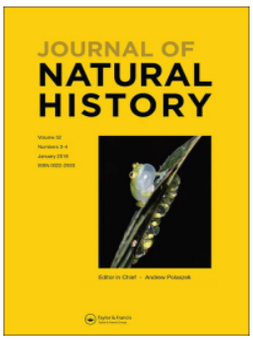

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Phylogenetic relationships and systematics of the jumping spider genus *Colopsus* with the description of eight new species from Sri Lanka (Araneae: Salticidae)

Nilani Kanesharatnam[a,b] and Suresh P. Benjamin[a]

[a]Evolution, Ecology and Biodiversity Research Project, National Institute of Fundamental Studies, Kandy, Sri Lanka; [b]Department of Zoology, Eastern University of Sri Lanka, Batticaloa, Sri Lanka

ABSTRACT

The Sri Lankan jumping spider species first described as *Colopsus cancellatus* and its close relatives are an understudied yet charismatic part of the fauna of the island. Here, using molecular sequence data (cytochrome c oxidase subunit I, 18S rRNA, 28S rRNA, and histone H3), and a variety of methods we tested the validity of this genus and recover three well-supported clades in the ML analysis: *Colopsus* and *Evarcha* in two separate clades with *Burmattus* in-between. In the MP analysis *Colopsus* and *Evarcha* form two separate clades. The Sri Lanka *Colopsus* previously misplaced in *Evarcha* formed a distinct clade in both the ML and MP topologies. Thus, *Colopsus* is restored as a distinct genus. *Pancorius* is recovered as non-monophyletic. We additionally describe the following new species: *Colopsus cinereus* sp. nov., *C. ferruginus* sp. nov., *C. magnus* sp. nov. and *C. tenuesi* sp. nov., *Evarcha latus* sp. nov., *Pancorius alboclypeus* sp. nov., *P. altus* sp. nov and *P. athukoralai* sp. nov. *Pancorius* is recorded for the first time from Sri Lanka.

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Arachnid; morphology; molecular phylogeny; comparative methods; India; South Asia

Introduction

The Sri Lankan jumping spider species first described as *Colopsus cancellatus* by Simon (1902) and its close relatives, currently placed in *Evarcha* Simon, 1902 are a charismatic part of the fauna of the island. They are encountered in all types of habitats, from sea-level to the highest mountains. *Evarcha* is a large genus with about 94 known species (World Spider Catalog 2020). Within it there is a huge diversity in genital morphology: emboli ranging from short, stout and compact to very long and filamentous, tegula ranging from simply rounded to more complex shapes bearing outgrowths, insemination ducts ranging from wide and membranous to thin and tube–shaped (Danilov and Logunov 1994; Prószyński 2018). Such diversity might suggest that *Evarcha* as currently defined is more of a 'hold all' genus harbouring unrelated species (Haddad and Wesołowska 2011; Zamani et al. 2017). Probably, motivated by this lack phylogenetic Prószyński (2017, 2018)) proposed a splitting mechanism, 'alternative classification of Salticidae' for ordering its diversity. This

CONTACT Suresh P. Benjamin suresh.benjamin@gmail.com
Supplemental data for this article can be accessed here.

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recent splitting of *Evarcha* into five genera was not supported phylogenetically, and it is not accepted (Blick and Marusik 2018; Kropf et al. 2019; World Spider Catalog 2020).

C. cancellatus was moved to *Evarcha* by Prószyński (1984). The validity of this combination was neither assessed within a phylogenetic framework in Prószyński (2017) or in Prószyński (2018) nor was any other scientific argumentation justifying the act provided. *Colopsus* is currently considered a junior synonym of *Evarcha* (WSC, 2020). *Evarcha* and the closely related genus *Pancorius* (Simon, 1902) are good examples of understudied genera whose systematics and phylogenetic placements are poorly resolved. This is evident from species of these genera being moved from one taxon into another.

Here we intend to study the phylogenetic placement of *C. cancellatus* and its close relatives using a data set of four genes. The implications of our results for the phylogeny of salticids are also discussed. In that endeavour, we also discover and described eight new endemic species belonging to the genera *Colopsus, Evarcha* and *Pancorius* from Sri Lanka.

Material and methods

Taxon selection

Our selection of taxa was based on Maddison (2015) and availability of material within Sri Lanka (Table 1). Fifteen ingroup genera were chosen from subtribe Plexippina including *Anarrhotus, Baryphas, Burmattus, Colopsus, Hermotimus, Evarcha, Epeus, Hyllus, Pancorius, Plexippoides, Polemus, Schenkelia, Telamonia* and *Yaginumaella*. Outgroup taxa for Plexippina were chosen from Harmochirina (*Harmochirus, Bianor*) and Aelurillini (*Aelurillus*). Other, outgroup taxa includes *Phintella* (Chrysillini), Subtribe *Dendryphantes* (Dendryphantina). *Phintella vittata* was used to route the tree.

Morphology

Sampling was primarily done by beating vegetation up to a height of approximately 1.5 m. Methodology and taxonomic descriptions are based on the format of Kanesharatnam and Benjamin (2016, 2018, 2019)). Specimens were identified using an Olympus SZX7 stereomicroscope. Female genitalia were excised and digested with Sigma Pancreatin LP 1750 enzyme

Table 1. Details of genes, primer names, primer sequences, and sources of all primers used in this study.

Gene	Primer	References
CO1 18S	CO1 1628 (F) 5 -ATAATGTAATTGTTACTGCTCA-3′	(Simon et al. 1994)
	C1-N-2191 (R) 5 - CCCGGTAAAATTAAAATATAAA-3′	(Dallas et al. 2005)
	18S 1 F 5 -TACCTGGTTGATCCTGCCAGT-3′	(Giribet and Ribera 2000)
	18S 5 R 5 -CTTGGCAAATGCTTTCGC-3′	(Giribet et al. 1996)
	18S 3 F 5 -GTTCGATTCCGGAGAGGGA-3′	(Giribet et al. 1996)
	18S 7 R 5 -GCATCACAGACCTGTTATTGC-3	(Giribet et al. 1996)
	18S 4 F 5 -CCAGCAGCCGCGCTAATTC-3′	(Giribet et al. 1996)
	18S 9 R 5 -GATCCTTCCGCAGGTTCACCT-3′	(Giribet et al. 1996)
28S	28S 'O' 5 -GAA ACT GCT CAA AGG TAA ACG G- 3′	(Whiting et al. 1997)
	28S 'C' 5 -GGT TCG ATT AGT CTT TCG CC-3	(Whiting et al. 1997)
H3	H3aF 5 -ATG GCT CGT ACC AAG CAG ACV- 3′	(Colgan et al. 1998)
	H3aR 5 -ATA TCC TTR GGC ATR ATR GTG- 3′	(Colgan et al. 1998)

Table 2. Details of exemplars used in this study including GenBank accession numbers and collection localities. All species belong to the family Salticidae. Collection localities are given if available. GenBank numbers in bold denote previously published sequences used in this study.

Species	Locality	Specimen No	CO1	28S	18S	H3
Colopsus ferruginus	Sri Lanka: Knuckles	IFS_SAL _ 173	MN895413	MN888676	-	MN895433
Colopsus ferruginus	Sri Lanka: Kurunegala	IFS_SAL _ 208	MN895412	MN888675	MN888688	MN895430
Colopsus ferruginus	Sri Lanka: Dambulla	IFS_SAL _ 233	MN895411	MN888672	MN888689	MN895429
Colopsus ferruginus	Sri Lanka: Dambulla	IFS_SAL _ 235	MN895410	MN888674	-	MN895428
Colopsus ferruginus	Sri Lanka: Kandy	IFS_SAL _ 248	MN895409	MN888673	MN888690	MN895431
Colopsus cancellatus	Sri Lanka: Badulla	IFS_SAL _ 325	MN895418	MN888681	-	-
Colopsus cancellatus	Sri Lanka: Nuwara Eliya	IFS_SAL _360	MN895417	MN888680	MN888692	MN895432
Colopsus cancellatus	Sri Lanka: Ethagala	IFS_SAL _381	MN895416	MN888679	-	-
Colopsus cancellatus	Sri Lanka: Galle	IFS_SAL _761	MN895415	MN888678	-	-
Colopsus cancellatus	Sri Lanka: Ethagala	IFS_SAL _797	MN895414	MN888677	MN888691	-
Colopsus magnus	Sri Lanka: Loolecondera	IFS_SAL _832	MN895408	MN888671	MN888687	-
Colopsus magnus	Sri Lanka: Nuwara Eliya	IFS_SAL _906	MN8954 07	MN888670	MN888686	-
Evarcha latus	Sri Lanka: Dambulla	IFS_SAL _ 236	MN895406	MN888669	-	MN895427
Evarcha latus	Sri Lanka: Samangala	IFS_SAL _ 243	MN895405	MN888668	-	MN895426
Pancorius altus	Sri Lanka: Loolecondera	IFS_SAL _ 829	MN895402	MN888665	-	-
Pancorius altus	Sri Lanka: Loolecondera	IFS_SAL _1050	-	MN888664	MN888684	MN895423
Pancorius altus	Sri Lanka: Nuwara Eliya	IFS_SAL _1074	MN895403	MN888666	-	MN895422
Pancorius alboclypeus	Sri Lanka: Knuckles	IFS_SAL _1145	MN895404	MN888667	MN888685	MN895424
Pancorius athukoralai	Sri Lanka: Loolecondera	IFS_SAL _1048	MN895401	MN888663	MN888683	MN895421
Pancorius athukoralai	Sri Lanka: Loolecondera	IFS_SAL _1049	MN895400	-	MN888682	MN895420
Phintella vittata	Sri Lanka: Ampara	IFS_SAL _240	KY888758	KY888746	KY888695	MN895419
Evarcha arcuata	Germany: Brandenburg	-	KX537413.1	-	–	-
Evarcha falcata	Germany: Brandenburg	-	KX537300.1	-	-	-
Evarcha hoyi	Canada: Alberta	-	JN309776.1	AY297249.1	-	-
Evarcha laetabunda	Austria: Duernstein	-	KY270106.1	-	–	-
Evarcha proszynskii	Canada: British Columbia	-	JF885957.1	DQ665765.1	KM033112.1	-
Evarcha albaria	-	-	JN817256.1	JN817038.1	JN816834.1	-
Evarcha coreana	-	-	JN817257.1	JN817039.1	JN816835.1	-
Hermotimus sp.	Gabon: Ngounie	-	JX145694.1	JX145778.1	-	-
Hyllus treleaveni	South Africa: Kwazulu-Natal	-	EU815595.1	EU815480.1	EU815531.1	-
Epeus sp.	-	-	AY297378.1	AY297248.1	-	-
Pancorius sp.	Malaysia: Pahang	-	JX145697.1	JX145781.1	-	-
Aelurillus cf. *ater*	Kazakhstan: Almaty Region	-	EU815615.1	EU815504.1	EU815536.1	-
Polemus cf. *chrysochirus*	Ghana: Kakum Forest	-	EU815619.1	EU815513.1	-	-
Schenkelia cf. *modesta*	Ghana: Kakum Forest	-	EU815620.1	EU815514.1	–	-

(*Continued*)

Table 2. (Continued).

Species	Locality	Specimen No	CO1	28S	18S	H3
Telamonia vlijmi	-	-	JN817281.1	JN817061.1	JN816859.1	-
Burmattus sp.	Singapore: Nee Soon Swamp	-	JX145691.1	JX145774.1	-	-
Anarrhotus fossulatus	Malaysia: Pahang	-	EU815605.1	EU815492.1	-	-
Baryphas ahenus	South Africa: Kwazulu-Natal Province	-	EU815612.1	EU815501.1	-	-
Plexippoides regius	China: Hebei	-	JN817260.1	JX145783.1	JN816838.1	-
Dendryphantes hastatus	Poland: Siedlce	-	KM033228.1	DQ665763.1	DQ665732.1	
Yaginumaella medvedevi	-	-	JN817280.1	JN817060.1	JN816858.1	
Harmochirus brachiatus	Malaysia: Selangor	-	JX145693.1	JX145777.1	-	-
Bianor maculatus	Australia: Glenelg	-	EU815585.1	EU815469.1	-	KM033200.1

complex in a solution of sodium borate (Dingerkus and Uhler 1977). Male palps and epigynes were cleared with methyl salicyclate for further examination. Drawings of male palps, epigynes and vulvae were made with the aid of a drawing tube attached to an Olympus BX51 compound microscope. Either a Nikon D80 or a D7000 camera with a macro lens was used to take photographs of live spiders. Photographs of palps, epigynes and intact spiders were taken with a Leica MC170 HD camera mounted on a Leica M205C stereomicroscope using the Leica Application Suite software (Leica Microsystems Limited, Germany). Images were merged with Helicon Focus image stacking software (version 6, Helicon soft Ltd). A complete synonymy of the genus and species is given in WSC (World Spider Catalog 2020). All measurements are in millimetres. All specimens unless otherwise stated are currently in the collections of NIFS and will be deposited in a public collection at the end of the study. Morphological abbreviations used in figures and text are based on Zamani et al. (2017).

Molecules

Laboratory protocols

Total genomic DNA was extracted from legs (Qiagen, Germany) using DNeasy Tissue Kit (Qiagen, Germany) as per manufacturer's protocol. The targeted markers and primers are standard in arachnid systematics and are given in Table (1). PCR amplification included a 2 min 94°C initial denaturation and 35 iterations of 30 s at 94°C, 30 s annealing step at 48°C (18S and CO1) and 55°C (28S), 30 s at 72°C and one 10 min extension step at 72°C (Kanesharatnam and Benjamin 2019). Each PCR mix was prepared by the addition of 3 µl MgCl2, 1 µl dNTPs, 4 µl 5X colourless GotaqR flexi buffer, 1 µl forward and reverse primers (10 pmol/µl) and 0.4 µl GotaqR polymerase (Promega Corporation, 2800 Woods Hollow Road, Madison, USA). Reaction volume was adjusted up to 20 µl by addition of 9.6 µl genomic DNA sample. For older specimens preserved in 70% ethanol, Qiagen Multiplex PCR kit (Qiagen, Germany) was used to enhance DNA yield. Reaction mixture per sample comprises 2.3 µl RNase free water, 10 µl QIAGEN Multiplex PCR Master Mix, 2 µl Q solution, 1.6 µl forward and reverse primers (10 pmol/µl) and 2.5 µl of DNA template. PCR was performed with an initial denaturation at 95°C for 15 min then denaturation at 95°C (30″), annealing temperature as mentioned above and extension at 72°C for 1′30″ for 35 cycles. Alternatively, IllustraTM puRE Taq Ready-To-Go PCR beads (GE Healthcare, UK) were used for PCR amplification. As a rule, 1.6 µl of forward and reverse primers (10 pmol/µl) and 2.5 µl of the DNA template were added to the tubes supplied by the manufacturer. Molecular-grade RO water made up the remaining volume. PCRs were subsequently visualised in a 0.8% agarose gel. Sequencing of the purified PCR products was done at Macrogen (Seoul, South Korea).

Sequence alignment and editing

Chromatograms were assembled and edited using the Geneious 6.1.5 software package (Biomatters Limited; Kearse et al. 2012). Sequences were aligned in the same package with options of automatically determine sequence direction, create alignment of consensus sequences only, gap open penalty 12, gap extension penalty 3, type of global alignment, refinement iterations 2. Edited sequences were queried in NCBI BLAST database (http://

blast.ncbi.nlm.nih.gov). The multiple sequence alignment was further refined manually in Mesquite (Maddison and Maddison 2019). Combined gene matrix was converted to tnt format using Sequence matrix 1.7.8 (Vaidya et al. 2011). All new sequences were submitted to GenBank; accession numbers are given in Table 2.

Phylogenetic analysis

Both parsimony and likelihood methods were used as optimality criteria for the phylogenetic analyses. RAxML–VI–HPC (randomised accelerated maximum likelihood for high performance computing v2.0.1; Stamatakis 2006) as implemented in T-REX (Tree and reticulogram REConstruction; Boc et al. 2012) was performed for maximum likelihood analysis using non-parametric bootstrapping in the program with the GTRGAMMAI model for all genes. For single gene matrices 100 search replicates and for the combined matrix 50 replicates were run. Branch support was asses using 1000 bootstrap resampling replicates. Parsimony analysis was performed by means of TNT 1.1 (Goloboff et al. 2003, 2008) using methods described in Benjamin et al. (2008).

Prior to likelihood analysis, Partitionfinder software (2.1.0; Lanfear et al. 2016) was run to determine appropriate models for gene matrices. The configuration file (.cfg format) was set with options as follows; branch lengths linked, model selection AICc, scheme greedy. Data blocks were clearly defined for individual non-protein coding genes (28S, 18S) and protein coding genes (CO1, H3) for 1st, 2nd and 3rd codon positions in configuration file. GTR+I + G model was chosen for combined gene matrix and GTR+I for other gene matrices.

Character abbreviations

al: abdominal length; ale: anterior lateral eyes; ame: anterior median eyes; aw: abdominal width; pl: prosoma length; ple: posterior lateral eyes; pme: posterior median eyes; pw: prosomal width; rta: retrolateral tibial apophysis; tl: total length; vta: ventral tibial apophysis.

Institutions

DFC: Department of Forest Conservation; DWLC: Department of Wildlife Conservation; NIFS: National Institute of Fundamental Studies; WSC; World Spider Catalogue.

Results

The concatenation of aligned sequences of the four genes resulted in a 2412 bp matrix for 44 taxa. Total length of individual gene matrixes was as follows: CO1 (545 bp, 43 taxa), 28s (726 bp, 41 taxa), 18s (879bp, 20 taxa) and H3 (332bp 14 taxa). Individual gene datasets for 18S and H3 contained missing data for over half of the taxa of the combined matrix.

The ML phylogenetic analysis of the four genes combined dataset retrieved a single tree (Figure 1). The resulting tree of the MP analysis of same matrix is given in Figure 2. The major topological change observed between the ML tree topology of Figure (1) and the MP tree topology of Figure (2) was the clustering of all included *Evarcha* species in the MP topology. All resulting single gene ML phylogenies (Supplementary Figure 1–4) were examined to assess their differences to the ML and MP tree topologies.

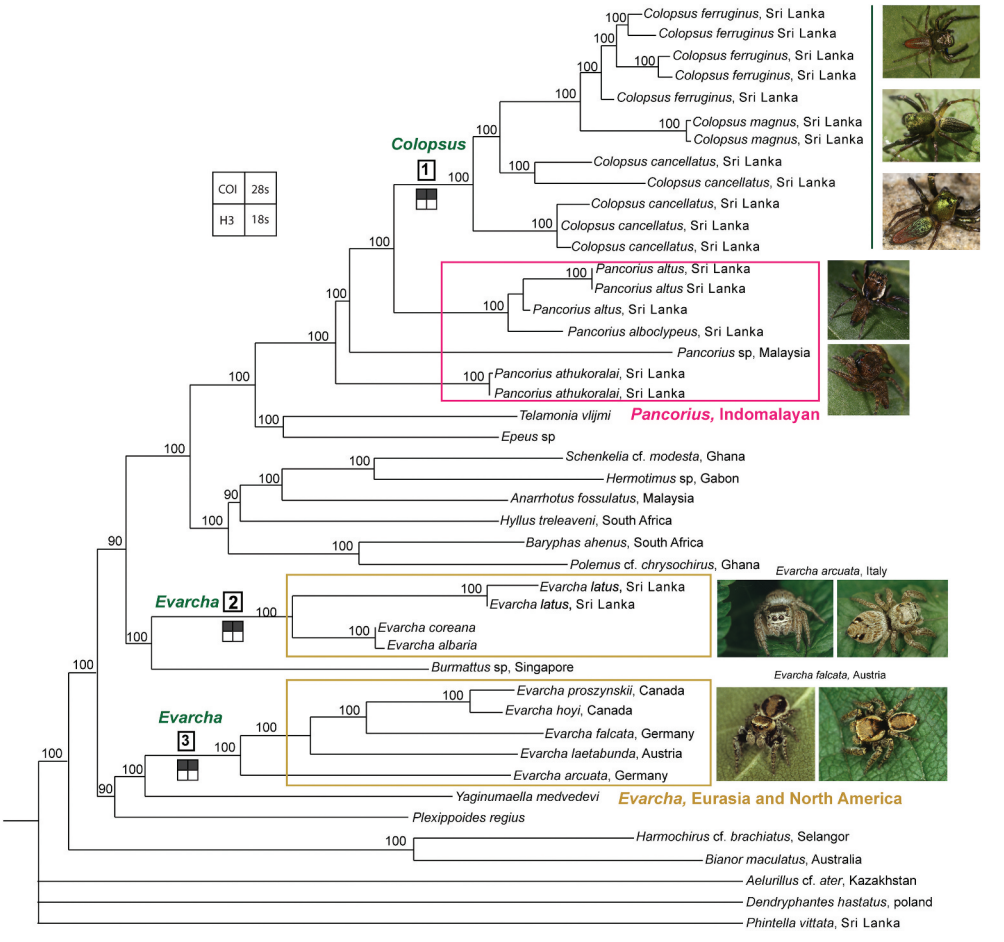

Figure 1. The single most likely tree obtained by ML analysis of the combined molecular data in RAxML–VI–HPC. The numbers at the nodes represent bootstrap values (only values 90 and above are given). Nodes that are unsupported have been collapsed. Collection country is given if available. 'Navajo rugs' indicate presence (black) or absence (white) of a given node in the tree specified in the legend. The images of *E. arcuate* and *E. falcata* are courtesy of Dr. Barbara Knoflach-Thaler.

Three well-supported clades, *Colopsus* and *Evarcha* in two separate clades with *Burmattus* in-between are recovered in the ML analysis. *Evarcha* forms a single clade in the MP analysis. The Sri Lanka *Colopsus* previously misplaced in *Evarcha* formed a clade in both the ML and MP topologies (Figures 1 and Figures 2). *Colopsus ferruginus* sp. nov. and *C. magnus* sp. nov. are recovered as sister species forming a clade with *C. cancellatus*. *Pancorius* is paraphyletic in both topologies. *P. alboclypeus* + *P. altus* formed a sister clade to the clade grouping of *C. ferruginus* + *C. magnus* + *C. cancellatus*. *P. alboclypeus* and *P. altus* were resolved as sister species, whereas *P. athukoralai* sp. nov. is in a separated clade.

Discussion

None of the tree topologies obtained supported the monophyly of *Evarcha* (*Evarcha* Simon, 1889 sensu lato, in Prószyński (2018) and as currently delimited in WSC (World

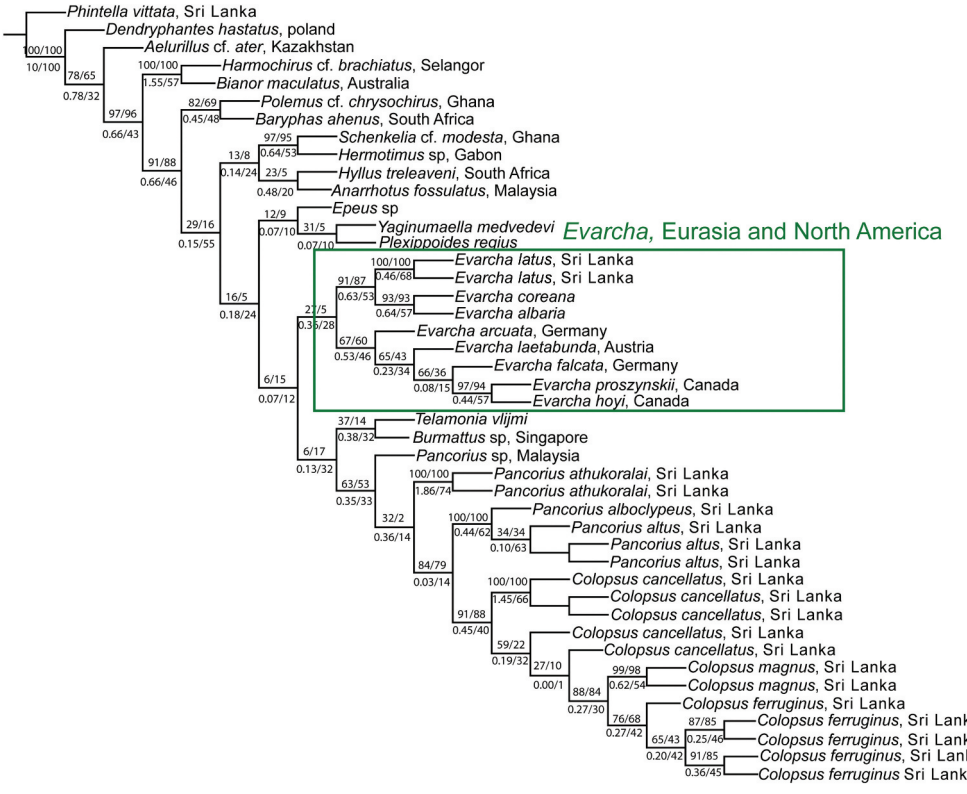

Figure 2. The single most parsimonious tree obtained by analysis of the combined molecular data in TNT. The numbers above nodes represent group resampling values and below nodes denotes Bremer supports and relative Bremer supports. Collection country is given if available.

Spider Catalog 2020). The tree topology recovered in the ML analysis failed to recover the monophyly of *Evarcha*; with *Colopsus* clustering separately and *Evarcha* clustering in two different clades (clades 1, 2 and 3 in Figure 1). Our results are significant in light of the recently proposed 'pragmatic' genera in the 'alternative classification of Salticidae' (Prószyński 2017, 2018) and suggest that at least some of the proposed genera, '*Evacin*', '*Evalba*', '*Evaneg*' and '*Evarcha* Simon, 1902 sensu stricto' are non-monophyletic. The primary difference of interest to this study is the separation of *Colopsus*. While our results agree with Prószyński (2018) that *Evarcha* should be split, the division supported by our analysis is different from what he chose, as *Colopsus* does not fall with either *Evacin* or *Evalba* or with *Evarcha* s. str. Several arguments have been presented against splitting of *Evarcha* (Blick & Marusik, 2018; Kropf et al. 2019). Counterarguments have also been put forward (Breitling 2019). It is also deemed that monophyletic groups are desirable in the process of classification of the living world (Nixon and Carpenter 2000). Thus, and in light of our results, completely resolving these issues would require a study with a much diverse sample of taxa and characters.

All tree topologies place *Colopsus* close to other Plexippina than to *Evarcha*. Further, *Colopsus* is sister to *Pancorius* and not to *Evarcha* (clade 1 in Figure 1). *Pancorius* is not well defined and badly in need of revision. Thus, the exact relationship of *Colopsus* to other

Plexippina remains to be studied. Sri Lankan species of *Colopsus* differ considerably from *Evarcha* (sensu lato, in Prószyński (2018) including the type species *E. falcata* (Clerck 1757). Species of *Colopsus* are colour dimorphic (Figure 1). Males of this genus are relatively large spiders, distinguishable by the shiny metallic green colouration of the anterior half of the body, this colour pattern tapers and is surrounded by ferrous red colouration, towards the anterior body. Most *Evarcha*, including *E. falcata,* possess a non-descript brown colouration (Figure 1).

In all tree topologies *Evarcha latus* sp. nov. cluster with *E. coreana* and *E. albaria* (clade 2 in Figure 1). However, the male palp of *E. latus* sp. nov. differs considerably from these two, by the absence of multifurcated RTA and the distal and proximal lobes of bulbus. Further, we were unable to extract DNA from the male and the two sequences of *E. latus* were obtained from female specimens of different localities (Ampara and Dambulla). The male specimen was assigned to the females based only on the collection data.

In *Pancorius, P. altus* sp. nov. and *P. alboclypeus* sp. nov. are sister species in all topologies. Their male and female genitalic structure support this placement. We have tentatively included *P. athukoralai* sp. nov. in g*Pancorius* punding further study. *P. athukoralai* sp. nov. rather differ somewhat from the above-mentioned species: presence of apical portion of tegulum, structures of vulva and general. Further studies are needed to clarify their phylogenetic placement.

The present study corroborates the monophyly of the subtribe Plexippina as discussed in previous molecular studies (Maddison and Hedin 2003; Maddison et al. 2008; Bodner and Maddison 2012; Maddison 2015). This subtribe primarily consists of major Old World group other than the New World, highly speciose genus *Evarcha*, which has two species in the New World.

Taxonomy

Family **SALTICIDAE** Blackwall, 1841
Subfamily **SALTICINAE** Blackwall, 1841
Clade Salticoida Maddison & Hedin, 2003
Clade Saltafresia Bodner & Maddison, 2012
Clade Simonida Maddison, 2015
Tribe Plexippini Simon, 1901
Subtribe Plexippina Simon, 1901
Genus *Colopsus* Simon, 1902

Colopsus Simon, 1902. Type species: *Colopsus cancellatus* Simon, 1902: 409–410 by original designation. Gender masculine.
Evarcha (in part) Prószyński 1984.
Evacin (in part) Prószyński 2018.

Remarks

Colopsus was described as a monotypic genus by Simon (1902) based on material from Sri Lanka. Prószyński (1984) letter synonymised *Colopsus* with *Evarcha*: at that time no specific characters unifying species of *Colopsus* with that of *Evarcha* or any other scientific argumentation justifying the act were provided. Further, the Sri Lankan species was never

studied in any detail except for a few drawings of the original type series. Aggravating the situation Prószyński (2018) placed *C. Cancellatus* in his new genus *Evacin* with more than 21 other species not related in any way to each other.

The differential diagnosis of *Evacin* directs the reader to a series of images leaving room to misinterpretation. The description, based on *Evacin kochi*, the type species that bear the designated homologies of the genus, does not tally with that of the type species of *Colopsus, C. cancellatus*. The type and other species of *Colopsus*, cannot be considered to be part of the most inclusive clade that included the type of *Evacin*. Also see Blick and Marusik (2018) and WSC (World Spider Catalog 2020).

Diagnosis

Species of *Colopsus* are colour dimorphic. Males of this genus are distinguishable by the metallic green colouration of the anterior half of the body, this colour pattern tapers and is surrounded by ferrous red colouration, towards the anterior body. Females are yellow-brown, with a prominent central yellow-brown central band on the opisthosoma (Figures 3(a–d), Figures 10(a–b, h–j), Figures 12(a–d)). The palpal tibia is longer than the bulbus, and in some cases is even longer than the cymbium; in most other species of *Evarcha* the palpal tibia is shorter than the bulbus/cymbium. A simple oval or rounded bulb (Figures 4(c,e), Figures 9(c,e), Figures 13(d), Figures 16(c, e) with/without posterior lobe and thread–like or dagger–like embolus (Figure 8(d) are characteristic of males. A large, membranous 'window' and epigynal plate with two lateral pockets (Figures 5(c,d,h,i), Figures 14(c,d), multi-chambered spermathecae (Figures 5(e, j), Figures 14(e) are characteristic in females.

Description

Medium to large spiders, size ranging from 6 to 13 mm in length. Prosoma high, longer than wide, colouration from metallic brownish green to dark brown. Horn like tuft of long, curved black bristles between ALE and PLE. Ocular area darker than carapace and rather elevated. Comparably narrower clypeus often covered with stiff pale white bristles. Chelicerae black covered with stiff white bristles. Sternum oval. Simple male palp with oval or rounded bulbus (Figures 4(c,e), Figures 11(c,e), Figures 13(d), Figures 16(c,e)) with/without posterior lobe. Embolus filiform or dagger–like and size ranging from short to long bent towards the bulbus (Figures 4(c,e), Figures 11(c,e), Figures 13(d), Figures 16(c,e)). Sperm duct not meandering decreasing in size from distal to proximal tegulum. RTA single, arising from broader base and ending in a pointed tip without bifurcation (Figures 4(c,e,f), Figures 8(d,e), Figures 11(c,e,f), Figures 13(d,e), Figures 16(c,e,f)). Palpal tibia long. Epigyne with posterior transverse plate with two lateral pockets (Figures 5(c,d,h,i), Figures 14(c,d)) at epigastric furrow. A pair of membranous window in front of the posterior epigynal plate. Spermathecae multi–chambered and highly sclerotised (Figures 5(e, j), Figures 14(e)).

Composition

Currently five species, *Colopsus cancellatus*, *C. cinereus* sp. nov., *C. ferruginus* sp. nov., *C. magnus* sp. nov. and *C. tenuis* sp. nov. All are endemic to Sri Lanka. More species should be expected to occur in India.

Distribution

Sri Lanka.

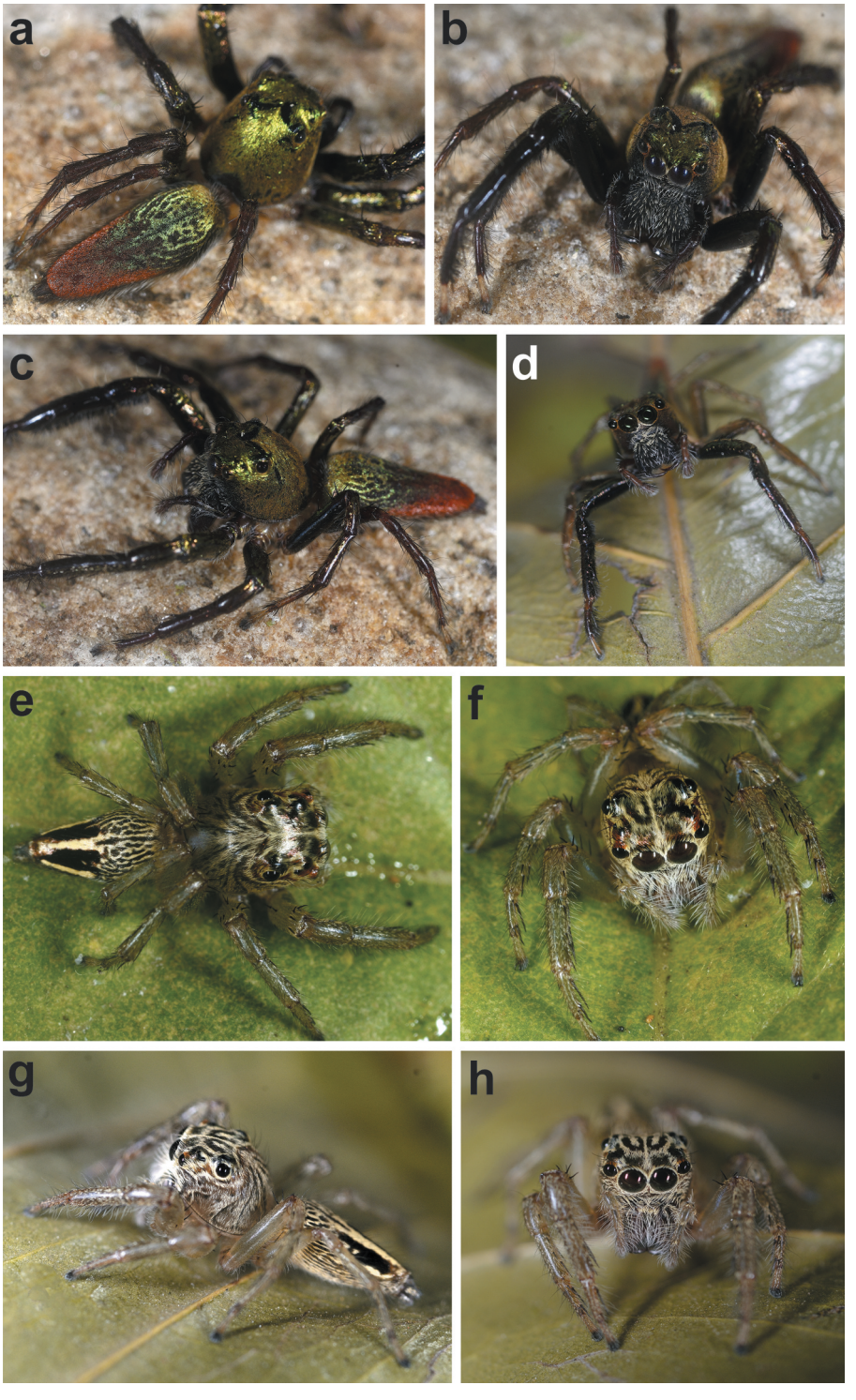

Figure 3. Photographs of live *Colopsus cancellatus* from Ethagala; (a–d). Male, (e–h). Female.

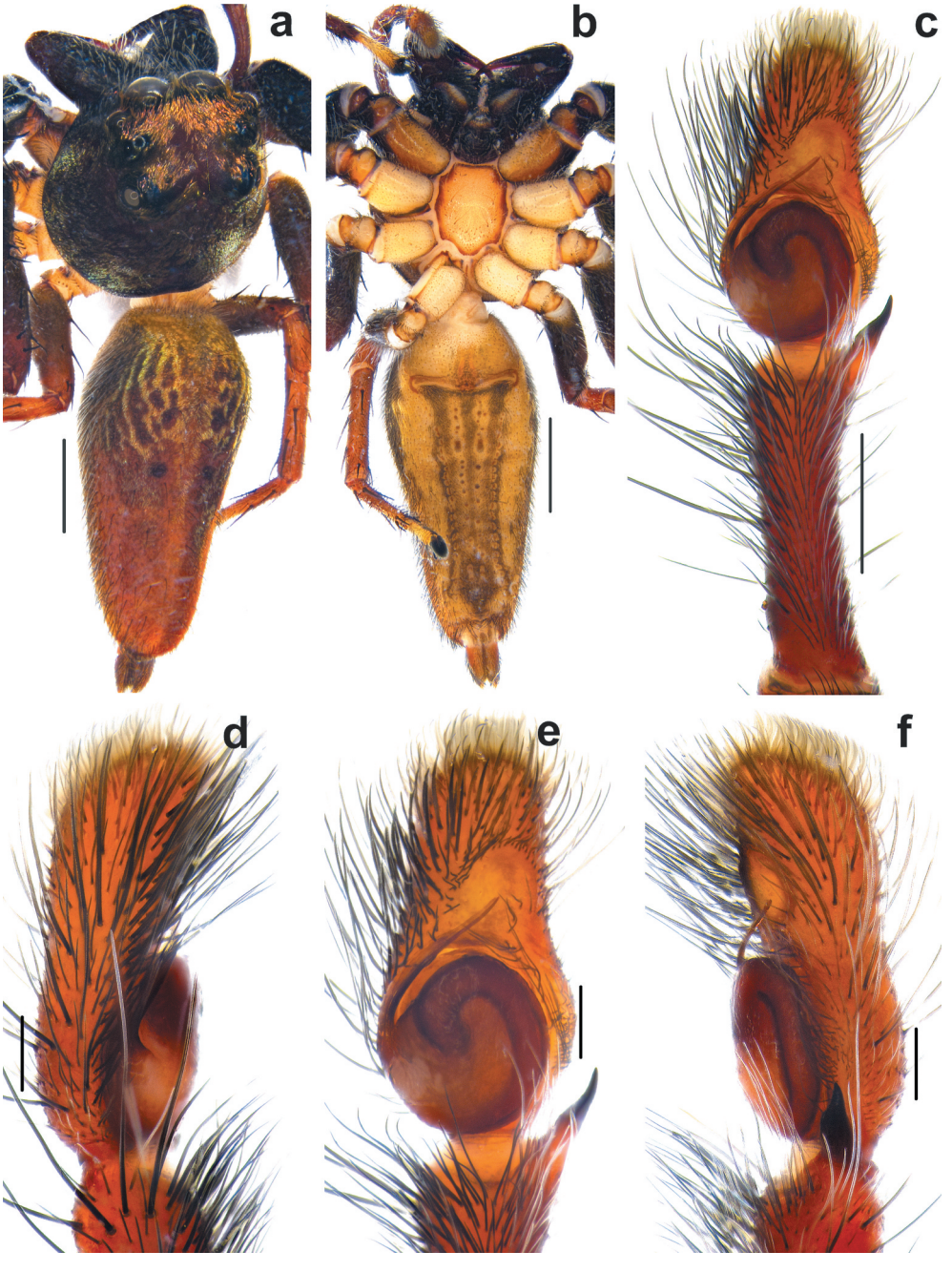

Figure 4. *Colopsus cancellatus* (a–b). Male habitus, (a). dorsal view, (b). ventral view. (c–f). Male palp, (c). ventral view. (d). prolateral view. (e). ventral view. (f). retrolateral view. Scale bars: (a–b) = 2 mm, (c) = 0.5 mm, (d–f) = 0.2 mm.

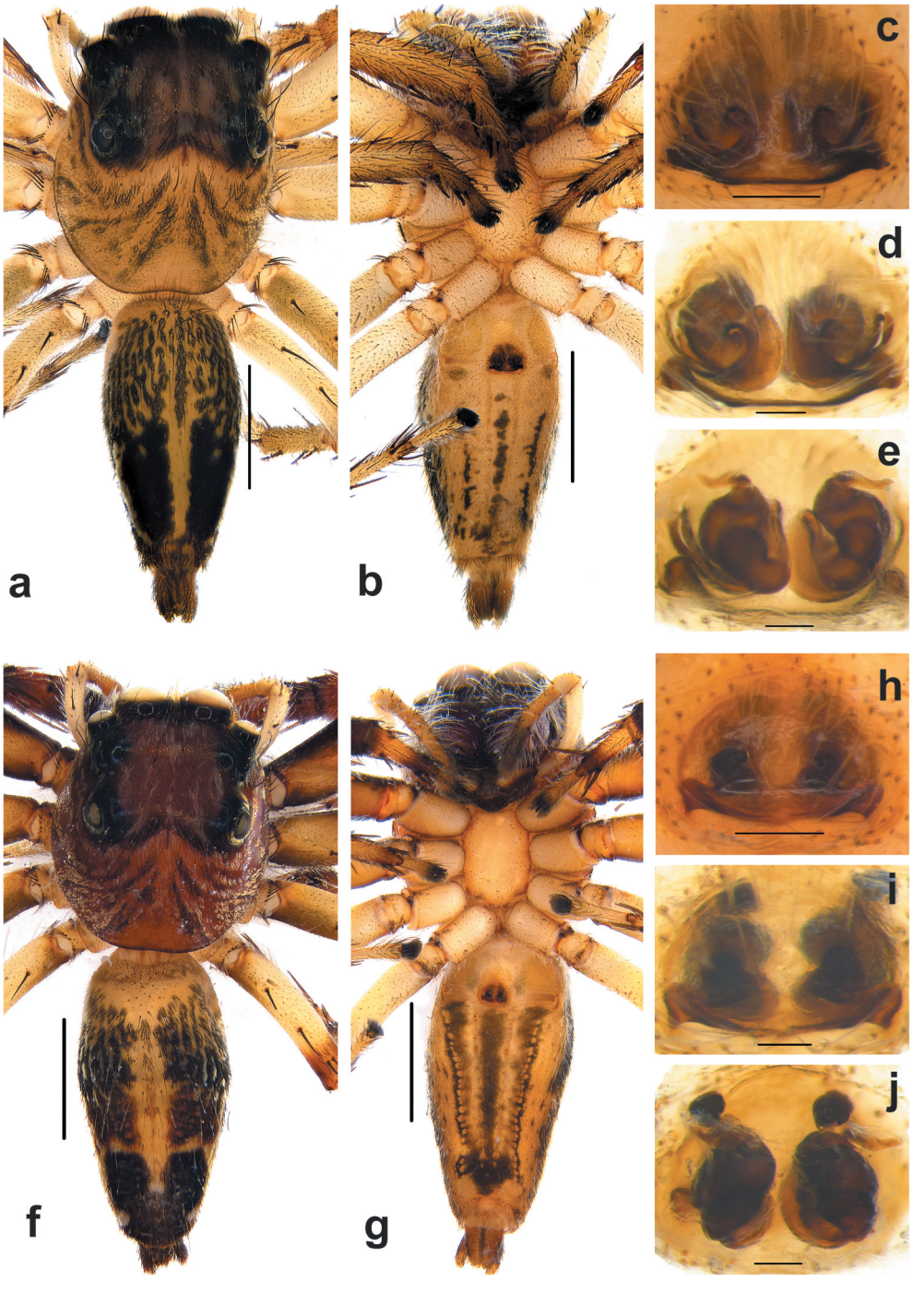

Figure 5. *Colopsus cancellatus* (a–e); a–b. Female habitus, a. dorsal view. b. ventral view. c–e. Epigynum, c–d. ventral view. e. dorsal view and *Colopsus ferruginus* sp. nov. (f–j); f–g. Female habitus, f. dorsal view. g. ventral view. h–j. Epigynum, h–i. ventral view. j. dorsal view. Scale bars: a–b, f–g = 2 mm, c, h = 0.2 mm, d–e, i–j = 0.1 mm.

Colopsus cancellatus Simon, 1902
(Figures 3(a–h), Figures 4(a–f), Figures 5(a–e), Figures 6(a,b), Figures 7(a,d))

Evarcha cancellata (Simon, 1902): Prószyński, 1984, p. 51.
Evacin cancellata (Simon, 1902): Prószyński, 2018, p. 143.

Material examined

Sri Lanka: Sabaragamuwa Province: Rathnapura District: 2♂ (IFS_SAL 115–116), Eastern Sinharaja, Morningside section, 06° 23′ 23″ N, 80° 30′ 05″, hand collection, 23 February 2007, leg. SP Benjamin and Z Jaleel; 1♀ (IFS_SAL 123), same locality and collection data; 2♂, 3♀ (IFS_SAL 124–128), Gilimale FR, 110 m, 06° 45′ 55.8″ N, 80° 25′ 45.5″ E, hand collection, 11 February 2007, leg. SP Benjamin and Z Jaleel; 2♀ (IFS_SAL 432–433), Palabaddala, 1115 m, 06° 48′ 27″ N, 80° 32528′ 12″ E, 22 August 2012, leg. SP Benjamin et al.; 2♂, 2♀ (IFS_SAL 982–985), Sinharaja FR, Kudawa, 521 m, 06° 24′ 58.26″ N, 80° 25′ 25″ E, beating, 11–13 October 2016, leg. K Nilani and I Sandunika. Central Province: Kandy District: 1♀ (IFS_SAL 161), Udawattakelle, 580 m, 07° 17′ 54″ N, 80° 38′ 29″ E, beating, 11 May 2015, leg. NP Athukorala et al. Matale District: 1♂, 1♀ (IFS_SAL 681–682), IFS Arboretum, 180 m, 07° 51′ 34″ N, 80° 40′ 28″ E, beating, 24 August 2010, leg. SP Benjamin

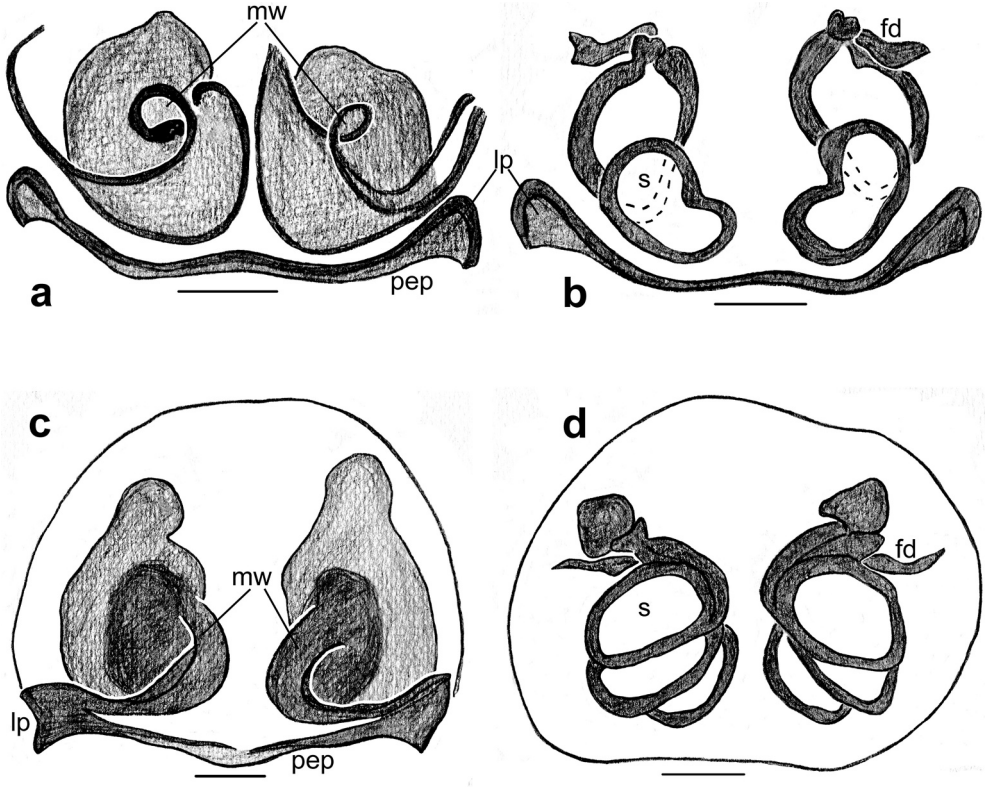

Figure 6. Epigynum, ventral view (a, c), dorsal view (b, d). *Colopsus cancellatus* (a–b) and *Colopsus ferruginus* sp. nov. (c–d). Abbreviations: cp = central pocket; fd = fertilisation duct; lp = lateral pocket; mw = membranous window; pep = posterior epigynal plate; s = spermathecae. Scale bars: (a–d) = 0.1 mm.

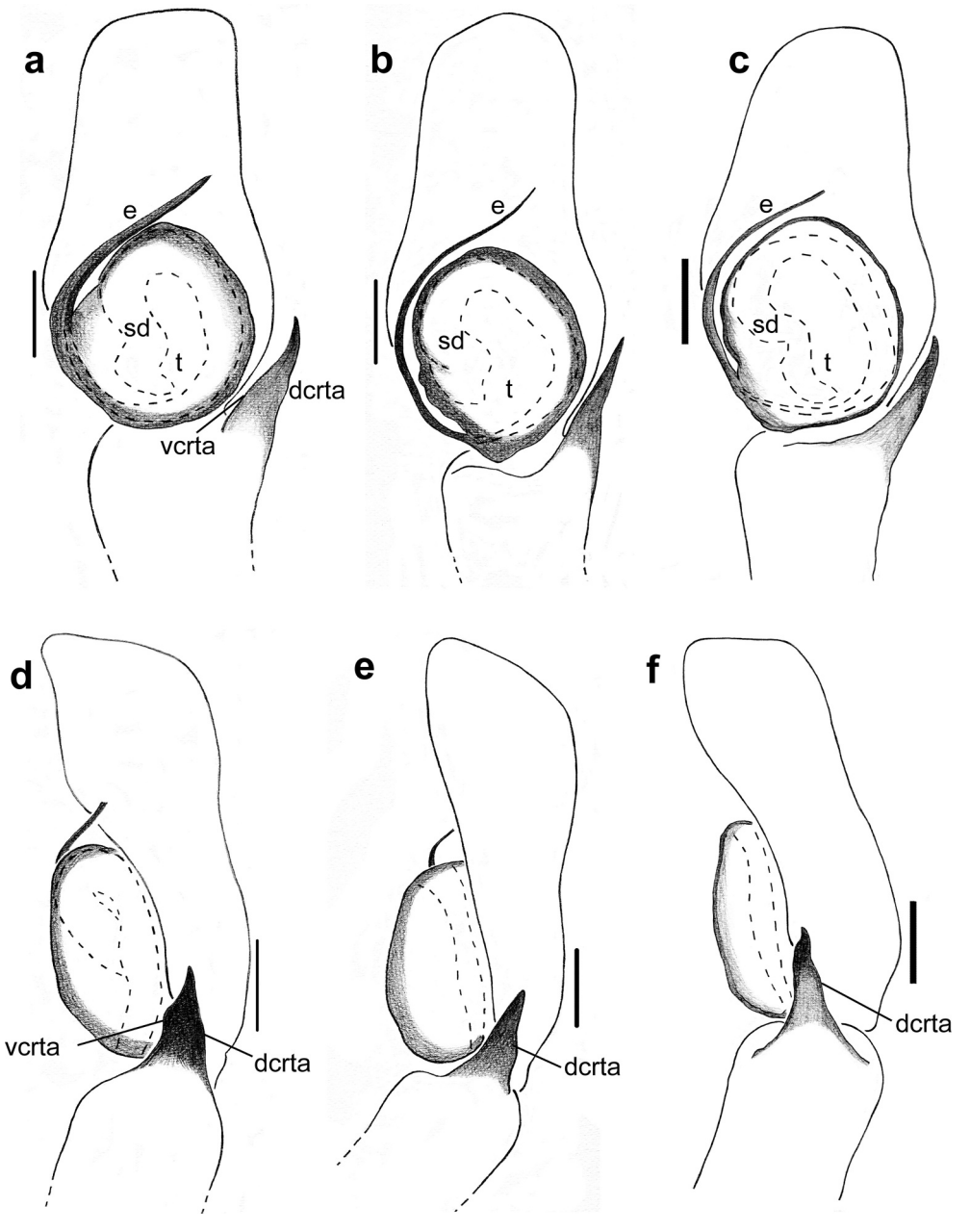

Figure 7. *Colopsus cancellatus* (a, d), *Colopsus ferruginus* sp. nov. (b, e) and *Colopsus tenuis* sp. nov. (c, f). (a–c). palp, ventral view. (d–f). palp, retrolateral view. Abbreviations: e = embolus; dcrta = dorsal curve of rta; sd = sperm duct; t = tegulum; vcrta = ventral curve of rta. Scale bars: a–f = 0.2 mm.

and S Batuwita; 1♂, 1♀ (IFS_SAL 468–469), same locality and collection data, 19 January 2010, leg. SP Benjamin, S Batuwita and PMH Sandamali; 1♂ (IFS_SAL 523), same locality and collection data, 2 February 2010, leg. S Batuwita and PMH Sandamali. Nuwara Eliya District: 2♀ (IFS_SAL 360–361), Agarapatana, Bopattalawa FR, 1665 m, 06° 50′ 36″ N, 80° 40′ 40″ E, hand collection, 18–21 February 2007, leg. SP Benjamin and Z Jaleel. Uva

Province: Badulla District: 1♀ (IFS_SAL 422), Ohiya, 1280 m, 06° 50′ 32″ N, 80° 53′ 05″ E, beating, 7 December 2011, leg. SP Benjamin; 1♂ (IFS_SAL 425), same locality and collection data, 26 May 2012, leg. NP Athukorala; 1♂ (IFS_SAL 481), Namunukula, along Passara, Elle Road (B113), 2000 m, 06° 52′ N, 81° 07′ E, beating, 27 February 2015, leg. SP Benjamin and NP Athukorala; 1♂, 1♀ (IFS_SAL_325–326), Diyaluma falls, 660 m, 06° 43′ 57″ N, 81° 01′ 58″ E, beating, 4 July 2012, leg. SP Benjamin. North Western Province: Kurunagala District: 1♀ (IFS_SAL 291), Ethagala, hand collection, 190 m, 07° 29′ 11.23″ N, 80° 22′ 21.64″ E, beating, 19 December 2007, leg. Z Jaleel; 1♂, 1♀ (IFS_SAL 411–412), same locality and collection data, 15 August 2007; 1♂ (IFS_SAL 513), same locality and collection data, 20–VIII–2010, leg. S Batuwita; 1♂, 4♀ (IFS_SAL 797–799), same locality and collection data, 7 June 2016, leg. NP Athukorala et al.; 1♂, 1♀ (IFS_SAL 372–373), Nikaravatiya, 53 m, 07° 44′ 46″ N, 80° 07′ 54″ E, 1–3 February 2007, leg. Z Jaleel; 1♂, 1♀ (IFS_SAL 393–394), same locality and collection data; 1♀ (IFS_SAL 381), Kankaniyamulla FR, 47 m, 07° 21′ 32″ N, 80° 02′ 07″ E, hand collection, 30 August 2012, leg. Z Jaleel. Western Province: 1♀ (IFS_SAL 465), Gampaha District, Alawala, 50 m, 07° 06′ 44″ N, 80° 09′ 42″ E, 29 March 2012; 2♂ (IFS_SAL 695–696), Kalutara District, Panadura, Mahabellana along Bolgoda south lake, 9 m, 06° 42′ 48″ N, 79° 54′ 09″ E, beating, 8 July 2010, leg. SP Benjamin and SK Dayananda.

Diagnosis

The species is distinguishable from other congeners by the dark golden green blotches on the anterior abdomen in males (Figure 3(a–c)), smooth rounded bulbus, embolus with membranous covering (Figures 4(c,e), Figures 7(a,d)), long palpal tibia (Figure 2(c); Prószyński 1984), strongly curved RTA (Figures 4(c,e,f), Figures 7(a, d)), orange blotches behind AMEs and ALEs in females (Figure 3(e,f)), broad median septum, spermathecae with oval–shaped large chamber and reniform small chamber (Figures 5e, Figures 6(b)), Posterior epigynal plate with median indentation and two lateral pockets (Figures 5(c,d), Figures 6(a)).

Description

Male: Large spiders. In life, brown prosoma covered with metallic yellowish green scales (Figure 3(a–c)). Clypeus covered with long, greyish white hairs (Figure 3(b)). Eye field rather elevated. ALEs, PMES and PLEs covered with golden yellow rings (Figure 3(b,d)). Prosoma high, broader than abdomen and sloping posteriorly. Chelicerae dark brown, covered with greyish white, tough hairs brown fangs (Figure 3(b). Sternum oval, prominent indentation near coxae IV, yellowish brown in middle and edges pale brown colour in ethanol-preserved specimens (Figure 4(b)). Posterior margin of prosoma steep, slightly truncated. Leg I rather robust, elongated, dense black bristles on patella, tibia, metatarsus I (Figure 3(a–d)). All legs blackish brown dispersed with metallic yellowish green blotches except pale brown tarsi (Figure 3(a–d)).

Abdomen longer and narrower than prosoma, tapering posteriorly. Dorsum covered with metallic yellowish green blotches on blackish brown anterior abdomen (Figure 3(a–c)). Posterior dorsum decorated with reddish brown scales. Ventrum pale yellowish brown with greyish brown dots arranged in four rows as a single band from epigastric furrow to spinnerets (Figure 4(b)). Spinnerets greyish brown. Measurements: TL 12.09, AL 7.15, AW 3.51, PL 4.68, PW 4.55.

Brown palp. Cymbium long with gradually narrowing distal region. Embolus thin, long, associated with membranous structure originating from antero–lateral portion of the

bulbus (Figures 4(c,e), Figures 7(a,d)). Rounded smooth bulbus without any projection (Figures 4(c,e), Figures 5(a)). Sperm duct comparably broader at the distal end of the tegulum, narrower at the posterior tegulum. Palpal tibia much longer (Figure 4(c)); Prószyński 1984). Medium-sized RTA with a lower dorsal curve and an upper ventral curve ending in a pointed tip (Figures 4(c,e,f), Figures 7(a,d)); Prószyński 1984).

Female: In life, prosoma with pale yellow and brownish black diagonal stripes radiating from fovea extending towards posterior prosoma (Figure 3(e,f)). Eye field metallic blackish white and rather raised. PLEs covered with pale yellow rings, orange blotches behind AMEs, ALEs, around PMEs (Figure 3(e–h)). Clypeus covered with tuft of long, white hairs (Figure 3(f,h)). Chelicerae pale brown with brown fangs. Shape of sternum as in males. Front pair of legs slightly enlarged than in males. Other pairs greenish white in colour.

Abdomen longer and narrower than prosoma, tapering posteriorly. Anterior dorsum decorated with brownish black blotches (Figure 3(e,g)). Large, black markings at the posterior half of abdomen, small brown patch near spinnerets. Ventrum as in males. Spinnerets greyish yellow. Measurements: TL 10.79, AL 5.20, AW 2.61, PL 4.81, PW 3.90.

Epigynum highly sclerotised. Large, membranous 'window' at epigastric furrow (Figure 5(c,d)), 6(a–b). Broad median septum (Prószyński 1984). Copulatory opening obvious and open inside of rounded portion of membranous 'window'. Copulatory ducts indistinct. Spermathecae highly sclerotised, two chambers; oval–shaped large chamber and reniform small chamber (Figure 5(e), Figures 6(b)). Fertilisation ducts originated from mid – anterior wall of large chamber (Figure 5(e), Figures 6(b). Highly sclerotised Posterior epigynal plate with median indentation, two lateral pockets (Figure 5(c,d), Figures 6(a, b); Prószyński 1984).

Remarks

Males of *C. cancellatus* are much larger than females and differ in body colouration, markings, and size of first pair of legs from females (Figure 3(a–h)). In localities where *C. cancellata* was found, it was sympatric with *C. ferruginus* sp. nov. Prószyński (2009) identified a specimen from Java as *Evarcha* cf. *cancellata*. However, he mentioned that his identification is provisional and an unambiguous identification of these specimens might require detailed illustrations of the internal epigynum of *C. cancellata*. Here, we compare his drawing to our specimens/illustrations of *C. cancellatus* and note that it differs considerably from our material. Thus, the occurrence of *C. cancellatus* in Java is doubtful.

Distribution

Sri Lanka.

Colopsus cinereus sp. nov.
(Figures 8(a–e), Figures 9(a,b))

Type material

Holotype, ♂ (IFS_SAL_648), Sri Lanka, North Central Province, Anuradhapura District, Mihintale Sanctuary, 123 m, 08° 21′ 10.60″ N, 80° 30′ 14.54″ E, 12 May 2013, hand collection, leg. I Sandunika.

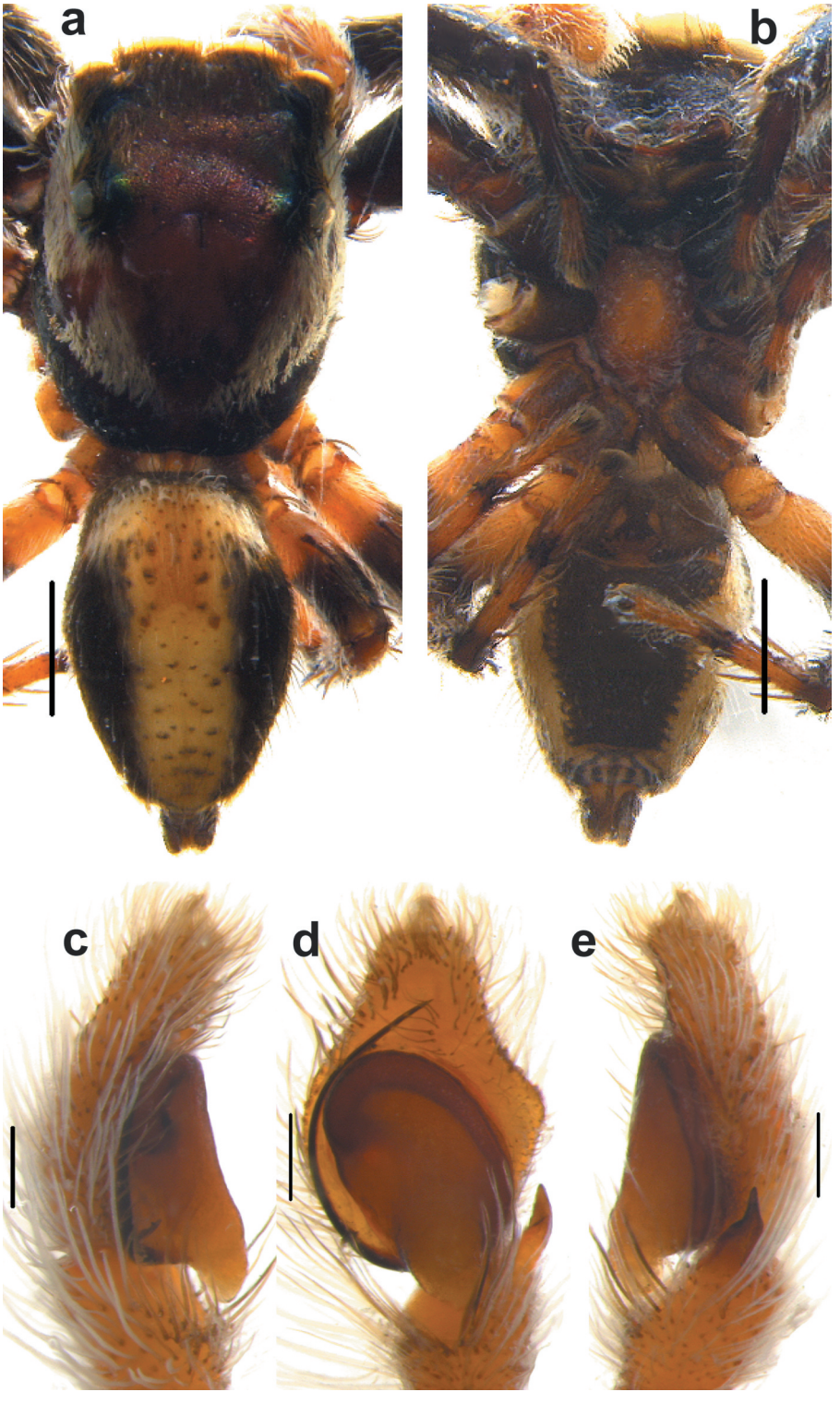

Figure 8. *Colopsus cinerea* sp. nov. (a, b). Male habitus, (a). dorsal view. (b). ventral view. (c–e). Male palp, (c). prolateral view. (d). ventral view. (e). retrolateral view. Scale bars: (a, b) = 1 mm, (c–e) = 0.2 mm.

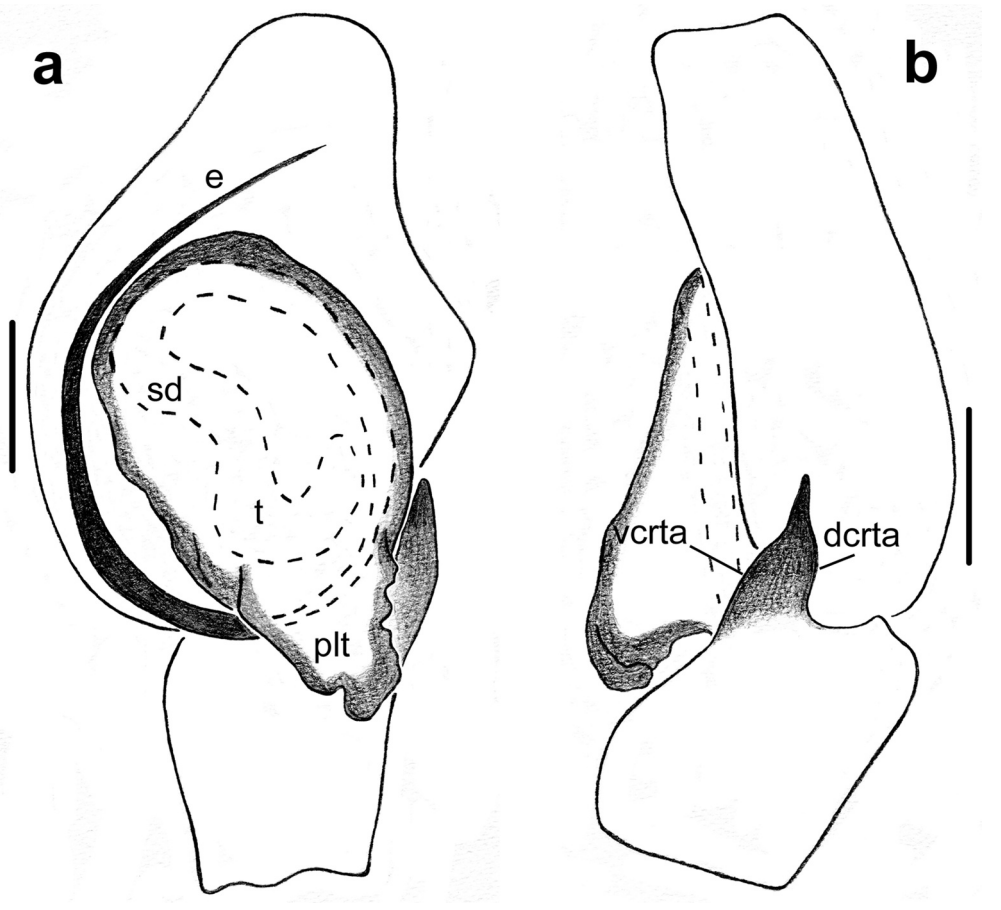

Figure 9. *Colopsus cinerea* sp. nov. (a, b), a. Palp, ventral view. (b). retrolateral view. Abbreviations: e = embolus; dcrta = dorsal curve of rta; sd = sperm duct; plt = posterior lobe of tegulum; t = tegulum; vcrta = ventral curve of rta. Scale bars: (a–d) = 0.2 mm.

Etymology

The species name refers to the greyish yellow median abdominal band in the preserved male specimen.

Diagnosis

The species is distinguishable from other congeners by the greyish pale yellow median band of abdomen (Figure 8(a)), oval bulbus with well-developed posterior lobe, long, thin embolus (Figures 8(d), Figures 9(a)), small RTA with a sharpened point (Figures 8(d,e), Figures 9(a,b)).

Description

Male: Medium-sized spider. In ethanol-preserved specimens, prosoma brown and covered with greyish white blotches laterally (Figure 8(a)). Eye field rather elevated. Fovea distinct. ALEs, PMES and PLEs covered with black rings. Prosoma high, sloping posteriorly. Chelicerae brown, yellowish brown fangs. Sternum oval, yellowish brown centrally,

edges brown (Figure 8(b)). Posterior margin of prosoma blackish brown, steep, slightly truncated. Leg I dark brown, rather robust, elongated, dense black bristles on patella, tibia metatarsus I, others brown with yellowish brown banding pattern.

Abdomen oval, smaller and narrower than prosoma, tapering posteriorly. Dorsum blackish grey with broad, greyish pale yellow median band dispersed with grey dots (Figure 8(a)). Ventrum greyish yellow with a dark grey median band comprising four rows of greyish brown dots from epigastric furrow to spinnerets (Figure 8(b)). Spinnerets greyish brown. Measurements: TL 5.98, AL 2.86, AW 1.69, PL 3.12, PW 2.34.

Yellowish brown palp. Moderately long cymbium with narrowest distal region. Embolus thin, long originating from posterior portion of the bulbus and partially surrounding it (Figures 8(d), Figures 9(a)). Bulbus oval with a large posterior lobe (Figures 8(d,e), Figures 9(a, b)). Sperm duct comparably broader at the distal end of tegulum, narrower at the posterior bulbus. Palpal tibia comparably short. Short RTA with an upper dorsal curve and a lower ventral curve terminating in a straight pointed tip (Figures 8(d,e), Figures 9(a,b)).
Female: unknown.

Remarks

This species is provisionally placed here based on currently available evidence. We do not have the corresponding female or molecular sequence data for this species for a better placement. The male palp suggests that it can be possibly also placed in either *Evarcha* or *Pancorius* (not metallic green, but striped, bulb with prominent lobe). However, the origin and shape of the embolus (long thin embolus that starts at about 6:00 o'clock position) are more or less as in *Colopsus*. Based on the length of the embolus, we predict that the insemination duct of the unknown female could be longer than that of its congeners.

During the review process it was suggested that this holotype is the male to go with the females of *E. latus*. We note that this issue can only be ratified in a broader population genetic study, which is beyond the scope of the current endeavour.

Distribution

Sri Lanka; known only from the type locality.

Colopsus ferruginus sp. nov.

(Figures 5(f–j), Figures 6(c,d), Figures 7(b,e), Figures 10(a–l), Figures 11(a–f))

Type material

Holotype, ♂ (IFS_SAL_800): Sri Lanka, North Western Province, Kurunegala District, Kurunegala, Ethagala, 190 m, 07° 29′ 11.23″ N, 80° 22′ 21.64″ E, beating, 7 June 2016, leg. K Nilani.

Paratype, ♀ (IFS_SAL_801): Same locality and collection data as in holotype.

Other material examined

3♀ (IFS_SAL_802-804): Same locality and collection data as in type materials. 1♀ (IFS_SAL_167), same locality and collection data, 8 April 2015, leg. SP Benjamin et al. 1♂, 3♀ (IFS_SAL_107–110), Sri Lanka: Central Province: Nuwara Eliya District: Agarapatana, Bopattalawa FR, 1665 m, 06° 50′ 36″ N, 80° 40′ 40″ E, hand collection,

Figure 10. Photographs of live *Colopsus ferruginus* sp. nov. (a, b, d, e, h–j). males. (c, f–g, k–l). females; (a–c). from Ethagala, (d–g). Mihintale sanctuary, (h–i). Gannoruwa forest. (j–l). Dambulla arboretum.

18–21 February 2007, leg. SP Benjamin and Z Jaleel. Kandy District: 1♂ (IFS_SAL_144) Dunumadalawa, 701 m, 07° 16′ 38″ N, 80° 38′ 69″ E, beating, 29 October 2009, leg. SP Benjamin and S Batuwita; 1♂ (IFS_SAL_352), same locality and collection data, 7 October 2009, leg. SP Benjamin, RMGN Tilakarathna and PMH Sandamali; 1♂, 2♀ (IFS_SAL_1019–1021), same locality and collection data, 6 November 2017, leg. NP Athukorala et al.; 1♀ (IFS_SAL 173), Knuckles range, 1446 m, 07° 26′ 32.6″ N, 80° 46′ 51.5″ E, beating, 7 April 2015, leg. NP Athukorala; 1♂ (IFS_SAL_208), Knuckles range, 1446 m, 07° 26′ 32.6″ N, 80° 46′ 51.5″ E, 7 April 2015, leg. NP Athukorala; 4♂, 2♀ (IFS_SAL_870–875), Udawattakelle, 580 m, 07° 17′ 54″ N, 80° 38′ 29″ E, beating, 24 August 2016, leg. K Nilani; 1♂ (IFS_SAL_248), same locality and collection data, 08-VI -2015, leg. S Ranasinghe and K Nilani. 3♂, 1♀ (IFS_SAL_ 884–887), Gannoruwa forest,

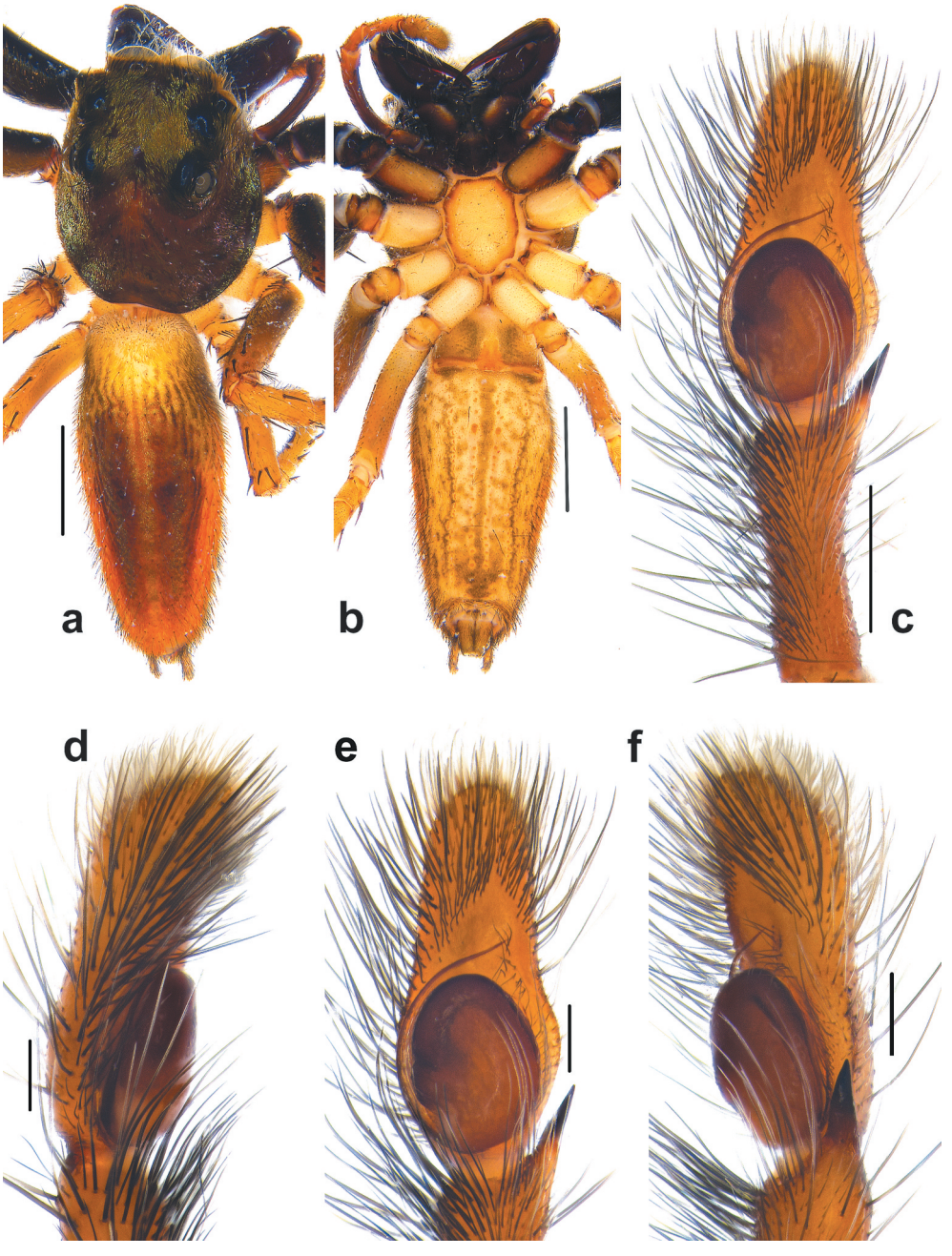

Figure 11. *Colopsus ferruginus* sp. nov. (a, b). Male habitus, (a). dorsal view. (b). ventral view. (c–f). Male palp, c. ventral view. d. prolateral view. (e). ventral view. (f). retrolateral view. Scale bars: (a, b) = 2 mm, (c) = 0.5 mm, (d–f) = 0.2 mm.

575 m, 07° 17′ 16″ N, 80° 35′ 47″ E, beating, 30 August 2016, leg. K Nilani. 2♂ (IFS_SAL_1152–1153), Knuckles, Along Dothalugala Nature Trail, 1202 m, 07° 20′ 19″ N, 80° 51′ 3″ E, beating, 3 May 2018, leg. SP Benjamin at al. Matale District: 1♂, 2♀ (IFS_SAL_233–235) IFS Arboretum, 180 m, 07° 51′ 34″ N, 80° 40′ 28″ E, beating, 28 May 2015, leg. NP Athukorala

et al.; 1♂ (IFS_SAL_590) same locality and collection data, 20 January 2016, leg. K Nilani. 1♂ (IFS_SAL_238) Gammaduwa, knuckles range, 918 m, 07° 34′ 45.6″ N, 80° 41′ 55.3″ E, hand collection, 19 February 2015, leg. SP Benjamin; 1♂ (IFS_SAL_244) Illukkumbura, Knuckles range, 505 m, 07° 32′ 20.04″ N, 80° 46′ 31.85″ E, beating, 3 June 2015, leg. NP Athukorala et al.; 1♂, 2♀ (IFS_SAL_601–603), Bowatenna, Reservoir area, 252 m, 07° 39′ 37″ N, 80° 41′ 18″ E, beating, 10 February 2016, leg. SP Benjamin, K Nilani and I Sandunika; 1♂ (IFS_SAL_1026), same locality and collection data,15 February 2017, NP Athukorala et al.; 1♂ (IFS_SAL_612), Elahera Pallegama Road, 3 km to Pallegama, 267 m, 07° 32′ 16″ N, 80° 40′ 20″ E, 3 February 2016, leg. SP Benjamin and NP Athukorala. Southern Province: (IFS_SAL_761–764), Galle District, Hiyare, Kombala–Kottawa FR, 252 m, 06° 03′ 53″ N, 80° 18′ 05″ E, beating, 24–26 May 2016, leg. K Nilani and I Sandunika. Uva Province: 1♂ (IFS_SAL_294), Moneragala District, Westminster Abbey, 120 m, 07° 02′ 42″ N, 81° 32′ 16″ E, hand collection, 10 February 2010, leg. SP Benjamin and S Batuwita et al. Eastern Province: 1♂ (IFS_SAL_1075), Ampara District, Nilgala FR, 341 m, 07°15′ 39″ N, 81° 22′ 05″ E, beating, 22 January 2013, leg. SP Benjamin et al. North Central Province: Anuradhapura District: 3♂, 1♀ (IFS_SAL_807–810), Mihinthale Sanctuary, 123 m, 08° 21′ 10.60″ N, 80° 30′ 14.54″ E, beating, 14 June 2016, leg. NP Athukorala et al. 2♂ (IFS_SAL_1126–1127), Allepothana, Kok-ebe FR, 88 m, 08° 26′ 58.17″ N, 80° 46′ 39.75″ E, beating, 24 April 2017, leg. N.P. Athukorala et al.

Etymology

The species name is an arbitrary combination of letters formed to be used as a word and refers to the reddish–brown markings on the abdomen in females. Used as a noun in apposition.

Diagnosis

The species is distinguishable from other congeners by prosomal and abdominal marking in both sexes as in Figure 10(a–l), long pointed RTA (Figures 7(b,e), Figures 11(c,e,f)), thin and long embolus (Figure 7(b, e), Figures 11(c, e–f), very long palpal tibia (Figure 11(c), broad median septum (Figure 5(h) three-chambered receptacles (Figures 5(j), Figures 6 (d)), triangular unusual structure on the anterior portion of epigynum in females (Figures 5 (j), Figures 6(d)).

Description

Male: Large spiders. In life, prosoma blackish–brown, covered with metallic brownish green scales (Figures 10(a,b), (d,e), (h–j)). Clypeus with long, white hairs (Figure 10(e,i). Eye field rather elevated. ALEs, PMES and PLEs covered with blackish brown rings (Figure 10(b,e,i). Prosoma high, broader than abdomen and sloping posteriorly. Chelicerae dark brown, covered with pale white, tough hairs (Figure 10(b,e,i), reddish brown fangs, one tooth on promargin and two teeth on retromargin. Sternum oval with prominent indentation near coxae IV, pale yellow in middle, edges yellowish brown colour in ethanol-preserved specimens (Figure 11(b). Posterior margin of prosoma steep, slightly truncated. Leg I rather robust, elongated, dense black bristles on patella, tibia, metatarsus I, others greenish brown.

Abdomen longer and narrower than prosoma, tapering posteriorly. Anterior portion of dorsum covered with metallic brownish green markings followed with reddish brown posterior portion (Figure 10(a,b,d,h). Ventrum yellowish brown with pale brown dots

arranged in four rows from epigastric furrow to spinnerets (Figure 11(b). Spinnerets brownish green. Measurements: TL 11.70, AL 6.50, AW 2.73, PL 4.81, PW 4.42.

Brown palp. Long cymbium, gradually narrowing at distal region. Embolus thin, long originated from posterolateral portion of the bulbus, partially encircling it (Figures 7(b), Figures 11(c,e)). Bulbus oval and smooth without any projection (Figures 7(b), Figures 11(c,e)). Sperm duct comparably broader at the distal end of tegulum, narrower at posterior end. Palpal tibia much longer. Medium sized, RTA straight with pointed tip (Figures 7(b,e), Figures 11(c, e, f).

Female: In life, prosoma brown with pale yellow and black diagonal stripes radiating from fovea extending towards posterior prosoma (Figure 10(c,f,k)). Eye field rather raised. PLEs covered with pale white rings (Figure 10(c,f,g,k,l)). Chelicerae pale brown covered with pale white hairs (Figure 10(g,l)), brown fangs. Shape of sternum as in males. Front pairs of legs brown and less strong than males, other pairs pale brown in colour.

Abdomen longer and narrower than prosoma, tapering posteriorly. Anterior dorsum decorated with similar pale yellow and black stripe patterns as in posterior prosoma (Figure 10(c,f,k)). Large, reddish brown and black markings at the posterior half of abdomen (Figure 10(c,f,k)). Ventrum as in males (Figure 5(g)). Measurements: TL 9.49, AL 4.81, AW 2.60, PL 4.29, PW 4.03.

Epigynum moderately sclerotised. Large, membranous 'window' at epigastric furrow (Figure 5(h–i), 6(c). Broad median septum. Copulatory opening could open inside of membranous depression. Copulatory ducts indistinct. Spermathecae highly sclerotised with three oval-shaped chambers (Figures 5(j), Figures 6(d)). Triangular unusual structures (accessory glands?) connected to anterior portion of receptacles (Figures 5(j), Figures 6(d)). Fertilisation ducts lanceolate, originated from first chamber at the anterior portion. Posterior epigynal plate broad, well-developed with two lateral pockets (Figures 5(h,i), Figures 6(c)).

Remarks

Females collected from Mihintale Sanctuary differ considerably from the paratype by the colouration of prosoma, lack of stripe pattern and abdominal markings (Figure 10(f–g). Males also differ from females by the abdominal markings and colouration (Figure 10(d–e).

Distribution

Sri Lanka .

Colopsus magnus sp. nov.
(Figures 12(a–d), Figures 13(a–e), Figures 14(a–e), Figures 15(a–d))

Type material

Holotype, ♂ (IFS_SAL_832), Sri Lanka, Central Province, Kandy District, Deltota, Loolecondera estate, 1480 m, 07° 08′ 45″ N, 80° 41′ 53″ E, beating, 22 June 2016, leg. NP Athukorala et al.

Paratype, ♀ (IFS_SAL_833), same locality and collection data as in holotype.

Other material examined

1♂, 2♀ (IFS_SAL 834–836), same locality and collection data as in type materials. Sri Lanka: Central Province: Nuwara Eliya District: 1♂ (IFS_SAL_145), Mariyakota, Sammimale,

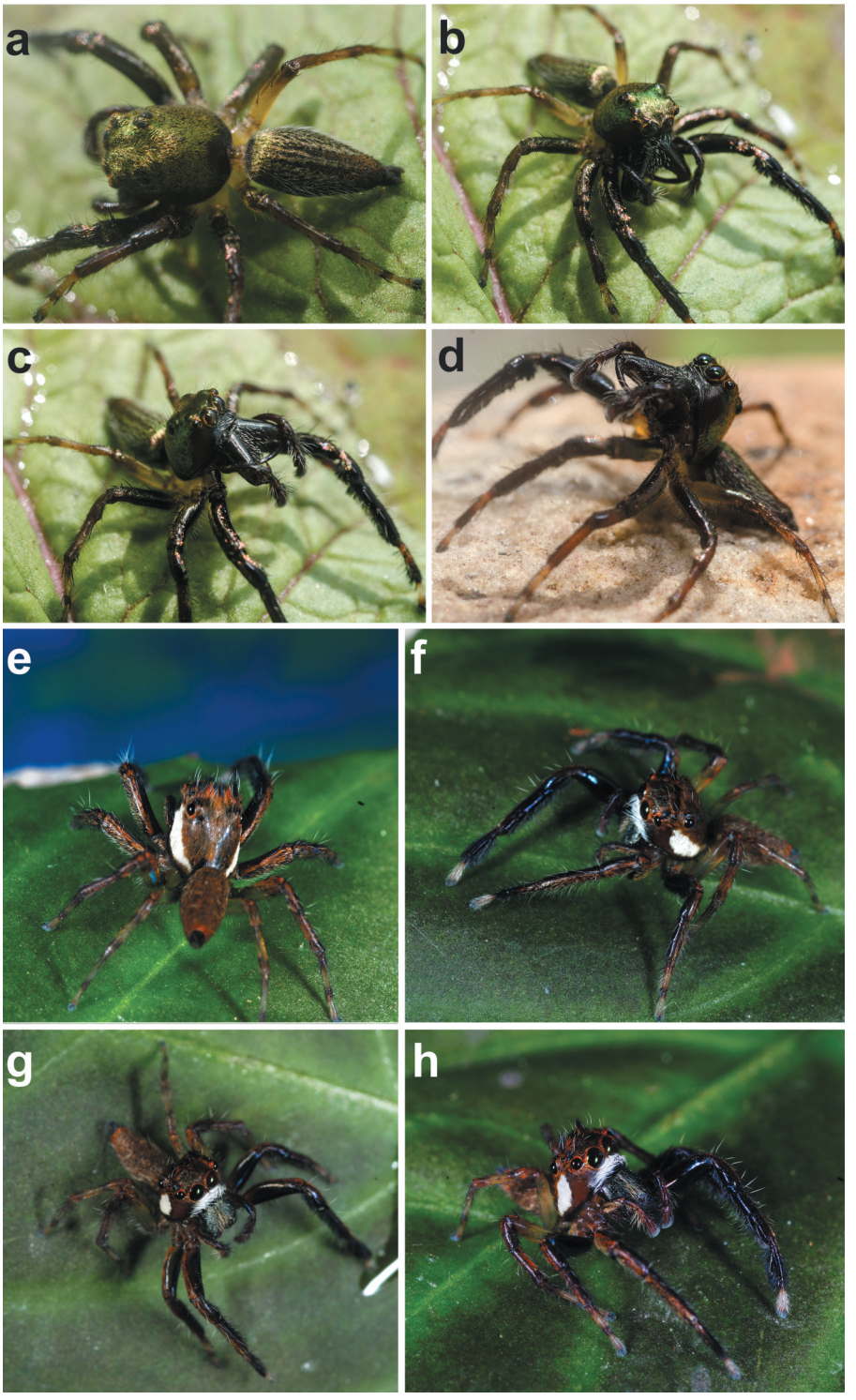

Figure 12. Photographs of live males of *Colopsus magnus* sp. nov. from Upcot, Nuwara Eliya (a–d) and *Pancorius alboclypeus* sp. nov. from Dothalugala (e–h).

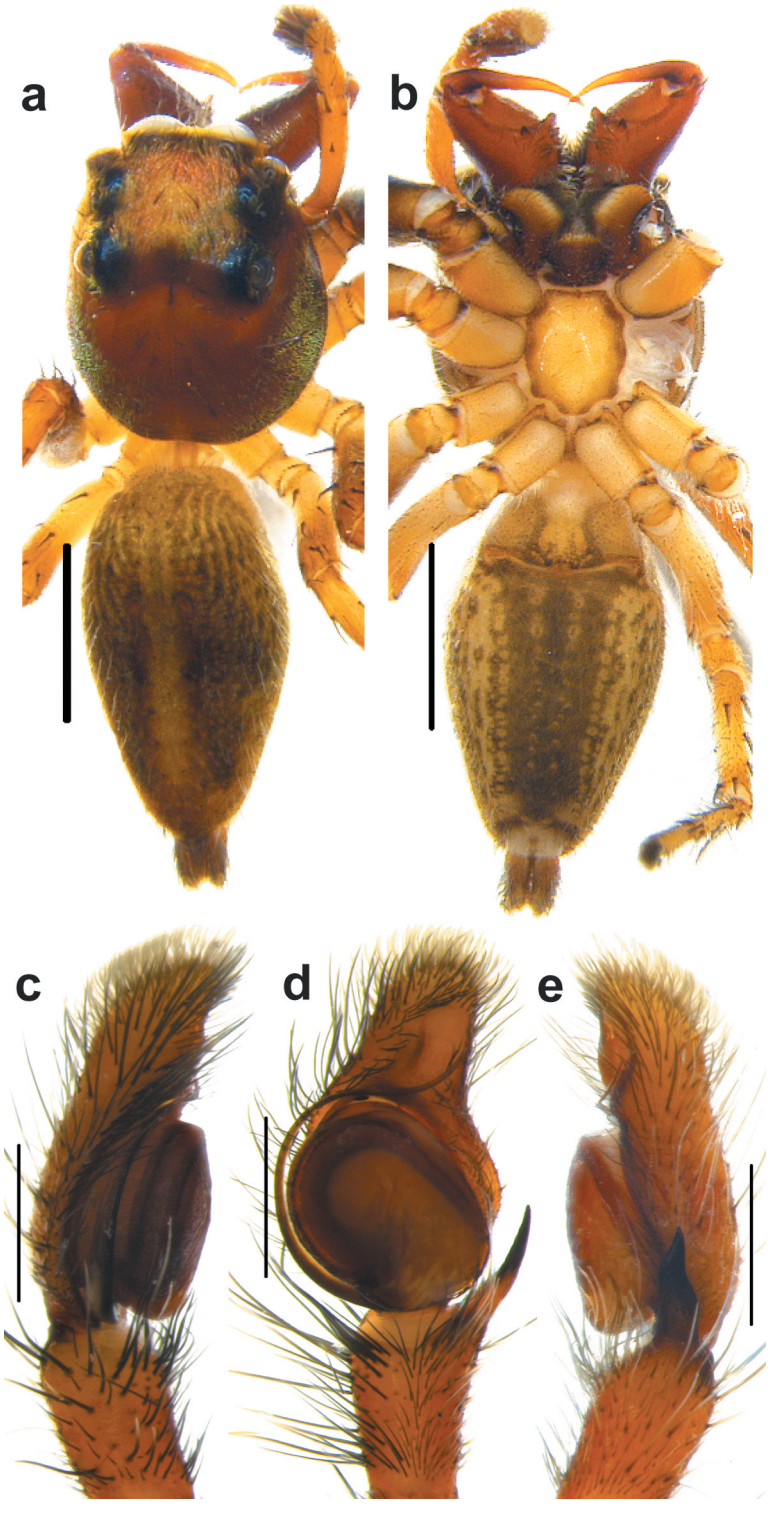

Figure 13. *Colopsus magnus* sp. nov. (a, b). Male habitus; a. dorsal view, (b). ventral view. (c–e). Male palp; (c). prolateral view, (d). ventral view, (e). retrolateral view. Scale bars: (a, b) = 2 mm, (c–e) = 0.5 mm.

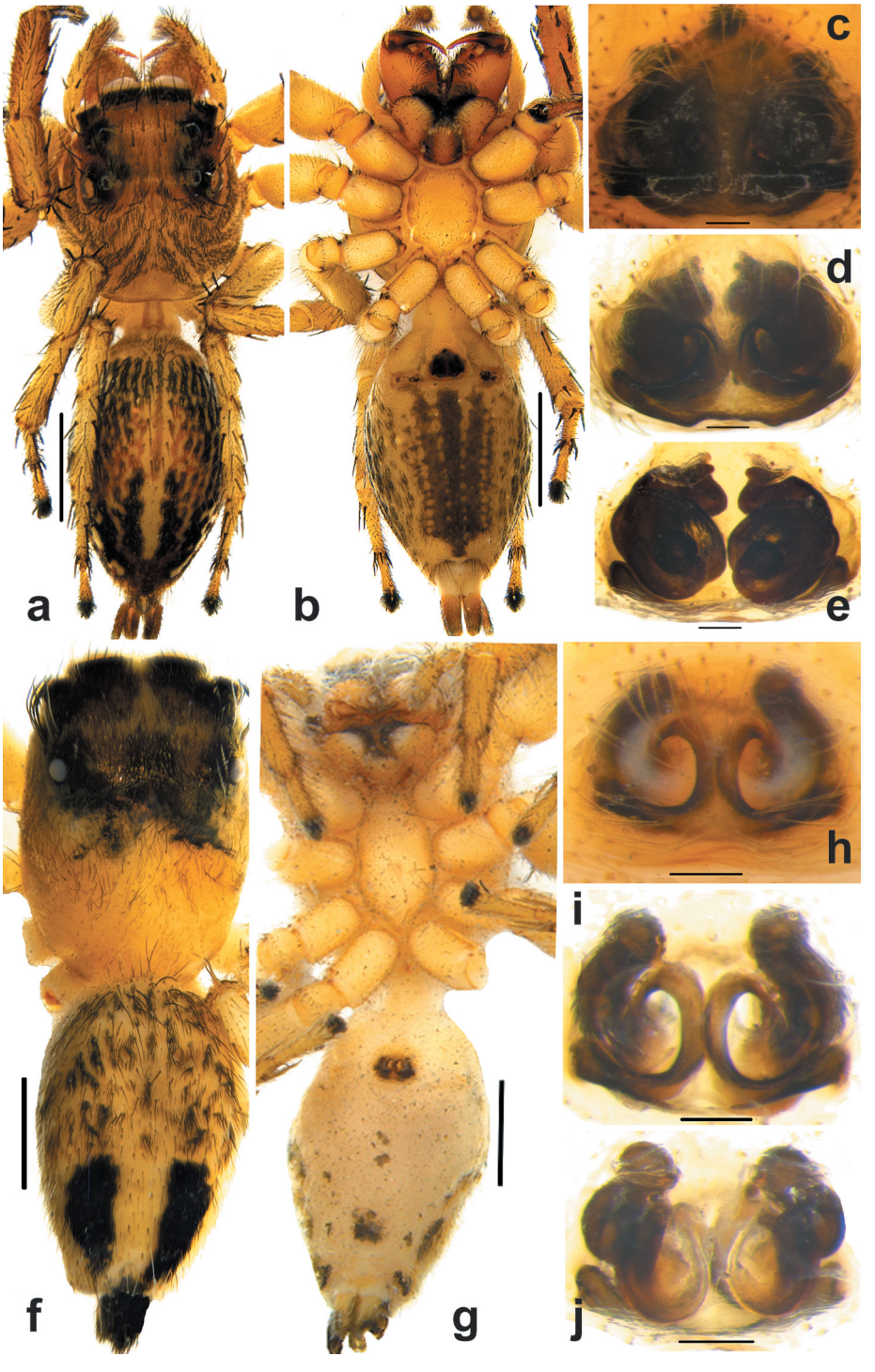

Figure 14. *Colopsus magnus* sp. nov. (a–e); (a, b). Female habitus, (a). dorsal view. (b). ventral view. (c–e). Epigynum, (c, d). ventral view. e. dorsal view and *Evarcha latus* sp. nov. (f–j); f–g. Female habitus, f. dorsal view. g. ventral view. (h–j). Epigynum, (h, i). ventral view. (j). dorsal view. Scale bars: (a, b, f, g) = 2 mm, (c–e, h–j) = 0.1 mm.

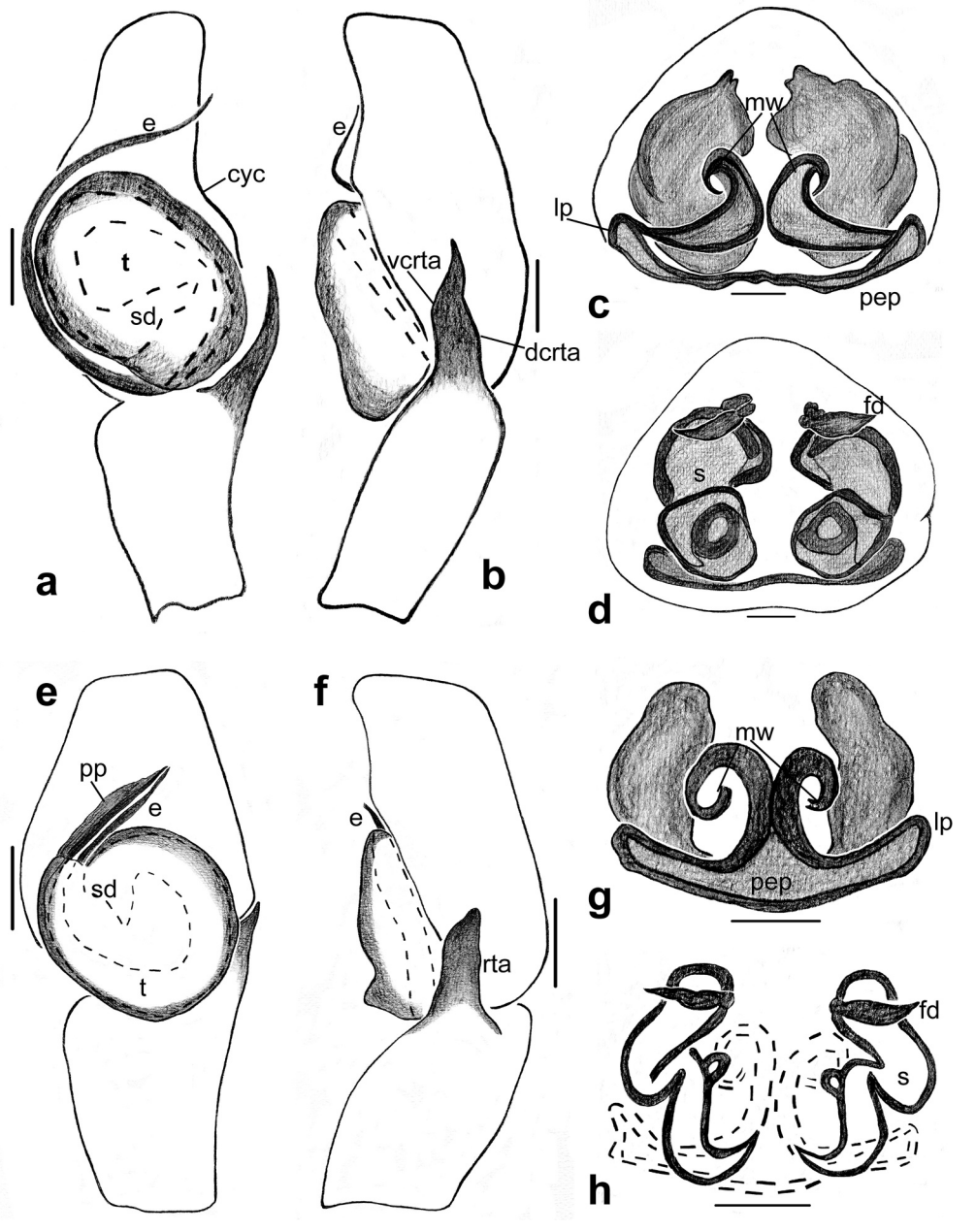

Figure 15. *Colopsus magnus* sp. nov. (a). palp, ventral view; (b). palp, retrolateral view; (c). epigynum, ventral view; (d). vulva, dorsal view and *Evarcha latus* sp. nov. (e). palp, ventral view; (f). palp, retrolateral view; (g). epigynum, ventral view; h. vulva, dorsal view. Abbreviations: cyc = cymbial constriction; dcrta = dorsal curve of RTA; (e) = embolus; fd = fertilisation duct; lp = lateral pocket; mw = membranous window; pep = posterior epigynal plate; pp = pars pendulum; rta = retrolateral tibial apophyses; s = spermathecae. sd = sperm duct; t = tegulum; vcrta = ventral curve of rta. Scale bars: (a–b), (e–f) = 0.2 mm, (c, d, g, h) = 0.1 mm.

1850 m, 06° 46′ N, 80° 36′ E, hand collection, 2 February 2011, leg. SP Benjamin and S Batuwita; 1♂ (IFS_SAL_195), Agarapatana, Bopattalawa FR, 1665 m, 06° 50′ 36″ N, 80° 40′ 40″ E, hand collection, 18–21 February 2007, leg. SP Benjamin, Z Jaleel. 1♂, 2♀ (IFS_SAL 906–910), Upcot, 1850 m, 06° 46′ N, 80° 36′ E, beating, 3 October 2016, leg. K Nilani.

Etymology

The species name refers to large bulbus compared to its congeners.

Diagnosis

The species is distinguishable from other congeners by the large, oval bulbus, long RTA with a lower dorsal curve and an upper ventral curve (Figures 13(d,e), Figures 15(a,b)), long and whip-like embolus (Figures 13(d), Figures 15(a,b)), comparably narrower median septum, large, multi-chambered spermathecae (Figures 14(e), Figures 15(d)), shape of membranous window as in Figures 14(c,d), Figures 15(c)).

Description

Male: Medium sized. In life, prosoma metallic green with dark brown posterior region (Figure 12(a,b)). Clypeus brown sparsely covered with pale white hairs (Figure 12(c,d)). In ethanol-preserved specimens, metallic brown prosoma covered with metallic yellowish green blotches (Figure 13(a)). Eye field rather elevated. ALEs, PMES and PLEs covered with black rings. Prosoma high, broader than abdomen and sloping posteriorly. Chelicerae brown with yellowish brown fangs. Sternum oval with prominent indentation near coxae IV, pale yellow in middle, edges yellowish grey (Figure 13(b)). Posterior margin of prosoma steep, slightly truncated. Leg I brown, rather robust and elongated with dense black bristles on patella I, tibia I and metatarsus I, others yellowish brown.

Abdomen slightly longer and narrower than prosoma, tapering posteriorly. Dorsum brown covered with metallic green scales in live spiders (Figure 12(a)) and metallic greyish yellow dispersed with grey dots in preserved specimens (Figure 13(a)). Ventrum greyish yellow with greyish brown dots arranged in four rows as a dark grey single band medially from epigastric furrow to spinnerets (Figure 13(b)). Spinnerets greyish brown. Measurements: TL 8.58, AL 4.16, AW 2.08, PL 3.77, PW 3.25.

Brown palp. Moderately long cymbium with narrowest distal region and broadest laterally at the proximal region. Embolus thin, long and whip like originating from posterior portion of the bulbus and encircling half of bulb (Figures 13(d), Figures 15(a,b)). Bulbus large, oval without any conspicuous projection (Figures 13(d), Figures 15(a,b)). Sperm duct comparably broader, at distal end of tegulum, narrower at posterior tegulum. Palpal tibia moderately long. RTA long, with a lower dorsal curve and an upper ventral curve ending in a pointed tip (Figures 13(d,e), Figures 15(a,b)).

Female: In ethanol-preserved specimens, prosoma yellowish brown with brownish black diagonal stripes radiating from fovea to posterior prosoma (Figure 14(a)). Eye field pale brown and rather raised. AMEs ALEs, PMEs and PLEs covered with pale black rings. Chelicerae pale brown with yellowish brown fangs. Shape of sternum as in males (Figure 14(b)). Front pairs of legs slightly enlarged and less strong than in males, all legs yellowish brown.

Abdomen slightly longer, narrower than prosoma, tapering posteriorly. Pale yellow anterior dorsum evenly decorated with small, black blotches and pale reddish brown

blotches (Figure 14(a). Irregular, black markings at the posterior half of abdomen, small brown patch near spinnerets. Ventrum as in males (Figure 14(b). Spinnerets yellowish brown. Measurements: TL 9.49, AL 5.20, AW 3.38, PL 4.16, PW 3.51.

Epigynum strongly sclerotised. Large, membranous 'window' at epigastric furrow (Figures 14(c,d), Figures 15(c)). Comparably narrow median septum. Spermathecae well sclerotised, multi–chambered (Figures 14(e), Figures 15(d)). Fertilisation ducts lanceolate, originated from anterior wall of large chamber (Figures 14(e), Figures 15 (d)). Highly sclerotised posterior wall, shallow median indentation and two lateral pockets (Figures 14(c,d), Figures 15(c)).

Distribution

Sri Lanka

Remarks

This species is found only in a few localities of the central highlands of Sri Lanka. In contrast, other three species of *Colopsus* are widely distributed in the island.

Colopsus tenuesi sp. nov.
(Figures 7(c), f, Figures 16(a–f))

Type material

Holotype, ♂ (IFS_SAL_1076), Sri Lanka, Uva Province, Monaragala District, Kataragama Peak, 06° 23′ 20″ N, 81° 19′ 52″ E, 22–23-XI-2017, beating, leg. SP. Benjamin at al.

Etymology

The species name is an arbitrary combination of letters formed to be used as a word and refers to thin embolus compared to its congeners. Used as a noun in apposition.

Diagnosis

The species is distinguishable from closely related species *C. cancellatus* and *C. ferruginus* sp. nov. by comparably short embolus (Figures 7(c), Figures 16(c,e)), posterolateral origin of embolus, broad RTA with ventrally curved tip (Figures 7(c,f), Figures 16(c,e,f)).

Description

Male: Large spiders. Brown prosoma covered with brownish green scales near the edges (Figure 16(a)). Ocular field slightly elevated. Eyes covered with blackish brown rings. Chelicerae pale yellowish brown, covered with pale white hairs. Sternum oval with prominent indentation near coxae IV (Figure 16(b)). Prosoma high, slightly broader than abdomen and posterior margin of prosoma steep, slightly truncated. Leg I rather robust, elongated, dense black bristles on patella I, tibia I, metatarsus I.

Abdomen slightly narrower than prosoma, tapering posteriorly. Dorsum pale brown with reddish brown longitudinal stripes extending towards posterior portion (Figure 16 (a)). Ventrum pale yellowish brown with greenish brown dots extending from epigastric

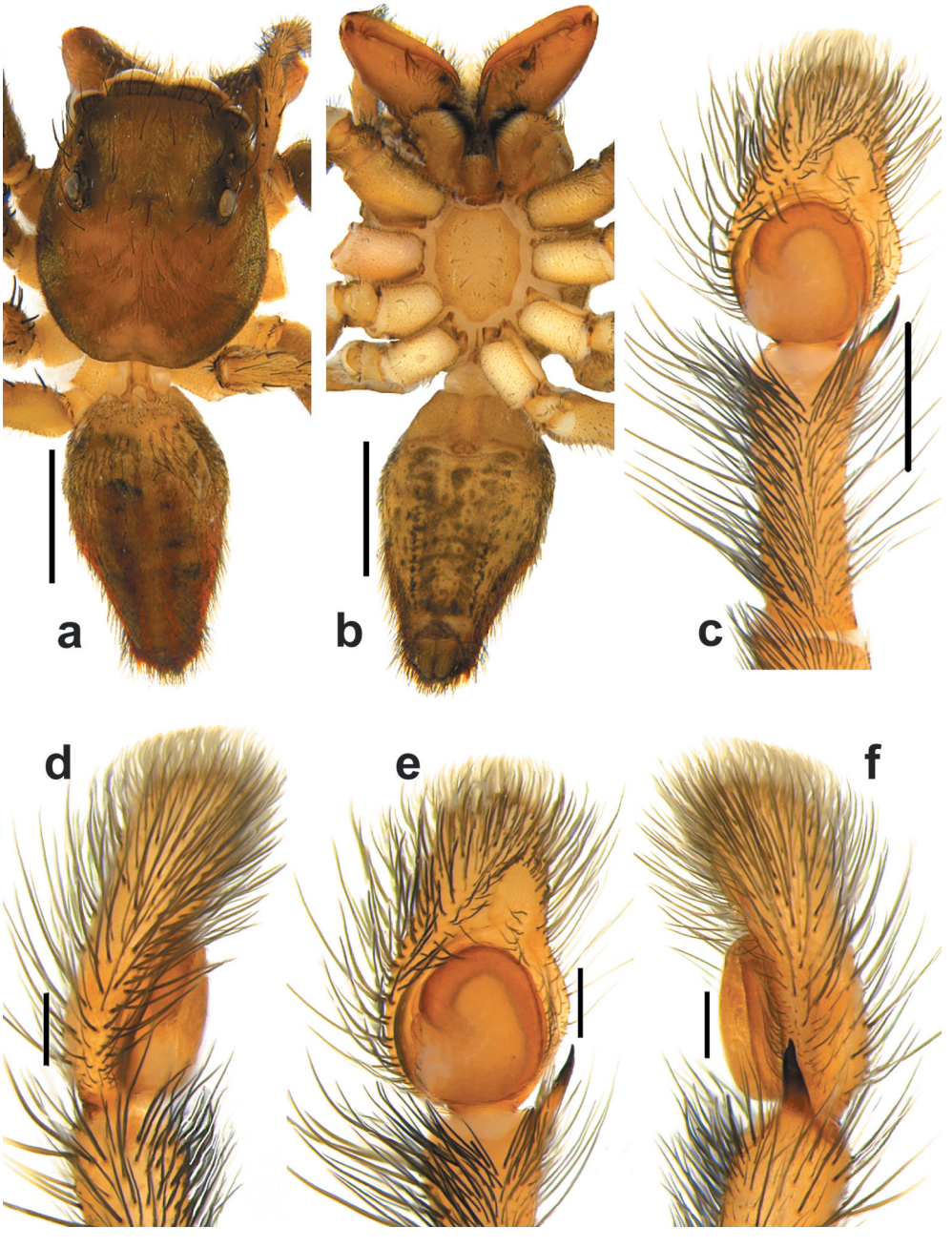

Figure 16. *Colopsus tenuis* sp. nov. (a, b). Male habitus, (a). dorsal view, (b). ventral view. (c–f). Male palp, (c). ventral view. (d). prolateral view. (e). ventral view. (f). retrolateral view. Scale bars: (a, b) = 2 mm, (c) = 0.5 mm, (d–f) = 0.2 mm.

furrow to spinnerets (Figure 16(b)). Spinnerets brownish green. Measurements: TL 11.85, AL 7.10, AW 3.23, PL 4.72, PW 4.50.

Pale yellow, cymbium with gradually narrowing distal region. Embolus thin, comparably short originated from postero-lateral bulbus (Figures 7(c), Figures 16(c,e)). Rounded

bulbus without posterior lobe (Figures 7(c), Figures 16(c,e)). Sperm duct comparably broader at the distal tegulum, narrower at posterior end. Palpal tibia much longer. Medium-sized RTA with ventrally curved tip (Figures 7(c,f), Figures 16(c,e,f)).

Female: unknown

Distribution

Sri Lanka.

Genus *Evarcha* Simon, 1902

Evarcha, 1902. Type species: *Araneus falcatus* Clerck, 1757.

Evarcha latus sp. nov.
(Figures 14(f–j), Figures 15(e–h), Figures 17(a–e))

Type material

Holotype, ♂ (IFS_SAL_497), Sri Lanka, Eastern Province, Ampara District, Nilgala FR, 341 m, 07° 15′ 39″ N, 81° 22′ 05″ E, 22 January 2013, leg. NP Athukorala.

Other material examined

1♀ (IFS_SAL_236), Sri Lanka, Central Province, Matale District, Dambulla, IFS Arboretum, 180 m, 07° 51′ 34″ N, 80° 40′ 28″ E, beating, 28 May 2015, leg. K Nilani. ♀ (IFS_SAL_243), Sri Lanka, Eastern Province, Ampara District, Samangala, 112 m, 07° 24′ 38.27″ N, 81° 34′ 52.38″ E, beating, 19 May 2015, leg. NP Athukorala.

Etymology

The species name refers to broad appearance of embolus accompanying the membranous pars pendulum.

Diagnosis

The species is distinguishable from other congeners by the membranous pars pendulum associated with embolus (Figures 15(e), Figures 17(d)), rounded, smooth bulbus, broad RTA with blunt tip (Figures 15(e,f), Figures 17(d,e), tubular spermathecae (Figures 14(j), Figures 15(h)), comparably large, semicircular membranous ‘window’, narrow median septum, two lateral pockets on the posterior epigynal plate, no median depression on posterior epigynal plate (Figures 14(h–i), Figures 15(g)).

Description

Male: Medium sized. In ethanol preserved specimens, dark brown prosoma covered with pale brown blotch behind fovea (Figure 17(a). Eye field rather elevated. ALEs, PMES and PLEs covered with black rings. Fovea distinct. Prosoma high and sloping posteriorly. Chelicerae dark brown with brown fangs. Sternum oval with prominent indentation near coxae IV, pale yellow in middle, edges yellowish brown (Figure 17 (b). Posterior margin of prosoma steep, slightly truncated. Leg I rather robust and

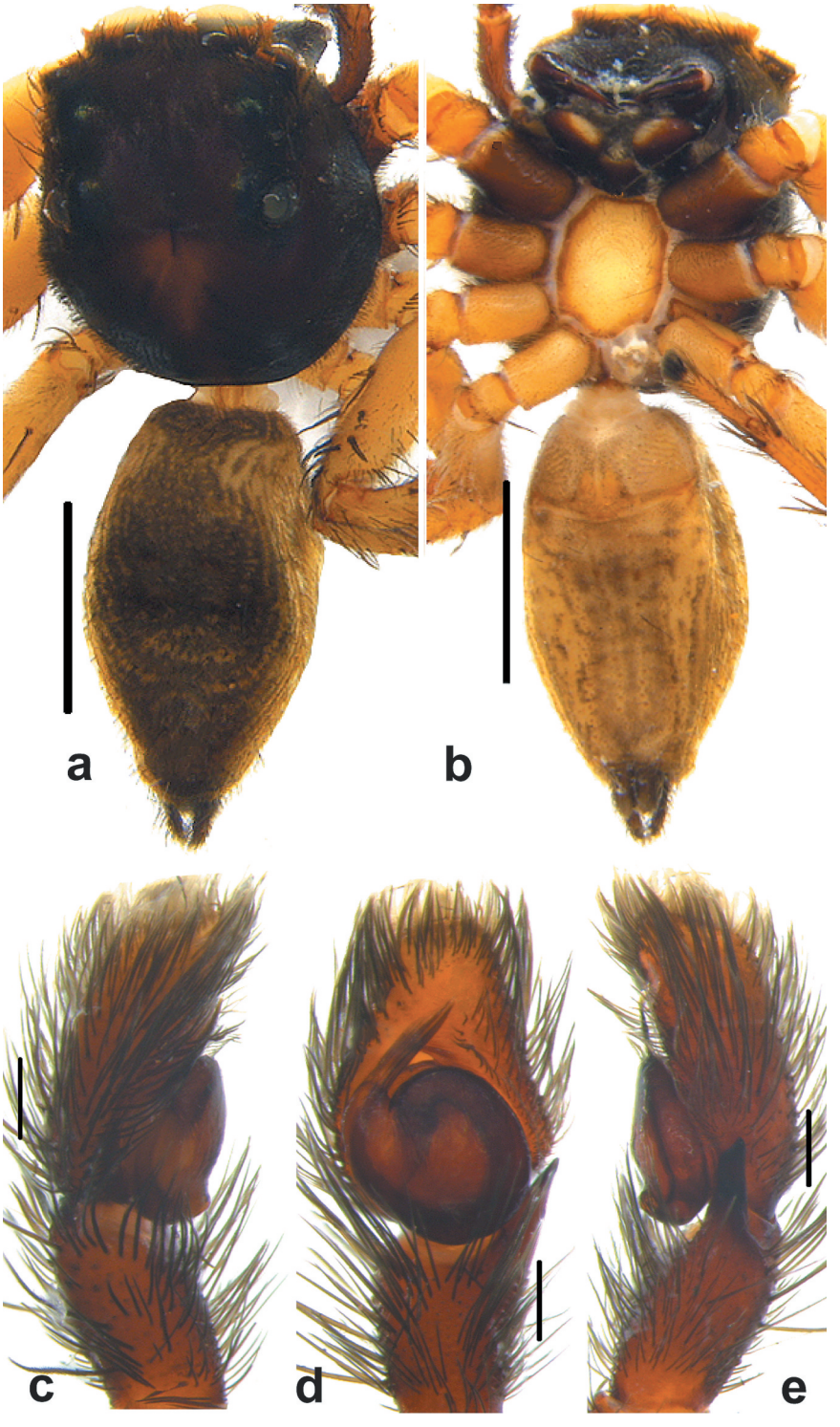

Figure 17. *Evarcha latus* sp. nov. (a,b). Male habitus, (a). dorsal view. (b). ventral view. (c–e). Male palp, c. prolateral view. (d). ventral view. (e). retrolateral view. Scale bars: (a,b) = 1 mm, (c–e) = 0.2 mm.

elongated with dense black bristles on patella I, tibia I and metatarsus I, all legs yellowish brown.

Abdomen oval, slightly longer and narrower than prosoma, tapering posteriorly. Dorsum yellowish grey dispersed with dark grey dots (Figure 17(a). Ventrum greyish yellow with greyish brown dots arranged in four rows from epigastric furrow to spinnerets (Figure 17(b). Spinnerets greyish brown. Measurements: TL 8.45, AL 3.90, AW 2.88, PL 4.16, PW 3.51.

Brown palp. Moderately long cymbium with gradually narrowing distal region. Embolus stout, short originating from inner anterolateral region of the bulbus and partially encircling it (Figure 15(e), Figure 17(d). Embolus associated with well-developed membranous pars pendulum (Figure 15(e), Figures 17(d). Rounded, smooth bulbus without any prominent projection. Sperm duct comparably broader at distal end of tegulum, narrower at the posterior tegulum. Palpal tibia comparably short. Moderately long, broad, straight RTA with a blunt tip (Figure 15(e–f), 17(d–e).

Female: In ethanol preserved specimens, oval, pale yellow prosoma. Blackish brown eye field rather raised. Long, black tuft of hairs near PMEs (Figure 14(f). Chelicerae pale brownish yellow, brown fangs. Sternum oval (Figure 14(g). Front pairs of legs slightly enlarged, less strong than in males, all legs pale yellow.

Abdomen slightly longer and narrower than prosoma, tapering posteriorly. Pale yellow anterior dorsum decorated with small, black blotches (Figure 14(f). Two large and black markings at the posterior abdomen near spinnerets. Ventrum pale yellowish grey with small black blotches at the posterior abdomen (Figure 14(g)). Spinnerets blackish yellow. Measurements: TL 5.85, AL 2.86, AW 1.95, PL 2.73, PW 1.69.

Epigynum moderately sclerotised. Large, semicircular membranous 'window' at epigastric furrow (Figures 14(h,i)), Figures 15(g)). Narrow median septum (Figure 17(c)). Spermathecae highly sclerotised, long, tubular–like (Figures 14(j), Figures 15(h)). Fertilisation ducts lanceolate, originated from anterolateral wall of receptacles (Figures 14(j), Figures 15(h)). Highly sclerotised posterior wall without median depression, two lateral pockets (Figures 14(h,i), Figures 15(g)).

Distribution

Sri Lanka.

Genus *Pancorius* Simon, 1902

Type species: *Ergane dentichelis* Simon, 1899.

Diagnosis

This genus is distinguishable from closely related genera *Colopsus, Evarcha, Hyllus* by sandy brown habitus with pale white central and lateral prosomal bands, serrated longitudinal abdominal band (Figures 12(e–h), Figures 18(a,b), Figures 20(a–g), Figures 21(a–f), Figures 22(a,b), Figures 23(a–h), Figures 24(a,b), Figures 25(a,b)), simple palp with rounded or oval bulbus, short embolus, single RTA with pointed tip, epigyne with large central pocket, comparably small membranous window and multi-chambered spermathecae.

Description

Medium-sized spiders (6–10 mm). Sandy brown, thickset and hirsute habitus (Zhang et al. 2003) Prosoma high (Żabka 1990) with pale white central and lateral bands in both sexes

(Figures 12(e–h), Figures 21(a–f)). Short, longitudinal fovea with pale white diamond mark behind it. Clypeus narrow. Chelicerae with simple retromarginal teeth (Ikeda 2013). Subparallel ocular quadrangle, first eye row is wider than third row in males, but in females eye row I is narrower than third row (Peckham and Peckham 1907; Ikeda 2013). Longitudinal median band of abdomen with serrated margins (Peng et al. 1998), this pattern is designated as 'herring-bone pattern' in Jastrzebski (Jastrzębski 2011). Simple male palp with rounded or oval bulbus with or without posterior lobe. Embolus thin and short to medium sized originating from antero-lateral portion of bulbus (Figures 18(c,e), Figures 19(a,e), Figures 22(c,e), Figures 24(c,e), Figures 26(a); Prószyński 2017). RTA with a pointed tip without bifurcation. Palpal tibia medium sized. Epigyne with simple sclerotised plate ending in front of epigastric furrow (Prószyński 1992). Posterior epigynal plate often with a single central pocket (Figures 18(c,e), Figures 19(c,d,g,h), Figures 20(c,d,h,i), Figures 25(c,d)) sometimes two small lateral pockets at the edges of plate. A pair of small membranous window or sclerotised narrow crevices leading to copulatory openings at anterior half of the epigynum. Sclerotised spermathecae with 2–3 chambers.

Composition

At present, the genus comprises 34 species (World Spider Catalog 2020). However, some of them may be misplaced and need to be transferred to other closely related or new genera. This study adds three more new species to the genus, all endemic to Sri Lanka.

Distribution

This genus is primarily distributed in the Oriental region, including Borneo, Bhutan, China, India, Indonesia, Japan, Malaysia, Nepal, Philippines, Singapore, Sri Lanka, Taiwan and Vietnam.

Pancorius alboclypeus sp. nov.

(Figures 12(e–h), Figures 18(a–f), Figures 19(a,c,e,g), Figures 20(a–e))

Type material

Holotype, ♂ (IFS_SAL_1145), Sri Lanka, Central Province, Kandy District, Knuckles, Along Dothalugala Nature Trail, 1202 m, 07° 20′ 19″ N, 80° 51′ 3″ E, beating, 3 May 2018, leg. SP Benjamin at al.

Paratype, ♀ (IFS_SAL_1146), same locality and collection data as in holotype.

Other material examined

5♂ (IFS_SAL_1147–1151), same locality and collection data as in type material; 1♂ (IFS_SAL 549), Kandy District, Corbett's Gap, Knuckles range, 1360 m, 07° 21′ 40″ N, 80° 50′ 00″ E, hand collection, 19 August 2010, leg. SP Benjamin and S Batuwita.

Etymology

The species name refers to the white-coloured scales on the clypeus.

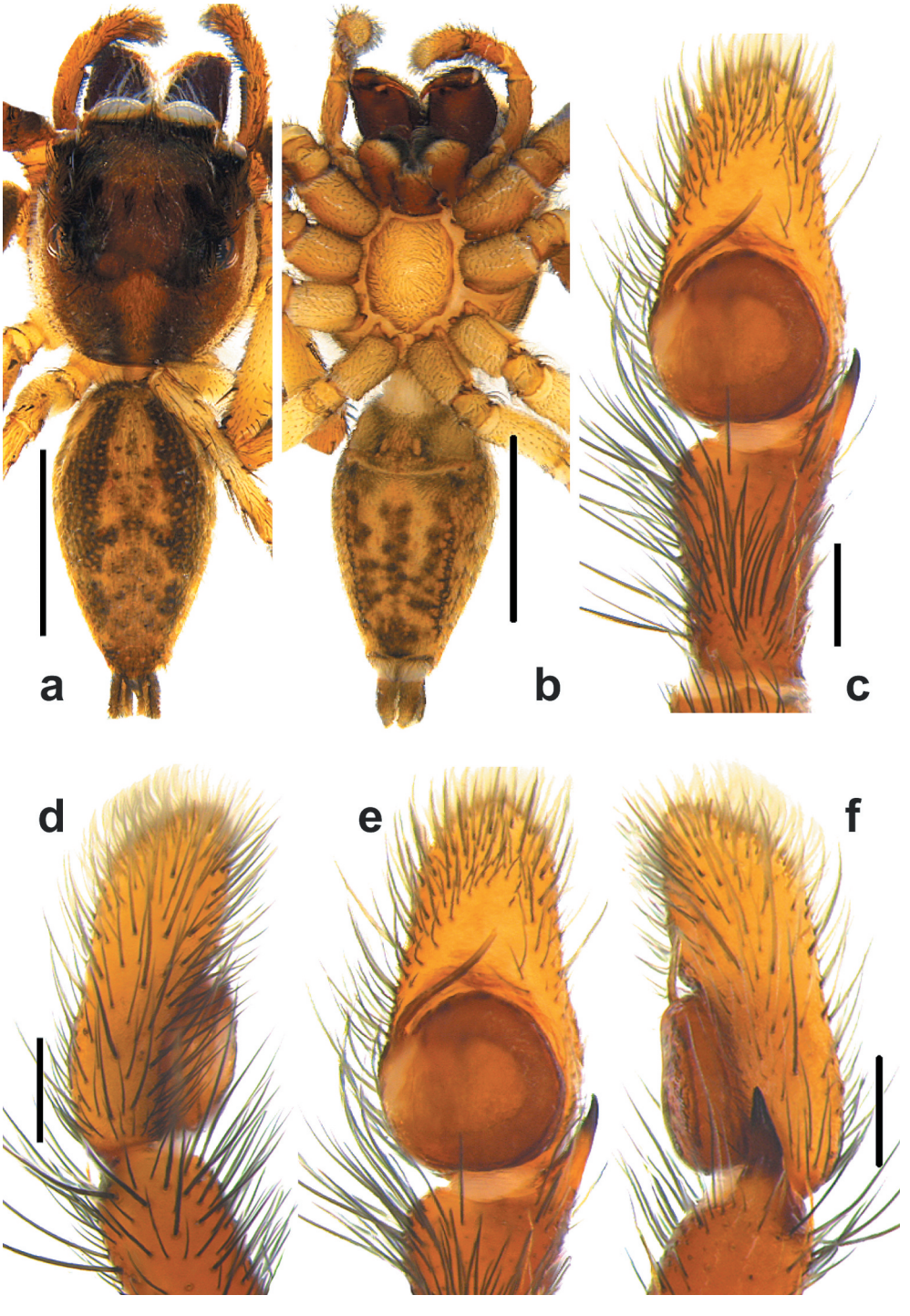

Figure 18. *Pancorius alboclypeus* sp. nov. (a, b). Male habitus, (a). dorsal view. (b). ventral view. (c–f). Male palp, (c). ventral view. (d). prolateral view. (e). ventral view. (f). retrolateral view. Scale bars: (a, b) = 2 mm, (c–f) = 0.2 mm.

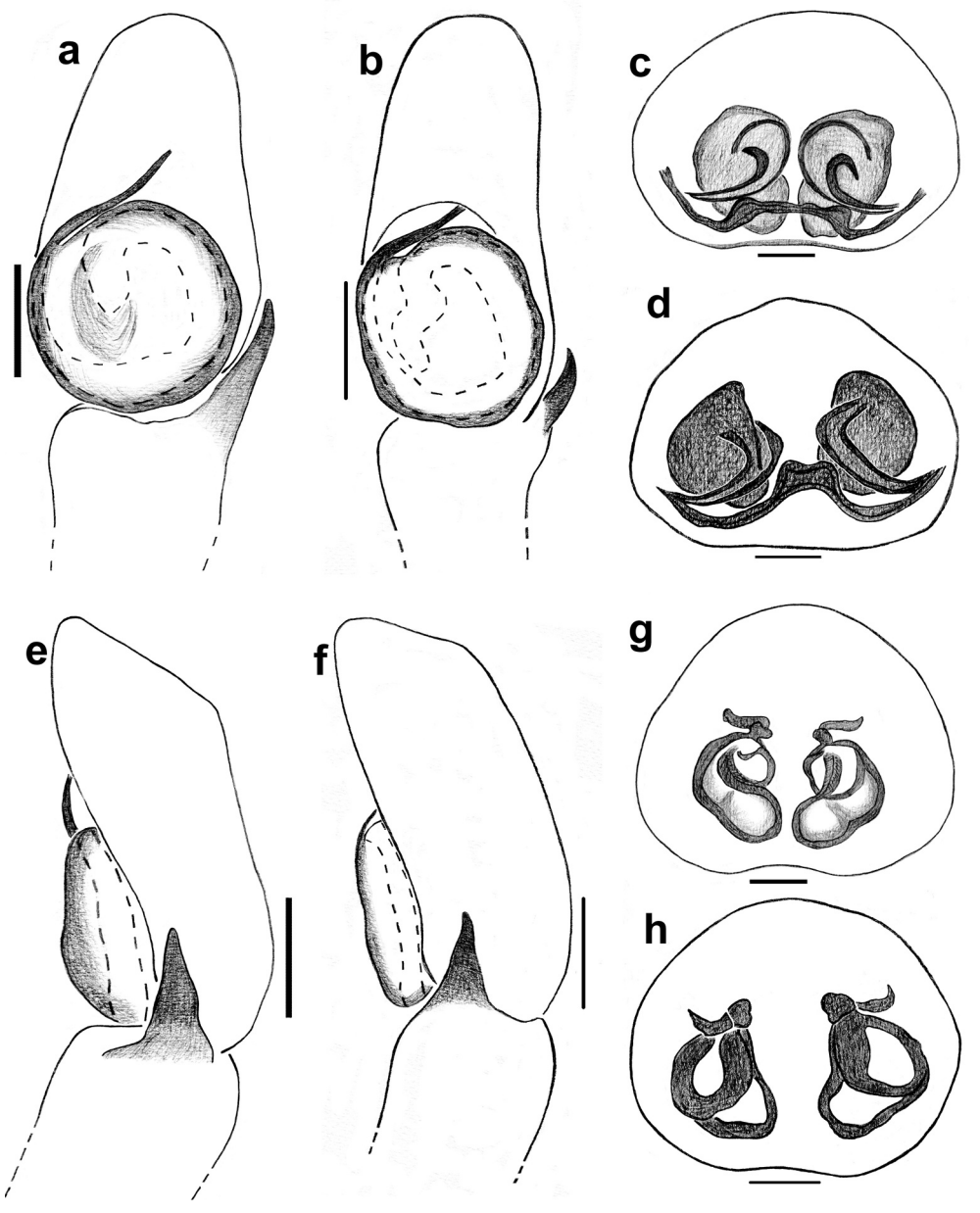

Figure 19. *Pancorius alboclypeus* sp. nov. (a, c, e, g) and *Pancorius altus* sp. nov. (b, d, f, h); (a, b). ventral view of palp, (c, d). ventral view of epigynum, (e, f). retrolateral view of palp, (g, h). dorsal view of vulva.

Diagnosis

This species is distinguishable from other congeners by white clypeus in males (Figure 12(g,h)), white median prosomal band in females, smooth rounded bulbus (Figures 18(c,e), Figures 19(a,b)), spermathecae with reniform large chamber and small oval–shaped chamber, comparably narrow median septum, Posterior epigynal

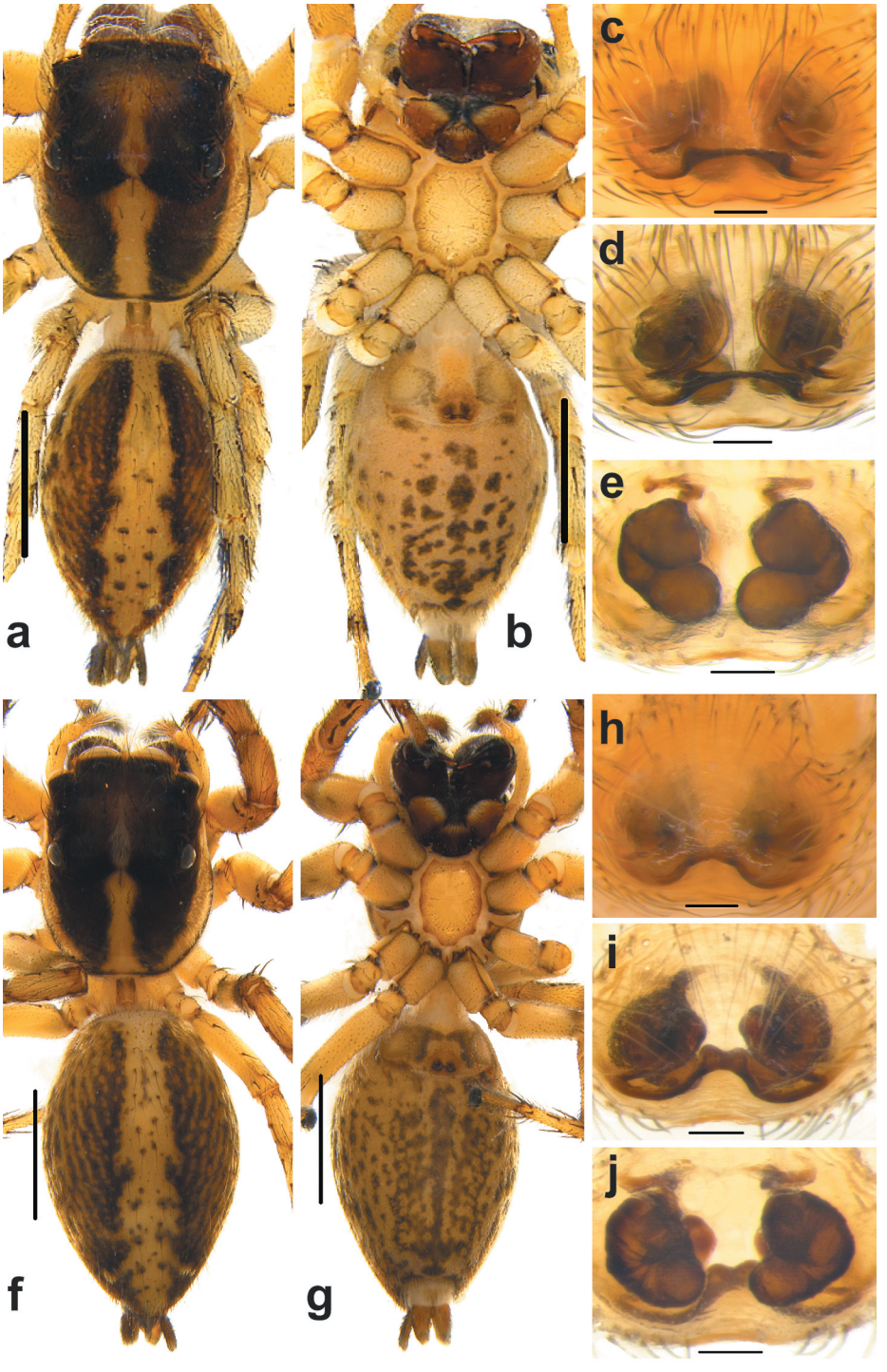

Figure 20. *Pancorius alboclypeus* sp. nov. (a–e); (a, b). Female habitus, a. dorsal view, b. ventral view, (c–e). Epigynum; (c, d). ventral view, (e). dorsal view and *Pancorius altus* sp. nov. (f–j); (f, g). Female habitus, f. dorsal view. (g). ventral view. (h–j). Epigynum; (h, i). ventral view. (j). dorsal view. Scale bars: (a, b), (f, g) = 2 mm, (c–e), (h–j) = 0.1 mm.

plate with broad and shallow notch as a central pocket. It is closely similar to *P. altus* sp. nov., *P. crassipes* (Karsch 1881), *P. dabanis* (Hogg 1922), *P. dentichelis* (Simon 1899) and *P. thorelli* (Simon 1899) in palpal structure, however it differs from them by white clypeus in males, structure of RTA (Figures 18(c,e,f), Figures 19(a,b)), shallow and wide central pocket in females (Figures 19(c), Figures 20(c,d)).

Description

Male: Medium-sized spider (6–8 mm). In live, orange brown habitus with dark brown patches, prosoma decorated with broad white lateral bands on the prosoma (Figure 12(e,f)). Clypeus densely covered with white hairs (Figure 12(g,h)). Eyes are surrounded by orange rings. Chelicerae black, covered with pale grey long hairs on the inner edges. In ethanol-preserved specimens, brown prosoma with pale brown median band behind fovea (Figure 18(a)). Elevated ocular region with black blotches. Fovea distinct. Prosoma high, wider than abdomen and sloping posteriorly. Sternum oval, pale yellow in middle, edges greyish brown (Figure 18(b)). Posterior prosoma steep, posterior margin not truncated. Legs orangish brown, first two pairs of front legs rather robust with elongated patella I, II, tibia I, II, metatarsus I, II covered with tufts of black bristles, tarsi pale brown.

Abdomen much narrower than prosoma, tapering posteriorly. In life, dorsum orangish brown, dispersed with blackish grey dots and pale brown longitudinal median band with serrated margins in preserved specimens (Figure 18(a)). Ventrum brownish yellow with greyish brown dots. Spinnerets black. Measurements: TL 7.65, AL 4.40, AW 2.18, PL 3.84, PW 2.90.

Brown palp. Cymbium with marginally narrowing distal region. Embolus ribbon like, comparably long, originating from antero-lateral portion of the bulbus (Figures 18(c,e), Figures 19(a,b)). Bulbus rounded without any posterior lobe. Palpal tibia long (Figure 18(c). RTA with broad base and straight in the retrolateral position with blunt tip (Figures 18(c,e,f), Figures 19(a,b)).

Female: Almost all characters are similar to male except diamond-shaped mark behind short fovea, comparably narrower prosoma with pale brownish yellow central band. Measurements: TL 9.71, AL 5.20, AW 3.32, PL 4.33, PW 2.40.

Epigynum moderately sclerotised. 'Gamma' shaped membranous 'window' near to epigastric furrow (Figures 19(c), Figures 20(c,d)). Comparably narrower median septum. Copulatory opening could be inner side of membranous window. Copulatory ducts not visible. Spermathecae sclerotised with bean-shaped large chamber and oval small chamber (Figures 19(d), Figures 20(e)). Fertilisation ducts originated from anterior wall of the receptacles. Thin posterior epigynal plate with comparably shallower and wider central pocket (Figures 19(c), Figures 20(c,d)).

Pancorius altus sp. nov.
(Figures 19(b,d,f,h), Figures 20(f–j), Figures 21(a–f), Figures 22(a–f))

Type material

Holotype, ♂ (IFS_SAL_829), Sri Lanka, Central Province, Kandy District, Deltota, Loolecondera estate, 1480 m, 07° 08′ 45″ N, 80° 41′ 53″ E, beating, 22 June 2016, leg. NP Athukorala et al.

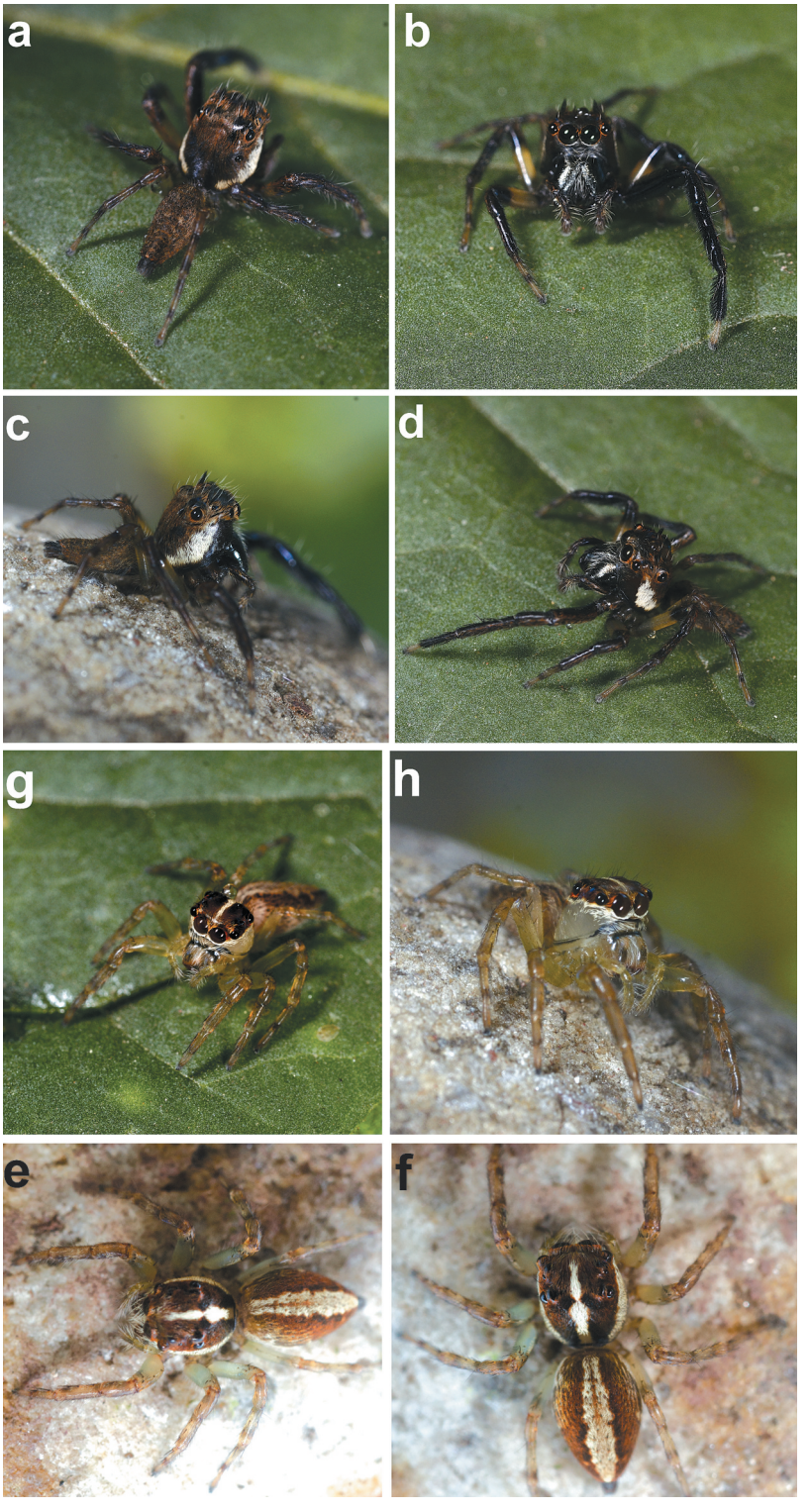

Figure 21. Photographs of live *Pancorius altus* sp. nov. (a–f); (a–d). male in life, (g–f). female from Loolecondera estate.

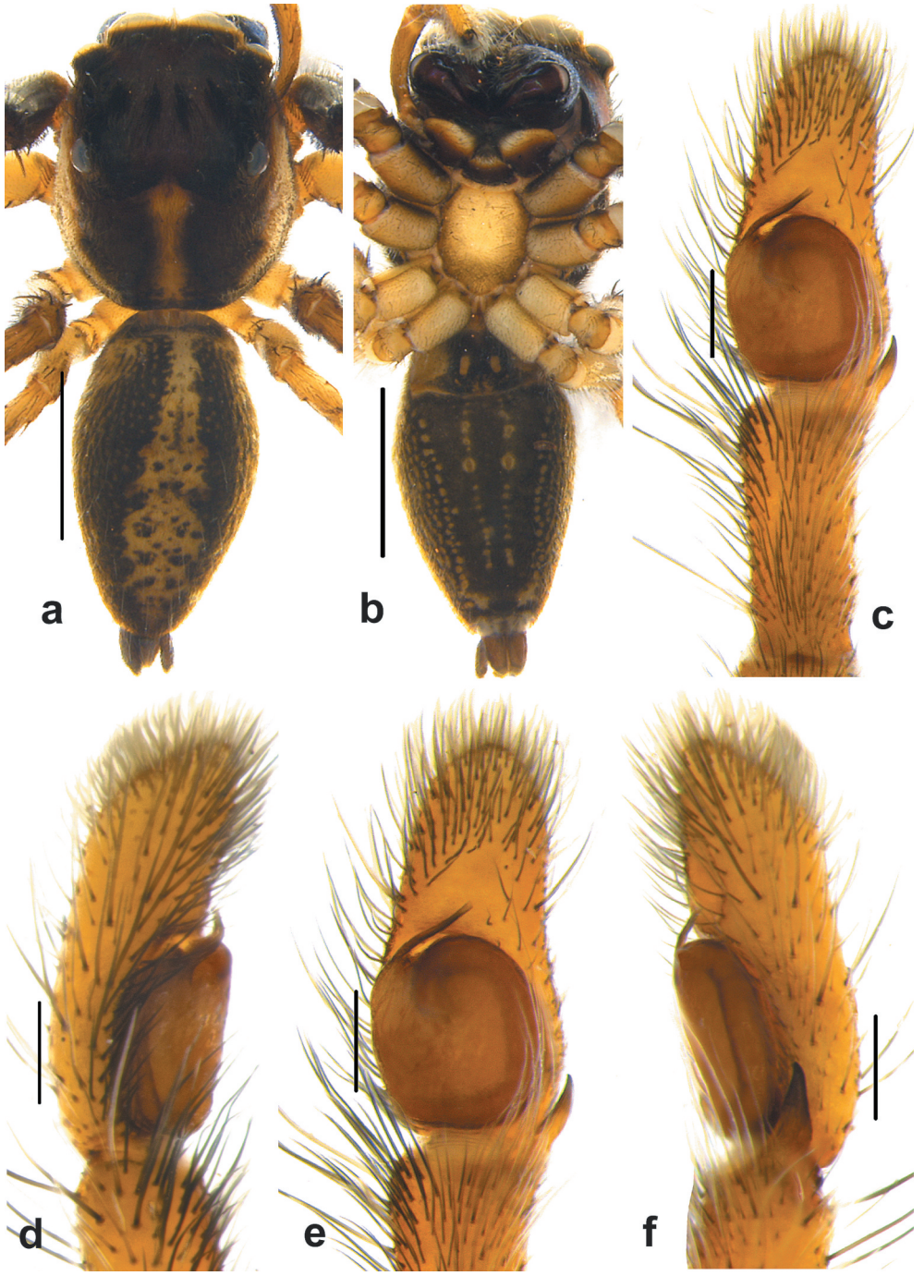

Figure 22. *Pancorius altus* sp. nov. (a, b). Male habitus, (a). dorsal view. (b). ventral view. (c–f). Male palp, c. ventral view. (d). prolateral view. (e). ventral view. (f). retrolateral view. Scale bars: (a, b) = 2 mm, (c–f) = 0.2 mm.

Paratype, ♀ (IFS_SAL_830), same locality and collection data as in holotype.

Other material examined

1♀ (IFS_SAL_831), same locality and collection data as in type material. 1♂ (IFS_SAL_344), same locality and collection data as in type material, 13 July 2010, leg. SP Benjamin and S Batuwita. 2♂ (IFS_SAL 1050-1051), same locality and collection data, 15 November 2017, leg. K. Nilani and B. Dilini. Nuwara Eliya District: 2♂, 1♀ (IFS_SAL 400-402), Peak wilderness sanctuary, 06° 58′ 36″ N, 80° 21′ 46″, hand collection, 22 February 2007, leg. SP Benjamin and Z Jaleel. 2♂ (IFS_SAL 1109-1110), Mandaram Nuwara, 1821 m, 07° 01′ 42″ N, 80° 46′ 3.2″ E, beating, 8 February 2018, leg. NP Athukorala et al. 2♂, 3♀ (IFS_SAL 124-128), Sabaragamuwa Province, Rathnapura District, Eastern Sinharaja, Morningside section, 06° 23′ 23″ N, 80° 30′ 05″, hand collection, 23 February 2007, leg. SP Benjamin and Z Jaleel.

Etymology

The species name refers to the deep notch at the middle of posterior epigynal plate in females.

Diagnosis

This species is distinguishable from other congeners by white central prosomal band in females (Figures 21(e,f)), rounded bulbus, comparably shorter embolus (Figures 19(b), Figures 22(c,e)), spermathecae with reniform, larger chamber and oval smaller chamber, comparably broader median septum, posterior epigynal plate with deep notch and a central pocket (Figures 19d, Figures 20h–i)). It differs from closely related *Pancorius alboclypeus* sp. nov. by the presence of black clypeus of males, deep and narrow central pocket in females and from *P. dabanis* (Hogg 1922) by the shape of the RTA: the ventrally curved distal tip.

Description

Male: Medium-sized spider. In life, habitus brown with dark brown patches, prosoma decorated with white bands on the lateral sides of the prosoma. Clypeus black, sparsely covered with long, grey hairs. Eyes are surrounded by pale orange rings. Anterior half of AMEs covered with pale orange rings and posterior half surrounded by pale white rings. Chelicerae black with dark brown fangs. In ethanol-preserved specimens, brown prosoma with pale yellowish brown median band behind fovea (Figure 22(a)). Eye field rather elevated with black blotches. Fovea distinct. Prosoma high, broader than abdomen and sloping posteriorly. Sternum oval, pale yellow in middle, edges greyish brown (Figure 22(b)). Posterior margin of prosoma steep, slightly truncated. Leg I dark brown, elongated with dense black bristles on patella I, tibia I, metatarsus I, others yellowish brown.

Abdomen as long as prosoma, slightly narrower tapering posteriorly. Dorsum blackish grey dispersed with pale brown dots and medially pale yellow longitudinal band with serrated margins (Figure 22(a)). Ventrum blackish grey with pale yellowish–brown dots arranged into four rows from epigastric furrow to spinnerets. Spinnerets blackish grey. Measurements: TL 7.80, AL 4.03, AW 2.08, PL 3.77, PW 2.86.

Yellowish brown palp. Cymbium with slightly narrower distal region. Embolus thin, short originating from antero–lateral portion of bulbus (Figures 19(b), Figures 22(c, e)). Bulbus oval without any projection (Figures 19(b), Figures 22(c,e)). Sperm duct comparably broader at the distal end of tegulum, narrower at the posterior bulbus. Palpal tibia long (Figure 22(c)). RTA with broad base and curved ventrally with pointed tip (Figures 19(b,f), Figures 22(c,e,f)).

Female: Almost all characters are similar to male except comparably narrower prosoma and yellowish brown, less stronger greenish brown front legs. In life, prosoma brown with a pale white central and lateral bands (Figure 19(e,f)). White diamond-shaped mark behind short fovea (Figure 20(f)). Abdomen brown with serrated longitudinal median band intermingled with brown patches. Measurements: TL 9.62, AL 4.94, AW 3.12, PL 4.03, PW 2.34.

Epigynum moderately sclerotised. Large, membranous 'window' near to epigastric furrow (Figures 19(c), Figures 20(h,i)). Broad median septum. Copulatory opening could open inside of membranous 'window'. Copulatory ducts not visible. Spermathecae highly sclerotised with two chambers; reniform large chamber and oval–shaped small chamber (Figures 19(g), Figures 20(j)). Fertilisation ducts originated from anterior wall of the receptacles (Figures 19(g), Figures 20(j)). Strongly sclerotised thin posterior wall with deep median indentation and one central pocket (Figures 19(c), Figures 20(h,i)).

Remarks

Due to the thick sclerotisation of the epigynum, it was digested for two days and then cleared with methyl salicyclate. However, the positions of copulatory opening and copulatory ducts were still difficult to recognise.

Distribution

Sri Lanka.

Pancorius athukoralai sp. nov.
(Figures 23(a–h), Figures 24(a–f), Figures 25(a–e), Figures 26(a–d))

Type material

Holotype, ♂ (IFS_SAL_321), Central Province, Kandy District, Dunumadalawa, 600 m, 07° 16′ 38″ N, 80° 38′ 69″ E, beating, 29 September 2009, leg. SP Benjamin et al.

Other material examined

Sri Lanka: 1♂ (IFS_SAL_320), Sri Lanka, Central Province, Kandy District, Udawattakelle, 580 m, 07° 17′ 54″ N, 80° 38′ 29″ E, beating, 11 May 2015, leg. NP Athukorala et al. 2♂ (IFS_SAL_1048–1049), Deltota, Loolecondera estate, 1480 m, 07° 08′ 45″ N, 80° 41′ 53″ E, beating, 15 November 2017, leg. K. Nilani. 1♂ (IFS_SAL_356), Sabaragamuwa Province, Rathnapura District, Gilimale FR, 110 m, 06° 45′ 55.8″ N, 80° 25′ 45.5″ E, hand collection, 11–II–2007, leg. SP Benjamin and Z Jaleel.

Etymology

This name is a patronym for the collector Namal Prasantha Athukorala who collected the holotype and many other specimens studied by us.

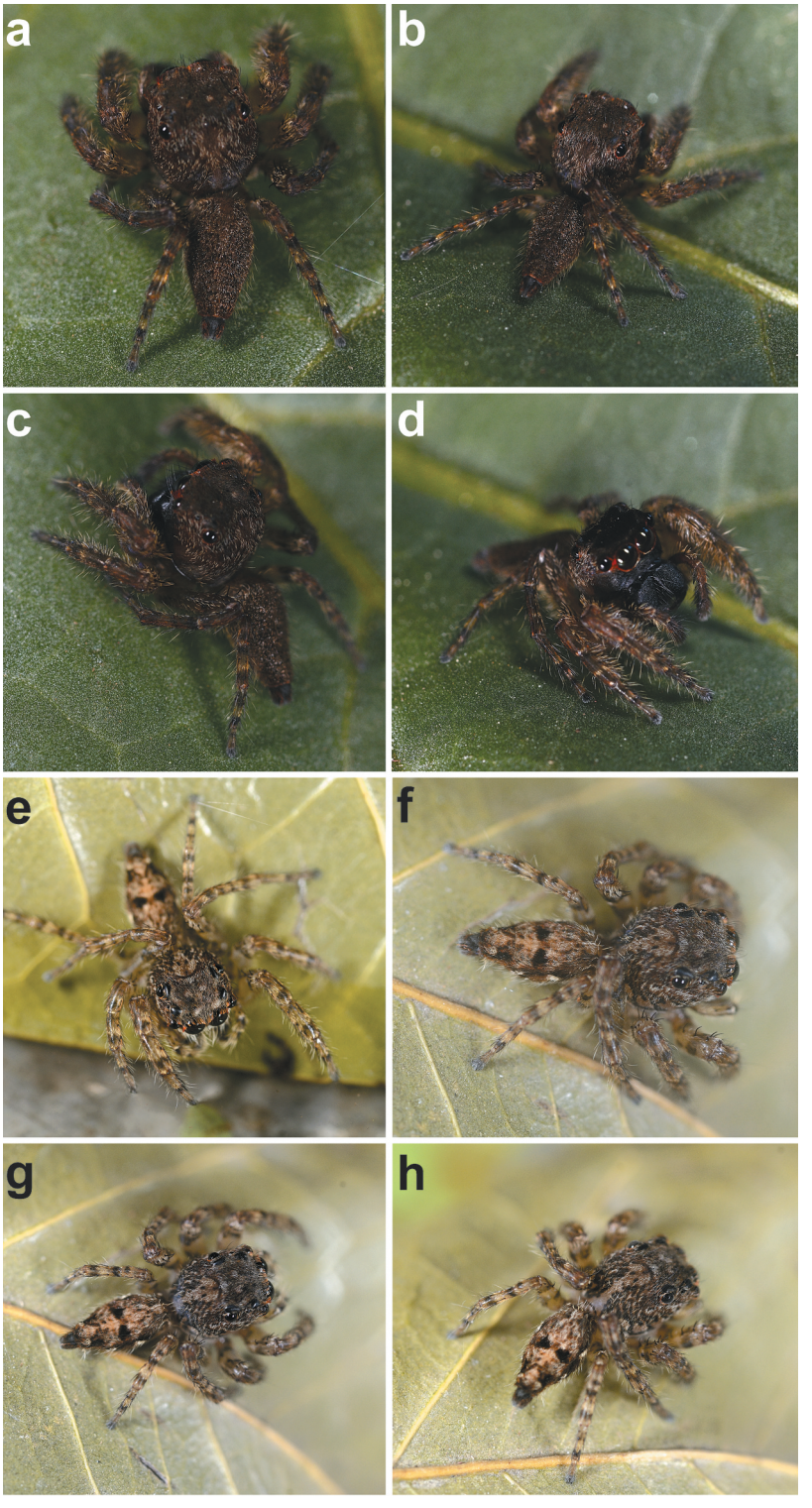

Figure 23. Photographs of live *Pancorius athukoralai* sp. nov. a–d. male from Deltota forest. (e–h). females.

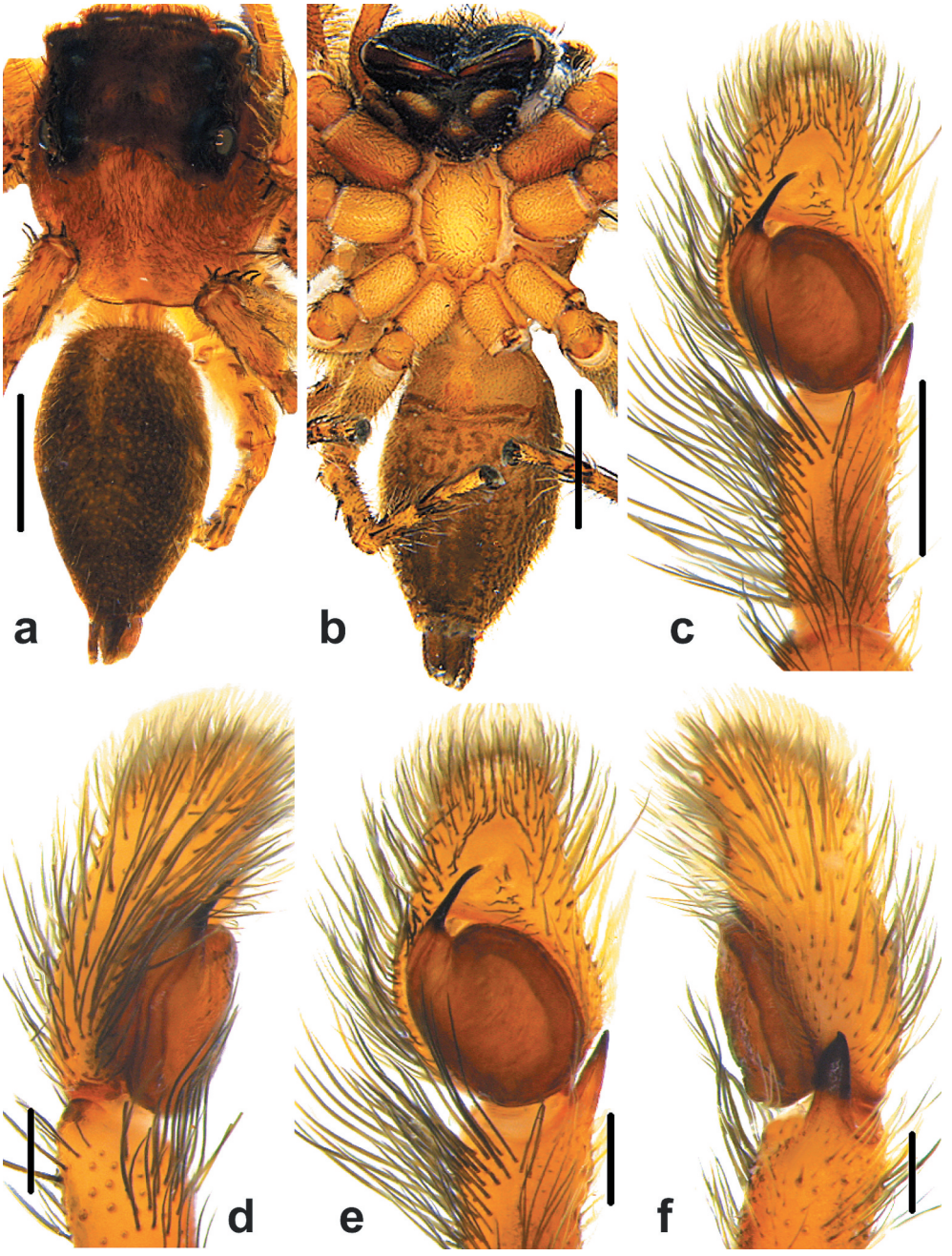

Figure 24. *Pancorisus athukoralai* sp. nov. (a, b). Male habitus, (a). dorsal view, (b). ventral view. (c–f). Male palp, c. ventral view. (d). prolateral view. (e). ventral view. (f). retrolateral view. Scale bars: (a, b) = 2 mm, (c) = 0.5 mm, (d–f) = 0.2 mm.

Diagnosis

The species is distinguishable from other congeners by the rounded, smooth bulbus with distinct apical tegulum, thin, short embolus, ventrally curved RTA (Figures 24(c,e,f), Figures 26 (a,b)). It resembles *P. changricus* Zabka 1990 by the presence of apical tegulum and general

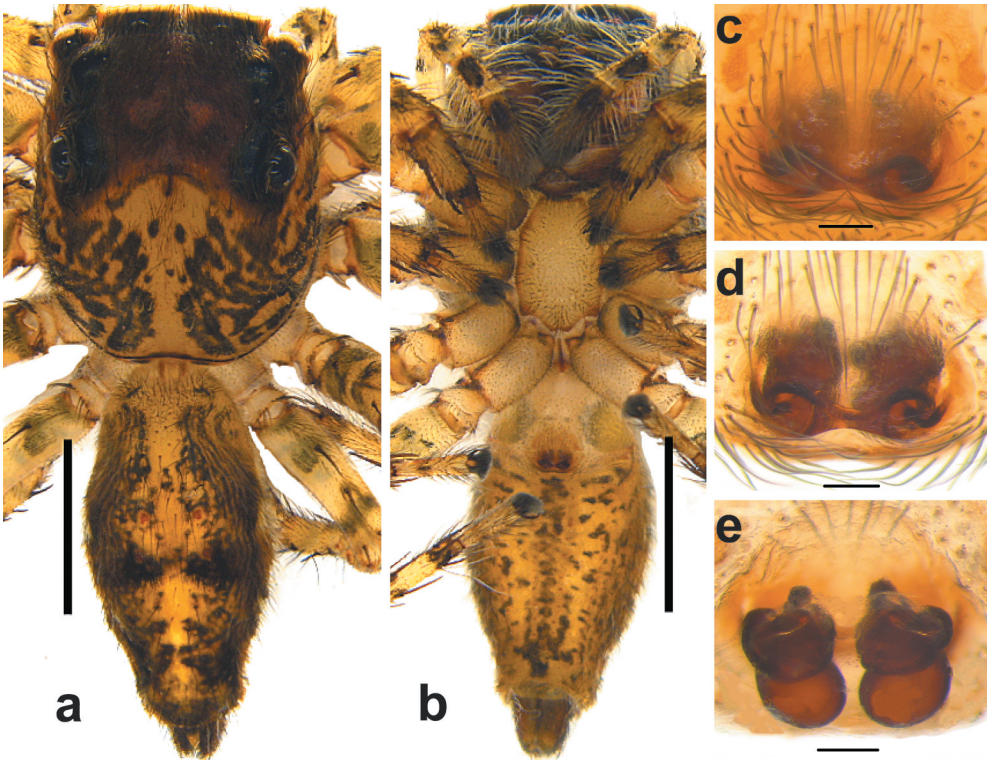

Figure 25. *Pancorius athukoralai* sp. nov. (a, b). Female habitus; (a). dorsal view, (b). ventral view, (c–e). Epigynum; (c, d). ventral view, (e). dorsal view. Scale bars: (a, b) = 2 mm, (c–e) = 0.1 mm.

palpal structure, however it differs by the shape of RTA (Figures 24(f), Figures 26(b)) and narrowed oval bulbus and also by shape of membranous window and spermathecae (Figures 25(c–e), Figures 26(c–d)).

Description

Male: Medium-sized, hirsute spider. In life, prosoma blackish brown, sparsely dispersed with white hairs and eyes covered with brownish orange scales (Figure 23(a–d)). Clypeus blackish brown (Figure 23(c)). In ethanol preserved specimens, dark brown prosoma covered with pale brown blotch behind fovea (Figure 24(a)). Eye field rather elevated. ALEs, PMES and PLEs covered with black rings. Fovea distinct. Prosoma high and sloping posteriorly. Chelicerae dark brown with brown fangs. Sternum oval with prominent indentation near coxae IV (Figure 24(b)), pale yellow in middle, edges yellowish brown (Figure 24(b)). Posterior margin of prosoma steep, slightly truncated. Leg I rather robust and elongated with dense black bristles on patella I, tibia I and metatarsus I, all legs blackish brown interspersed with white hairs (Figure 23(a–d)).

Abdomen oval, slightly longer and narrower than prosoma, tapering posteriorly. Dorsum orangish brown, anterior margin of the dorsum densely covered with white hairs in live specimens (Figure 23(a,b)), greyish brown dorsum dispersed with greyish yellow small dots, a pair of rounded brown blotches in mid–abdomen in preserved specimens (Figure 24(a)). Ventrum greyish yellow with greyish brown dots arranged

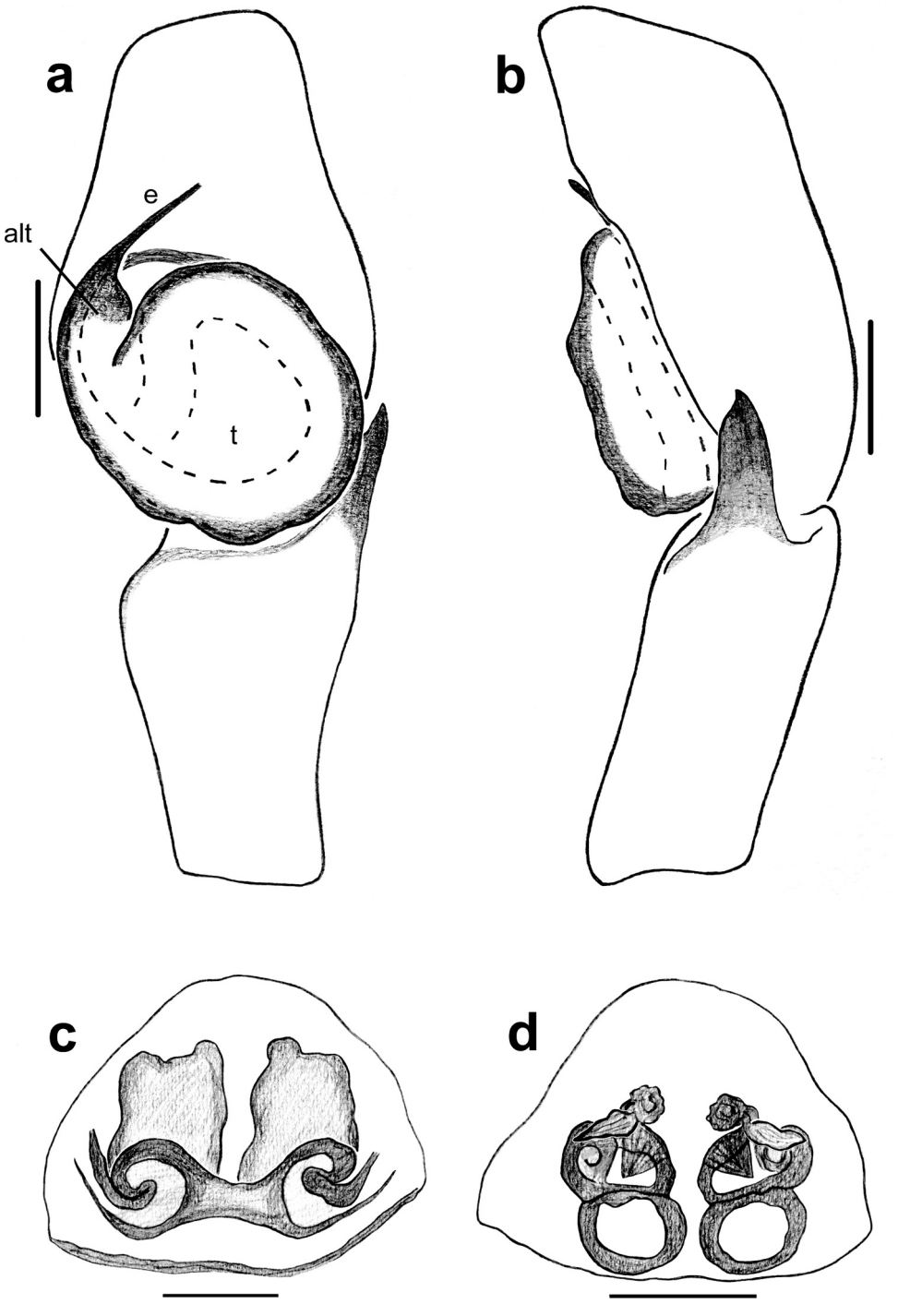

Figure 26. *Pancorius athukoralai* sp. nov. (a). Palp, ventral view, (b). retrolateral view; (c). Epigynum, ventral view, (d). dorsal view. Scale bars: (a–d) = 0.2 mm. Abbreviations: alt: apical lobe of tegulum; e: embolus; t = tegulum.

into four rows from epigastric furrow to spinnerets (Figure 24(b)). Spinnerets greyish brown. Measurements: TL 6.89, AL 3.38, AW 1.95, PL 3.51, PW 2.73.

Brown palp. Cymbium moderately long with gradually narrowing distal region. Embolus thin, short originating from apical region of bulbus (Figures 24(c,e,f), Figures 26(a,b)). Rounded, smooth bulbus, distinct apical portion (Figures 24(c,e,f), Figures 26(a, b)). Sperm duct comparably broader at distal end of tegulum, narrower at posterior end. Palpal tibia long. RTA with broad base, curved, pointed tip ventrally (Figure 24(f), Figures 26(b)).

Female: Comparably paler body colouration than males and black blotches on dorsum of abdomen clearly differentiate male and females. In life, prosoma pale brown densely dispersed with black blotches and white bristles (Figure 23(e–h). Eyes covered with brownish orange scales. In ethanol-preserved specimens, pale yellow prosoma covered with dark grey blotches behind fovea (Figure 25(a). Eye field brown and elevated. PMES and PLEs covered with black rings. Fovea short, distinct. Abdominal dorsum pale brown, decorated with a pair of conspicuous black blotches in middle and anterior margin of the dorsum densely covered with white hairs in live specimens (Figure 23(e–h)), pale yellow dorsum dispersed with dark grey patches, a pair of rounded reddish brown dots in mid–abdomen in preserved specimens (Figure 25(a)). Other characters are similar to males. Measurements: TL 7.12, AL 3.80, AW 2.15, PL 3.72, PW 2.80.

Epigynum well sclerotised. Broad membranous 'window' near to epigastric furrow (Figures 25(c,d), Figures 26(c)). Broad median septum. Copulatory ducts not visible. Spermathecae highly sclerotised with two, oval chambers (Figures 25(e), Figures 26(d)). Fertilisation ducts originated from anterior wall of the receptacles. Posterior epigynal plate with shallow median indentation and a central pocket (Figures 25(c,d), Figures 26(c)).

Distribution

Sri Lanka.

Key to the Sri Lankan *Colopsus, Evarcha* and *Pancorius*

1. Small spiders, embolus inner origin with membranous pars pendulum (Figures 16(d), Figures 18(a)), straight RTA with blunt tip (Figures 16(d,e), Figures 18(a,b)), large, semicircular membranous window, narrow median septum (Figure 17(c)), long, tubular spermathecae (Figures 17(d,e), Figures 18(d)) ..... *Evarcha latus* sp. nov.
   Medium to large spiders, embolus smooth without any membranous structure, RTA with pointe tip, comparably smaller membranous window, comparably broad median septum, broad, compact spermathecae ..... 2.

2. Metallic brownish green, reddish brown habitus, sometimes abdomen with pale yellow median band, posterior epigynal plate with two lateral pockets ..... 3 (*Colopsus*).
   Sandy brown habitus with pale white central and lateral prosomal bands, serrated longitudinal abdominal band, posterior epigynal plate often with central pocket ..... 7 (*Pancorius*)

3. Abdomen with broad, greyish pale yellow median band (Figure 13(a)), Bulbus oval with large posterior lobe, embolus long, whip–like originating from posterior portion of bulbus ..... *Colopsus cinerea* sp. nov.
   Abdomen without median band, bulbus smooth, oval or rounded without posterior lobe, embolus medium sized to long, spermathecae complex with more than two chambers 4

4. Embolus comparably stouter originating from antero-lateral bulbus (Figures 5(b,e)), 11 (c, e), spermathecae with oval large and reniform small chambers (Figures 6(d), Figures 10(e)). .... *C. cancellatus*
   Embolus thin originating from postero-lateral of bulbus, spermathecae with three lobes 5

5. RTA with well–defined dorsal and ventral curves, cymbium with narrowest distal end, lack of accessory glands (Figures 9(c,d), Figures 13(d,e), Figures 19(d,e), Figures 20(a, b)) 6
   RTA without well–defined ventral curve, cymbium with gradually narrowing distal end (Figures 5(c,f), Figures 15(c,e,f)), accessory glands attached with receptacles (Figures 6(f), Figures 12(j)) .... *C. ferruginus* sp. nov.

6. Bulbus large and oval, embolus very long partially encircling half of bulbus, RTA long with sharp distal end (Figures 4(j), Figures 20(d)). .... *C. magnus* sp. nov.
   Bulbus comparably small and rounded, embolus short, RTA medium sized .... *C. tenuis* sp. nov.

7. Central, lateral prosomal and longitudinal abdominal bands absent, semicircular apical lobe of bulbus ..... *P. athukoralai* sp. nov.
   Prosomal and abdominal bands present, lack of apical lobe of bulbus 8

8. Posterior epigynal plate with deep notch, narrow central pocket (Figures 4(c–e), Figures 6(a,b)) .... *P. altus* sp. nov.
   Posterior epigynal plate with shallow notch, broader central pocket .... *P. alboclypeus* sp. nov.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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ORCID

Suresh P. Benjamin http://orcid.org/0000-0003-4666-0330

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