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An annotated checklist and a family key to the pseudoscorpion fauna (Arachnida: Pseudoscorpiones) of Sri Lanka

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Abstract

Sri Lanka is part of the Western Ghats & Sri Lanka biodiversity hotspot. Thus, the conservation of Sri Lanka's unique biodiversity is crucial. The current study is part of an ongoing survey of pseudoscorpion fauna of Sri Lanka. We carried out an island-wide survey of pseudoscorpions using a range of collection methods to sample a diverse set of habitats around the country. This produced 32 species, four of which might be new to science, belonging to 25 genera. The family Cheiridiidae was discovered on the island for the first time. One new combination, *Indogarypus ceylonicus* (Beier, 1973) **comb. nov.**, is proposed. Out of the 47 species now recorded, 20 (43 %) are potentially endemic to Sri Lanka. We provide a checklist of all known species, document their distribution and give a key to the families.

Key words: biodiversity, Deccan plate, endemics, India, Knuckles Range, Central Hills, arachnids

Introduction

Sri Lanka possesses a highly diverse endemic fauna and flora and is a reservoir of unique evolutionary history (Bossuyt *et al.* 2004; Myers *et al.* 2000). Unfortunately, Sri Lanka's diverse invertebrate fauna remains largely unexplored. Several taxonomic studies on both vertebrates and invertebrates were published during British rule of the island (see Pethiyagoda 2005, 2007 for a review). The standard work on Sri Lanka's invertebrate fauna was published as a part of the monographic series "Fauna of British India, including Ceylon and Burma", during this period. However, it did not treat many smaller arachnid orders like pseudoscorpions (Pocock 1900). This situation is now gradually changing, with a renewed interest in the study of Sri Lanka's invertebrate biodiversity (Bahir & Ng 2005; Beenaerts *et al.* 2010; Benjamin 2001, 2004, 2010; Gunawardene *et al.* 2008; Krombein 1981; Naggs *et al.* 2005; Ng 1994, 1995a, 1995b; Ng & Tay 2001).

Sri Lanka is a relatively large (ca 66,000 km^2) continental island (Somasekaram 1988), which during the greater part of its geological history was part of the Indian subcontinent (Erdelen 1989). Geologically, it is differentiated into the Precambrian Highland Series, Cambrian Vijayan Series, Southwestern Group and the Miocene limestones (Cooray 1967). Sri Lanka is subdivided into four ecological zones—wet, dry, intermediate and arid—primarily based on annual precipitation (Puvaneswaran & Smithson 1993). Additionally, the topology of Sri Lanka is subdivided into three loosely-defined plains of erosion or peneplains: first (0–30 m), second (30–500 m) and third peneplain (500 m upwards) (Adams 1929; Domrös 1998; Wadia 1945). A similar ecological division that subdivides the island into the three zones—lowlands (0–270 m), uplands (270–1060 m) and highlands (910–2420 m), based on a combination of elevation, slope and regional topographic discontinuities—has also been proposed (Dahanayake 1982; Vitanage 1970). These variations may have contributed to the island's high biodiversity and unique evolutionary history (Bossuyt *et al.* 2004).

Sri Lanka's floral diversity and its evolution are comparatively better understood. According to Gunatilleke & Gunatilleke (1991), the rich floras of Sri Lanka are aseasonal forests and relicts of the Deccan flora. The Deccan flora is thought to have evolved in isolation in the late Cretaceous and early Tertiary periods, as the Indian plate

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moved from southern latitudes to its current position, 6–9° north of the equator (Ashton & Gunatilleke 1987; Audley-Charles *et al.* 1981). During this transit and before its collision with Laurasia in the Eocene, tropical rainforests thrived on most of the Deccan plate (Meher Homji 1978). Since the Miocene, however, aridity has increased, mainly in the northern part of the Deccan peninsula in which most of the tropical rainforests were replaced by savannas and scrub forests (Axelrod 1974). Many taxa in remaining rain forests on the Deccan plate have ceased spreading into Asia since the mid-Tertiary, due to changes in climate and competition from Asian floras. Thus, the flora and fauna of the southern part of the Deccan plate (i.e. South India and Sri Lanka) may have rapidly diversified leading to high rates of endemism (Bossuyt *et al.* 2004).

Pseudoscorpiones are one of the oldest lineages of terrestrial organisms (Shear 1991; Shear *et al.* 1989). They are small (usually < 5 mm in length), secretive animals that live in humid soil, leaf litter, under tree bark or in otherwise sheltered environments (Jones 1970; Weygoldt 1969; Witt & Dill 1996). They occur in both natural and man-made habitats. Some species of pseudoscorpions live on or in the nests of, birds (Bhattacharyya 1990; Turienzo *et al.* 2010) and rodents (Rodentia: Muridae) (Beier 1948; Francke & Villegas-Guzman 2006; Hoff & Clawson 1952), indicative of a communalistic relationship, whereby they gain shelter and food from the nest by feeding on ectoparasites, such as larval and adult fleas (Ratnaweera *et al.* 2010; Thanee *et al.* 2009). Pseudoscorpions are predators that feed on a variety of small arthropods. They have weak eyesight and hunt using trichobothria on their pedipalps. Prey are captured with the pedipalps and transferred to the chelicerae (Weygoldt 1969; Witt & Dill 1996).

An interesting and widespread association of pseudoscorpions with arthropods is that of 'phoresy', in which pseudoscorpions attach themselves to a wide variety of other more mobile arthropods for transport (Aguiar & Bührnheim 1998; Santos *et al.* 2005). Phoresy primarily benefits pseudoscorpions by aiding colonization of new habitats with an adequate food supply and thus increasing spatial distribution (Poinar *et al.* 1998). Phoretic associations of pseudoscorpions with arthropods have been recorded in at least 44 families of insects and about 6 families of arachnids (Beier 1948; Muchmore 1971; Poinar et al. 1998; Zeh & Zeh 1992). Further, a close association of some bark inhabiting pseudoscorpions and ants is also known (Cole *et al.* 1994; Krombein *et al.* 1999).

All pseudoscorpion species provide some level of parental care (Tizo-Pedroso & Del-Claro 2005). In some cases female pseudoscorpions carry the fertilized eggs in a brood sac and the embryos are nourished by the female (Fig. 6L). The females are also responsible in some cases for early nymphal care (Del-Claro & Tizo-Pedroso 2009). Tizo-Pedroso & Del-Claro (2005) observed the occurrence of matriphagy in a pseudoscorpion.

The present higher-level classification system of pseudoscorpions is based primarily on morphological evidence and was proposed by Chamberlin (1931), Beier (1932a, 1932b) and Harvey (1992), the latter providing the first cladistic analysis of the order. Recently, Murienne *et al.* (2008) studied the molecular systematics of pseudoscorpions. They recovered groups proposed by both Chamberlin (1931) and Harvey (1992). However, several "black holes" of pseudoscorpion systematics, such as the monophyly of Garypoidea and Neobisioidea, remain to be addressed through studies based on better taxon and character sampling.

Currently, 26 families of recent pseudoscorpions are recognized from around the world (Harvey 1992). 48 species of pseudoscorpions, classified in 15 families and 34 genera, are found in Sri Lanka (Beier 1973; Harvey 2011; Ratnaweera *et al.* 2010). Research on the pseudoscorpions of Sri Lanka started with Ellingsen's (1913) record of *Olpium jacobsoni*, based on a specimen collected by Prof. Arthur Willey. Later, Ellingsen (1914) published a detailed account on pseudoscorpions in the collections of the Indian Museum (Kolkata) that included several new records and a new species from Sri Lanka. Two species of pseudoscorpions were described from Sri Lanka by Chamberlin (1930; 1949), but the exact localities of the two specimens used in his study remain unknown. In 1932, Max Beier (Fig. 1) described *Paratemnus ceylonicus* (now a synonym of *Paratemnoides pallidus*) (Beier 1932c) and in 1973, he published the most comprehensive work on pseudoscorpions of Sri Lanka to date (Beier 1973). This extensive study was based on two large collections of pseudoscorpions from the Muséum d'Histoire Naturelle, Genève (collected by C. Besuchet and I. Löbl in 1970) and the Lund University Museum (collected by P. Brinck, H. Andersson and L. Cederholm; see Brinck *et al.* 1971). Beier (1973) described a new genus and 16 new species, and revised many of the species known from the island at that time. Beier's study forms the basis of our work.

This paper is part of an ongoing island-wide project to collect and record Sri Lanka's pseudoscorpion biodiversity. The end of the 30-year long civil conflict in Sri Lanka provides us with an unparalleled opportunity to

conduct biodiversity surveys and inventories. Here we aim to survey and inventory the pseudoscorpion fauna of Sri Lanka and compare the present status with that of Beier (1973). Further, we provide a checklist of all known species, document their current distribution and give a key to the families. Most Sri Lankan pseudoscorpions are illustrated in color for the first time. Future studies will describe the putative new species and assess their conservation status.

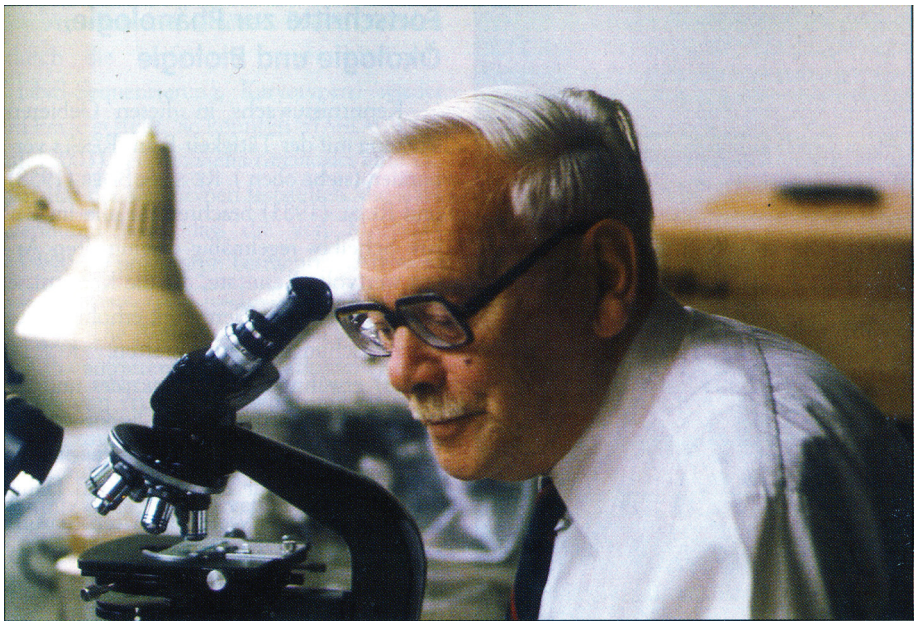

FIGURE 1. Max Walter Peter Beier (1903–1978). Courtesy of Bernd Hauser, Natural History Museum of Geneva.

Material and methods

Soil samples were collected using a litter sieve. The samples were then spread on a white plastic tray positioned under a table lamp and the specimens handpicked with the aid of a magnifying glass. Additionally, species were collected by beating vegetation and searching under tree bark. All collected material was preserved in 70% ethanol. Live specimens were photographed with a Nikon D80 digital camera equipped with a macro attachment. Specimens selected for detailed study were cleared by placing them in lactic acid at room temperature for 1–3 days, depending on the size of the specimen. Cleared whole specimens and dissected structures (such as chelicerae, pedipalps and legs) were examined after mounting them in glycerin, in microscope cavity slides under a coverslip. The mounted specimens were observed under a compound microscope (Olympus BX 51) or a stereo microscope (Olympus SZX 7) and photographed with an Olympus E 330 digital camera. Eight to ten photographs were taken at different depths of field, stacked using Heliconfocus software (Version 5.1) and edited using Adobe Photoshop (Version 7.0). Specimens were identified using papers published by following authors: J.C. Chamberlin, M. Beier, C.C. Hoff and M.S. Harvey.

Sampling was carried out in all major climatic-physiographic zones of Sri Lanka (Pethiyagoda & Manamendra-Arachchi 1998), i.e. Central Mountain Range, Knuckles Range, Low Country wet zone and the dry zone, with the aim of maximizing the number of species collected. Locations are listed alphabetically by provinces and districts to facilitate future studies (Fig. 2). The specimens collected during the course of this study will be deposited in the Department of Wildlife Conservation (DWLC) and the National Museum of Sri Lanka (NMSL).

Abbreviations: IFS, Institute of Fundamental Studies Sri Lanka; BMNH, Natural History Museum London; FR, Forest reserve; L, Location; NP, National Park.

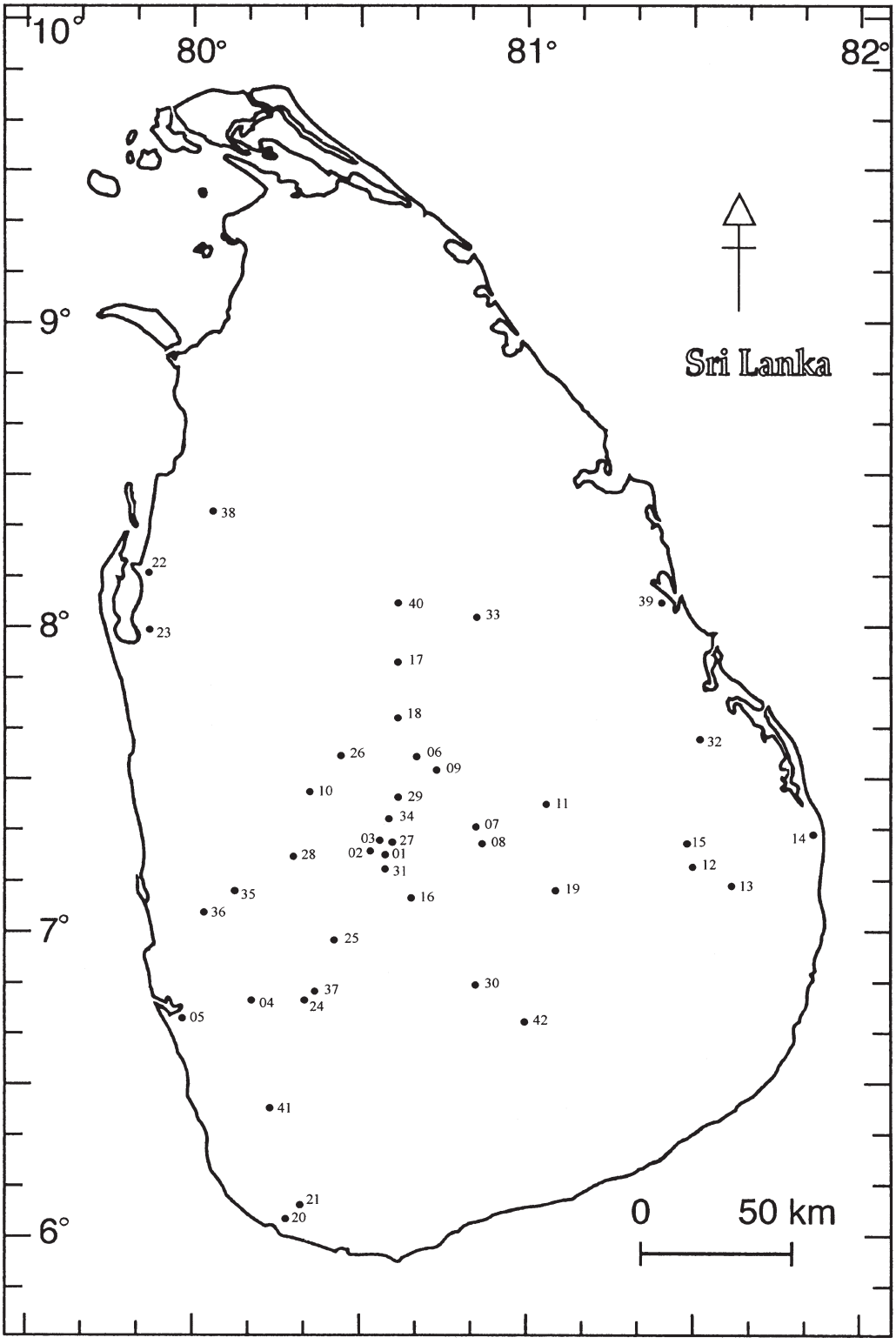

FIGURE 2. Map of Sri Lanka showing sampled localities.

Sampled localities

Central Province, Kandy District

L 1: Dunumadalawa (Wakarawatta forest = Walker's estate), 07°17′00″ N 80°37′49″ E, 600 m, secondary forest, 24 September 2009, S.P. Benjamin and P.M.H. Sandamali; 6 October 2009, S.P. Benjamin *et al.*; 29 October

2009, S.P. Benjamin and S. Batuwita; 22 April 2010, S.P. Benjamin and S. Batuwita.

L 2: Gannoruwa forest, 07°16′60″ N, 80°34′60″ E, 700 m, secondary forest, 27 October 2009, S. Batuwita *et al*.

L 3: Halloluwa, near Peradeniya, 07°17′25″ N, 80°36′22″ E, 500 m, home garden (local term for an overgrown spice garden), under tree bark, 21 May 2010, Z. Jaleel.

L 7: Deenston, Knuclkes Range, 07°20′10″ N, 80°51′31″ E, 1120 m, disturbed forest, litter sieving, 19 January 2010, S.P. Benjamin and S. Batuwita.

L 8: Hunnasgiriya, 07°18′23″ N, 80°51′42″ E, 1100 m, secondary forest, litter sieving, 19 January 2010, S.P. Benjamin and S. Batuwita.

L 16: Loolcondera Estate, Deltota, 07°08′45″ N, 80°41′53″ E, 1480 m, primary forest patch, litter sieving, 23 March 2010, S. Batuwita *et. al*.; 11 May 2010, S. Batuwita and N. Atukorala.

L 27: Udawattekele, Kandy, 07°17′57″ N, 80°38′29″ E, 580 m, secondary forest, litter sieving, 21 August 2010, S. Batuwita.

L 31: Doluwa, near Gampola, 07°11′10″ N, 80°36′22″ E, 480 m, secondary forest, under bark of Jackfruit tree (*Artocarpus heterophyllum*), 24 August 2010, S. Batuwita.

L 34: Jambugahapitiya, near Katugastota, 07°21′35″ N, 80°38′20″ E, 540 m, home garden, under tree bark of Nutmeg tree (*Myristica fragrans*), 24 August 2010, S. Batuwita.

Central Province, Matale District

L 6: Gammaduwa, Knuckles Range, 07°34′ N, 80°42′ E, 900 m, primary forest, 18 November 2009, S.P. Benjamin *et al*.

L 9: Riverstone, Knuckles Range, 07°32′36″ N, 80°45′13″ E, 1000 m, secondary forest, litter sieving, 2 December 2009, S.P. Benjamin and S. Batuwita.

L 17: IFS Arboretum, Dambulla, 07°51′34″ N, 80°40′28″ E, 180 m, secondary forest, litter sieving & under tree bark, 27 April 2010, S.P. Benjamin and S. Batuwita; 23 August 2010, S. Batuwita, 24 August 2010, S.P. Benjamin and S. Batuwita.

L 18: 2 km from Naula town towards Matale, 07°42′26″ N, 80°39′08″ E, 300 m, secondary forest, litter sieving, 27 April 2010, S.P. Benjamin and S. Batuwita.

L 29: Meemure, Knuckles Range, 07°14′14″ N, 80°38′19″ E, 890 m, home garden, under Jackfruit tree bark, 23 August 2010, S.P. Benjamin and S. Batuwita.

Central Province, Nuwara Eliya District

L 19: close to Victoria-Randenigala-Rantambe Sanctuary, 07°09′14″ N, 81°54′12″ E, 290 m secondary forest, litter sieving, 11 May 2010, S. Batuwita and N. Atukorala.

Eastern Province, Ampara District

L 11: 18 km from Padiyathalawa, 07°23′42″ N, 81°05′15″ E, 120 m, secondary forest, litter sieving, 9 February 2010, S.P. Benjamin and S. Batuwita.

L 12: Inginiyagala, Gal Oya NP, 07°13′22″ N, 81°31′56″ E, 80 m, secondary forest, litter sieving & tree beating, 10 February 2010, S.P. Benjamin and S. Batuwita.

L 13: Ekgal Aru, 07°09′44″ N, 80°37′14″ E, 80m, secondary forest, litter sieving, 80 m, 10 February 2010, S.P. Benjamin and S. Batuwita.

L 14: Akkaraipattu, 07°17′35″ N, 81°51′17″ E, 5 m, beach, under scrub, sieving sand with some litter, 11 February 2010, S.P. Benjamin and S. Batuwita.

L 32: Unachchiya, Batticaloa, 07°37′25″ N, 81°33′19″ E, 23 m, secondary forest, litter sieving, 1 November 2009, N. Atukorala.

Eastern Province, Batticaloa District

L 39: Sallimunai, 4 km North of Panichchankerni, 08°06′37″ N, 81°27′20″ E, sea level, 7–9 June 2011, S.P. Benjamin and S. Batuwita.

Eastern Province, Moneragala District

L 15: near Namal Oya tank, Gal Oya NP, 07°17′02″ N, 81°29′35″ E, 5 m, secondary forest, litter sieving, 11 February 2010, S.P. Benjamin and S. Batuwita.

North Central Province, Polonnaruwa District

L 33: Minneriya, 08°02′00″ N, 80°53′52″ E, 88 m, secondary forest, litter sieving, 1 December 2009, N. Atukorala.

North Central Province, Anuradhapura District

L 38: Maradanmaduwa, Wilpattu NP, 08°22′30″ N, 80°05′00″ E, 5 m, scrub jungle, litter sieving, under tree bark, 6 April 2011, S. Batuwita.

L 40: Ritigala, 08°06' N, 80°39 E, 500 m, dry mixed forest, under tree bark, 28 June 2011, S.P. Benjamin *et.al.*

North Western Province, Kurunegala District

L 10: Ethagala Range, 07°28′17″ N, 80°22′30″ E, 190 m, secondary forest, under tree bark, 2 September 2009, R.M.G.N.Tilakaratne *et al*. litter sieving; 24 November 2009, S.P. Benjamin and S. Batuwita; 20 August 2010, S. Batuwita.

L 26: near Ridigama, 07°34′30″ N, 80°29′08″ E, 180 m, Mahogany (*Swietenia macrophylla*) plantation, under Jackfruit tree bark, 20 August 2010, S. Batuwita.

North Western Province, Puttalam District

L 22: Wanathavillua, near Eluwankulam, 08°10′15″ N, 79°52′30″ E, 30 m, secondary forest, litter sieving, 24 May 2010, S. Batuwita, N. Atukorala; 28 June 2010, N. Atukorala; 19 July 2010, N. Atukorala.

L 23: near Puttalam town, 08°02′00″ N, 79°50′00″ E, sea level, scrub forest, litter sieving, 24 May 2010, S. Batuwita and N. Atukorala.

Sabaragamuwa Province, Kegalle District

L 25: Kitulgala, 06°59′15″ N, 80°26′11″ E, 150 m, secondary forest, litter sieving, 1 June 2010, S.P. Benjamin and S. Batuwita.

L 28: Kegalle, close to Kurulukelle, 07°14′12″ N, 80°20′33″ E, 200 m, secondary forest, litter sieving, 21 August 2010, S. Batuwita.

Sabaragamuwa Province, Ratnapura District

L 24: Bopath Ella, Kuruwita, 06°48′06″ N, 80°22′05″ E, 44 m, secondary forest, litter sieving, 1 June 2010, S.P. Benjamin and S. Batuwita.

L 37: Sudagala, near Deerwood Estate (Kuruwita), 06°48′13″ N, 80°23′25″ E, 400m, remnant patch of rainforest, litter sieving and under bark of *Myristica dactyloides*, 11 March 2011, S. Batuwita.

Southern Province, Galle District

L 20: Hiyare, Kottawa-Kombala FR, Galle, 06°04′00″ N, 80°15′00″ E, 80 m, primary forest, litter sieving, 18 May2010, S.P. Benjamin and S. Batuwita.

L 21: Kottawa-Kombala FR, Galle, 06°05′00″ N, 80°20′00″ E, 60 m, primary forest, litter sieving, 19 May 2010, S.P. Benjamin *et al*.

Uva Province, Badulla District

L 30: close to Ohiya Railway station, 06°50′32″ N, 80°53′05″ E, 1280 m, remnant of primary forest, either side of the road to Horton Plains NP, litter sieving and under tree bark, 8 November 2010, S. Batuwita.

L 42: between Diyaluma Falls and Wellawaya (close to a stream), 06°43′32″ N, 81°01′45″ E. 480 m, remnant of primary forest, litter sieving and under tree bark; 4 July 2011, SP. Benjamin and S. Batuwita.

Western Province, Kalutara District

L 4: Bodinagala FR, Ingiriya, 06°46′00" N, 80°11′40″E, 150 m, primary forest, tree beating, 10 November 2009, S.P. Benjamin.

L 5: Panadura, Mahabellana, 06°41′40″ N, 79°58′04″ E, 7 m, scrub forest, tree beating, 1 December 2009, S.P. Benjamin.

L 41: Kalugala FR, Agalawatta, 06°26′35″ N, 80°14′52″ E, 40 m, primary forest, litter sieving, 29 July 2011, S Batuwita *et al.*

Western Province, Gampaha District

L 35: Alawala, on the Attanagalla–Alawala road, coconut plantation by the Attanagalu river, 07°06′44″ N, 80°09′42″ E, 50 m, under bark of Jackfruit and *Dipterocarpus* trees, 17 January 2011, S. Batuwita.

L 36: Pilikuttuwa, close to Yakkala, 07°03′53″ N, 80°03′04″ E, 50 m, litter sieving and under tree bark, 17 January 2011, S. Batuwita.

Checklist of the pseudoscorpions of Sri Lanka

Synonyms, type localities and distribution data given below are from Harvey (2011) and Beier (1973).

Order Pseudoscorpiones

Family Chthoniidae Daday, 1889

Subfamily Chthoniinae Daday, 1889

Tribe Tyrannochthoniini Chamberlin, 1962

Genus *Lagynochthonius* Beier, 1951

Lagynochthonius brincki (Beier, 1973)

(Fig. 4D)

Tyrannochthonius (Lagynochthonius) brincki Beier 1973: 39–40, fig 1.
Lagynochthonius brincki (Beier): Harvey 1991: 183.

Distribution. Sri Lanka; Thailand.

Previous records. *Sabaragamuwa Province:* Bopathella Falls (type locality); *Uva Province:* Diyaluma Falls; *Southern Province:* Palatupana (Beier 1973).

New record. *Uva Province*: Badulla District: L 42.

Remarks. Collected from a location close to Diyaluma Falls, locality of the paratype.

Genus *Tyrannochthonius* Chamberlin, 1929

Tyrannochthonius heterodentatus Beier, 1930

(Fig. 4C)

Tyrannochthonius heterodentatus Beier 1930: 294–295, fig 1.
Tyrannochthonius (Tyrannochthonius) madrasensis Murthy, 1961: 223–224, figs 2a–b; Beier 1973: 39; Harvey 1991: 209 (synonymized by Beier (1974)).

Distribution. India (Kerala; type locality); Sri Lanka (island-wide).

Previous records. *Western Province*: Alawala, Yakkala; *Central Province*: Kandy, Udawattakelle, Peradeniya, Hatton, Dambulla; *Sabaragamuwa Province*: Kuruwita (Deerwood estate), Bopathella Falls, Kegalle, Kalawana, Ratnapura; *North Central Province*: **"**Blut Oya" [not located], Ambagaswewa, Medawachchiya, Mihintale; *North*

Central Province: Madhu road, Nedunleni, Puliyan, Mullativu; *Eastern Province*: Kantalai; *Uva Province*: Inginiyagala (Beier 1973).

New records. Kandy District: L 1, L 8; Kurunegala District: L 10; Ampara District: L 12; Moneragala District: L 15; Galle District: L 20; L 21; Polonnaruwa District: L 33; Ratnapura District: L 37; Anuradhapura District: L 38; Kalutara District: L 41.

Family Pseudotyrannochthoniidae Beier, 1932

Genus *Afrochthonius* Beier, 1930

Afrochthonius ceylonicus Beier, 1973
(Fig. 4B)

Afrochthonius ceylonicus Beier 1973: 40–42, fig 2; Harvey, 1991: 131.

Distribution. Sri Lanka.

Previous records. *Central Province:* Horton Plains (type locality), Hakgala, Piduruthalagala, Udawattakele (Beier 1973).

New record. *Central Province:* Badulla District: L 30.

Remarks. Found under decaying logs in primary forest.

Afrochthonius reductus Beier, 1973
(Fig. 4A)

Afrochthonius reductus Beier 1973: 42, fig 3.

Distribution. Sri Lanka.

Previous records. *Central Province:* Hatton (type locality), Hakgala (Beier 1973).

New record. *Central Province:* Kandy District: L 1.

Remarks. Found under decaying logs in primary forest. Mainly distinguished from *A. ceylonicus* by the trichobothrial position of the movable chelal finger (Beier 1973). Our specimens of the two species are in accordance with the descriptions given by Beier (1973).

Family Feaellidae Ellingsen, 1906

Genus *Feaella* Ellingsen, 1906

Feaella (*Tetrafeaella*) *indica* Chamberlin, 1931
(Fig. 5J)

Feaella indica Chamberlin 1931a: 234, figs 1p, 6f, 7c–g, 9k, 11d, 14f, 16m, 18h, 20a, 29g, 38c–d, 64.
Feaella (Tetrafeaella) indica: Beier 1955: 546; Murthy & Ananthakrishnan, 1977: 112–114; Harvey, 1991: 231.

Distribution. Bangladesh (*Khulna*: Jhenaidah, Jessore District; type locality); India; Sri Lanka.

Previous records. *Eastern Province*: Gal Oya, Rambukkan Oya (?=Kumbukkan Oya), Kantale, Periyapullamalai near Pulaveli; *Central Province*: Hasalaka near Weragamtota, Dambulla; *North Central Province*: Mihintale; *North Province*: Mullatiuv; *Uva Province*: Inginiyagala (Beier 1973).

New record. *Eastern Province:* Ampara District: L 12.

Remarks. Collected from leaf litter near a large rock cave.

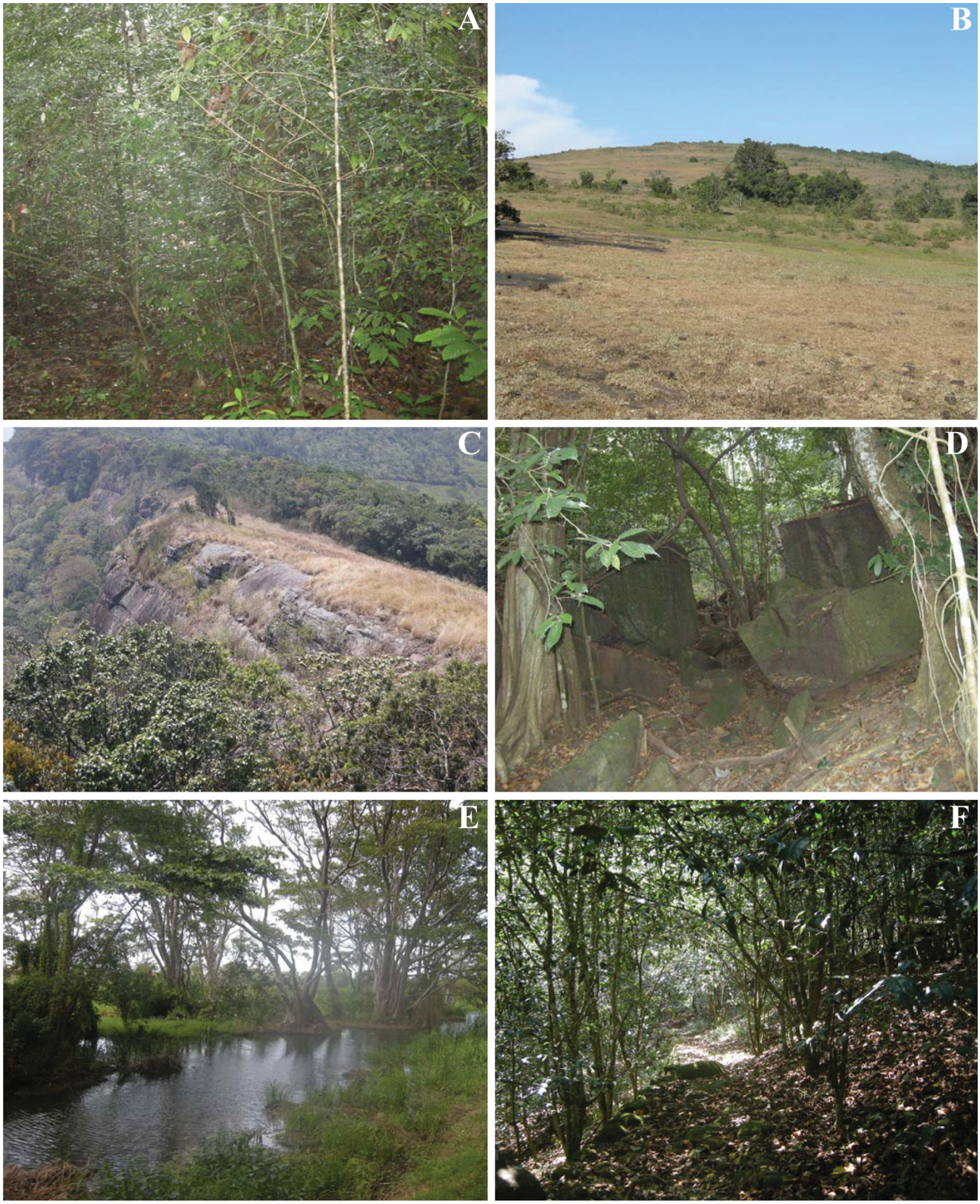

FIGURE 3. A. Low country rain forest (Kombala-Kottawa forest reserve); B. Knuckles Range (Pitawala Patana); C. Central Hills (Loolcondera estate); D. Dry zone intermediate forest (Inginiyagala); E. Dry zone riverine forest (Wanathavilluwa); F. Kandiyan home garden (Katugastota).

Family Hyidae Chamberlin, 1930

Genus *Hya* Chamberlin, 1930

***Hya chamberlini* Harvey, 1993**
(Fig. 4F)

Hya minuta (not Tullgren, 1905): Beier 1973: 42 (misidentification).
Hya chamberlini Harvey 1993: 12–15, figs 2, 17–27.

Distribution. Sri Lanka.

Previous records. SRI LANKA: *Western Province*: Alawala; *Eastern Province*: Gal Oya, Kantale; *Central Province*: Dambulla (type locality), Hasalaka near Weragamtota; *North Central Province*: Ambegaswewa, Medawachchiya, Mihintale; *Sabaragamuwa Province*: Kegalle (Beier 1973).

New records. *Northwestern Province:* Kurunegala District: L 10; *Central Provinc:* Matale District: L 18; *Eastern Province:* Batticaloa District: L 32; *North Central Province:* Polonnaruwa District: L 33.

Remarks. Collected from moist leaf litter in primary and secondary forests.

Family Ideoroncidae Chamberlin, 1930

Genus *Nhatrangia* Redikorzev, 1938

***Nhatrangia ceylonensis* Mahnert, 1984**
(Fig. 6A)

Shravana dawydoffi (not Redikorzev, 1938): Beier 1973: 43 (misidentification).
Nhatrangia ceylonensis Mahnert 1984: 681–684, figs 56–61; Harvey 1991: 322.

Distribution. Sri Lanka.

Previous records. *Eastern Province*: Kantale, Trincomalee, Gal Oya; *North Central Province:* Mihintale, Minneriya, Medawachchiya (type locality); *North Province:* Mankulam, Point Pedro, Puliyan, Mullattivu (Beier 1973; Mahnert 1984).

New record. *North Central Province:* Anuradhapura District: L 38.

Family Syarinidae Chamberlin, 1930

Genus *Ideoblothrus* Balzan, 1892

***Ideoblothrus ceylonicus* (Beier, 1973)**
(Fig. 4G)

Ideobisium ceylonicum Beier 1973: 42–43, fig 4.
Ideoblothrus ceylonicus (Beier): Harvey 1991: 422.

Distribution. Sri Lanka.

Previous records. Andapolakanda (type locality); *Western Province:* Colombo (Colpetty); *Sabaragamuwa Province:* Karagal Oya; *Central Province:* Dambulla (Beier 1973).

New records. *Eastern Province,* Ampara District: L 13; *Central Province,* Matale District: L 9; *Central Province,* Nuwara Eliya District: L 19; *Southern Province,* Galle District: L 21.

Remarks. Collected from moist leaf litter.

Family Garypidae Simon, 1879

Genus *Garypus* Koch, 1873

***Garypus maldivensis* Pocock, 1904**

Garypus maldivensis Pocock 1904: 798–799, figs 1a–e.

Distribution. Indonesia (Krakatau Islands); Maldives (*Addu Atoll*; type locality); Oman; Sri Lanka.

Previous record. *North Province*: Point Pedro (Beier 1973).

Remarks. Not found in the present study.

Family Geogarypidae Chamberlin, 1930

Genus *Geogarypus* Chamberlin, 1930

***Geogarypus tenuis* Chamberlin, 1930**

Geogarypus tenuis Chamberlin 1930: 611–612; Chamberlin 1931a: fig 29i; Vachon 1934: 414; Beier, 1973: 45; Harvey 1986: 760.
Geogarypus (Geogarypus) tenuis Chamberlin: Beier 1932a: 234.

Distribution. Sri Lanka (type locality; 'presumably from Ceylon' (Chamberlin 1930)).

Previous record. *North Central Province*: Mankulam (Beier 1973).

New record. *North Central Province*, Anuradhapura District: L 40.

Remarks. According to Judson (1997) the original label of the holotype gave only the number '39' and the collector E.E. Green, from which Chamberlin inferred that the material came from Sri Lanka.

Genus *Indogarypus* Beier, 1957

Remarks. The subgenus *Indogarypus* was erected by Beier (1957). However, he did not mention it in his paper on the Sri Lanka fauna (Beier 1973). Later, the Sri Lankan species *Geogarypus ceylonicus* was transferred to the subgenus *Indogarypus* by Murthy & Ananthakrishnan (1977). Harvey (1986) raised Geogarypidae to family status and recognized three genera, including *Indogarypus*, which was elevated to generic rank (Harvey 1986). However, Murthy & Ananthakrishnan's (1977) transfer of *G. ceylonicus* to *Indogarypus* was not accepted by Harvey (1986), leaving *Indogarypus* monotypic. The specimens collected from L 10, L 11, L 19 and L 22 (4 ex.), correspond well to the description given by Beier (1973) for *G. ceylonicus* Beier, 1973 and all our mature specimens possess interno-lateral sulci on the pedipalpal chela, which is considered diagnostic for the genus *Indogarypus* (Harvey 1986). Thus, *G. ceylonicus* is here transferred to *Indogarypus*.

***Indogarypus ceylonicus* (Beier, 1973) new combination**
(Figs 5G, 5H)

Geogarypus ceylonicus Beier 1973: 46, fig 10; Harvey 1986: 760; Harvey 1991: 253.
Geogarypus (Indogarypus) ceylonicus Beier: Murthy & Ananthakrishnan 1977: 110.

Distribution. Sri Lanka, India.

Previous records. *Western Province*: Yakkala (type locality); *Central Province*: Hasalaka near Weragamthota, Kandy (Udawattekele), Mululla, Blut Oya; *North Central Province*: Mihintale; *North Province*: Nedunleni; *Eastern Province*: Periyapullamalai near Pulaveli; *North Western Province*: Ambepussa, Polganawela (= Polgahawela); *Southern Province*: Yala National Park (Beier 1973).

New record. *Northwestern Province,* Puttalam District, L 22; *Northwestern Province,* Kurunegala District, L 10; *Central Province,* Nuwara Eliya District, L 19; *Eastern Province,* Ampara District L 11.

Remarks. Found in leaf litter and under decaying logs in secondary forests.

***Indogarypus indicus* (Beier, 1930)**
(Fig. 5I)

Garypus indicus Beier 1930: 290–291, figs 3, 4a–b.
Geogarypus (Geogarypus) indicus Beier: Beier 1932a: 235.
Geogarypus (Indogarypus) indicus Beier: Beier 1957: 25.
Geogarypus indicus Beier: Beier 1973: 46.
Indogarypus indicus (Beier): Harvey 1986: 759.

Distribution. India (*Kerala*: Travancore; type locality); Sri Lanka.

Previous record. *Central Province:* Horton Plains, Nuwara Eliya, Hatton, Hakgala (Beier 1973).

New record. *Central Province:* Badulla District: L 30.

Family Olpiidae Banks, 1895

Subfamily Olpiinae Banks, 1895

Genus *Calocheiridius* Beier and Turk, 1952

***Calocheiridius mussardi* Beier, 1973**
(Fig. 4H)

Calocheiridius mussardi Beier 1973: 44–45, fig 8.

Distribution. Sri Lanka.

Previous record. *Southern Province:* Palatupana (type locality).

New records. *Eastern Province:* Ampara District: L 14; *North Western Province:* Puttalam District: L 23; *North Central Province:* Anuradhapura District: L 38.

Remarks. Found in coastal areas. *Calocheiridius mussardi* seems to be a widespread species in the dry zone of Sri Lanka. Specimens were collected from Puttalam (scrub jungle close to salt factory), Akkaraipattu (under a shrub on sandy beach) and Maradanmaduwa (scrub jungle).

Genus *Indolpium* Hoff, 1945

***Indolpium loyolae* (Murthy, 1961)**
(Fig. 4J)

Minniza loyolae Murthy 1961: 221–222, fig 1a–b.
Indolpium loyolae (Murthy): Beier 1967: 347; Harvey 1991: 283.

Distribution. India (*Tamil Nadu*: Nungambakkam, Chennai (as Madras); type locality); Sri Lanka.

Previous records. *Northern Province*: Point Pedro, Gaint's tank, Pulian, Nedunleni, Nadhu Road (=Madhu Road), Murunkan; *North Central Province*: Blut Oya?, Ambegaswewa, Mihintale; *Central Province*: Kandy, Weragamthota; *Eastern Province*: Kantale; *Uva Province*: Inginiyagala; *Sabaragamuwa Province*: Ratnapura (Beier 1973).

New records. *Eastern Province:* Ampara District: L 12 & L 13; Batticaloa District: L 39; *Central Province:* Matale District: L 17; Nuwara Eliya District: L 19; *North Western Province:* Puttalam District: L 22.

Genus *Minniza* Simon, 1881

Minniza ceylonica Beier, 1973

Minniza ceylonica Beier 1973: 44, fig 7.

Distribution. Sri Lanka.

Previous record. *North Province*: Nanthi Kadal, three miles South of Mullaittivu (type locality) (Beier 1973).

Remarks. Not found in the present study.

Genus *Olpium* L. Koch, 1873

Olpium ceylonicum Beier, 1973

Olpium ceylonicum Beier 1973: 43–44, fig 6.

Distribution. Sri Lanka.

Previous records. *Eastern Province*: Kuchchaveli (type locality); *Western Province:* Colombo, Ja-Ela (Beier 1973).

New record. *Western Province:* Kalutara District: L 4.

Remarks. Collected by tree beating from a low country evergreen forest patch in the Western Province of Sri Lanka. This specimen, a male, is in a bad condition, making identification difficult. We tentatively identify it as *O. ceylonicum* due to its characteristic carapace length/width ratio of 1.2 (vs. 1.4 in our specimens of *O. jacobsoni*).

Olpium jacobsoni Tullgren, 1908
(Fig. 4I)

Olpium jacobsoni Tullgren 1908: 148–150, fig 1; Ellingsen 1913: 455.

Distribution. India; Indonesia (Java; type locality); Sri Lanka; Taiwan; Thailand.

Previous record. No specific locality, Ceylon (= Sri Lanka), Arthur Willey, 22 October 1906 (Ellingsen 1913).

New records. *North Western Province:* Kurunegala District: L 10; *Eastern Province:* Ampara District: L 12; *Sabaragamuwa Provinc:* Kegalle District: L 28.

Remarks. This species is tentatively identified based on Tullgren's (1908) original description. The new specimens were collected by tree beating as well as litter sieving. The specimens, all males, have the following length/width ratios: carapace 1.4 (vs. 1.2 in male *O. ceylonicum*), pedipalpal femur 2.6–2.9 (vs. 3.6), patella 2.2–2.5 (vs. 2.8) and chela 3.0–3.4 (vs. 3.0). The length/width ratios given by Tullgren (1908) were carapace 1.37, pedipalpal femur 3.0 and patella 2.4.

The records of *Olpium ceylonicum* and *O. jacobsoni* from Sri Lanka need further consideration. Ellingsen's (1913) record of *Olpium jacobsoni* from Sri Lanka was based on a single specimen, which was sent to BMNH by Prof. Arthur Willey of the National Museum, Colombo. Unfortunately, as with many old records of the fauna of Sri Lanka, the exact locality of the specimen is unknown. Furthermore, Ellingsen's (1913) record of *O. jacobsonii* from Sri Lanka lacks a detailed description of the specimen. It is possible that Ellingsen's record might instead pertain to *Olpium ceylonicum*: the descriptions of these two species (Tullgren, 1908; Beier, 1973) are very similar.

Family Sternophoridae Chamberlin, 1923

Genus *Afrosternophorus* Beier, 1967

***Afrosternophorus ceylonicus* (Beier, 1973)**
(Fig. 4E)

Sternophorus ceylonicus Beier 1973: 47, fig 11.
Afrosternophorus ceylonicus Harvey 1985: 174–177, figs 53, 65–66, 80–85, 90, map 4; Harvey, 1991: 447.

Distribution. India; Sri Lanka.

Previous records. *North Province:* Chemiyanpattu (type locality); *North Western Province:* five miles NNE Puttalam (Beier 1973).

New records. *Central Province:* Matale District: L 17; *Western Province:* Gampaha District: L 35; *North Central Province:* Anuradhapura District: L 38.

Remarks. Found under tree bark of *Dipterocarpus* trees.

Family Cheiridiidae Hansen, 1894

Genus *Cryptocheiridium* Chamberlin, 1931

***Cryptocheiridium* sp.**
(Fig. 6G)

Distribution. *Eastern Province:* L 12.

Remarks. Generic identification is based on Beier (1932b), Mahnert (1982) and Schawaller (1981). This is the first record of the family Cheiridiidae in Sri Lanka. The specimen, found among leaf litter in the Gal Oya National Park in Inginiyagala, is of an undescribed species, which will be described in the near future. Found together with *Feaella* (*Tetrafeaella*) *indica*.

Family Atemnidae Kishida, 1929

Subfamily Atemninae Kishida, 1929

Genus *Anatemnus* Beier, 1932

***Anatemnus* cf. *javanus* (Thorell, 1883)**
(Fig. 5E)

Chelifer javanus Thorell 1883: 37–40; Ellingsen 1914: 3.
Anatemnus javanus (Thorell): Harvey 1991: 451–452; Klausen, 2005: 643, fig 24.

Distribution. India; Indonesia (Java, Cibodas (as Tcibodas), Jawa Barat; type locality); Malaysia; Myanmar; Papua New Guinea; Sri Lanka.

Previous record. *Central Province*: Pattipola, under bark of trees (Ellingsen 1914).

New record. *Uva province:* Badulla District: L 30.

Remarks. The two females were collected from a remnant forest patch close to the Ohiya Railway station, not far from Pattipola. They were found under bark of moss-covered trees. Pedipalpal femur 1.4 mm, 2.1 times as long as broad; serrula exterior with 21 blades (vs. pedipalpal femur 1.1 mm, 2.6 times as long as broad; serrula exterior with 26 blades in *Anatemnus javanus* (Beier 1932b). Provisionally compared to *A. javanus*, as Pattipola is about a kilometer from Ohiya. However, given the differences of our specimens, they may not belong to *A. javanus*.

Currently, there are 16 described species of *Anatemnus*, several with very wide distributions (Harvey 2011; Klausen, 2005). A comparative study of type material is required to determine if these specimens are of a species new to science.

Anatemnus nilgiricus Beier, 1932

Anatemnus nilgiricus Beier 1932b: 52, fig 63; Beier 1932c: 582–583; Beier 1973: 47; Harvey, 1991: 452.

Distribution. India (***Tamil Nadu*:** Nilgiris; type locality); Sri Lanka.

Previous records. *Western Province:* Alawala; *Sabaragamuwa Province:* Maratenna, Karagal Oya; *North Province:* Puliyan (Beier 1973).

New records. *Central Province:* Matale District: L17 and L 29; Kandy District: L 31.

Anatemnus orites (Thorell, 1889)

(Fig. 5F)

Chelifer orites Thorell 1889: 597–599, plate 5 fig 7; Ellingsen 1914: 4.
Anatemnus orites (Thorell): Beier 1932b: 50, fig 59; Beier 1932c: 580; Klausen 2005: 643; Harvey, 1991: 453.

Distribution. China (Yunnan); India; Indonesia (Sumatra); Myanmar (Mt. Mooleyit; type locality); Philippines; Sri Lanka; Thailand.

Previous records. *North Central Province*: Anuradhapura, *Central Province*: Peradeniya (Ellingsen 1914).

New records. *Central Province:* Matale District: L 6; Sabaragamuwa province: Ratnapura district: L 37; *Western Province:* Gampaha District: L 35 & L 36.

Remarks. Found under bark of Jackfruit tree and in leaf litter.

Genus *Micratemnus* Beier, 1932

Micratemnus anderssoni Beier, 1973

(Fig. 5B)

Micratemnus anderssoni Beier 1973: 49, fig 13.

Distribution. Sri Lanka.

Previous record. *Sabaragamuwa Province:* Kuruwita, Deerwood (type locality).

New records. *Central Province:* Kandy District: L 27; *Sabaragamuwa Province:* Ratnapura District: L 37; *North Central Province:* L 38.

Remarks. Rather common in the Kandy area.

Micratemnus ceylonicus Beier, 1973

Micratemnus ceylonicus Beier 1973: 47–49, fig 12; Beier 1974: 1009–1010, fig 6.

Distribution. India; Sri Lanka; Thailand.

Previous records. Yalakumbura, 5 miles SSW of Bibile (type locality); *Central Province:* Mululla (Beier 1973).

Remarks. Not found in the present study.

***Micratemnus* sp.**

Distribution. *Central Province:* Kandy District: L 16.

Remarks. Collected from Loolcondera estate in Deltota; found in leaf litter.

A possible new species: the pedipalpal femur and patella length/width ratios are 2.7 and 2.5, respectively (vs.2.4–2.5 and 2.0–2.1 in *Micratemnus anderssoni* or 2.2–2.4 and 2.1–2.3 in *M. ceylonicus* Beier 1973).

Genus *Oratemnus* Beier, 1932

***Oratemnus indicus* (With, 1906)**
(Fig. 5D)

Chelifer indicus With 1906: 194–196, fig 23, plate 4 fig 10a–d; Ellingsen 1914: 3.
Oratemnus indicus (With): Beier 1932b: 60; Beier 1932c: 591; Beier 1973: 49.

Distribution. India (*Tamil Nadu*: Vellore, near Chennai (Madras); type locality); Sri Lanka.

Previous record. *Sabaragamuwa Province:* Maratenna (Beier 1973).

New records. *Central Province:* Matale district: L 29; *Northwestern Province,* L 22.

Remarks. L 22 specimens were found in leaf litter close to an irrigation canal. L 17 & L 29 specimens were found under bark of Jackfruit trees. All specimens are provisionally identified. The type from Vellore, Madras as well as Beier's (1973) specimen from Maratanne need to be studied to confirm the identity of these specimens. It is possible that more than one species is involved, as the habitats are different and the localities are far apart.

***Oratemnus loyolai* Sivaraman, 1980**

Oratemnus loyolai Sivaraman 1980: 349–352, figs 3a–b; Klausen 2005: 645, fig 15.

Distribution. India (*Tamil Nadu*: Red Hills, Chennai (as Madras); type locality); Sri Lanka.

Previous record. *Central Province:* Peradeniya, Botanical Garden, (Klausen 2005).

Remarks. Not found in the present study.

***Oratemnus navigator* (With, 1906)**

Chelifer navigator With 1906: 191–193; Ellingsen 1914: 3–4.
Oratemnus navigator (With): Beier 1932b: 589–590; Beier 1932e; Harvey 1991: 467; Klausen 2005: 645–646.

Distribution. India (type locality 'on ship from India'); Indonesia (Bali, Java); Malaysia; Myanmar; Philippines; Seychelles; Sri Lanka; Thailand.

Previous record. *Central Province*: Peradeniya, under bark of Jackfruit tree (Ellingsen 1914).

Remarks. Not found in the present study. Because this species and *O. loyolai* are both now known from the same locality and habitat, under bark of Jackfruit trees in the Botanical Gardens, Peradeniya, these two records might refer to the same species.

***Oratemnus proximus* Beier, 1932**
(Fig. 5C)

Oratemnus proximus Beier 1932c: 590–591; Beier 1932b: 59–60, fig 71.

Distribution. Indonesia (type locality); Sri Lanka.

Previous records. *North Central Province:* Maradan Maduwa (Wilpattu National Park), Ritigala, Minneriya, Maha Bulankulama, Polonnaruwa; *North Western Province:* Andapolakanda, Puttalam; *Central Province:* 20 miles East of Kandy; *Uva Province:* Haputale (Beier 1973).

New records. *Central Province:* Kandy District: L 31; *North Central Province:* Anuradhapura District: L 38 & L 40.

Remarks. Collected from bark and leaf litter. According to Beier (1973) this species may be a small form of *Oratemnus indicus*.

Genus *Paratemnoides* Harvey, 1991

Paratemnoides pallidus (Balzan, 1892)

(Figs 6H, 6K)

Chelifer (Atemnus) pallidus Balzan 1892: 511–512, fig 2, 2a.
Chelifer plebejus (not With, 1906): Tullgren 1907: 55, fig 15; Ellingsen, 1914: 4 (in part) (misidentifications).
Paratemnus ceylonicus Beier, 1932c: 569; Beier 1932b: 39–40, fig 43–44; Beier 1973: 47 (synonymized by Klausen 2005: 647, fig 18).
Paratemnoides pallidus (Balzan): Harvey 1991: 472–473; Klausen 2005: 647.

Distribution. Burundi; Cameroon; Congo; Côte d'Ivoire; Democratic Republic of Congo (Zaire); Equatorial Guinea; Gabon; Guinea; Guinea-Bissau; India; Kenya; Malaysia; São Tomé and Príncipe; Sierra Leone (type locality); Sri Lanka; Togo; Uganda.

Previous records. *Western Province:* Yakkala; *Southern Province*: Kosgoda, Udugama; *Sabaragamuwa Province:* Deerwood estate Kuruwita; *Uva Province:* Westminister Abbey; *North Central Province:* Maradan Maduwa, Minneriya (Beier 1973).

New records. *Central Province:* Kandy District: L 3 & L 17; *North Western Province:* Kurunegala District: L 10 & L 26.

Remarks. Common in Sri Lanka.

Genus *Stenatemnus* Beier, 1932

Stenatemnus brincki Beier, 1973

(Fig. 5A)

Stenatemnus brincki Beier 1973: 50, fig 14; Beier 1974: 1010.

Distribution. India; Sri Lanka.

Previous records. *Sabaragamuwa Province:* Deerwood (type locality), Five miles NNW Balangoda, Karagal Oya; *Central Province:* Kandy (Beier 1973).

New records. *Central Province:* Kandy District: L 1, L 27, Matale District: L 6; *Sabaragamuwa Province:* Kegalle District: L 25, Ratnapura District: L 37; *Western Province:* Kalutara District: L 41.

Remarks. Common in Sri Lanka.

Family Cheliferidae Risso, 1827

Subfamily Cheliferinae Risso, 1827

Genus *Lissochelifer* Chamberlin, 1932

***Lissochelifer depressoides* (Beier, 1967)**

Lophochelifer depressoides Beier 1967: 362–363, fig 23; Beier 1973: 52–53, fig 17.
Lissochelifer depressoides (Beier): Harvey 1991: 510.

Distribution. India (*Karnataka:* 19 km E of Virajpet, Mysore; type locality); Sri Lanka.
Previous record. *Western Province:* Alawala, 26 miles NE Colombo (Beier 1973).
Remarks. Not found in the present study.

Genus *Lophochernes* Simon, 1878

***Lophochernes cederholmi* Beier, 1973**

Lophochernes cederholmi Beier 1973: 54–55, fig 19; Harvey 1991: 512.

Distribution. Sri Lanka.
Previous record. *North Central Province*: Maradanmaduwa (type locality).
Remarks. Not found in the present study. A rare species of pseudoscorpion only known from the type locality.

***Lophochernes ceylonicus* Beier, 1973**

Lophochernes ceylonicus Beier 1973: 53–54, fig 18.

Distribution. Sri Lanka.
Previous records. *Sabaragamuwa Province:* Deerwood (type locality).
Remarks. Not found in the present study.

Genus *Mucrochelifer* Beier, 1932

***Mucrochelifer borneoensis* (Ellingsen, 1901)**

Chelifer borneoensis Ellingsen 1901: 206–208; Ellingsen 1914: 6–7.
Mucrochelifer borneoensis (Ellingsen): Beier 1932b: 250–251, figs 258–259; Harvey 1991: 518.

Distribution. Indonesia ("Borneo", Java; type locality); Myanmar; Papua New Guinea; Sri Lanka.
Previous record. *Central Province:* Peradeniya, under loose bark of Jackfruit tree (Ellingsen 1914).
Remarks. Not found in the present study. The record of *Mucrochelifer borneoensis* by Ellingsen (1913) might be a misidentification. According to Ellingsen (1913), the Sri Lankan specimen, an adult male, was smaller than the type from Borneo. He further notes that the tarsal claws of leg I lacked teeth. Since the Sri Lankan specimen was a mature male, it should have possessed these characteristic teeth illustrated by Beier (1932b, fig 258).

Genus *Telechelifer* Chamberlin, 1949

***Telechelifer lophonotus* Chamberlin, 1949**

Telechelifer lophonotus Chamberlin 1949: 38–41, figs 11a–l; Harvey 1991: 532; Judson 1997: 25.

Distribution. Sri Lanka (Chamberlin 1949).
Remarks. Not found in the present study. According to Chamberlin (1949), the type locality of *Telechelifer*

lophonotus is doubtful. The specimen, collected by E.E. Green, might have come from either India or Sri Lanka. We sampled several locations in the Kandy and Nuwara Eliya districts, including Punduloya and Peradeniya, localities where E.E. Green was known to have lived. However, we failed to find any pseudoscorpions that fit the description of *T. lophonotus*.

Family Chernetidae Menge, 1885

Subfamily Chernetinae Menge, 1885

Tribe Chernetini Menge, 1885

Genus *Ceriochernes* Beier, 1937

***Ceriochernes besucheti* Beier, 1973**
(Fig. 6B)

Ceriochernes besucheti Beier 1973: 51, fig 15; Harvey 1991: 553.

Distribution. Sri Lanka.

Previous record. *Sabaragamuwa Province:* Kegalle (type locality).

New records. *Northwestern Province:* Kurunegala District: L 10; *Western Province:* Gampaha District: L 36.

Remarks. *Ceriochernes besucheti* was found in the Ethagala Range. This species has the characteristic number of three rallar blades seen in most congeners, as stated by Harvey & Volschenk (2007).

Genus *Haplochernes* Beier, 1932

***Haplochernes warburgi* (Tullgren, 1905)**

Chelifer warburgi Tullgren 1905: 42–43, figs 3a–b.
Haplochernes warburgi (Tullgren): Harvey 1991: 582; Krombein *et al.* 1999: 28.

Distribution. Indonesia (Java, Krakatau Islands, Sulawesi, West Papua; type locality); Papua New Guinea; Sri Lanka; Thailand.

Previous records. *Sabaragamuwa Province:* Rakwana (Beier 1973), Ratnapura District (Krombein *et al.* 1999).

Remarks. Not found in the present study.

Genus *Parachernes* Chamberlin, 1931

***Parachernes* (*Parachernes*) *cocophilus* (Simon, 1901)**
(Figs 6C–D, 6H–J)

Chelifer cocophilus Simon 1901: 79–80; Ellingsen 1912: 81.
Parachernes (Argentochernes) cocophilus (Simon): Beier 1932b: 123–124, figs 140.
Parachernes cocophilus (Simon): Beier, 1967: 354; Beier 1973: 51.
Parachernes (Parachernes) cocophilus (Simon): Harvey 1991: 614.

Distribution. Equatorial Guinea; Malaysia (*Kelantan:* Kuala Aring; type locality); Sri Lanka; Thailand; Vietnam.

Previous record. *North Central Province:* Maradan Maduwa (Wilpattu National Park; Beier 1973).

New records. *Northwestern Province:* Kurunegala District: L 10 & L 26.

Remarks. Found under bark of Jackfruit trees (Figs 6H–K). *Parachernes* (*P.*) *cocophilus* was found living in large colonies together with *Paratemnoides pallidus*, in forests of the dry zone.

Parachernes (*Parachernes*) *indicus* Beier, 1967

Parachernes indicus Beier 1967: 354–355, fig 14; Beier 1973: 50–51.
Parachernes (Parachernes) indicus Beier: Harvey 1991: 615.

Distribution. India (*Karnataka*: 6 km SW of Sidapur; type locality); Sri Lanka.

Previous records. *Sabaragamuwa Province:* Kuruwita (Deerwood estate) (Beier 1973).

Remarks. Not found in the present study.

Genus *Parapilanus* Beier, 1973

Parapilanus ceylonicus Beier, 1973

Parapilanus ceylonicus Beier 1973: 52–53, fig 16.

Distribution. Sri Lanka.

Previous record. *Sabaragamuwa Province:* Kegalla (type locality).

Remarks. Not found in the present study.

Genus *Verrucachernes* Chamberlin, 1947

Verrucachernes oca Chamberlin, 1947
(Fig. 6E)

Verrucachernes oca Chamberlin 1947: 313–316, figs 3a–i; Harvey 1991: 639.
Microchernes orientalis Beier 1951: 92–93, fig 27 (synonymized by Harvey 1988).

Distribution. Bhutan; Cambodia; China (Sichuan, Yunnan); Federated States of Micronesia; Guam (Oca Point; type locality); Indonesia (Krakatau Islands, Sumba); Marshall Islands; Nepal; Northern Mariana Islands; Papua New Guinea; Solomon Islands; Sri Lanka; Thailand; Vietnam.

Previous records. *Sabaragamuwa Province:* Two Miles NNE Belihul Oya; Allerton Estate, 1 mile SW Rakwana, Kegalle (Beier 1973).

New record. *Northwestern Province:* Puttalam District: L 22.

Remarks. Found in leaf litter in Wanathavilluwa.

Verrucachernes aff. *oca* Chamberlin, 1947
(Fig. 6F)

Distribution. *Sabaragamuwa Province:* Ratnapura District: L 24.

Remarks. Found in moist sandy soil surrounding the Bopath Ella Falls in Ratnapura (L 24); it is distinguished from *V. oca* by the presence of two lateral setae on the tergites.

Subfamily Lamprochernetinae Beier, 1932

Genus *Lamprochernes* Tömösváry, 1882

***Lamprochernes nodosus* (Schrank, 1803)**

Chelifer nodosus Schrank 1803: 246; Ellingsen 1914: 4.
Lamprochernes nodosus (Schrank): Beier, 1932b: 83–84, fig. 101.

Distribution. Widespread (see Harvey 2011).

Previous record. *Central Province:* Peradeniya (Ellingsen 1914).

Remarks. Not found in the present study. The presence of this species on the island needs clarification. Ellingsen (1914) notes that the palpal protuberance is not so well developed as in European and Indian specimens.

Genus *Megachernes* Beier, 1932

***Megachernes kanneliyensis* Harvey *et al.* 2012**

Megachernes kanneliyensis Harvey *et al.* 2012: 2522–2528, figs 2a–d, 3, 4a–j.

Distribution. SRI LANKA: *Southern Province:* Galle District: Kanneliya forest.

Remarks. Commensal collected on *Mus mayori pococki* (Rodentia: Muridae) (Ratnaweera, et al. 2010). Not found in the present study.

Family Withiidae Chamberlin, 1931

Subfamily Withiinae Chamberlin, 1931

Tribe Withiini Chamberlin, 1931

Genus *Withius* Kew, 1911

***Withius ceylanicus* (Ellingsen, 1914)**

Chelifer ceylanicus Ellingsen 1914: 7–9.
Allowithius ceylanicus (Ellingsen): Beier 1932b: 205; Beier 1932d: 55; Beier 1973: 53.
Withius ceylanicus (Ellingsen): Harvey 1991: 659.

Distribution. Sri Lanka.

Previous records. SRI LANKA: *Central Province:* Peradeniya (type locality); *Central Province:* Kandy; *North Central Province:* Ritigala, Talawa; *Sabaragamuwa Province:* two miles NNE Belihul Oya (Beier 1973).

Present record. *North Central Province:* Anuradhapura District: L 40.

***Withius piger* (Simon, 1878)**

Chelifer piger Simon 1878: 148–149.
Chelifer subruber Simon 1879: 30; Ellingsen 1914: 10 (synonymised by Heurtault 1971: 1037).
Withius piger (Simon): Vachon 1970: 186–188; Harvey 1991: 663–664.

Distribution. Cosmopolitan.

Previous record. As *Chelifer subruber*, from Peradeniya under bark of Jackfruit tree (Ellingsen 1914).

Remarks. Not found in the present study; previous record probably based on a misidentification. Ellingsen (1913) recorded *Chelifer subruber* (= *Withius piger*) from Peradeniya under bark of Jackfruit trees and stated, "The specimen from Ceylon is rather young and badly preserved, but it may belong to this species". We consider this record doubtful.

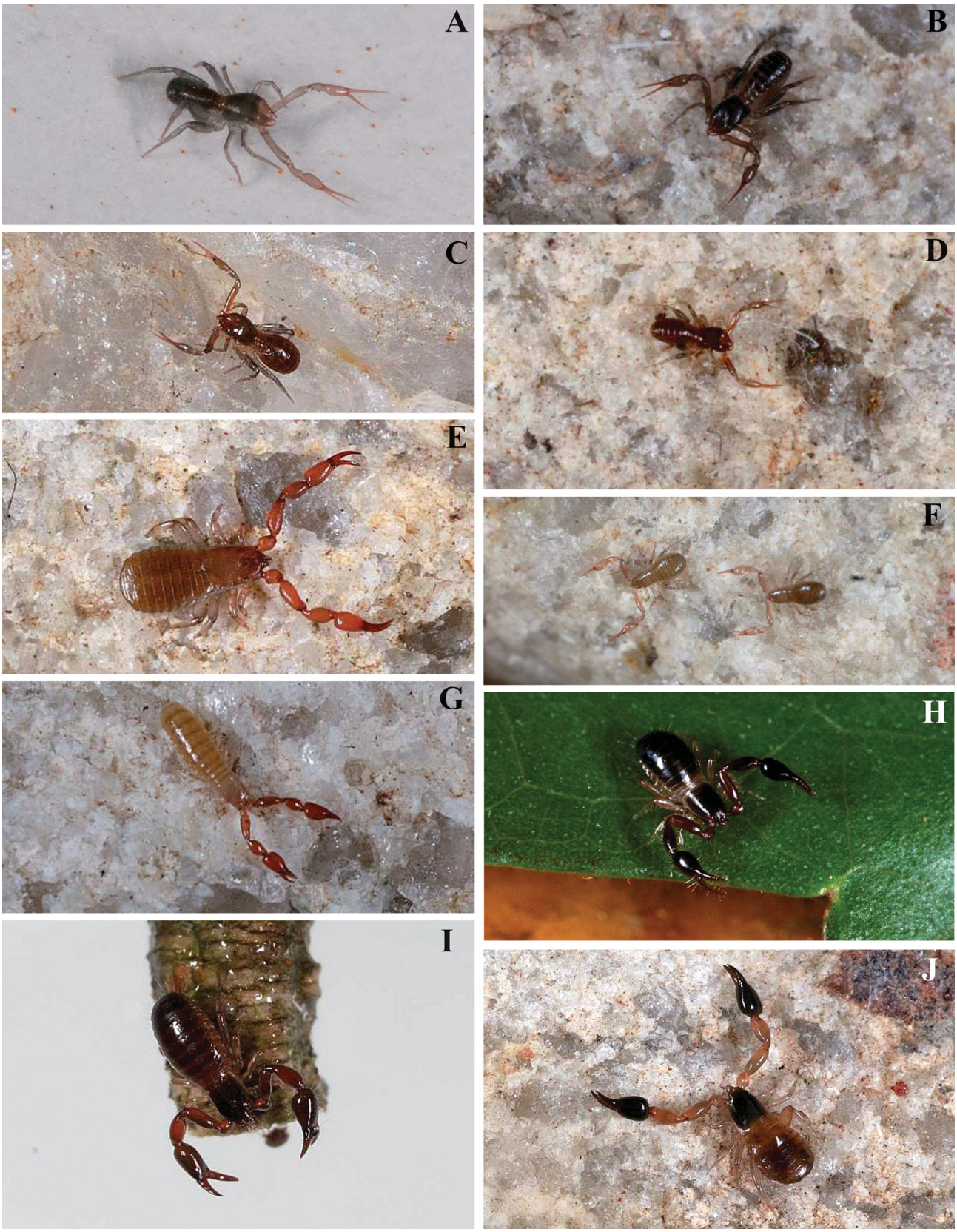

FIGURE 4. A. *Afrochthonius reductus,* male, Dunumadalawa.B. *Afrochthonius ceylonicus*, male, Ohiya. C. *Tyrannochthonius heterodentatus*, male, Kottawa-Kombala FR. D. *Lagynochthonius brincki*, male, Sudagala (Kuruwita). E. *Afrosternophorus ceylonicus*, female, IFS Aroboretum. F. *Hya chamberlini*, female (left) and male, Unachchiya. G. *Ideoblothrus ceylonicus* H. *Calocheiridius mussardi*, male, Akkaraipattu. I. *Olpium jacobsoni*, male, Inginiyagala. J. *Indolpium loyolae*, female, Wanathavillua.

FIGURE 5. A. *Stenatemnus brincki*, female, Kitulgala. B. *Micratemnus anderssoni*, female, Sudagala (Kuruwita). C. *Oratemnus proximus*, female, Maradanmaduwa. D. *Oratemnus* cf. *indicus*, male, Wanathavillua. E. *Anatemnus* cf. *javanus*, male, Ohiya. F. *Anatemnus orites*, male, Alawala. G. *Indogarypus ceylonicus* (Beier, 1973) **new combination**, female, Wanathavilluwa. H. *I. ceylonicus* (Beier, 1973) **new combination**, female, Padiyathalawa. I. *Indogarypus indicus*, female, Ohiya. J. *Feaella* (*Tetrafeaella*) *indica*, female, Inginiyagala.

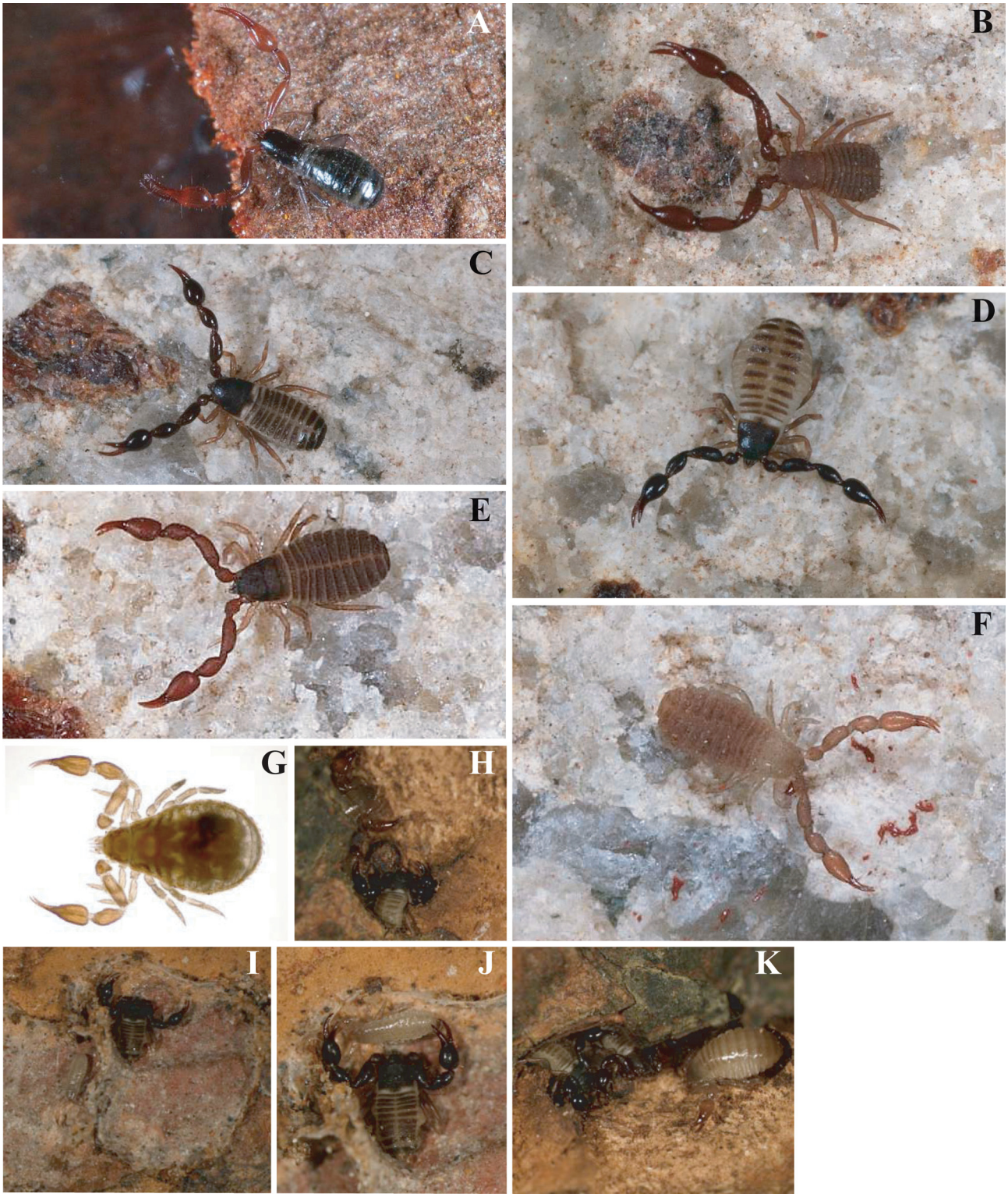

FIGURE 6. A. *Nhatrangia ceylonensis*, female, Maradanmaduwa. B. *Ceriochernes besucheti*, male, Ethagala Range. C. *Parachernes* (*Parachernes*) *cocophilus*, male, Pilikuttuwa. D. *Parachernes* (*Parachernes*) *cocophilus*, female, Ridigama. E. *Verrucachernes oca*, male, Wanathavillua. F. *Verrucachernes* cf. *oca*, nymph, Bopath Ella. G. *Cryptocheiridium* sp., Inginiyagala. H–K (all under bark of Jackfruit tree), H. Adult males of *Paratemnoides pallidus* (above) and *Parachernes* (*Parachernes*) *cocophilus* from Kurunegala. I. Adult *P.* (*P.*) *cocophilus*, male and *P. pallidus* nymph in chamber-like structure. J. *P.* (*P.*) *cocophilus* male grabbing a nymph of *P. pallidus*. K. *P.* (*P.*) *cocophilus*, colony with *P. pallidus* female (right).

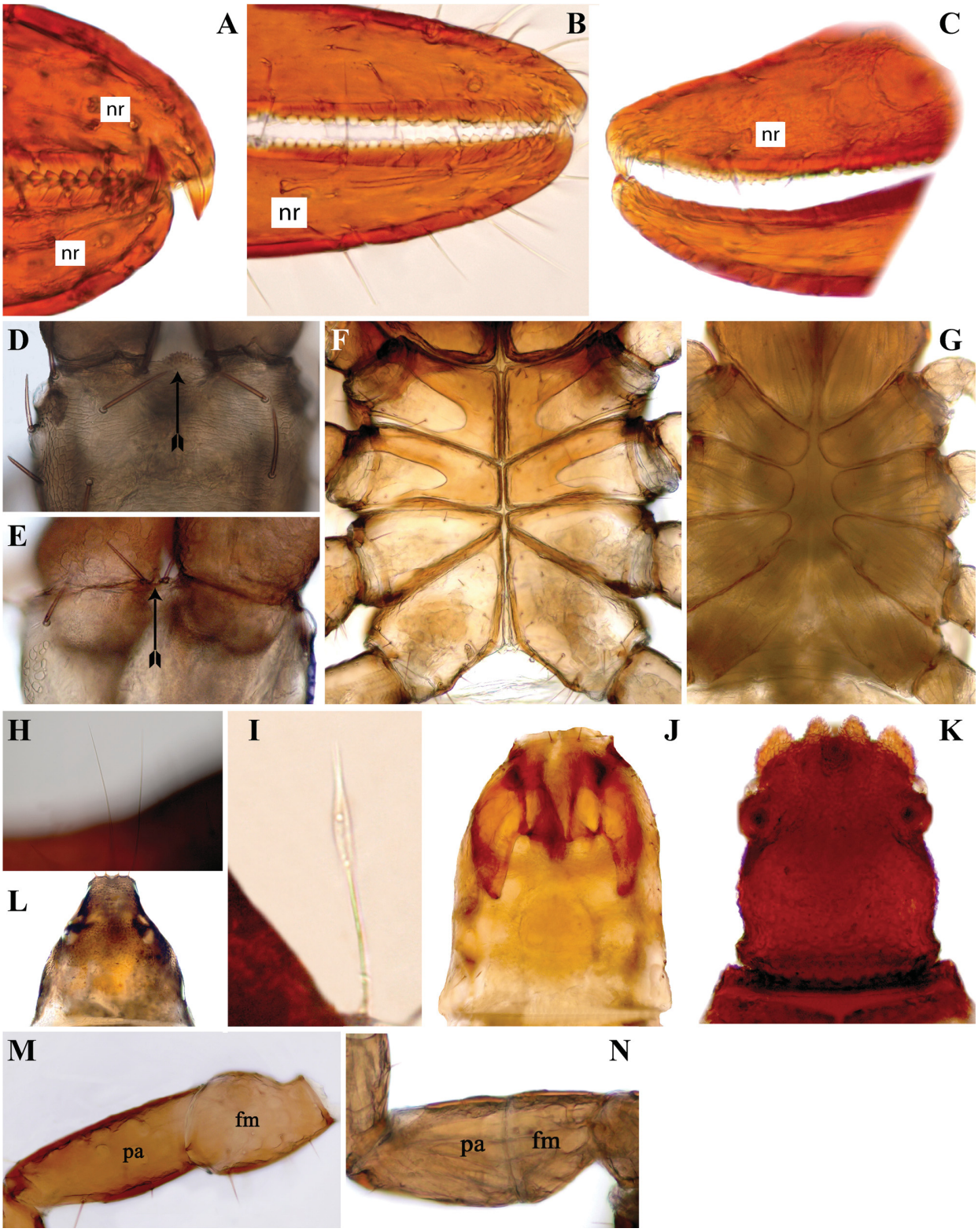

FIGURE 7. A. Venom apparatus present in both fingers (Olpiidae sp.). B. Venom apparatus present only in movable finger (Chernetidae sp.). C. Venom apparatus present only in fixed finger (Atemnidae sp.). D. Epistome with several minute teeth (Pseudotyrannochthoniidae sp.). E. Simple epistome (Chthoniidae sp.). F. Coxal region of Atemnidae sp. G. Coxal region of *Afrosternophorus ceylonicus*. with pseudosternum. H. Acuminate trichobothrium *t*. I. Lanceolate trichobothrium *t* (*Ideoblothrus ceylonicus*). J. Carapace more or less rectangular shaped and without anterior lobes. K. Carapace with anterior lobes (*Feaella indica*). L. Carapace triangular (Geogarypidae). M. Articulation between femur and patella of legs I, oblique (Atemnidae sp.). N. Perpendicular articulation between femur and patella of leg I (Sternophoridae sp.). Abbreviations: fm = femur, pa = patella, nr = nodus ramosus of venom duct. Arrows indicate position of epistome.

Key to the pseudoscorpion families of Sri Lanka (adults only)

Based on Harvey (1992) and only applying to families recorded from Sri Lanka.

1	Chelal fingers without venom apparatus; trichobothria *xs* present	2
-	At least one chelal finger with venom apparatus (Figs 7A–C); trichobothria *xs* absent	4
2	Carapace without anterior lobes (Fig. 7J); legs III and IV with tarsi divided into basi- and telotarsi	3
-	Carapace with anterior lobes (Fig. 7K); tarsi of all legs undivided	Feaellidae
3	Epistome a simple tooth-like projection (Fig. 7E); coxal spines on coxa II	Chthoniidae
-	Epistome rounded, covered with several minute teeth (Fig. 7D); coxal spines on coxa I	Pseudotyrannochthoniidae
4	Pseudosternum absent (Fig. 7F)	5
-	Pseudosternum present (Fig. 7G)	Sternophoridae
5	Movable cheliceral finger with several teeth	6
-	Movable cheliceral finger with 1–2 subapical teeth	8
6	Trichobothrium *t* acuminate (Fig. 7H)	7
-	Trichobothrium *t* lanceolate (Fig. 7I)	Syarinidae
7	Chelae with 30–45 trichobothria	Ideoroncidae
-	Chelae with 12 trichobothria	Hyidae
8	Carapace more or less rectangular (Fig. 7J); eyes situated near anterior margin of carapace	9
-	Carapace triangular (Fig. 7L); eyes situated away from anterior margin of carapace	13
9	Spermathecae absent; pedipalpal femur with 1–2 tactile setae	Olpiidae
-	Spermathecae present; pedipalpal femur without tactile setae	10
10	Articulation of femur and patella of leg I, oblique (Fig. 7M)	11
-	Articulation of femur and patella of leg I, perpendicular (Fig. 7N)	Withiidae
11	Well developed venom apparatus present in both chelal fingers (Fig. 7A)	Cheliferidae
-	Well developed venom apparatus absent from one chelal finger (Figs 7B–C)	12
12	Well developed venom apparatus only present in movable chelal finger (Fig. 7B)	Chernetidae
-	Well developed venom apparatus only present in fixed chelal finger (Fig. 7C)	Atemnidae
13	Anal plate surrounded by sternite XI; coxa IV much wider than coxa I	14
-	Anal plate situated between tergite XI and sternite XI; coxa IV approximately same width as coxa I	Geogarypidae
14	Carapace with one pair of eyes	Cheiridiidae
-	Carapace with 2 pairs of eyes	Garypidae

Discussion

Prior to this study, 43 species of pseudoscorpions were known from Sri Lanka (Beier 1973; Harvey 2011). The tally is now 47 and includes a species of the newly recorded family, Cheiridiidae. Out of the 47 recorded species, 20 (43%) are endemic to Sri Lanka. Except for the Northern Province and the northern part of the Eastern Province, the whole country was sampled during the period of 2009–2011 for this study. However, the true diversity and endemism of Sri Lankan pseudoscorpions will only be known after further sampling of habitats such as caves, mangroves and the forest canopy. Although the pseudoscorpion fauna of southern India is fairly well studied, with good descriptions, the examination of types or topotypes of the Indian species will be necessary for positive identification of some of our species. We plan to sample several other localities mentioned in Beier (1973) and Ellingsen (1914), as well as several new locations and habitats in the future. Unfortunately, due to the threat of landmines, several habitats in the Northern and Eastern Provinces are inaccessible at present.

Two endemic species of the genus *Afrochthonius* (family Pseudotyrannochthoniidae) are recorded from Sri Lanka. These are the only records of *Afrochthonius* outside the African continent. So far, seven species of *Afrochthonius* have been described or reported from Madagascar, southern Africa, and Sri Lanka (Heurtault, 1986; Harvey 1996; Harms & Harvey, 2013). A similar disjunctive distribution pattern is seen in the nephilid spider genus *Clitaetra* Simon, 1889 (Dimitrov *et al.* 2009; Kuntner 2006).

In spite of having sampled several localities of the Lund University Ceylon Expedition (1962) and the Geneva Expedition (1970), we have not found many species reported by Beier (1973) and are continuing to look for them. However, several localities of the Lund University Ceylon Expedition have suffered deforestation (e.g. Bopathella Falls, Diyaluma Falls, Deerwood and Hatton). Deforestation, soil erosion and resulting loss of habitats, adversely affect pseudoscorpions and other soil arthropods in Sri Lanka. Thus, the assessment of the conservation status of soil arthropods is imperative (Bambaradeniya & Edirisinghe 2001; Benjamin & Bambaradeniya 2006). Moreover, due to their relatively short life cycles, high abundances and sensitivity to environmental changes, small arthropods

such as pseudoscorpions are useful indicator groups to understand the effects of processes like habitat fragmentation and climate change (Jansen 1997; Marc *et al.* 1999; Miyashita *et al.* 1998).We failed to collect any pseudoscorpions in cardamom (*Elettaria cardamom*) plantations in the Knuckles Range. However, they were abundant in the surrounding home gardens (under bark of other tree species). The reason for this is unclear. It might be due to the extensive use of pesticides or to substances released by the cardamom plants themselves. Pesticides are widely used in agriculture in Sri Lanka, but it is not clear if they affect small invertebrates such as pseudoscorpions. Forests of the Knuckles, Deniyaya and Namunukula Ranges have been cleared for cardamom cultivation. However, some large trees were left for shade and are faunal refuges.

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References

Adams, F.D. (1929) The geology of Ceylon. *Canadian Journal of Research*, 1, 425–511. http://dx.doi.org/10.1139/cjr29-025

Aguiar, N.O. & Bührnheim, P.F. (1998) Phoretic pseudoscorpions associated with flying insects in Brazilian Amazonia. *Journal of Arachnology*, 26, 452–459.

Ashton, P.S. & Gunatilleke, C.V.S. (1987) New light on the plant geography of Ceylon, I. Historical plant geography. *Journal of Biogeography*, 14, 249–285. http://dx.doi.org/10.2307/2844895

Audley-Charles, M.G., Hurley, A.M. & Smith, A.G. (1981) Continental movements in the Mesozoic and Coenozoic. *In:* Whitmore, T.C. (Ed.) *Wallace's Line and Plate Tectonics*. Clarendon Press, Oxford, pp. 9–23.

Axelrod, D.I. (1974) Plate tectonics in relation to the history of angiosperm vegetation in India. *Birbal Sahni Institute of Paleobotany, Special Publications*, 1, 5–18.

Bahir, M.M. & Ng, P.K.L. (2005) Descriptions of ten new species of freshwater crabs (Crustacea: Brachyura: Parathelphusidae: *Ceylonthelphusa*, *Mahatha*, *Perbrinckia*) from Sri Lanka. *Raffles Bulletin of Zoology*, Supplement 12, 47–75.

Balzan, L. (1892) Voyage de M. E. Simon au Venezuela (Décembre 1887 – Avril 1888). Arachnides. Chernetes (Pseudoscorpiones). *Annales de la Société Entomologique de France,* 60, 497–552.

Bambaradeniya, C. & Edirisinghe, J. (2001) The ecological role of spiders in the rice fields of Sri Lanka. *Biodiversity*, 2, 3–10. http://dx.doi.org/10.1080/14888386.2001.9712671

Beenaerts, N., Pethiyagoda, R., Ng, P.K.L., Yeo, D.C.J., Bex, G.J., Bahir, M.M. & Artois, T. (2010) Phylogenetic diversity of Sri Lankan freshwater crabs and its implications for conservation. *Molecular Ecology*, 19, 183–196. http://dx.doi.org/10.1111/j.1365-294X.2009.04439.x

Beier, M. (1930) Die Pseudoskorpione der Sammlung Röwer. *Zoologischer Anzeiger*, 91, 284–300.

Beier, M. (1932a) Pseudoscorpionidea I. Subord. Chthoniinea et Neobisiinea. *Tierreich*, 57, i–xx+1–258.

Beier, M. (1932b) Pseudoscorpionidea II. Subord. C. Cheliferinea. *Tierreich*, 58, i–xxi+1–294.

Beier, M. (1932c) Revision der Atemnidae (Pseudoscorpionidea). *Zoologische Jahrbücher, Abteilung für Systematik, Ökologie und Geographie der Tiere*, 62, 547–610.

Beier, M. (1948) Phoresie und Phagophilie bei Pseudoscorpionen. *Österreichische Zoologische Zeitschrift*, 1, 441–497.

Beier, M. (1951) Die Pseudoscorpione Indochinas. *Mémoires du Muséum National d'Histoire Naturelle, Paris, nouvelle série,* 1, 47–123.

Beier, M. (1955) Pseudoscorpionidea, gesammelt während der schwedischen Expeditionen nach Ostafrika 1937-38 und 1948. *Arkiv för Zoologi,* 7, 527–558.

Beier, M. (1957) Pseudoscorpionida. *Insects of Micronesia*, 3, 1–64.

Beier, M. (1967) Pseudoscorpione vom kontinentalen Südost-Asien. *Pacific Insects,* 9, 341–369.
Beier, M. (1973) Pseudoscorpionidea von Ceylon. *Entomologica Scandinavica*, 4, 39–55.
Beier, M. (1974) Pseudoscorpione aus Südindien des Naturhistorischen Museums in Genf. *Revue suisse de Zoologie*, 81, 999–1017.
Beier, M. (1951) Die Pseudoscorpione Indochinas. *Mémoires du Muséum National d'Histoire Naturelle, Paris, nouvelle série,* 1, 47–123.
Benjamin, S.P. (2001) The genus *Oxytate* L. Koch 1878 from Sri Lanka, with description of *Oxytate taprobane* sp. n. (Araneae: Thomisidae). *Journal of South Asian Natural History*, 5, 153–158.
Benjamin, S.P. (2004) Taxonomic revision and phylogenetic hypothesis for the jumping spider subfamily Ballinae (Araneae, Salticidae). *Zoological Journal of the Linnean Society*, 142, 1–82.
http://dx.doi.org/10.1111/j.1096-3642.2004.00123.x
Benjamin, S.P. (2010) Revision and cladistic analysis of the jumping spider genus *Onomastus* (Araneae: Salticidae). *Zoological Journal of the Linnean Society*, 159, 711–745.
http://dx.doi.org/10.1111/j.1096-3642.2009.00580.x
Benjamin, S.P. & Bambaradeniya, C.N.B. (2006) Systematics and conservation of spiders in Sri Lanka: current status and future prospects. *In:* Bambaradeniya, C.N.B. (Ed.) *The Fauna of Sri Lanka*. IUCN - The World Conservation Union, Colombo, pp. 70–76.
Bhattacharyya, S. (1990) A survey of pseudoscorpions in the nests of Passer domesticus (Linnaeus) in West Bengal. *Environment and Ecology*, 8, 245–247.
Bossuyt, F., Meegaskumbura, M., Beenaerts, N., Gower, D.J., Pethiyagoda, R., Roelants, K., Mannaert, A., Wilkinson, M., Bahir, M.M., Manamendra-Arachchi, K., Ng, P.K.L., Schneider, C.J., Oommen, O.V. & Milinkovitch, M.C. (2004) Local endemism within the Western Ghats-Sri Lanka biodiversity hotspot. *Science*, 306, 479–481.
http://dx.doi.org/10.1126/science.1100167
Brinck, P., Andersson, H. & Cederholm, L. (1971) Reports from the Lund University Ceylon Expedition in 1962 Vol. 1: Introduction. *Entomologica Scandinavica*, Supplement 1, 1–36.
Chamberlin, J.C. (1929). A synoptic classification of the false scorpions or chela-spinners, with a report on a cosmopolitan collection of the same. Part 1. The Heterosphyronida (Chthoniidae) (Arachnida-Chelonethida). *Annals and Magazine of Natural History*, 10, 50–80.
http://dx.doi.org/10.1080/00222932908673028
Chamberlin, J.C. (1930) A synoptic classification of the false scorpions or chela-spinners, with a report on a cosmopolitan collection of the same. Part II. The Diplosphyronida (Arachnida-Chelonethida). *Annals and Magazine of Natural History*, 10, 1–48, 585–620.
http://dx.doi.org/10.1080/00222933008673104
Chamberlin, J.C. (1931) The arachnid order Chelonethida. *Stanford University Publications, Biological Sciences*, 7, 1–284.
Chamberlin, J.C. (1947). Three new species of false scorpions from the islands of Guam (Arachnida, Chelonethida). *Occasional Papers of the Bernice P. Bishop Museum,* 18, 305–316.
Chamberlin, J.C. (1949) New and little-known false scorpions from various parts of the world (Arachnida, Chelonethida), with notes on structural abnormalities in two species. *American Museum Novitates*, 1430, 1–57.
Chamberlin, J.C. (1962) New and little-known false scorpions, principally from caves, belonging to the families Chthoniidae and Neobisiidae (Arachnida, Chelonethida). *Bulletin of the American Museum of Natural History.* 123, 303–352.
Cole, D.C., Elgar, M.A. & Harvey, M.S. (1994) Association between Australian pseudoscorpions and ants. *Psyche*, 101, 221–227.
http://dx.doi.org/10.1155/1994/23982
Cooray, P.G. (1967) *An introduction to the geology of Ceylon*. National Museums of Ceylon, Colombo, 324 pp.
Dahanayake, K. (1982) Laterites of Sri Lanka – a reconnaissance study. *Mineralium Deposita*, 17, 245–256.
http://dx.doi.org/10.1007/BF00206474
Del-Claro, K. & Tizo-Pedroso, E. (2009) Ecological and evolutionary pathways of social behavior in pseudoscorpions (Arachnida: Pseudoscorpiones). *Acta Ethologica*, 12, 13–22.
http://dx.doi.org/10.1007/s10211-009-0052-y
Dimitrov, D., Benjamin, S.P. & Hormiga, G. (2009) A revised phylogenetic analysis for the spider genus *Clitaetra* Simon, 1889 (Araneae, Araneodiea, Nephilidae) with the first description of the male of the Sri Lankan species *Clitaetra thisbe* Simon, 1903. *Bulletin of the Museum of Comparative Zoology*, 159, 301–323.
http://dx.doi.org/10.3099/0027-4100-159.6.301
Domrös, M. (1998) Variabilities of the temporal and spatial organization of rainfall in Sri Lanka. *In:* Domrös, M. & Roth, H. (Eds.) *Sri Lanka: past and present Arachaeology, geography, economics – selected papers on German research*. Margraf Verlag, Weikersheim, pp. 82–102.
Ellingsen, E. (1901) Sur deux espèces de pseudoscorpions de l'Asie. *Bulletin de la Société Zoologique de France,* 26, 205–209.
Ellingsen, E. (1912) The pseudoscorpions of South Africa, based on the collections of the South African Museum, Cape Town. *Annals of the South African Museum* 10, 75–128.
Ellingsen, E. (1913) Note on some pseudoscorpions in the British Museum. *Annals and Magazine of Natural History*, 8, 451–455.

http://dx.doi.org/10.1080/00222931308693337
Ellingsen, E. (1914) On the pseudoscorpions of the Indian Museum, Calcutta. *Records of the Indian Museum*, 10, 1–14.
Erdelen, W. (1989) Aspects of the biogeography of Sri Lanka. *Forschungen auf Ceylon*, 3, 73–100.
Francke, O.F. & Villegas-Guzman, G.A. (2006) Symbiotic relationships between pseudoscorpions (Arachnida) and packrats (Rodentia). *Journal of Arachnology*, 34, 289–298.
http://dx.doi.org/10.1636/04-36.1
Gunatilleke, I.A.U.N. & Gunatilleke, C.V.S. (1991) Threatened woody endemics of the wet lowlands of Sri Lanka and their conservation. *Biological Conservation*, 55, 17–36.
http://dx.doi.org/10.1016/0006-3207(91)90003-R
Gunawardene, N.R., Majer, J.D. & Edirisinghe, J.P. (2008) Diversity and richness of ant species in a lowland wet forest reserve in Sri Lanka. *Asian Myrmecology*, 2, 71–83.
Harms, D. & Harvey, M.S. (2013) Review of the cave-dwelling species of *Pseudotyrannochthonius* Beier (Arachnida: Pseudoscorpiones: Pseudotyrannochthoniidae) from mainland Australia, with description of two troglobitic species. *Australian Journal of Entomology*, 52, 129–143.
http://dx.doi.org/10.1111/aen.12009
Harvey, M.S. (1985) The systematics of the family Sternophoridae (Pseudoscorpionida). *Journal of Arachnology* 13, 141–209.
Harvey, M.S. (1986) The Australian Geogarypidae, new status, with a review of the generic classification (Arachnida: Pseudoscorpionida). *Australian Journal of Zoology*, 34, 753–778.
http://dx.doi.org/10.1071/ZO9860753
Harvey, M.S. (1991) *Catalogue of the Pseudoscorpionida*. Manchester University Press, Manchester, pp. vi + 726.
Harvey, M.S. (1992) The phylogeny and classification of the Pseudoscorpionida (Chelicerata: Arachnida). *Invertebrate Taxonomy*, 6, 1373–1435.
http://dx.doi.org/10.1071/IT9921373
Harvey, M.S. (1993) The systematics of the Hyidae (Pseudoscorpionida: Neobisioidea). *Invertebrate Taxonomy*, 7, 1–32.
http://dx.doi.org/10.1071/IT9930001
Harvey, M.S. (1996) Small arachnids and their value in Gondwanan biogeographic studies. *In:* Hopper, S.D., Chappill, J.A., Harvey, M.S. & George, A.S. (Eds.) *Gondwanan heritage: past, present and future of the Western Australian biota*. Surrey Beatty & Sons, Chipping Norton, pp. 155–162.
Harvey, M.S. (2011) Pseudoscorpions of the World, version 2.0. Western Australian Museum, Perth. http://www.museum.wa.gov.au/arachnids/pseudoscorpions/ (Accessed 8 Jun. 2013)
Harvey, M.S., Ratnaweera, P.B., Udagama, P.V. & Wijesinghe M.R. (2012) A new species of the pseudoscorpion genus *Megachernes* (Pseudoscorpiones: Chernetidae) associated with a threatened Sri Lankan rainforest rodent, with a review of host associations of *Megachernes*. *Journal of Natural History*, 46, 2519–2535.
http://dx.doi.org/10.1080/00222933.2012.707251
Harvey, M.S. & Volschenk, E.S. (2007) A review of some Australasian Chernetidae: *Sundochernes*, *Troglochernes* and a new genus (Pseudoscorpiones). *Journal of Arachnology*, 35, 238–277.
http://dx.doi.org/10.1636/SH06-41.1
Heurtault, J. (1971) Chambre génitale, armature génitale et caractères sexuels secondaires chez quelques espèces de Pseudoscorpions (Arachnida) du genre *Withius*. *Bulletin du Muséum National d'Histoire Naturelle, Paris,* (2) 42, 1037–1053.
Heurtault, J. (1986) Les Pseudoscorpions de Madagascar: Réflexions sur la répartition géographique. *In*: Eberhard, W.G., Lubin, Y.D. & Robinson, B.C. (Eds), *Proceedings of the ninth International Congress of Arachnology, Panama 1983*. Smithsonian Institution Press, Washington D.C., pp. 127–129.
Hoff, C.C. & Clawson, D.L. (1952) Pseudoscorpions from rodent nests. *American Museum Novitates*, 1585, 1–38.
Jansen, A. (1997) Terrestrial invertebrate community structure as an indicator of the success of a tropical rainforest restoration project. *Restoration Ecology*, 2, 115–124.
http://dx.doi.org/10.1046/j.1526-100X.1997.09714.x
Jones, P.E. (1970) The occurrence of *Chthonius ischnocheles* (Hermann) (Chelonethi: Chthoniidae) in two types of hazel coppice leaf litter. *Bulletin of the British Arachnological Society*, 1, 72–79.
Judson, M. (1997) Catalogue of the pseudoscorpion types (Arachnida: Chelonethi) in The Natural History Museum, London. *Occasional Papers on Systematic Entomology*, 11, 1–54.
Klausen, F.E. (2005) The male genitalia of the family Atemnidae (Pseudoscorpiones). *Journal of Arachnology*, 33, 641–662.
http://dx.doi.org/10.1636/H03-6.1
Krombein, K.V. (1981) The Smithsonian Insect Project in Sri Lanka, 1969–1975. *Spolia Zeylanica,* 35, 119–135.
Krombein, K.V., Norden, B.B., Rickson, M.M. & Rickson, F.R. (1999) Biodiversity of Domatia occupants (ants, wasps, bees, and others) of the Sri Lankan myrmecophyte *Humboldtia laurifolia* Vahl (Fabaceae). *Smithsonian Contributions to Zoology*, 603, 1–34.
http://dx.doi.org/10.5479/si.00810282.603
Kuntner, M. (2006) Phylogenetic systematics of the Gondwanan nephilid spiders lineage Clitaetrinae (Araneae, Nephilidae). *Zoologica Scripta*, 35, 19–62.
http://dx.doi.org/10.1111/j.1463-6409.2006.00220.x

Mahnert, V. (1982) Die Pseudoskorpione (Arachnida) Kenyas II. Feaellidae; Cheiridiidae. *Revue suisse de Zoologie*, 89, 115–134.
Mahnert, V. (1984) Beitrag zu einer besseren Kenntnis der Ideoroncidae (Arachnida: Pseudoscorpiones), mit Beschreibung von sechs neuen Arten. *Revue suisse de Zoologie*, 91, 651–686.
Marc, P., Canard, A. & Ysnel, F. (1999) Spiders (Araneae) useful for pest limitation and bioindication. *Agriculture, Ecosystems & Environment*, 74, 229–273.
http://dx.doi.org/10.1016/S0167-8809(99)00038-9
Meher Homji, V.M. (1978) Environmental implications of the tertiary plant fossils of India. *Indian Journal of Botany*, 1, 19–27.
Miyashita, T., Shinkai, A. & Chida, T. (1998) The effects of forest fragmentation on web spider communities in urban areas. *Biological Conservation*, 86, 357–364.
http://dx.doi.org/10.1016/S0006-3207(98)00025-1
Muchmore, W.B. (1971) Phoresy by North and Central American pseudoscorpions. *Proceedings of the Rochester Academy of Science*, 12, 77–97.
Murienne, J., Harvey, M.S. & Giribet, G. (2008) First molecular phylogeny of the major clades of Pseudoscorpiones (Arthropoda: Chelicerata). *Molecular Phylogenetics and Evolution*, 49, 170–184.
http://dx.doi.org/10.1016/j.ympev.2008.06.002
Murthy, V.A. (1961) Two new species of pseudoscorpions from south India. *Annals and Magazine of Natural History* 13, 221–224.
http://dx.doi.org/10.1080/00222936108651100
Murthy, V.A. & Ananthakrishnan, T.N. (1977) Indian Chelonethi. *Oriental Insects Monograph*, 4, 1–210.
Myers, N., Mittermeier, R.A., Mittermeier, C.G., da Fonseca, G.A.B. & Kent, J. (2000) Biodiversity hotspots for conservation priorities. *Nature*, 403, 853–858.
http://dx.doi.org/10.1038/35002501
Naggs, F., Raheem, D., Ranawana, K. & Mapatuna, Y. (2005) The Darwin initiative project on Sri Lankan land snails: patterns of diversity in Sri Lankan forests. *Raffles Bulletin of Zoology*, Supplement 12, 23–29.
Ng, P.K.L. (1994) A note on the freshwater crabs of the genus *Spiralothelphusa* Bott, 1968 (Crustacea: Decapoda: Brachyura: Parathelphusidae), with description of a new species from Sri Lanka. *Journal of South Asian Natural History*, 1, 27–30.
Ng, P.K.L. (1995a) *Ceylonthelphusa scansor*, a new species of treeclimbing crab from Sinharaja Forest in Sri Lanka (Crustacea: Decapoda: Brachyura: Parathelphusidae). *Journal of South Asian Natural History*, 1, 175–184.
Ng, P.K.L. (1995b) A revision of the Sri Lankan montane crabs of the genus *Perbrinckia* Bott, 1969 (Crustacea: Decapoda: Brachyura: Parathelphusidae). *Journal of South Asian Natural History*, 1, 129–174.
Ng, P.K.L. & Tay, W.M. (2001) The freshwater crabs of Sri Lanka (Decapoda: Brachyura: Parathelphusidae). *Zeylanica*, 6, 113–199.
Pethiyagoda, R. (2005) Exploring Sri Lanka's biodiversity. *Raffles Bulletin of Zoology*, 12, 1–4.
Pethiyagoda, R. (2007) *Pearls, spices and green gold: a history of biodiversity exploration in Sri Lanka*. WHT Publications, Colombo, 241 pp.
Pethiyagoda, R. & Manamendra-Arachchi, K. (1998) Evaluating Sri Lanka's amphibian diversity. *Occasional Papers of the Wildlife Heritage Trust of Sri Lanka*, 2, 1–12.
Pocock, R.I. (1900) *The Fauna of British India including Ceylon and Burma*. Taylor and Francis, London, 152 pp.
Pocock, R.I. (1904) The fauna and geography of the Maldive and Laccadive Archipelagoes: being the account of the work carried on and of the collections made by an expedition during the years 1899 and 1900. *In:* Gardiner, J.S. (Eds.), *Arachnida*. Cambridge University, Cambridge. pp. 797–805.
Poinar, G.O. Jr, Ćurčić, B.P.M. & Cokendolpher, J.C. (1998) Arthropod phoresy involving pseudoscorpions in the past and present. *Acta Arachnologica*, 47, 79–96.
http://dx.doi.org/10.2476/asjaa.47.79
Puvaneswaran, K.M. & Smithson, P.A. (1993) An objective classification of homogeneous rainfall regimes in Sri Lanka. *Theoretical and Applied Climatology*, 48, 133–145.
http://dx.doi.org/10.1007/BF00864920
Ratnaweera, P.B., Wijesinghe, M.R. & Udagama-Randeniya, P.V. (2010) Parasitic associations of a threatened Sri Lankan rainforest rodent, *Mus mayori pococki* (Rodentia: Muridae). *Journal of Threatened Taxa*, 2, 901–907.
http://dx.doi.org/10.11609/JoTT.o2194.901-7
Redikortzev, V. (1938) Les pseudoscorpions de l'Indochine française recueillis par M. C. Dawydoff. *Bulletin du Museum national d'Histoire naturelle. Paris*, 10, 69–116.
Santos, J.C., Tizo-Pedroso, E. & Fernandes, G.W. (2005) A case of phoresy of *Semeiochernes armiger* Balzan, 1892 (Pseudoscorpiones: Chernetidae) on the giant tropical fly *Pantophthalmus tabaninus* Thunberg, 1819 (Diptera: Pantophthalmidae) in an Amazonian rain forest, Pará. *Lundiana*, 6, 11–12.
Schawaller, W. (1981) Cheiridiidae in Dominikanischen Bernstein, mit Anmerkungen zur morphologischen Variabilität (Stuttgarter Bernsteinsammlung: Arachnida, Pseudoscorpionidea). Stuttgarter Beiträge zur Naturkunde (B), 75, 1–14.
Schrank, F.P. (1803) *Fauna Boica. Durchgedachte, Geschichte der in Baiern einheimischen und Zahmen Theire*. Vol. **3**. Krüll, Landshut.
Shear, W.A. (1991) The early development of terrestrial ecosystems. *Nature*, 351, 283–289.

http://dx.doi.org/10.1038/351283a0
Shear, W.A., Schawaller, W. & Bonamo, P.M. (1989) Record of Palaeozoic pseudoscorpions. *Nature*, 341, 527–529. http://dx.doi.org/10.1038/341527a0
Simon, E. (1878) Liste des espèces de la famille des Cheliferidae qui habitant l'Algérie et le Maroc. *Annales de la Société Entomologique de France*, 5 (8), 144–153.
Simon, E. (1879) Les Ordres des Chernetes, Scorpiones et Opiliones. Librairie Encyclopédique de Roret, Paris, *In Les Arachnides de France*, 7, 1–332.
Simon, E. (1901) On the Arachnida collected during the "Skeat Expedition" to the Malay Peninsula, 1899-1900. *Proceedings of the Zoological Society of London*, 71, 45–84. http://dx.doi.org/10.1111/j.1469-7998.1901.tb08164.x
Sivaraman, S. (1980) Pseudoscorpions from South India: some new species of the family Atemnidae Chamberlin (Pseudoscorpionida: Monosphyronida). *Oriental Insects*, 14, 345–362. http://dx.doi.org/10.1080/00305316.1980.10434813
Somasekaram, T. (1988) *National Atlas for Sri Lanka*. Survey Department Colombo, pp. 1–141.
Thanee, N., Kupittayanant, S. & Pinmongkholgul, S. (2009) Prevalence of ectoparasites and blood parasites in small mammals at Sakaerat Environmental Research Station, Thailand. *Thai Journal of Agricultural Science*, 42, 149–158.
Thorell, T. (1883) Descrizione di alcuni Aracnidi inferiori dell'Arcipelago Malese. *Annali del Museo Civico di Storia Naturale di Genova*, 18, 21–69.
Thorell, T. (1889) Aracnidi Artrogastri Birmani raccolti da L. Fea nel 1885-1887. *Annali del Museo Civico di Storia Naturale di Genova*, 2, 521–729.
Tizo-Pedroso, E. & Del-Claro, K. (2005) Matriphagy in the neotropical pseudoscorpion *Paratemnoides nidificator* (Balzan 1888) (Atemnidae). *Journal of Arachnology*, 33, 873–877. http://dx.doi.org/10.1636/S03-61.1
Tullgren, A. (1905) Einige Chelonethiden aus Java. *Mitteilungen aus dem Naturhistorischen Museum in Hamburg,* 22, 37–47.
Tullgren, A. (1907) Zur Kenntnis aussereuropäischer Chelonethiden des Naturhistorischen Museums in Hamburg. *Mitteilungen aus dem Naturhistorischen Museum in Hamburg,* 24, 21–75.
Tullgren, A. (1908) Eine neue *Olpium*-Art aus Java. *Notes from the Leyden Museum*, 29, 148–150.
Turienzo, P., Di Iorio, O. & Mahnert, V. (2010) Global checklist of pseudoscorpions (Arachnida) found in birds' nests. *Revue suisse de Zoologie*, 117, 557–598.
Vachon, M. (1934) Sur le développement post-embryonnaire des pseudoscorpionides. Deuxiemes note. Les formes immatures de *Chelifer cancroides* L. (suite). *Bulletin de la Société Zoologique de France* 59, 405–416.
Vachon, M. (1970) Remarques sur *Withius piger* (Simon, 1878) nov. comb. (Pseudoscorpion Cheliferidae) et sur le genre *Diplotemnus* J.C. Chamberlin, 1933, à propos de *Diplotemnus beieri* nov. nom. (Pseudoscorpion Miratemnidae). *Bulletin du Muséum National d'Histoire Naturelle, Paris* 42, 185–191.
Vitanage, P.W. (1970) A study of the geomorphology and morphotectonics of Ceylon. Proceedings of the Second Seminar on Geochemical Prospecting Methods and Techniques. UN Mineral Resources Development Series, 38, 391–405.
Wadia, D.N. (1945) The three superimposed peneplains of Ceylon: their physiography and geological structure. *Records of the Department of Mineralogy (Ceylon)*, 1, 25–32.
Weygoldt, P. (1969) *The biology of pseudoscorpions*. Harvard University Press, Cambridge, Massachusetts, pp. 1–145.
With, C.J. (1906) The Danish expedition to Siam 1899-1900. III. Chelonethi. An account of the Indian false-scorpions together with studies on the anatomy and classification of the order. *Oversigt over det Konigelige Danske Videnskabernes Selskabs Forhandlinger,* 7, 1–214.
Witt, D.L. & Dill, L.M. (1996) Springtail postmolt vulnerability to pseudoscorpion predation: mechanisms and implications. *Journal of Insect Behavior*, 9, 395–406.
Zeh, D.W. & Zeh, J.A. (1992) Failed predation or transportation? Causes and consequences of phoretic behavior in the pseudoscorpion *Dinocheirus arizonensis* (Pseudoscorpionida: Chernetidae). *Journal of Insect Behaviour*, 5, 37–49. http://dx.doi.org/10.1007/BF01049156