessors, naturalists and even nature photographers (see e.g. <inaturalist.org>). We are in a period of mass extinctions, when many species of animals, plants and other organisms are disappearing as direct or indirect results of human activities. Yet, the declining number of expert taxonomists represents a barrier to identifying, studying and providing data to protect threatened species (Wilson 2005; Engel *et al.* 2021), and this is especially true in developing and biodiverse countries such as Sri Lanka (Amarasinghe 2020). Precious time is spent unravelling such problems, and this may even lead to delays of several years if taxonomic problems of this sort are

referred to the International Commission of Zoological Nomenclature in order for them to use their plenary powers to help solve these issues. Such delays would directly affect the conservation status of this species in a country like Sri Lanka which is experiencing massive deforestation (Samarasinghe *et al.* 2020). Taking everything above into consideration, we therefore invalidate the neotype designation of *La. megalops* by Batuwita (2019), and here synonymize *Ly. megalops* with *La. fallax*. We think that this action is the most relevant one according to the available data and also that it will allow a better ascertainment of the true species composition of Sri Lankan skinks.

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APPENDIX 1. Specimens examined.

- Lankascincus gansi* Greer, 1991.** (NMSL 0397-SB), Udugama; (WHT 6670), Kanneliya; (WHT 6664), Dediya; (WHT 0151), Haycock-Hiniduma; (WHT 6661, 6676), Kombala-Kottawa Forest Reserve (Hiyare); (WHT 6672), Kottawa; (WHT 6776), Navinna; (WHT 6576, NMSL 0154), Rumassala; (WHT 6752), Yagirala; (WHT 6780), Kandy, Gannoruwa; (NMSL 0186b, WHT 6613), Kithulgala.
- La. taylori* Greer, 1991.** (NHMUK 1872.3.23.4A [holotype], NHMUK 1872.3.23.4B–C [paratypes], WHT 6707), Pundaluoya.
- La. sripadensis* Wickramasinghe, Rodrigo, Dayawansa & Jayantha, 2007.** (NMSL 2007.05.01 [holotype], NMSL 2007.05.02 [paratype]), Sripada Sanctuary (Adam's peak); (WHT 2238, 6566, 6636, NMSL uncat. 125, 126), Agra Arboretum.
- La. deignani* (Taylor, 1950).** (WHT 6524 [holotype of *La. greeri* Batuwita & Pethiyagoda, 2007], 6525 [paratype of *La. greeri*], NMSL uncat.), Kombala-Kottawa Forest Reserve (Hiyare).
- La. fallax* (Peters, 1860).** (ZMB 3762 [syntype], FMNH 120229 [holotype of *Sphenomorphus rufogulus* Taylor, 1950]), Trincomalee; (ZMB 64361 [syntype]), Ratnapura; (NHMUK 1895.723.28c [holotype of *La. deraniyagalae* Greer, 1991], 1895.723.28b [paratype of *La. deraniyagalae*]), Pundaluoya; (WHT 1579), Passara, Kandahena Estate; (WHT 2055, NMSL uncat. 9, 11–13), Puwakpitiya; (NMSL uncat. 30–31), Mahamewna Uyana; (WHT 6735), Polonnaruwa; (NMSL uncat. 1), Mathale; (NMSL uncat. 34), Yala block I; (NMSL uncat. 66), Galle, Kitulampitiya; (NMSL uncat. 197), Balangoda, Mahawalattenna; (ZMH R08082–87, 08100–01, 08116–17), Yakkala, Yongamulla; (ZMH R08115), Chilaw Mundal Lake; (ZMH R08118), Malsiripura, Andapolakanda; (ZMH R08119), Monaragala, Badulla; (ZMH R12151), Peradeniya; (ZMH R12151), Colombo.
- La. dorsicatenatus* (Deraniyagala, 1953).** WHT 6619 [neotype, designated by Danushka *et al.* in press]), Kuruwita Batadombalena; (NMSL RSK 307 [historical paratype]), Angammana, Nivithigala; (WHT 6774, 6779), Nawinna; (WHT 6737, 6745), Koskulana, Panapola; (WHT 6736), Owilkanda, Mathale; (WHT 6719, 6728–29, NMSL uncat. 120), Nainakanda, Wathura; (NMSL [SB], 0391), Hanthana; (NMSL uncat.), Batadombalena, Kithulgala.
- La. taprobanensis* (Kelaart, 1854).** (NHMUK 1946.8.26.11 [syntype]), Nuwara Eliya (?); (NMSL 2007.22.01–02, WHT 2014, 2097, 2097a–b), Horton plains.
- La. merrill* Wickramasinghe, Vidanapathirana & Wickramasinghe, 2020.** (NMSL 2011.01.01 [holotype], 2011.01.02, DWC 2011.05.01, 2011.05.02), Sinharaja, Enasalwatte Estate; (WHT 6747), Mahawalattenna.
- La. sameerai* Kanishka, Danushka & Amarasinghe, 2020.** (WHT 6720 [holotype], 1608 [paratype]), Morningside; (WHT 6593, 6741, 6749a–b), Deniyaya, Silverkanda.