



Four new species of *Utivarachna* Kishida, 1940 (Araneae: Trachelidae) from Sumatra

NAUFAL URFI DHIYA'ULHAQ^{1,7}, NADINE DUPÉRRÉ^{2,3}, DAMAYANTI BUCHORI^{4,5}, STEFAN SCHEU^{1,6} & JOCHEN DRESCHER^{1,8,*}

¹Department of Animal Ecology, J.-F. Blumenbach Institute for Zoology and Anthropology, University of Göttingen, Göttingen, Germany

²Centre for Taxonomy and Morphology, Leibniz Institute for the Analysis of Biodiversity Change (LIB), Museum of Nature Hamburg, Hamburg, Germany

³American Museum of Natural History, New York, NY, United States of America

✉ n.duperre@leibniz-lib.de; <https://orcid.org/0000-0003-2195-878X>

⁴Department of Plant Protection, Faculty of Agriculture, IPB University, Bogor, Indonesia

⁵Centre for Transdisciplinary and Sustainability Sciences, IPB University, Bogor, Indonesia

✉ damibuchori@yahoo.com; <https://orcid.org/0000-0002-2843-0737>

⁶Centre of Biodiversity and Sustainable Land Use, Göttingen, Germany

✉ stefan.scheu@biologie.uni-goettingen.de; <https://orcid.org/0000-0003-4350-9520>

⁷✉ naufalurfi.du@gmail.com; <https://orcid.org/0000-0001-6563-4643>

⁸✉ jochen.drescher@biologie.uni-goettingen.de; <https://orcid.org/0000-0002-5162-9779>

*corresponding author

Abstract

Four new species of trachelid spiders belonging to the genus *Utivarachna* Kishida, 1940 are described: *U. angso duo sp. nov.*, *U. balonku sp. nov.*, *U. rimba sp. nov.*, and *U. trisula sp. nov.* Part of the EFForTS project, the spider specimens were uncovered in a canopy fogging collection of tree crown arthropods along a land-use gradient from rainforest via jungle rubber (rubber agroforestry) to monocultures of rubber and oil palm in Jambi Province, Sumatra, Indonesia. Three of the proposed new species were found exclusively in rainforest or jungle rubber agroforest (*U. angso duo sp. nov.*, *U. rimba sp. nov.*, *U. trisula sp. nov.*), and one of them exclusively in monocultures of rubber trees (*U. balonku sp. nov.*). We provide photographs and distribution maps for the proposed new species, and discuss their potential ecology based on their sampling locations. We also encountered a fifth species of the genus in all four land-use systems, *U. phyllicola* Deeleman-Reinhold, 2001, one of two species of the genus previously recorded from Sumatra, and also provide photographs and distribution maps for this species in the research area of the EFForTS project.

Key words: EFForTS, sac spiders, canopy fogging, Indonesia, Southeast Asia

Introduction

The family Trachelidae Simon, 1897 comprises 269 species and 20 genera distributed mainly in tropical and subtropical areas across the globe (WSC 2023). The group was previously regarded as a subfamily of Corinnidae (Deeleman-Reinhold 2001) before being elevated to family rank by Ramírez (2014). Members of this family are typically well-sclerotized spiders with reduced leg spination (in many genera completely absent). Out of the 20 genera, three occur in Southeast Asia: *Orthobula* Simon, 1897, *Trachelas* L. Koch, 1872 and *Utivarachna* Kishida, 1940.

The genus *Utivarachna* contains 31 species, fifteen of which are recorded from Southeast Asia. Kishida (1940) introduced this genus in order to accommodate *U. fukasawana* Kishida, 1940, a species from Borneo with a peculiar morphology, namely an elongation of the posterior end of the carapace into a stalk. Deeleman-Reinhold (2001) described the majority of the Southeast Asian species, including the first from Sumatra (*U. phyllicola* Deeleman-Reinhold, 2001), and divided the genus into four species groups based on a combination of somatic and genitalic

morphology: *dusun*-group, *fukasawana*-group, *kinabaluensis*-group and *phyllicola*-group. One additional species, *U. galyaniae* Dankittipakul, Tavano & Singtripop, 2011, was later described from Sumatra by Dankittipakul *et al.* (2011), bringing the total number of species recorded in Sumatra prior to this study to two.

Utivarachna specimens were collected as part of a canopy fogging campaign in the framework of the EFForTS project, a German-Indonesian interdisciplinary research project aiming to understand the drivers and consequences of lowland rainforest conversion to monoculture plantations of rubber (*Hevea brasiliensis*) and oil palm (*Elaeis guineensis*) in Sumatra, Indonesia (Drescher *et al.*, 2016; <https://www.uni-goettingen.de/en/310995.html>).

Materials and Methods

Sample collection

Using canopy fogging, 48 *Utivarachna* specimens were collected in Jambi Province, Sumatra, Indonesia, in the dry season of 2013. The specimens were found in a collection of more than half a million canopy arthropods (Pollierer *et al.*, 2023), stemming from 96 individual canopy fogging events in 32 permanent research plots of the EFForTS project (Drescher *et al.*, 2016). Research plots were evenly distributed among four land-use systems: lowland rainforest, “jungle rubber” (extensively managed rubber agroforest), and smallholder monocultures of (*H. brasiliensis*) and oil palm (*E. guineensis*).

Canopy fogging was conducted by applying 50 ml of DECIS 25 (Bayer Crop Science; active ingredient deltamethrin, 25 g/L) dissolved in four liters of petroleum oil (“white oil”) to three target canopies in each of 32 permanent EFForTS research plots. Underneath each canopy, 16 square collection traps were placed, each measuring 1 m × 1 m, to which PE bottles with 100 ml 99% ethanol were attached. Two hours after applying the entire mixture of white oil and insecticide to the canopy, the contents of the collection traps were emptied into the ethanol-filled bottles, which were themselves combined into a single 1 L PE bottle with fresh ethanol. Canopy arthropods were stored at –20 °C whenever possible, and subsequently sorted to orders and deeper taxa, including spiders. Overall, more than 10,000 spider individuals from more than 30 families and at least 400 species were found among the more than half million canopy arthropods (Ramos *et al.* 2022). More details on the plot design and the EFForTS research framework is given in Drescher *et al.* (2016), on the canopy fogging method in Pollierer *et al.* (2023), and on biodiversity patterns of the collected canopy spider community in Ramos *et al.* (2022).

Specimen processing

Specimens were examined under Leica M205A and ZEISS Stemi 2000 microscopes. Female genitalia were excised from the specimen’s body and cleared in 10% KOH for at least one hour to examine the internal copulatory organs. Imaging of the specimens was done using either a custom-made BK Plus lab System by Dun, Inc. with integrated Canon camera, macro lens (65 mm) and the Zerene stacking software (Zerene Systems, Richland WA, USA), or with a KEYENCE VHX–7000 (Osaka, JPN) digital microscope system. Description of coloration is based on specimens in ethanol. Measurements of legs are given as total length (femur, patella, tibia, metatarsus and tarsus).

Holotypes of the examined materials examined have been, or will be, deposited in the Museum Zoologicum Bogoriense, Bogor, Indonesia (MZB). Paratypes of the examined material have been, or will be, shared with the Zoological Museum Hamburg, Hamburg, Germany (ZMH) and the Senckenberg Museum, Frankfurt am Main, Germany (SMF).

Abbreviations: AER, anterior eye row; ALE, anterior lateral eye; AME, anterior median eye; MOA, median ocular area; PER, posterior eye row; PLE, posterior lateral eye; PME, posterior median eye; RTA, retrolateral tibial apophysis of male palp.

Taxonomy

TRACHELIDAE Simon, 1897

Utivarachna Kishida, 1940

Type species: *Utivarachna fukasawana* Kishida, 1940

Diagnosis. According to Deeleman-Reinhold (2001), the genus *Utivarachna* is closest to *Trachelas* L. Koch, 1872 but can be distinguished from it by the following characters: lateral invagination of carapace just behind the cephalic region (Figs 1A, 3A); pits in the margins of sternum (Figs 1B, 3B); triangular projection of the clypeus extending between the cheliceral bases; chitinous stripes between carapace and sternum (Figs 1B, 3B); lengthened leg I with multiple rows of ventral cuspules in males (Figs 1C, 7C) (versus not lengthened and with one row of cuspules or cuspules absent); embolus forming transverse apical coil (Figs 2, 4); epigynum with large posterior atrium (Figs 6, 9D–E); copulatory openings located posteriorly (versus more anteriorly-located, Figs 6 9D–E).

Composition. *Utivarachna* contains 31 species that are currently divided into four species groups. For their diagnosis, see Deeleman-Reinhold (2001) and Liu *et al.* (2020):

dusun-group: *U. dusun* Deeleman-Reinhold, 2001; *U. itiokai* Yamasaki, 2023; *U. rubra* Deeleman-Reinhold, 2001 and *U. yumaoui* Lin & Li, 2023.

fukasawana-group: *U. chamaeleon* Deeleman-Reinhold, 2001; *U. galyanae* Dankittipakul, Tavano & Singtripop, 2011; *U. fukasawana* Kishida, 1940 and *U. ichneumon* Deeleman-Reinhold, 2001.

kinabaluensis-group: *U. accentuata* (Simon, 1896); *U. angsoduo* **sp. nov.**; *U. arcuata* Zhao & Peng, 2014; *U. bucculenta* Deeleman-Reinhold, 2001; *U. convolutiva* Dankittipakul, Tavano & Singtripop, 2011; *U. fabaria* Zhao & Peng, 2014; *U. fanjing* Li, Zhang & Yu, 2022; *U. fronto* (Simon, 1906); *U. gongshanensis* Zhao & Peng, 2014; *U. kinabaluensis* Deeleman-Reinhold, 2001; *U. lata* Jin, Yin & Zhang, 2015; *U. linyejiei* Chu & Li, 2023; *U. rama* Chami-Kranon & Likhitrakarn, 2007; *U. subfabaria* Liu, Xu & Haddad, 2020; *U. taiwanica* (Hayashi & Yoshida, 1993); *U. tamdao* Chu & Li, 2023; *U. tangi* Liu, Xu & Haddad, 2020; *U. trisula* **sp. nov.** and *U. zhengguoi* Chu & Li, 2023.

phyllicola-group: *U. balonku* **sp. nov.**; *U. gui* (Zhu, Song & Kim, 1998); *U. phyllicola* Deeleman-Reinhold, 2001 and *U. rimba* **sp. nov.**

Distribution. Tropical Asia: India, Sri Lanka, China, Taiwan, Myanmar, Vietnam, Thailand, Peninsular Malaysia, Sumatra, and Borneo.

Utivarachna angsoduo Dhiya'ulhaq & Dupérré, **sp. nov.**

Figures 1, 2

Type material. Holotype ♂: SUMATRA: **Jambi Province:** Dusun Baru, Air Hitam, Sarolangun (2013_BJ4.2_AraTrac005N_001), canopy fogging jungle rubber agroforest, 02°00'56.8"S, 102°45'12.6"E, altitude 64 m, 14.VII.2013, leg. J. Drescher (MZB).

Etymology. The specific name is taken from Jambi Malay *angso duo* meaning “two swans”, part of the mythological founding story of Jambi and is a common symbol in Jambi culture. Also alluding to the long, two-lobed RTA of the species. Noun in apposition.

Diagnosis. This species belongs to the *kinabaluensis*-group based on the following characters: carapace wedge-shaped with undulating lateral margins; posterior end of carapace not produced into an elongated stalk (Fig. 1A); PER recurved and much longer than AER (Fig. 1A); palpal tegulum not enlarged and bulbous (Fig. 2). Males of this species have a similar cephalothorax and abdomen to those of *U. trisula* **sp. nov.**, but can be distinguished from it (as well as from all other congeners) by the long bifid shape of the RTA (Figs 2B–E), each lobe curving in the opposite direction of one another, the ventral lobe additionally with a small spine-like dorsal projection (Figs 2C, E) (versus trifid in *U. trisula*, Figs 15B–E). Female: unknown

Description. Male (Holotype). Total length 4.90. Carapace length 2.36; width 2.00. Carapace maroon, strongly sclerotized, surface granulated, with granules ending in long white seta, lateral margins undulating, posterior half of carapace almost wedge-shaped with narrowly truncate end; fovea short but distinct; PER longer than AER, both slightly recurved (Fig. 1A); clypeus short with slight projection between the chelicerae. Eye diameters: AME 0.13; ALE 0.17; PLE 0.14; PME 0.15. Eye interdistances: AME–AME 0.08; AME–ALE 0.10; ALE–ALE 0.49; PME–PME 0.17; PME–PLE 0.18; ALE–PLE 0.17; AME–PME 0.14; PLE–PLE 0.87. MOA: length 0.41; anterior width 0.33; posterior width 0.48. Clypeus height 0.32. Sternum heart-shaped, colored as carapace, surface granulated (Figs 1B, D).



FIGURE 1. *Utivarachna angsoduo* sp. nov., male holotype. **A, B** Habitus, dorsal view (**A**), ventral view (**B**); **C** Right leg I, prolateral view. **D** Sternum, ventral view. Scale bars A, B = 1 mm; C, D = 0.5 mm.

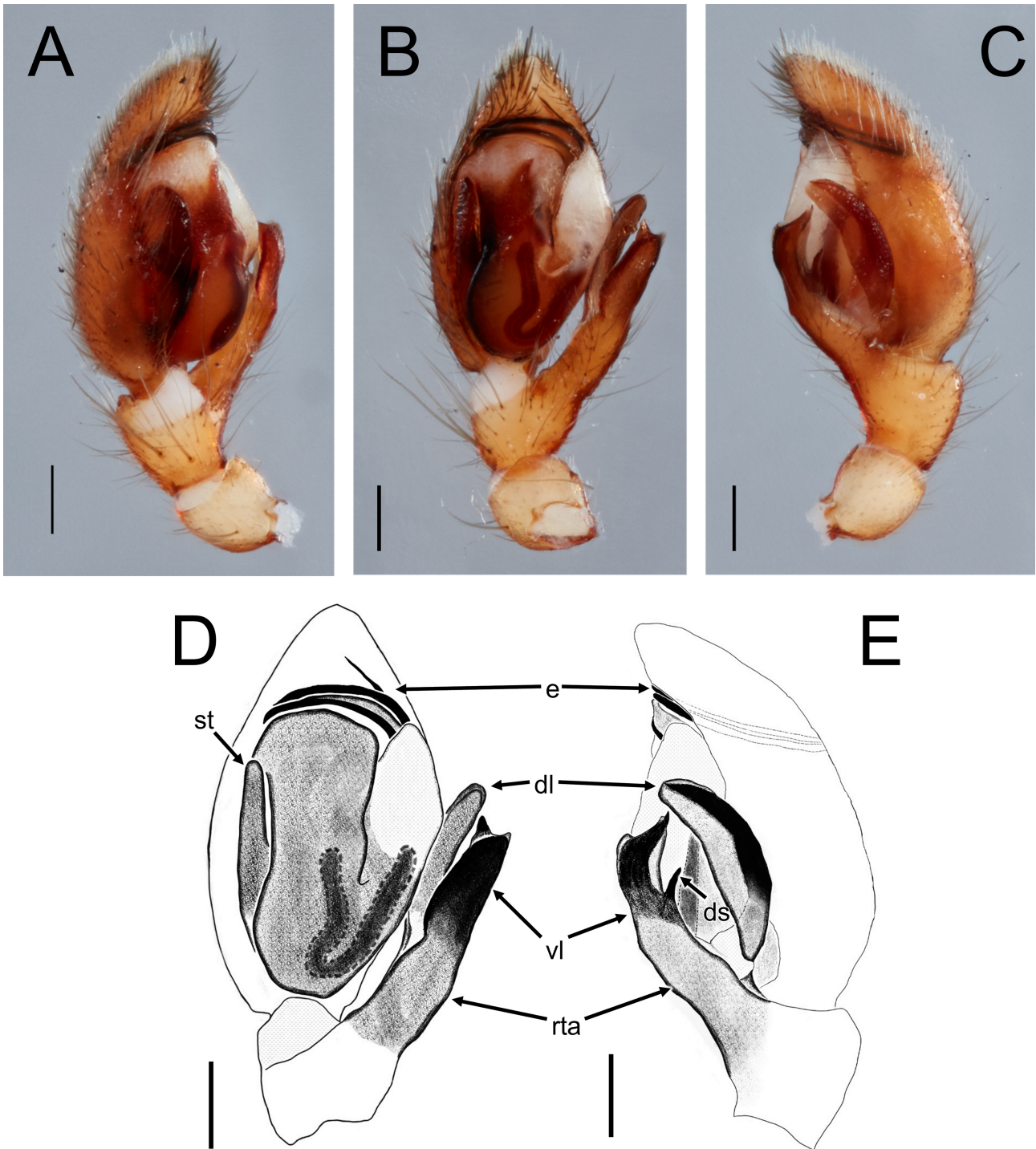


FIGURE 2. *Utivarachna angsoduo* sp. nov., male holotype. A–E Left palp: A prolateral view; B, D ventral view; C, E retrolateral view. Scale bars = 0.2 mm. Abbreviations: dl, dorsal lobe of RTA; ds, dorsal spine of dorsal RTA lobe; e, embolus; rta, retrolateral tibial apophysis; st, subtegulum; vl, ventral lobe of RTA.

Abdomen length 2.54; width 1.56. Abdomen oval, pale-colored with three pairs of dark patches on the lateral margin, the anterior two pairs rather faint, as well as a darker-shaded cardiac pattern and a pair of small dark patches directly anterior to the spinnerets; most of the dorsal surface of abdomen covered with an orange scutum; ventral side of abdomen sclerotized on the area anterior to the epigastric furrow, projecting a short distance posterior to it on the sides; four longitudinal rows of sclerotized dots present between epigastric furrow and spinnerets.

Legs yellow, covered with long white seta especially on the ventral surface, striated with black bands distally and proximally on tibiae I–IV and femur I, while femora II–IV and metatarsi III–IV with distal bands only; anterior

legs stouter and longer than posterior legs; the ventral side of anterior legs filled with leg cuspules from tarsi to tibiae (Fig. 1C), metatarsi III and IV distally with comb-like structure distally followed by brush of setae. Leg measurements: leg I 7.46 (2.13, 0.73, 2.11, 1.72, 0.77); leg II 7.55 (2.17, 0.72, 2.05, 1.76, 0.85); leg III 5.19 (1.45, 0.48, 1.26, 1.44, 0.56); leg IV 6.48 (1.72, 0.54, 1.50, 2.09, 0.63).

Male palp (Fig. 2): Cymbium and bulb oval. Sperm duct starting out diagonally then turning at 120° angle, before making narrow U-shaped turn. RTA bifid, ventral lobe canoe-shaped with excavated dorsal surface, long and slightly curved, ending in sharp bifid tip; curved spine-like projection grows dorsally in middle of lobe; dorsal lobe canoe-shaped, with excavated ventral surface, curved more prominently than ventral lobe and in opposite direction, separated from ventral lobe by membranous area, tip rounded, longer and slightly wider than the ventral lobe. Prolateral margins of both lobes narrower than retrolateral margin, giving lobes rebordered appearance when viewed retrolaterally. Embolus long, coiled horizontally. as wide as bulb, looping twice, visible dorsally through the cymbium.

Distribution. Jambi Province, Sumatra (only known from type locality) (Maps 1 and 2).

Remarks. The type specimen was collected by canopy fogging in jungle rubber agroforest, and is considered arboreal.

Utivarachna balonku Dhiya'ulhaq & Dupérré, sp. nov.

Figs 3–6

Type material. Holotype ♂: **SUMATRA: Jambi Province:** Lubuk Kepayang, Air Hitam, Sarolangun (2013_BR4.1_AraTrac001N), canopy fogging in rubber plantation, 02°06'36.0"S, 102°46'22.4"E, altitude 54 m, 3.XII.2013, leg. J. Drescher (MZB).

Paratypes: SUMATRA: Jambi Province: 1♀, Singkawang, Muara Bulian, Batang Hari (2013_HR4.2_AraTrac001N), canopy fogging in rubber plantation, 01°48'18.3"S, 103°15'52.0"E, altitude 51 m, 17.XI.2013, leg. J. Drescher (MZB); 1♂, Sungkai, Bajubang, Batang Hari (2013_HR3.1_AraTrac001N), canopy fogging in rubber plantation, 01°51'36.5"S, 103°18'00.6"E, altitude 41 m, 13.XI.2013, leg. J. Drescher (ZMH-A0023858).

Etymology. The specific name is taken from the Indonesian children's song *Balonku Ada Lima* ("I have five balloons"), created by Pak Kasur and modified into its popular version by A.T. Mahmud. It alludes to the inflated tegulum of the male palp. Noun in apposition.

Diagnosis. This species belongs to the *phyllicola*-group based on the inflated tegulum and bursae located distantly from the spermathecae, close to the pedicel. Males of this species are most similar to those of *U. gui*, *U. rimba* sp. nov. and *U. phyllicola* but can be distinguished from *U. gui* and *U. rimba* sp. nov. by the much more inflated tegulum, obstructing the RTA in ventral view, as well as having a longer distal, filiform part of embolus (Fig. 4), whereas in the latter two species the RTA is visible ventrally (Jin *et al.* 2015, fig. 8D, 11); from *U. phyllicola* by the wider, shorter RTA, reaching only the middle of the bulb (Figs 4C, E) (versus almost reaching the anterior end of the bulb in *U. phyllicola*, Fig. 9C). Females of this species are most similar to those of *U. gui* and *U. rimba* sp. nov. by the slender copulatory ducts and u-shaped medial part of connecting ducts but can be distinguished from those of *U. gui* by the much larger scutum covering almost half of the dorsal abdomen surface (Fig. 5A) (versus scutum covering only a small part anteriorly in *U. gui* (Jin *et al.* 2015: fig. 7A); larger spermathecae (Figs 6B, 6C) as well as the shorter copulatory ducts, being roughly two times the length of spermathecae (versus three times the length of spermatheca in *U. gui*; Jin, *et al.* 2015: fig. 8F); and from females of *U. rimba* sp. nov. by the pear-shaped spermathecae (Figs 6B, C) (versus almost tube-shaped in *U. rimba* sp. nov., Figs 13B, C).

Description. Male (Holotype). Total length 3.40. Carapace length 1.75; width 1.29. Carapace oval, dark-brown, strongly sclerotized, surface granulated, with each granule ending in long, white setae, lateral margin vaguely undulating; fovea indistinct; PER longer than AER, both slightly recurved (Fig. 1A); clypeus short, with slight projection between chelicerae. Eye diameters: AME 0.10; ALE 0.10; PLE 0.11; PME 0.10; Eye interdistances: AME–AME 0.06; AME–ALE 0.07; ALE–ALE 0.38; PME–PME 0.12; PME–PLE 0.11; ALE–PLE 0.10; AME–PME 0.08; PLE–PLE 0.56. MOA: length 0.28; anterior width 0.27; posterior width 0.32. Clypeus height 0.17. Sternum heart-shaped, colored slightly lighter than carapace, surface granulated (Fig. 3B).

Abdomen length 1.65; width 1.29. Abdomen oval, most of dorsal surface covered with light-brown scutum (Fig. 3A); ventral side of abdomen lightly sclerotized on area anterior to epigastric furrow, colored light brown;

dark, wide band runs posteriorly from epigastric furrow, ending in circle surrounding spinnerets; rest of abdomen light gray (Fig. 3B).

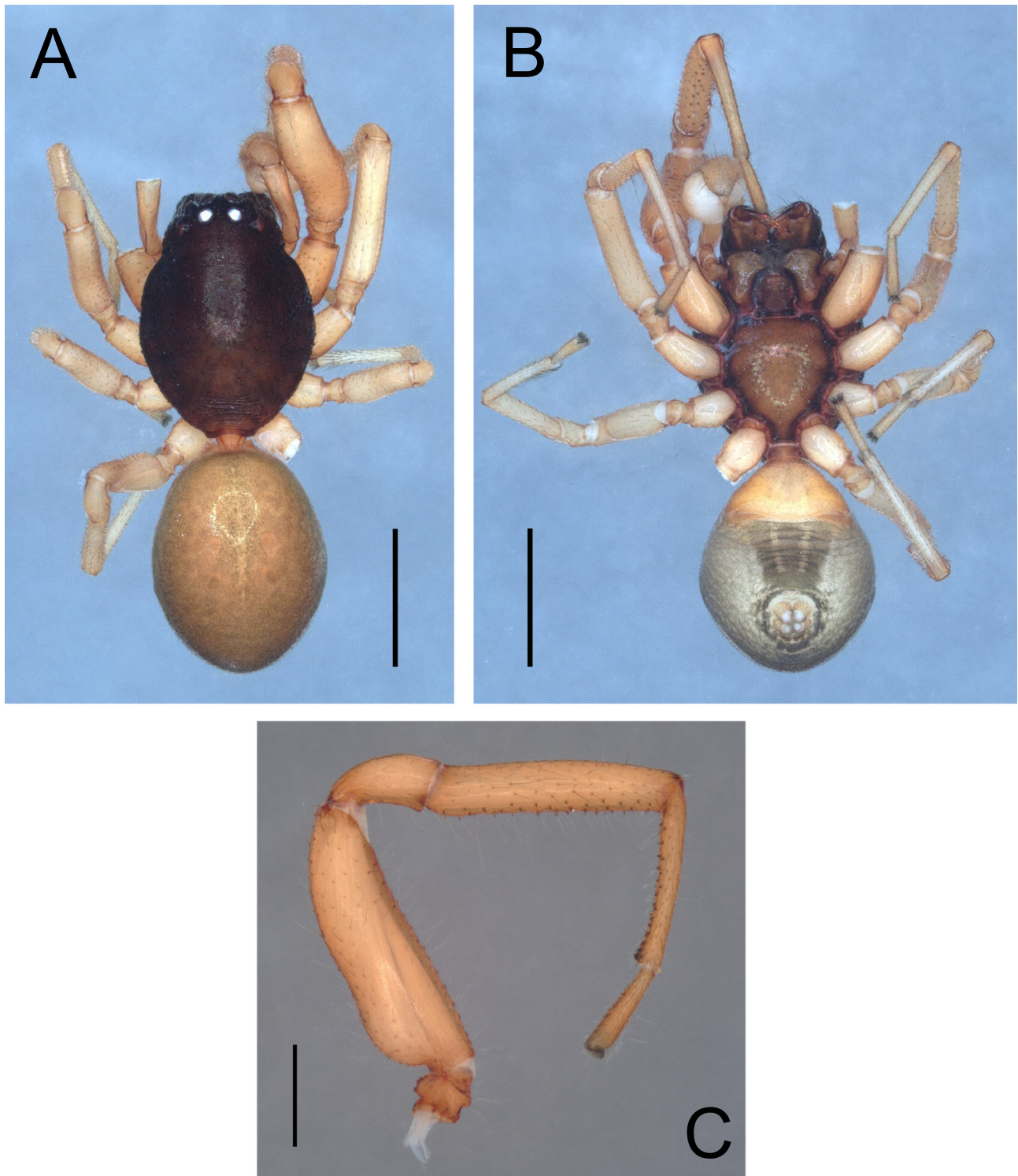


FIGURE 3. *Utivarachna balonku* sp. nov., male holotype. **A, B** Habitus, dorsal view (**A**), ventral view (**B**); **C** Left leg I, prolateral view. Scale bars A, B = 1 mm; C = 0.5 mm.

Legs uniformly light brown, covered with long white seta, especially on ventral surface. Leg I longer and much stouter than other legs, ventrally filled with leg cuspules from tarsus to femur, except on patella (Fig. 3C); metatarsi III and IV distally with comb-like structure distally followed by brush of setae. Leg measurements: leg I 4.38 (1.39, 0.46, 1.20, 0.84, 0.49); leg II 3.71 (1.18, 0.34, 0.99, 0.72, 0.48); leg III 2.78 (0.81, 0.33, 0.63, 0.62, 0.39); leg IV 3.74 (1.14, 0.32, 0.83, 1.02, 0.43).

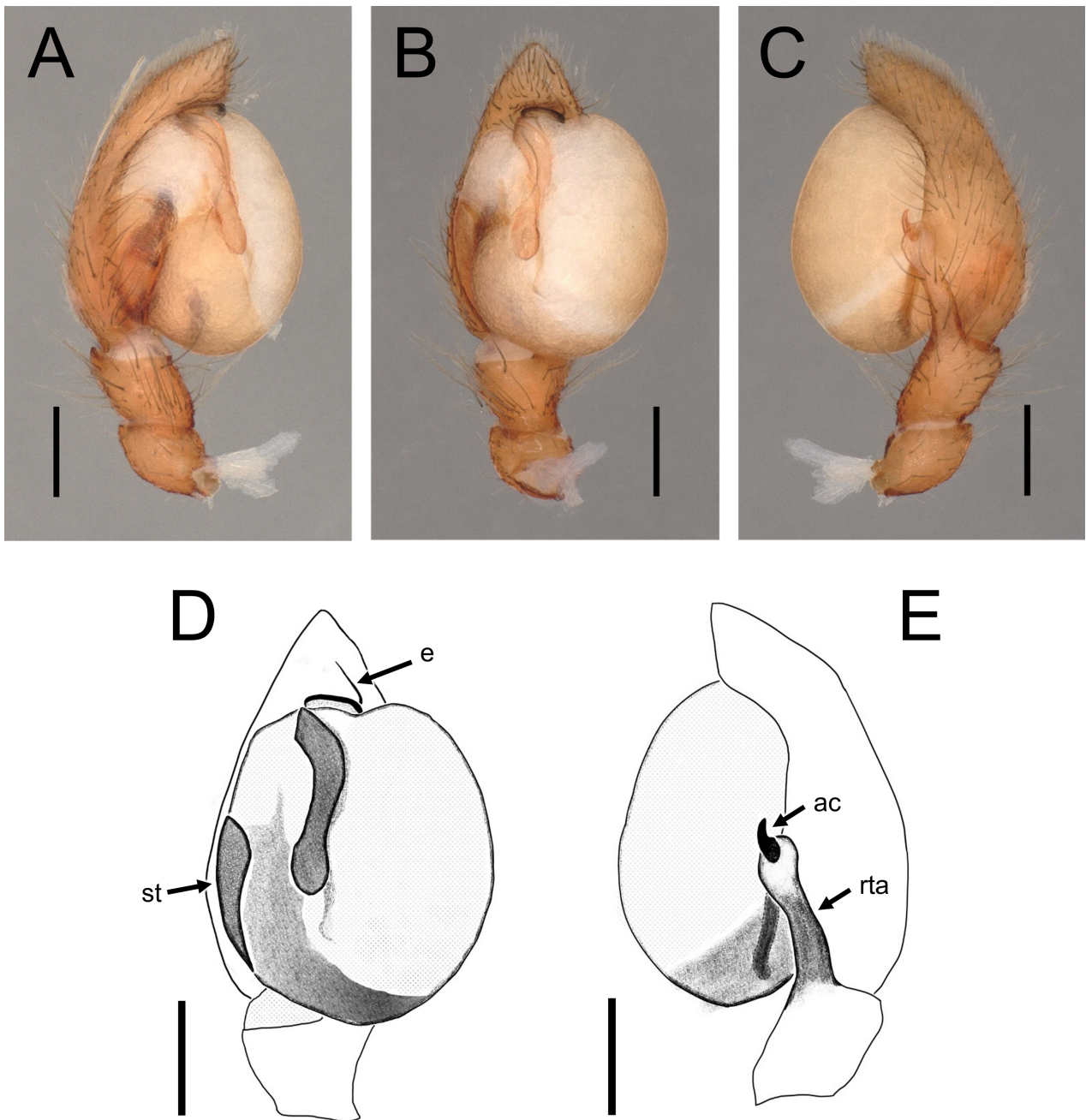


FIGURE 4. *Utivarachna balonku* sp. nov., male holotype. A–E Left palp: A prolateral view; B, D ventral view; C, E retrolateral view. Scale bars A–E = 0.2 mm. Abbreviations: ac, apical claw of RTA; e, embolus; rta, retrolateral tibial apophysis; st, subtegulum.

Male palp (Fig. 4): Cymbium oval. Bulb round. Tegulum membranous and much inflated, covering RTA in ventral view. RTA long, distally spatulate, ending in sickle-shaped apical claw. Sperm duct only visible in retrolateral and prolateral view. Embolus arising from wide basal part originating from middle of bulb; distal part coiled horizontally, much narrower than bulb, looping once.

Female (Paratype). Total length 3.68. Carapace length 1.63; width 1.25. Eye diameters: AME 0.10; ALE 0.12; PLE 0.10; PME 0.09. Eye interdistances: AME–AME 0.05; AME–ALE 0.04; ALE–ALE 0.30; PME–PME 0.10; PME–PLE 0.09; ALE–PLE 0.10; AME–PME 0.06; PLE–PLE 0.49. MOA: length 0.27; anterior width 0.22; posterior width 0.29. Clypeus height 0.21. Abdomen length 2.05; width 1.53. General appearance as in male except dorsal scutum only covering half of abdomen (Fig. 5A) and leg I cuspules sparser, especially on femora (Fig. 5C). Leg measurements: leg I 3.73 (1.23, 0.37, 0.94, 0.76, 0.43); leg II 3.57 (1.08, 0.33, 0.90, 0.79, 0.47); leg III 2.59 (0.72, 0.25, 0.60, 0.63, 0.39); leg IV 3.59 (1.11, 0.28, 0.83, 0.96, 0.41).

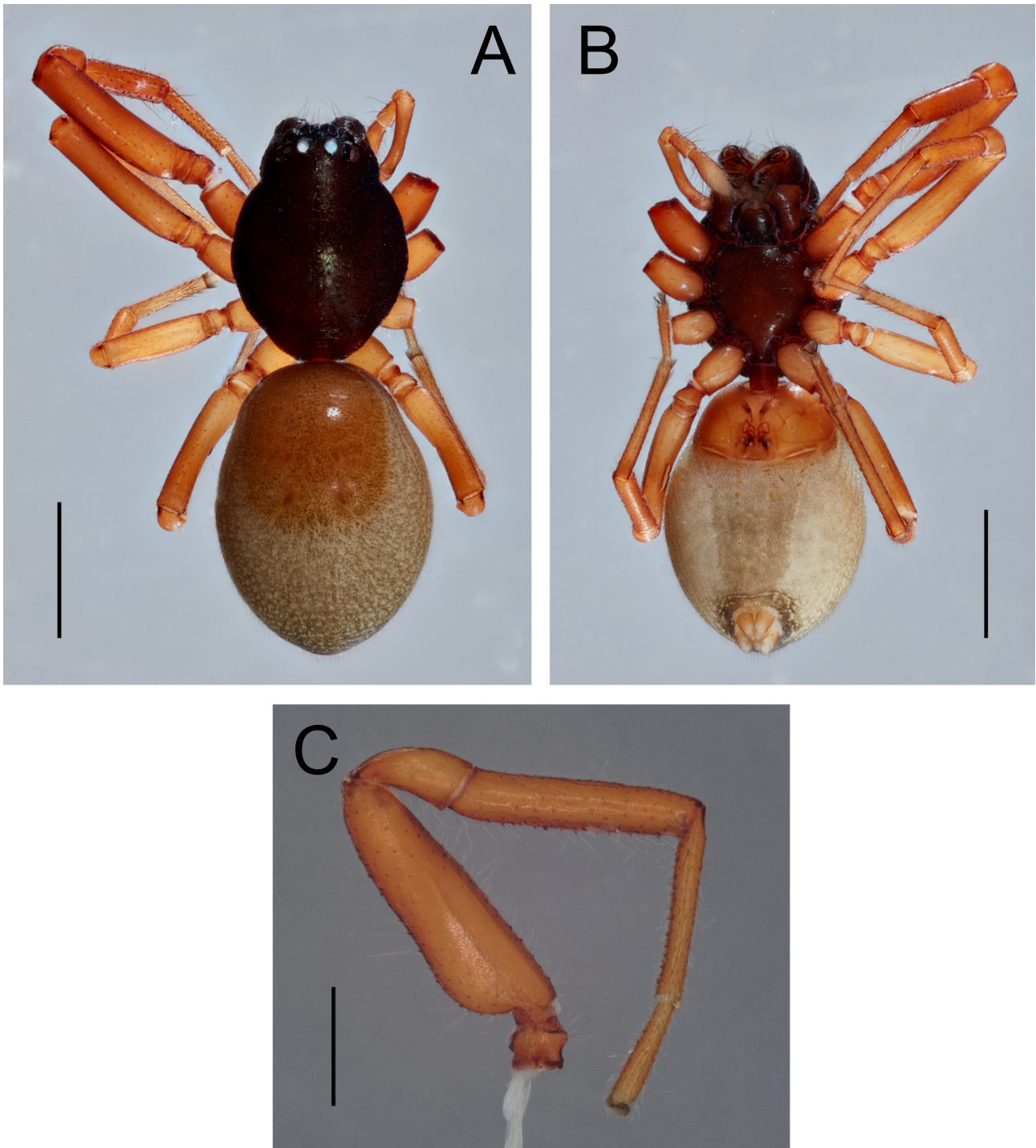


FIGURE 5. *Utivarachna balonku* **sp. nov.**, female paratype. **A, B** Habitus, dorsal view (**A**), ventral view (**B**); **C** Left leg I, prolateral view. Scale bars A, B = 1 mm; C = 0.5 mm.

Copulatory organs (Fig. 6): Atrium as wide as long. Copulatory openings located on the anterior corners of atrium, close to the epigastric furrow. Copulatory ducts narrow, slightly S-shaped. Bursae oval, very large and fragile, located close to the pedicel. Connecting ducts narrow, prominently S-shaped. Spermathecae pear-shaped. Fertilization ducts straight, almost as long as spermatheca.

Distribution. Jambi Province, Sumatra (Maps 1 and 2).

Remarks. All specimens of *U. balonku* **sp. nov.** were collected by canopy fogging in smallholder rubber monoculture plantations, and are considered arboreal. *Utivarachna balonku* **sp. nov.** is similar to *U. rimba* **sp. nov.** both in habitus and genitalic morphology, but was collected from different habitats: *U. balonku* **sp. nov.** was

collected exclusively in rubber monoculture plantations, whereas *U. rimba* **sp. nov.** was collected from rainforest and jungle rubber agroforestry, i.e. sites with more natural vegetation.

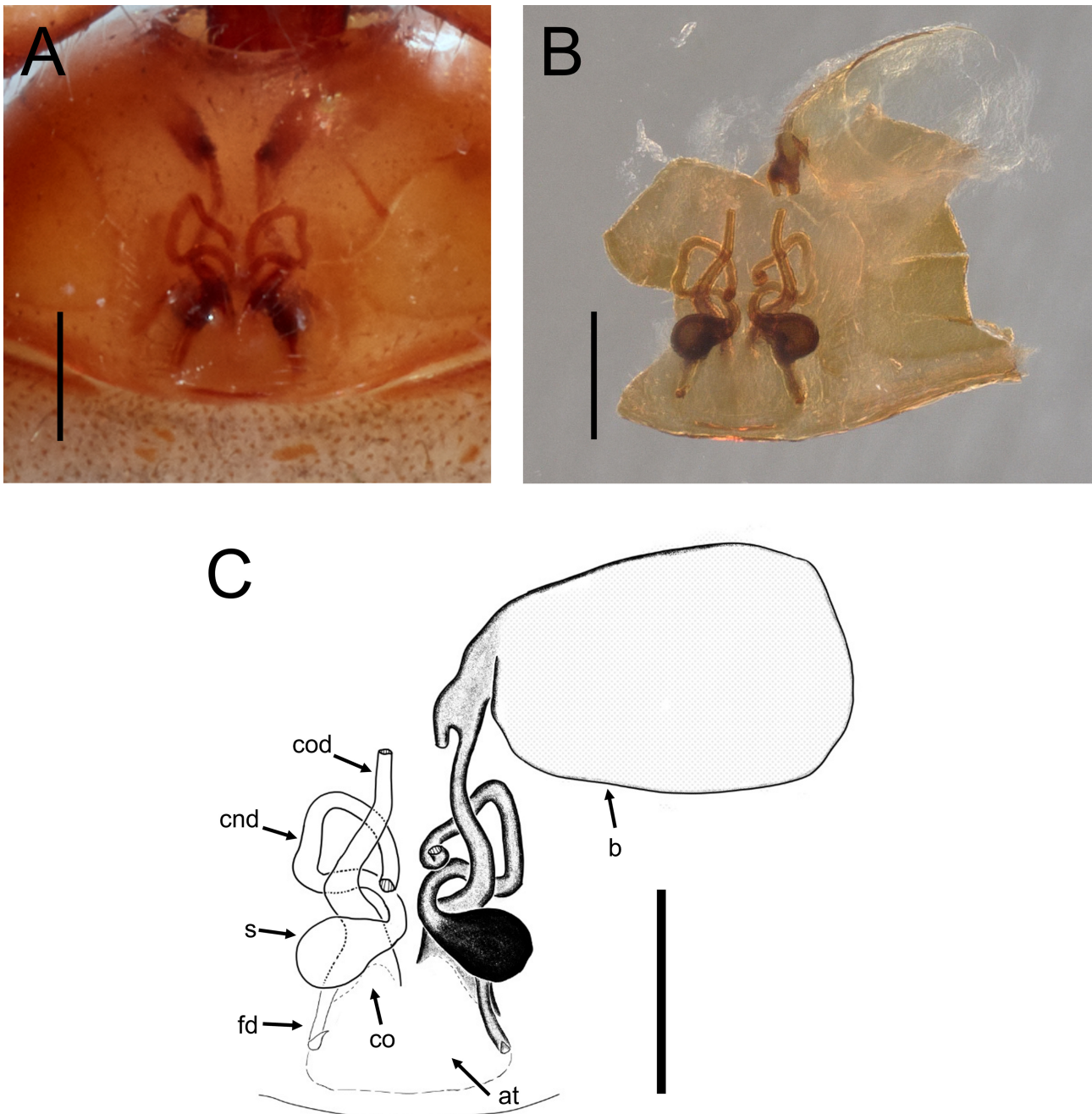


FIGURE 6. *Utivarachna balonku* **sp. nov.**, female paratype. **A** Epigynum, ventral view; **B, C** Internal genitalia, cleared, dorsal view. Scale bars 0.2 mm. Abbreviations: at, atrium; b, bursa; cnd, connecting duct; co, copulatory opening; cod, copulatory duct; fd, fertilization duct; s, spermatheca.

Utivarachna phyllicola Deeleman-Reinhold, 2001

Figures 7–9

Utivarachna phyllicola Deeleman-Reinhold, 2001: 386, figs 604–609; Dankittipakul, Tavano & Singtripop, 2011: 143, fig. 5; Ono & Aung, 2022: 30, figs 1–7.

Diagnosis and description. See Deeleman-Reinhold (2001).

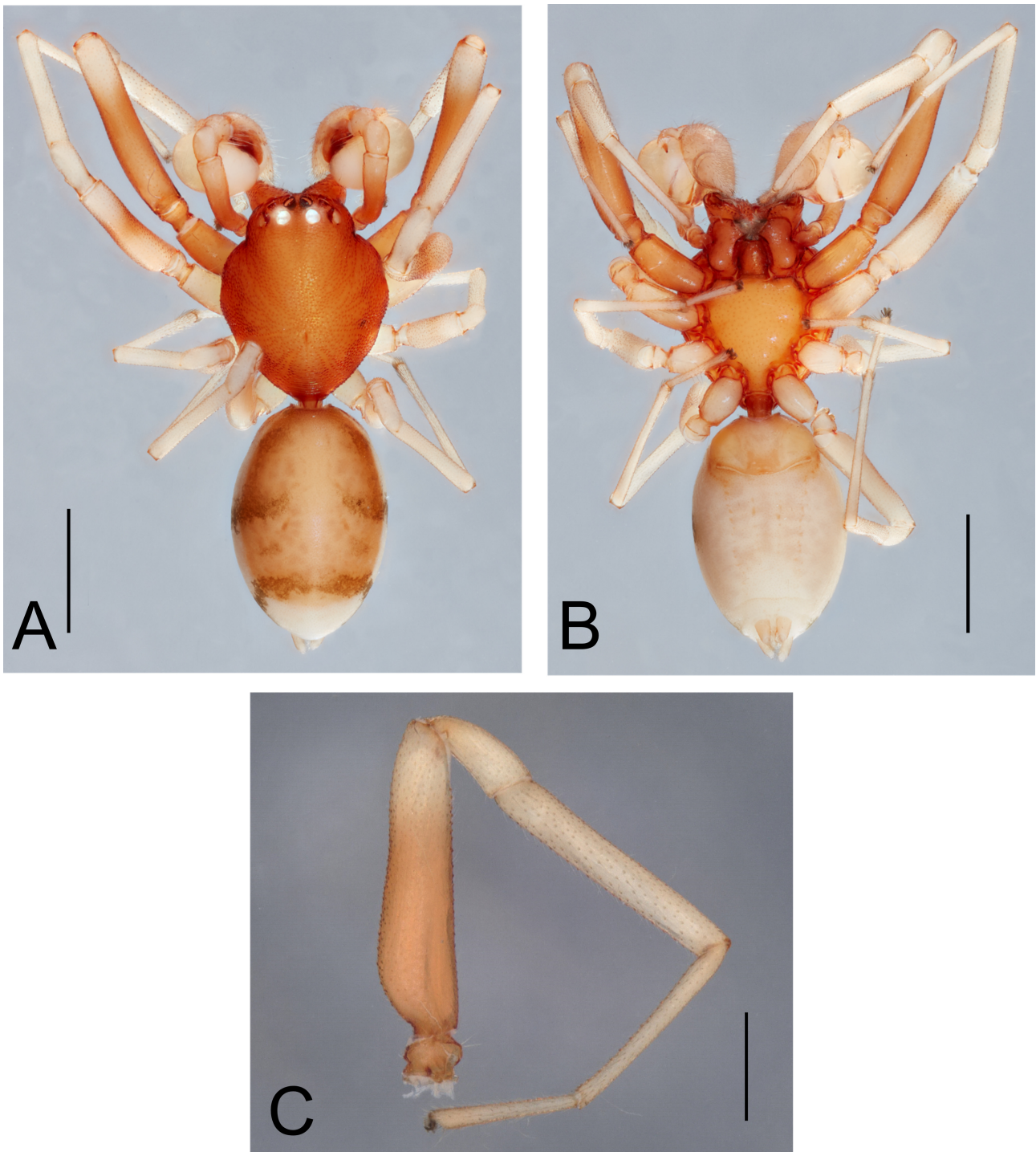


FIGURE 7. *Utivarachna phyllicola* Deeleman-Reinhold, 2001, male. **A, B** Habitus, dorsal view (**A**), ventral view (**B**); **C** Left leg I, prolateral view. Scale bars A, B = 1 mm; C = 0.5 mm.

Material examined. SUMATRA: Jambi Province: Bukit Duabelas National Park, Sarolangun: 1♂ (2013_BF1.2_AraTrac002N), canopy fogging in rainforest, 01°59'42.6"S, 102°45'08.0"E, altitude 69 m, 8.X.2013, leg. J. Drescher (MZB); 1♀ 1♂ (2013_BF2.1_AraTrac001N), canopy fogging in rainforest, 01°58'55.2"S, 102°45'02.6"E, altitude 73 m, 7.X.2013, leg. J. Drescher (ZMH-A0023859); 3♀ 1♂ (2013_BF2.2_AraTrac001N), canopy fogging in rainforest, 01°58'55.2"S, 102°45'02.6"E, altitude 73 m, 7.X.2013, leg. J. Drescher (MZB); Lubuk Kepayang, Air Hitam, Sarolangun: 1♀ (2013_BJ3.1_AraTrac002N), canopy fogging in jungle rubber plantation, 02°03'46.6"S, 102°48'03.5"E, altitude 74 m, 26.VII.2013, leg. J. Drescher (ZMH-A0023860); 1♀ (2013_BO3.1_AraTrac002N), canopy fogging in oil palm plantation, 02°04'15.2"S, 102°47'30.8"E, altitude 54 m, 25.VI.2013, leg. J. Drescher

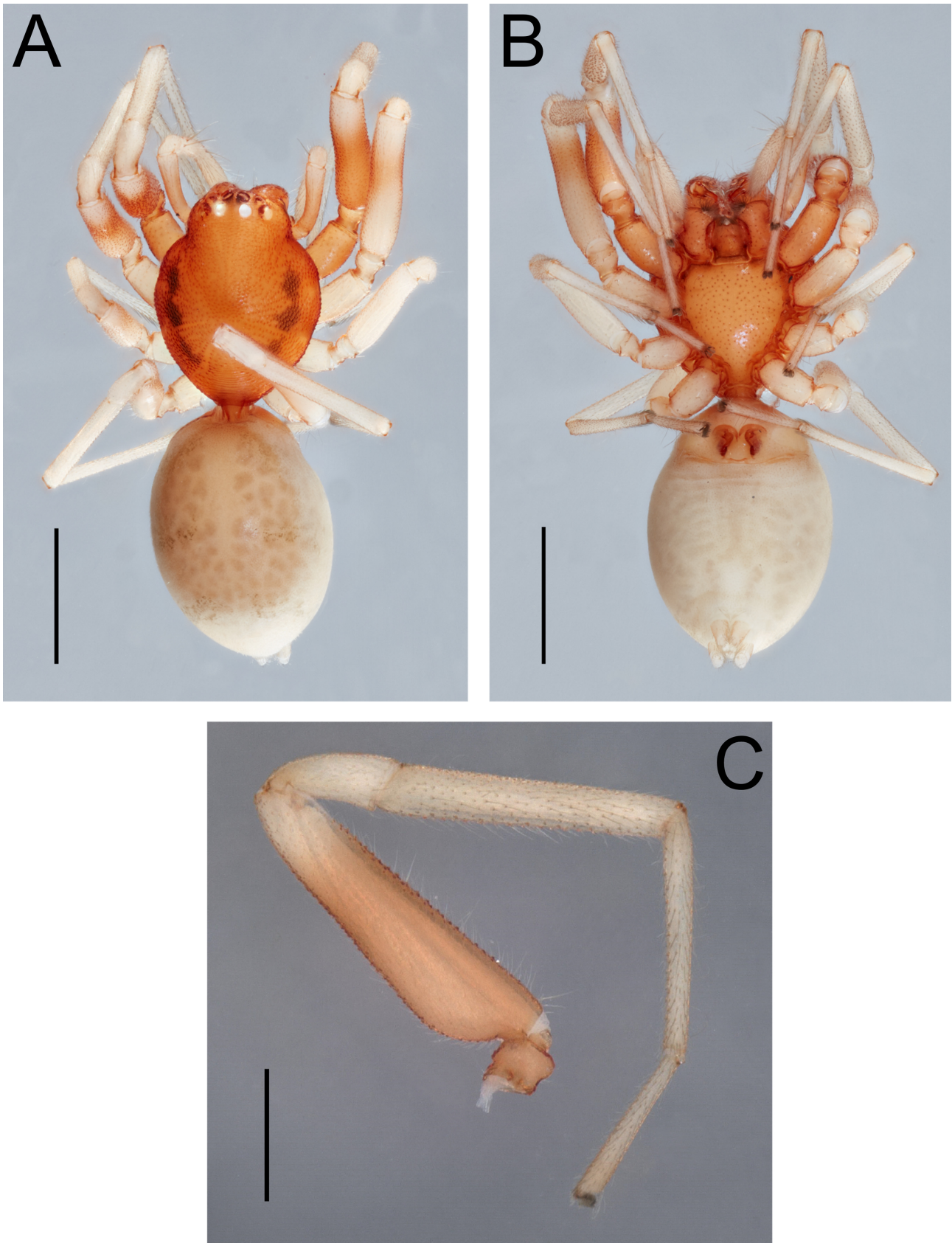


FIGURE 8. *Utivarachna phyllicola* Deeleman-Reinhold, 2001, female. **A, B** Habitus, dorsal view (**A**), ventral view (**B**); **C** Left leg I, prolateral view. Scale bars A, B = 1 mm; C = 0.5 mm.

(SMF); 1♂ (2013_BO3.2_AraTrac002N), canopy fogging in oil palm plantation, 02°04'15.2"S, 102°47'30.8"E, altitude 54 m, 25.VI.2013, leg. J. Drescher (ZMH-A0023862); 2♂ (2013_BR4.1_AraTrac002N), canopy fogging in rubber plantation, 02°06'36.0"S, 102°46'22.4"E, altitude 54 m, 3.XII.2013, leg. J. Drescher (ZMH-A0023861); 1♀, Semarang, Pauh, Sarolangun (2013_BJ5.1_AraTrac002N), canopy fogging in jungle rubber plantation, 02°08'35.9"S, 102°51'04.5"E, altitude 45 m, 16.VII.2013, leg. J. Drescher (SMF); 2♀ 1♂, Hutan Harapan Rainforest Conservation Area, Batang Hari (2013_HF4.1_AraTrac002N), canopy fogging in rainforest, 2°11'15.3"S, 103°20'36.0"E, altitude 69 m, 30.VI.2013, leg. J. Drescher (SMF); Bungku, Bajubang, Batang Hari: 2♀ 1♂ (2013_HJ1.1_AraTrac002N), canopy fogging in jungle rubber plantation, 01°55'41.6"S, 103°15'34.2"E, altitude 58 m, 9.V.2013, leg. J. Drescher (ZMH-A0023863); 1♀ 1♂ (2013_HR1.2_AraTrac002N), canopy fogging in rubber plantation, 01°54'29.6"S, 103°15'59.9"E, altitude 68 m, 13.V.2013, leg. J. Drescher (SMF); 1♀ 2♂ (2013_HR2.2_AraTrac002N), canopy fogging in rubber plantation, 01°54'29.6"S, 103°15'59.9"E, altitude 68 m, 13.V.2013, leg. J. Drescher (ZMH-A0023864); 6♂, Singkawang, Muara Bulian, Batang Hari (2013_HJ4.1_AraTrac002N), canopy fogging in jungle rubber plantation, 01°47'07.9"S, 103°16'37.4"E, altitude 55 m, 18.VI.2013, leg. J. Drescher (SMF); 1♀ 1♂, Sungkai, Bajubang, Batang Hari (2013_HR3.1_AraTrac002N), canopy fogging in rubber plantation, 01°51'36.5"S, 103°18'00.6"E, altitude 41 m, 2.VI.2013, leg. J. Drescher (ZMH-A0023865).

Distribution. Thailand, Myanmar, Sumatra and Borneo (Maps 1 and 2).

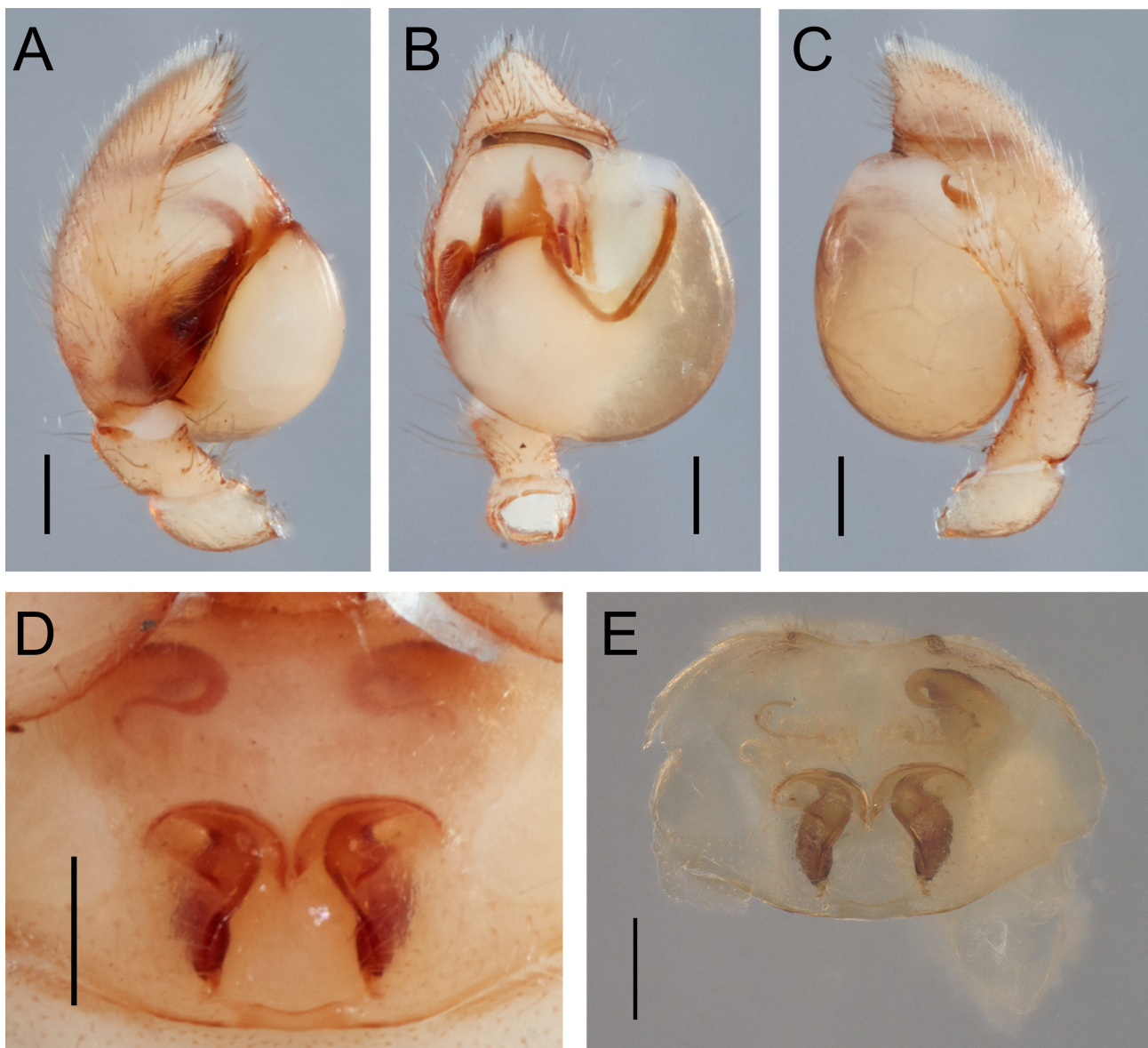


FIGURE 9. *Utivarachna phyllicola* Deeleman-Reinhold, 2001. **A–C** Male left palp: **A** prolateral view; **B** ventral view; **C** retrolateral view; **D** Epigynum, ventral view. **E** Female internal genitalia, cleared, dorsal view. Scale bars 0.2 mm.

Utivarachna rimba Dhiya'ulhaq & Dupérré, sp. nov.

Figures 10–13

Type material. Holotype: SUMATRA: *Jambi Province*: Bukit Duabelas National Park, Sarolangun ♂ (2013_BF4.2_AraTrac001N_002), canopy fogging in rainforest, 01°56'30.8"S, 102°34'50.6"E, altitude 91 m, 4.X.2013, leg. J. Drescher (MZB).

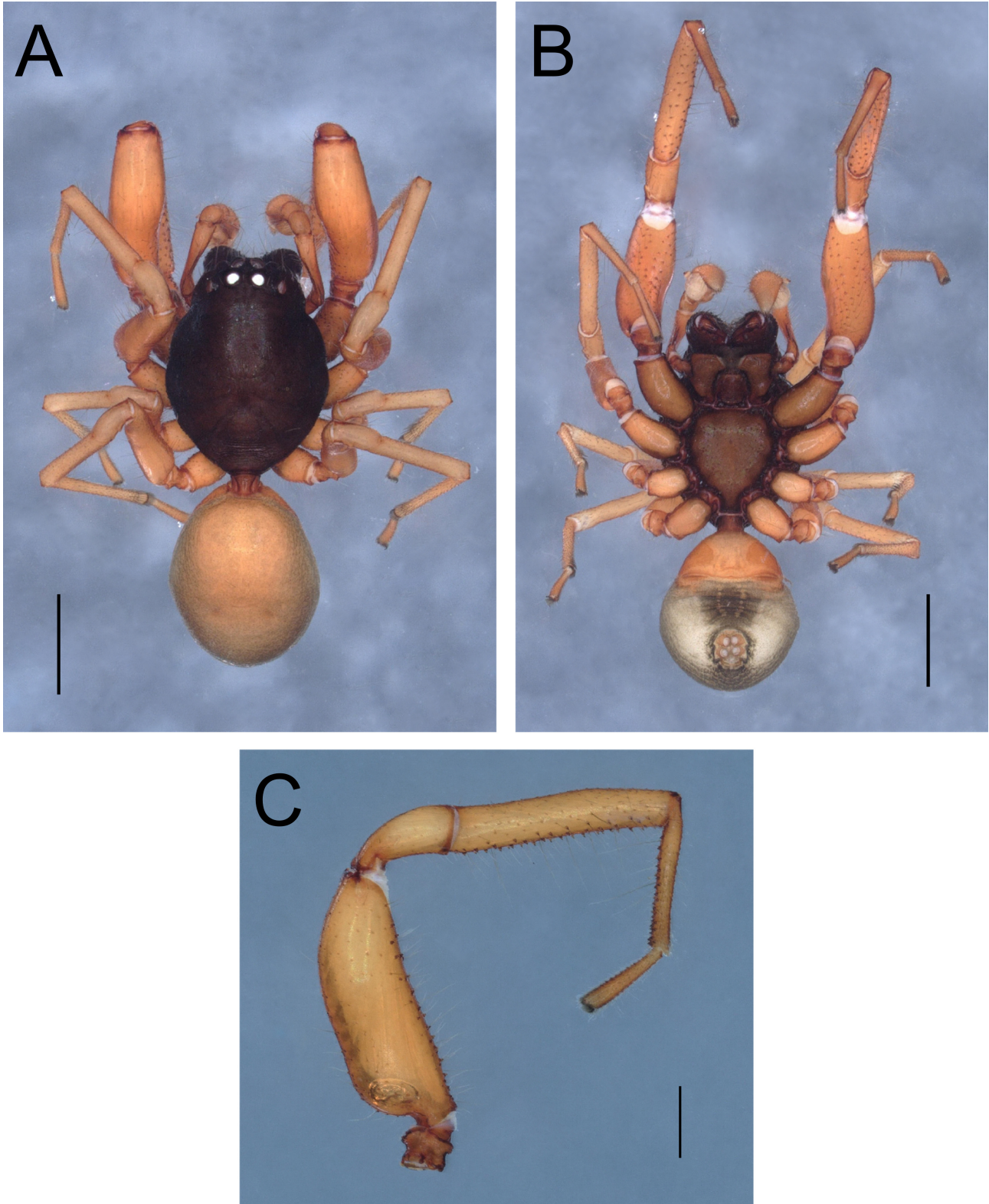


FIGURE 10. *Utivarachna rimba* sp. nov., male holotype. **A, B** Habitus, dorsal view (**A**), ventral view (**B**); **C**, Left leg I, prolateral view. Scale bars A, B = 1 mm; C = 0.5 mm.

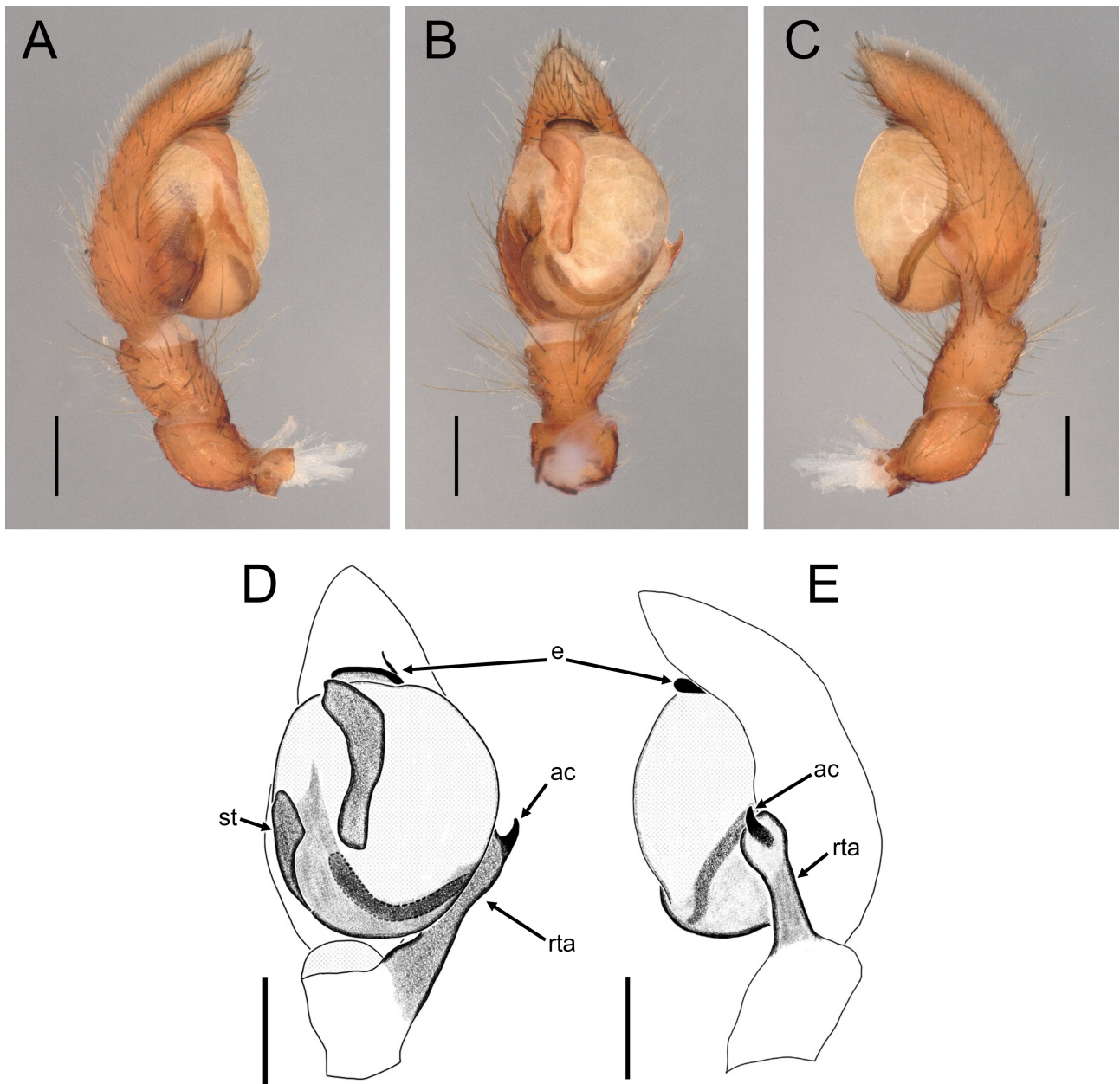


FIGURE 11. *Utivarachna rimba* sp. nov., male holotype. A–E Left palp: A prolateral view; B, D ventral view; C, E retrolateral view. Scale bars 0.2 mm. Abbreviations: ac, apical claw of RTA; e, embolus; rta, retrolateral tibial apophysis; st, subtegulum.

Paratypes: **SUMATRA: Jambi Province:** 3♂ 2♀ (2013_BF4.2_AraTrac001N), same data as holotype (MZB); Bukit Duabelas National Park, Sarolangun: 2♂ (2013_BF1.1_AraTrac001N), canopy fogging in rainforest, 01°59'42.6"S, 102°45'08.0"E, altitude 69 m, 8.X.2013, leg. J. Drescher (SMF); 1♀ (2013_BF2.1_AraTrac001N), canopy fogging in rainforest, 01°58'55.2"S, 102°45'02.6"E, altitude 73 m, 7.X.2013, leg. J. Drescher (ZMH-A0023866); Dusun Baru, Air Hitam, Sarolangun, 1♀ (2013_BJ4.1_AraTrac001N), canopy fogging in jungle rubber plantation, 02°00'56.8"S, 102°45'12.6"E, altitude 64 m, 14.VII.2013, leg. J. Drescher (ZMH-A0023867).

Etymology. The specific name is taken from Indonesian *rimba* meaning “jungle”, as most of the specimens were collected from research plots in lowland rainforest. Also in honor of the indigenous Orang Rimba people that inhabit the Bukit Duabelas National Park. Noun in apposition.

Diagnosis. This species belongs to the *phyllicola*-group based on the inflated tegulum and bursae located distantly from the spermatheca, close to the pedicel. Males of this species are most similar to those of *U. gui* and *U. balonku* sp. nov., but can be distinguished from *U. gui* by the narrower RTA with a longer, narrower, and more curved apical claw (Figs 11B–11E); from *U. balonku* sp. nov. by the less inflated tegulum, the RTA and sperm duct being

visible from ventral view (versus tegulum more inflated, ventrally covering the RTA and sperm duct in *U. balonku* **sp. nov.**, Fig. 4). Females of this species are most similar to those of *U. gui* and *U. balonku* **sp. nov.** by the slender copulatory ducts and U-shaped medial part of the connecting ducts, but can be distinguished from both by the almost tube-shaped spermathecae (Figs 13B, C) (versus pear-shaped in both *U. balonku* **sp. nov.** (Fig. 6B, C) and *U. gui* (Jin *et al.* 2015: fig. 8F)) and additionally from *U. gui* by the shorter copulatory ducts, being roughly double the length of the spermathecae (versus three times the length of spermathecae in *U. gui* (Jin *et al.* 2015: fig. 8F)).

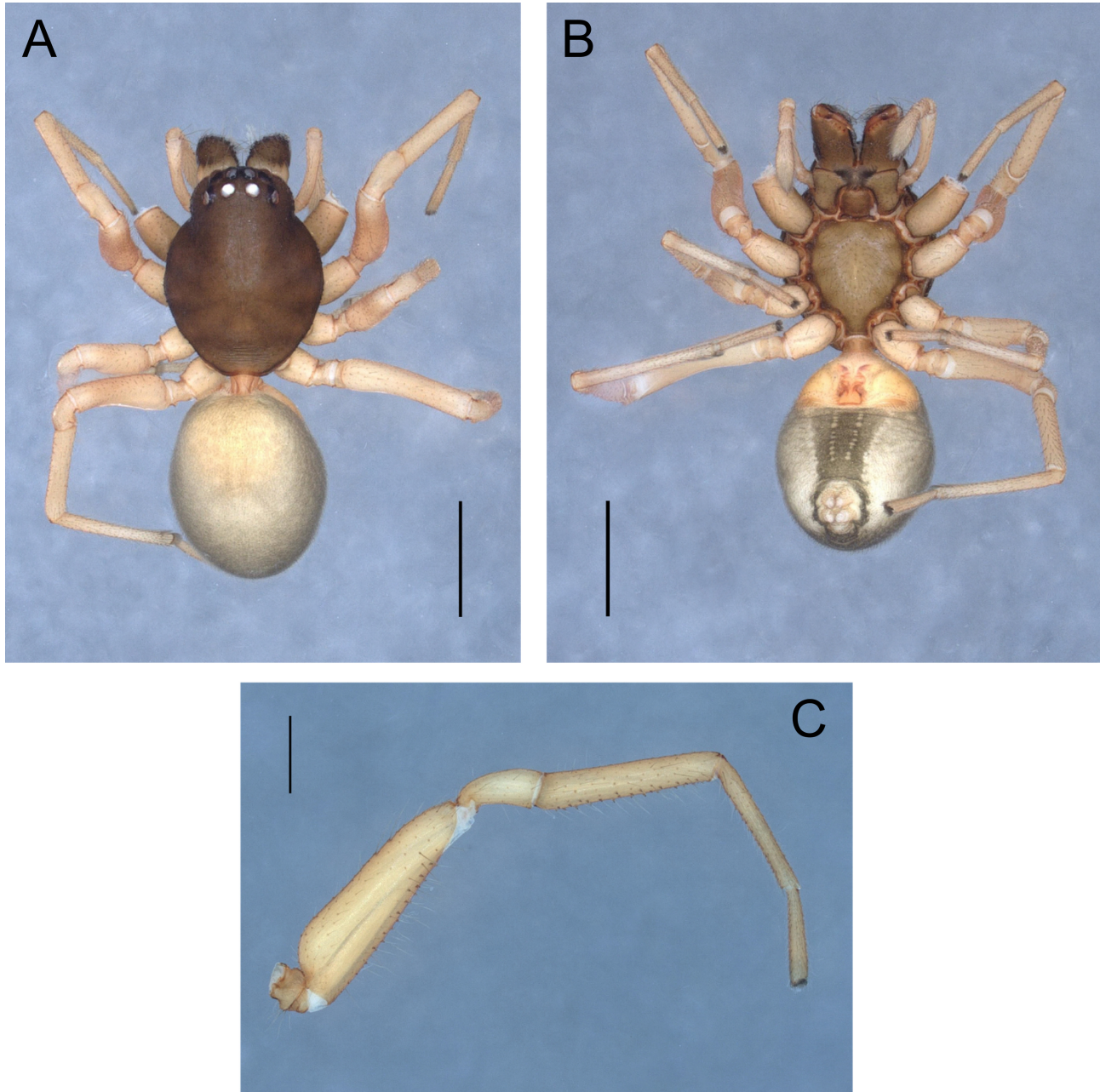


FIGURE 12. *Utivarachna rimba* **sp. nov.**, female paratype. **A, B** Habitus, dorsal view (**A**), ventral view (**B**); **C**, Left leg I, prolateral view. Scale bars A, B = 1 mm; C = 0.5 mm.

Description. Male (Holotype). Total length 3.90. Carapace length 2.17; width 1.65. Carapace oval, dark-brown colored, strongly sclerotized, surface granulated, with each granule ending in long, white setae, lateral margin vaguely undulating; fovea indistinct; PER longer than AER, both slightly recurved (Fig. 10A); clypeus short with slight projection between chelicerae. Eye diameters: AME 0.12; ALE 0.13; PLE 0.13; PME 0.13. Eye interdistances: AME–AME 0.07; AME–ALE 0.07; ALE–ALE 0.44; PME–PME 0.12; PME–PLE 0.14; ALE–PLE 0.14; AME–PME 0.09; PLE–PLE 0.69. MOA: length 0.36; anterior width 0.31; posterior width 0.40. Clypeus height 0.20. Sternum heart-shaped, slightly lighter than carapace, surface granulated (Fig. 10B).

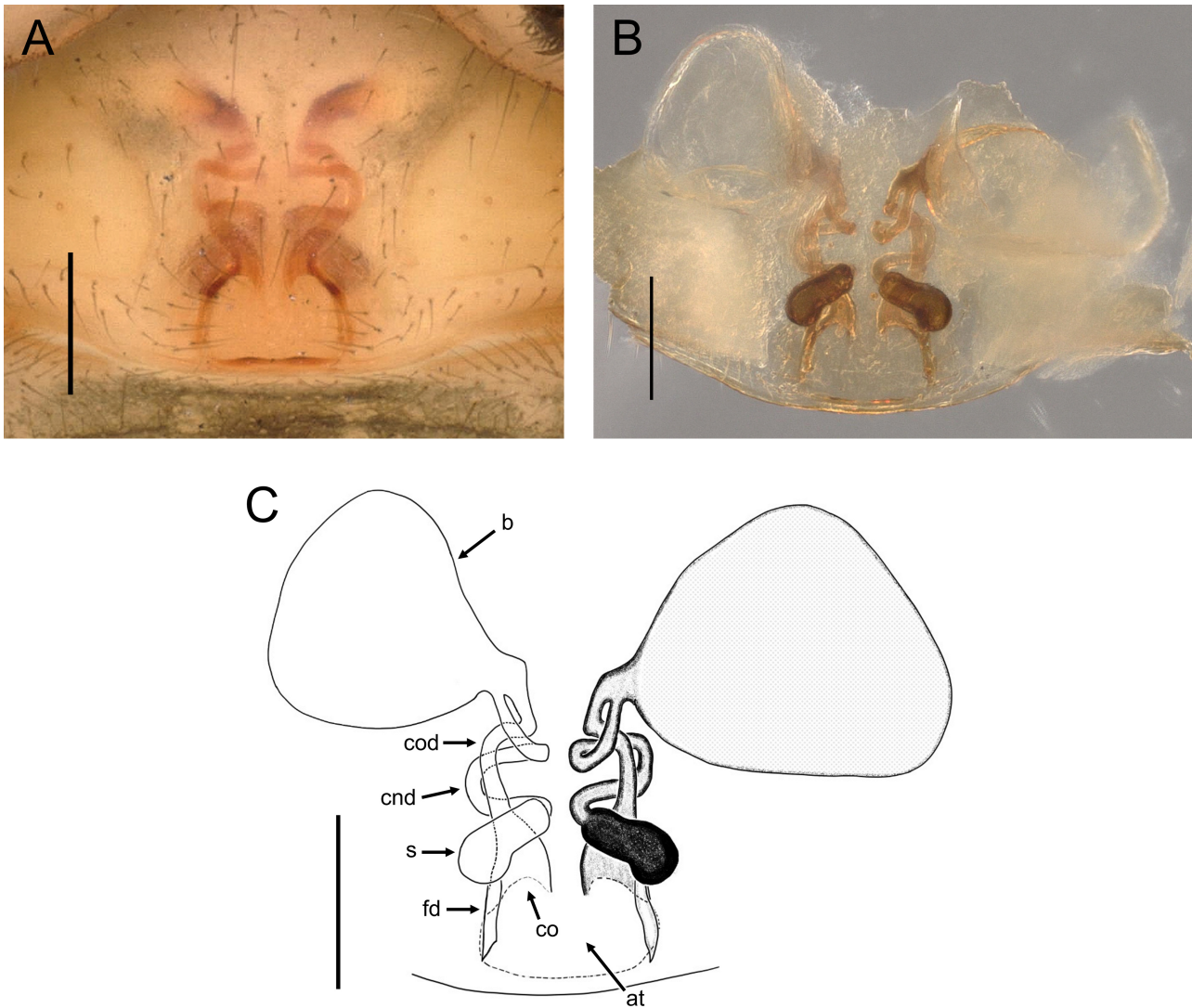


FIGURE 13. *Utivarachna rimba* sp. nov., female paratype. **A** Epigynum, ventral view; **B, C** Internal genitalia, cleared, dorsal view. Scale bars 0.2 mm. Abbreviations: at, atrium; b, bursa; cnd, connecting duct; co, copulatory opening; cod, copulatory duct; fd, fertilization duct; s, spermatheca.

Abdomen length 1.73; width 1.55. Abdomen oval, most of dorsal surface covered with light-brown scutum (Fig. 10A); ventral side of abdomen lightly sclerotized on area anterior to epigastric furrow, colored light brown; dark, wide band runs posteriorly from epigastric furrow, ending in circle surrounding spinnerets; rest of abdomen light gray (Fig. 10B).

Legs uniformly light brown, covered with long white seta, especially on ventral surface. Leg I longer and much stouter than the other legs, ventrally filled with leg cuspules from tarsus to femur, except on patella (Fig. 10C); metatarsi III and IV distally with a comb-like structure distally, followed by brush of setae. Leg measurements: leg I 5.65 (1.77, 0.66, 1.57, 1.02, 0.63); leg II 5.37 (1.65, 0.52, 1.35, 1.18, 0.67); leg III 3.62 (1.03, 0.36, 0.84, 0.92, 0.47); leg IV 4.91 (1.42, 0.40, 1.27, 1.27, 0.55).

Male palp (Fig. 11): Cymbium oval. Bulb round. Tegulum inflated, but not covering RTA in ventral view. RTA long, distally spatulate, ending in sickle-shaped apical claw. Sperm duct visible in ventral view, widely U-shaped. Embolus arising from wide basal part originating from middle of bulb; distal part coiled horizontally, much narrower than bulb, looping once.

Female (Paratype). Total length 3.73. Carapace length 1.84; width 1.42. Eye diameters: AME 0.10; ALE 0.11; PLE 0.11; PME 0.12. Eye interdistances: AME–AME 0.06; AME–ALE 0.08; ALE–ALE 0.37; PME–PME 0.08; PME–PLE 0.10; ALE–PLE 0.11; AME–PME 0.08; PLE–PLE 0.57. MOA: length 0.30; anterior width 0.28; posterior width 0.34. Clypeus height 0.22. Abdomen length 1.89; width 1.38. General appearance as in male except

dorsal scutum only covering half of abdomen (Fig. 12A) and leg I cuspules sparser (Fig. 12C). Leg measurements: leg I 4.80 (1.52, 0.54, 1.19, 0.91, 0.64); leg II 4.37 (1.35, 0.44, 1.08, 0.89, 0.61); leg III 3.13 (0.86, 0.27, 0.69, 0.83, 0.48); leg IV 4.35 (1.17, 0.34, 1.02, 1.25, 0.57).

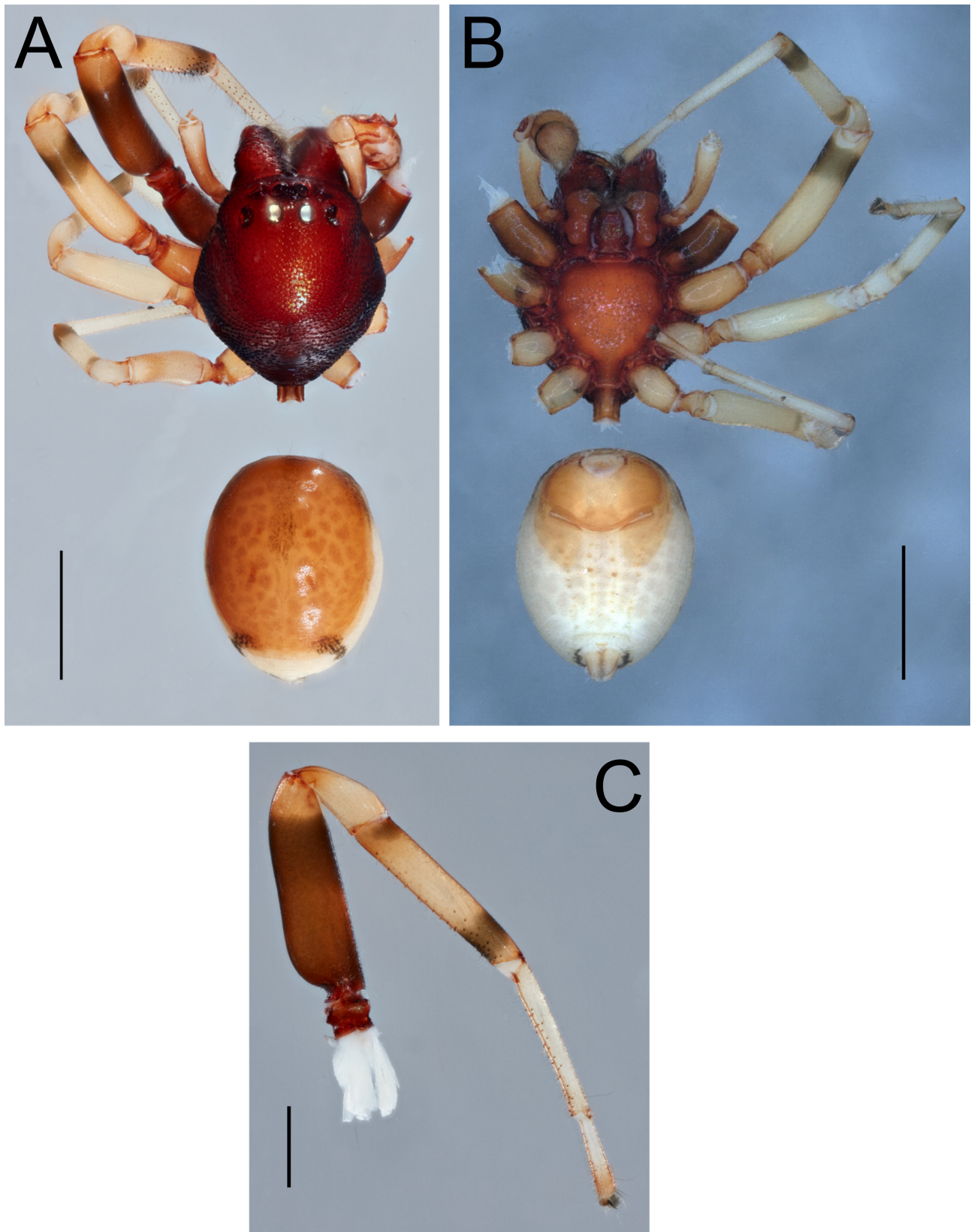


FIGURE 14. *Utivarachna trisula* sp. nov., male holotype. **A**, Habitus, dorsal view; **B**, Sternum, ventral view; **C**, Left leg I, prolateral view. Scale bars A = 1 mm; B, C = 0.5 mm.

Copulatory organs (Fig. 13): Atrium wider than long. Copulatory openings located on anterior corners of atrium, close to epigastric furrow. Copulatory ducts narrow, slightly S-shaped, anteriorly with sharp turn. Bursae oval, very large and fragile, located close to pedicel. Connecting ducts narrow, prominently S-shaped, medial part U-shaped. Spermathecae almost rectangular-shaped, slightly bulbous posteriorly. Fertilization ducts straight, $\frac{2}{3}$ the length of spermathecae.

Distribution. Jambi Province, Sumatra (Maps 1 and 2)

Remarks. All specimens were collected by fogging in rainforests and jungle rubber plantations, and are considered arboreal.

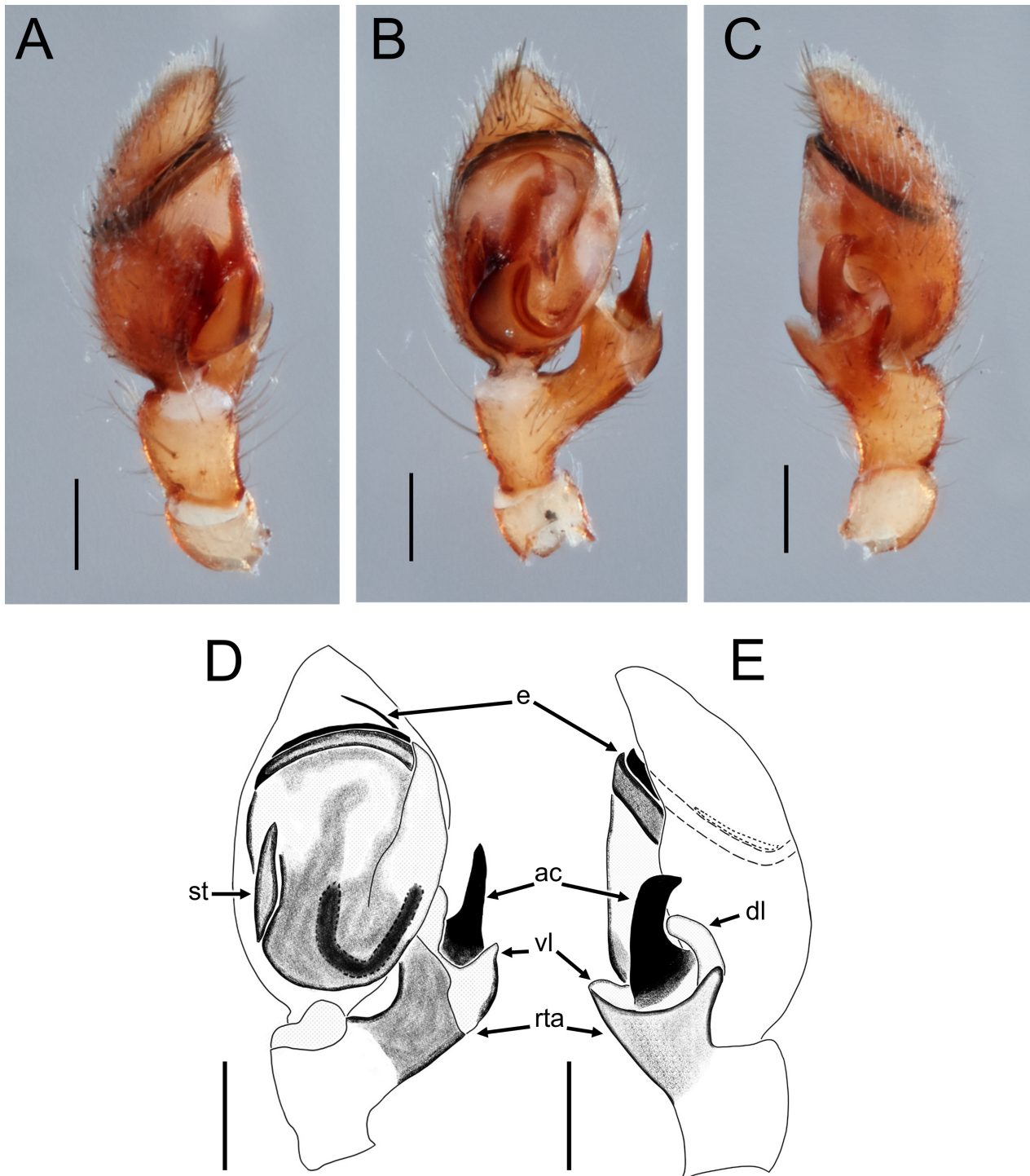


FIGURE 15. *Utivarachna trisula* sp. nov., male holotype. A–E Left palp: A, prolateral view; B, D, ventral view; C, E retrolateral view. Scale bars 0.2 mm. Abbreviations: ac, apical claw of RTA; dl, dorsal lobe of RTA; e, embolus; rta, retrolateral tibial apophysis; st, subtegulum; vl, ventral lobe of RTA.

Utivarachna trisula Dhiya'ulhaq & Dupérré, sp. nov.

Figures 14–17

Type material. Holotype ♂: Sumatra: *Jambi Province*: Bungku, Bajubang, Batang Hari (2013_HJ1.1_AraTrac003N_001), canopy fogging in jungle rubber plantation, 01°55'41.6"S, 103°15'34.2"E, altitude 48 m, 9.V.2013, leg. J. Drescher (MZB).

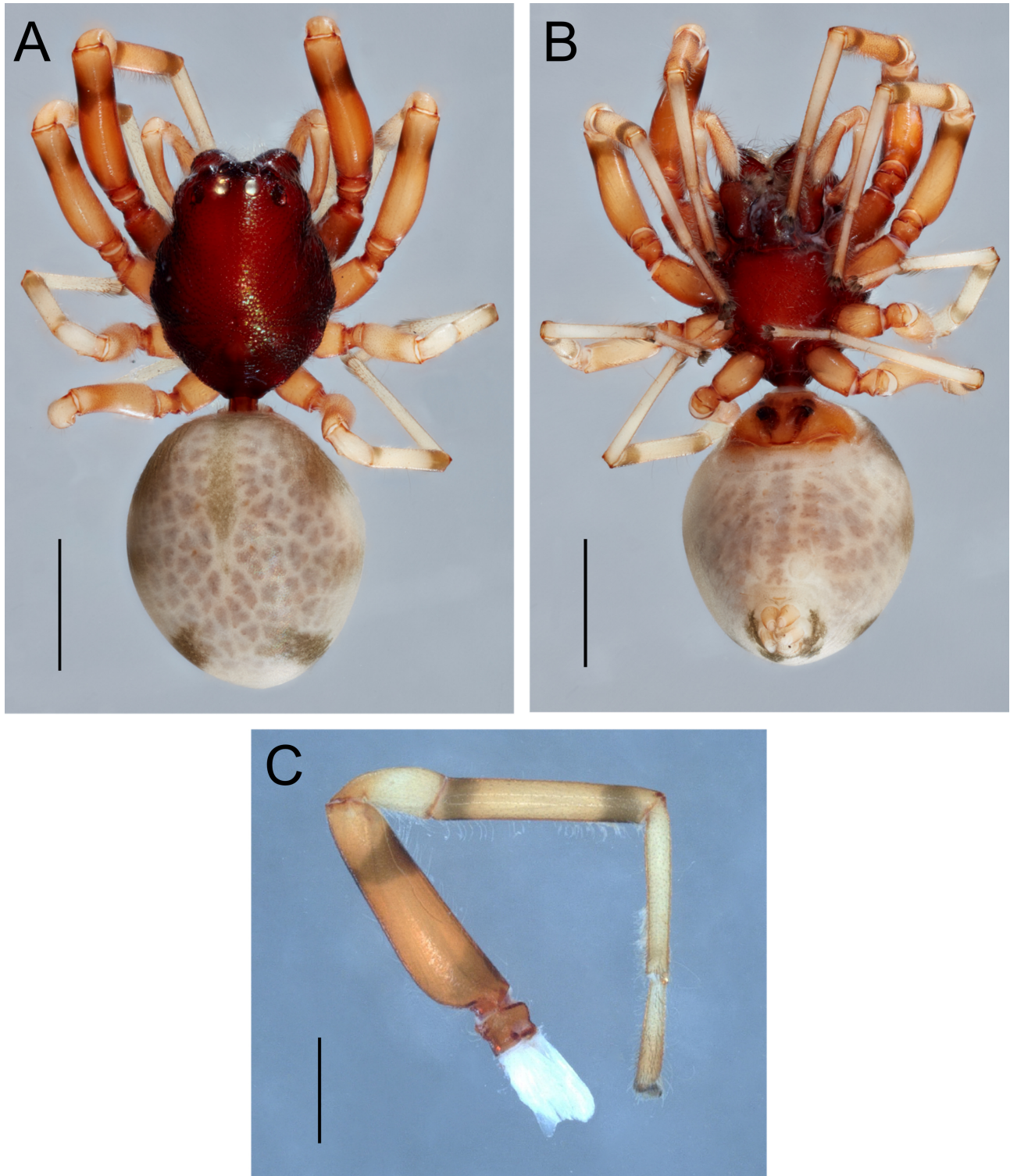


FIGURE 16. *Utivarachna trisula* sp. nov., female paratype. **A, B** Habitus, dorsal view (**A**), ventral view (**B**); **C**, Left leg I, prolateral view. Scale bars A, B = 1 mm; C = 0.5 mm.

Paratypes: Sumatra: Jambi Province: 1♀ (2013_HJ1.1_AraTrac003N_002), with the same data as holotype (MZB); 1♀, Dusun Baru, Air Hitam, Sarolangun, (2013_BJ4.1_AraTrac003N_001), canopy fogging in jungle rubber plantation, 02°00'56.8"S, 102°45'12.6"E, altitude 64 m, 14.VII.2013, leg. J. Drescher (ZMH-A0023868).

Etymology. The specific name is taken from Indonesian *trisula*, meaning “trident”, referring to the trifid RTA. Noun in apposition.

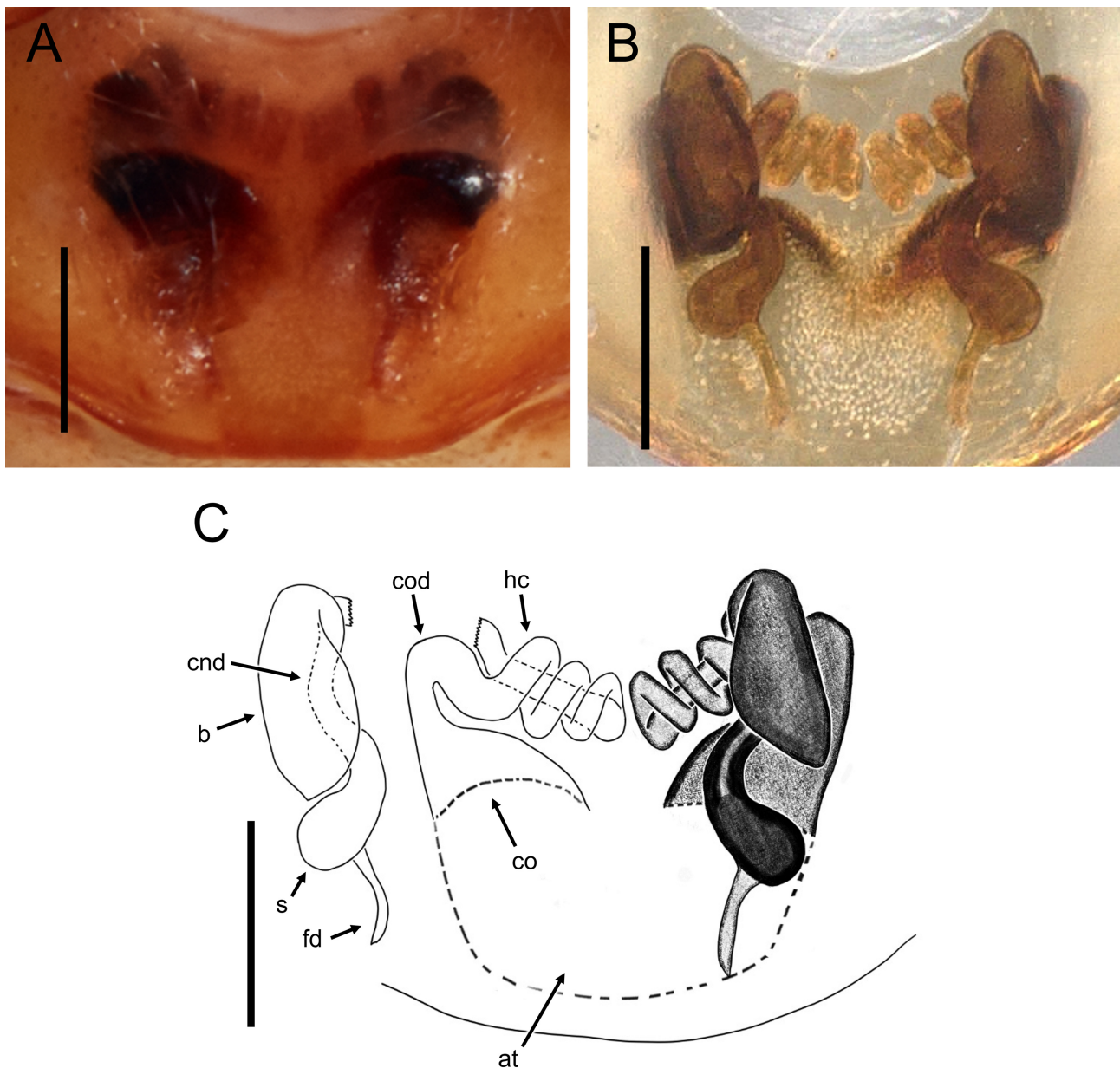
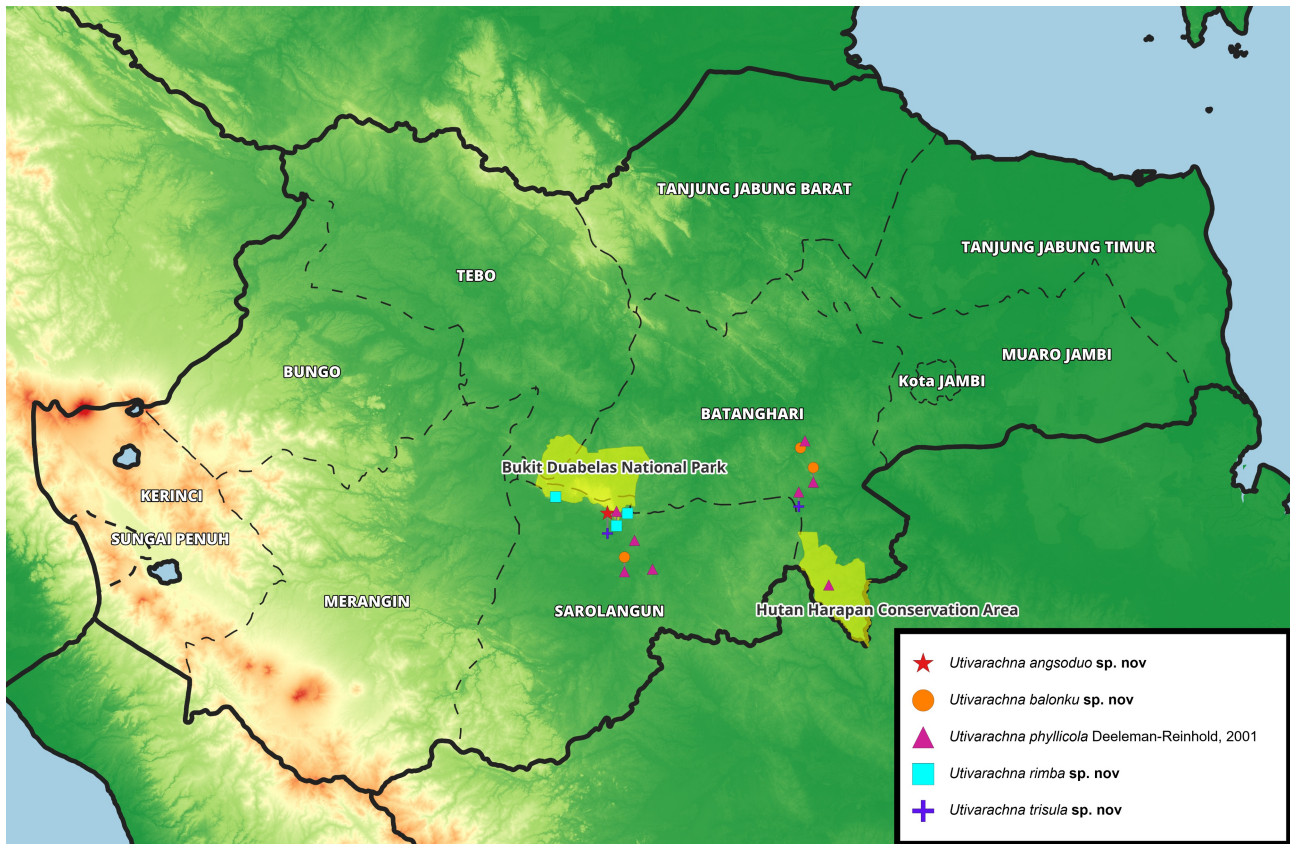


FIGURE 17. *Utivarachna trisula* sp. nov., female paratype. **A** Epigynum, ventral view; **B, C** Internal genitalia, cleared, dorsal view. Scale bars 0.2 mm. Abbreviations: at, atrium; b, bursa; cnd, connecting duct; co, copulatory opening; cod, copulatory duct; fd, fertilization duct; s, spermatheca.

Diagnosis. This species belongs to the *kinabaluensis*-group based on the following characters: carapace wedge-shaped with undulating lateral margins, posterior end of carapace not produced into an elongated stalk, PER strongly recurved and much longer than AER, palpal tegulum not enlarged and bulbous, bursae curved backwards towards spermathecae. Among the *kinabaluensis*-group, males of this species are most similar to those of *U. kinabaluensis* by the RTA ending in a wide arch and an apical claw separated by a membranous area, but can be distinguished by the thumb-shaped RTA-claw with a broad tip (Fig. 15B, E) versus curved and with a sickle-shaped tip in *U. kinabaluensis* (Deeleman-Reinhold 2001: figs 594–595; Yamasaki 2023: figs 25A, B, D), and the arch of the RTA extending into a thinner, membranous lobe on the dorsal side. Females of this species are most similar to those of *U.*

kinabaluensis in having the copulatory ducts produced into a horizontal helical coil, but can be distinguished by the posteriorly wider bursae versus anteriorly wider in *U. kinabaluensis* (Yamasaki *et al.* 2023: fig. 27C), and the thick, posteriorly broadening connecting ducts ending in not clearly distinguishable spermatheca (Figs 17B, C) versus clearly distinguishable, oval-shaped spermatheca in *U. kinabaluensis* (Yamasaki *et al.* 2023: fig. 27C).



MAP 1. Distribution map of *Utivarachna* species collected in the framework of the 2013 EFForTS project in Jambi Province, Sumatra, Indonesia.

Description. Male (Holotype). Total length 3.41. Carapace length 1.72; width 1.72. Carapace maroon, almost wedge-shaped, with narrowly truncate posterior end, strongly sclerotized, surface granulated, with each granule ending in long white seta, lateral margins undulating, fovea short but distinct; PER longer than AER, both slightly recurved (Fig. 14A); clypeus short, with slight projection between chelicerae. Eye diameters: AME 0.09; ALE 0.12; PLE 0.11; PME 0.11. Eye interdistances: AME–AME 0.07; AME–ALE 0.08; ALE–ALE 0.38; PME–PME 0.14; PME–PLE 0.16; ALE–PLE 0.11; AME–PME 0.08; PLE–PLE 0.69. MOA: length 0.28; anterior width 0.25; posterior width 0.35. Clypeus height 0.21. Sternum heart-shaped, colored as carapace, surface granulated (Fig. 14B).

Abdomen length 1.69; width 1.30. Abdomen oval, pale-colored, with two pairs of dark patches on lateral margin, one anteriorly and one posteriorly, as well as darker-shaded cardiac pattern and pair of small dark patches directly anterior to spinnerets; most of dorsal surface of abdomen covered with orange scutum (Fig. 14A); ventral side of abdomen sclerotized on area anterior to epigastric furrow, projecting a short distance posterior to it on sides, four longitudinal rows of rather faintly sclerotized dots present between epigastric furrow and spinnerets (Fig. 14B).

Legs yellow, covered with long white setae, especially on ventral surface, striated with black bands distally and proximally on tibiae I–IV, while on femora I, II only with distal bands. Anterior legs stouter and longer than posterior legs, ventrally filled with leg cuspules from tarsus to tibiae (Fig. 14C), metatarsi III and IV distally with comb-like structure followed by brush of setae. Leg measurements: leg I 4.31 (1.26, 0.45, 1.15, 0.96, 0.49); leg II 3.94 (1.18, 0.35, 1.05, 0.9, 0.46); leg III 2.97 (0.88, 0.28, 0.69, 0.78, 0.34); leg IV 3.67 (1.00, 0.31, 0.86, 1.06, 0.44).

Male palp (Fig. 15): Cymbium and bulb oval, sperm duct U-shaped with rather broad turn. Embolus long, coiled

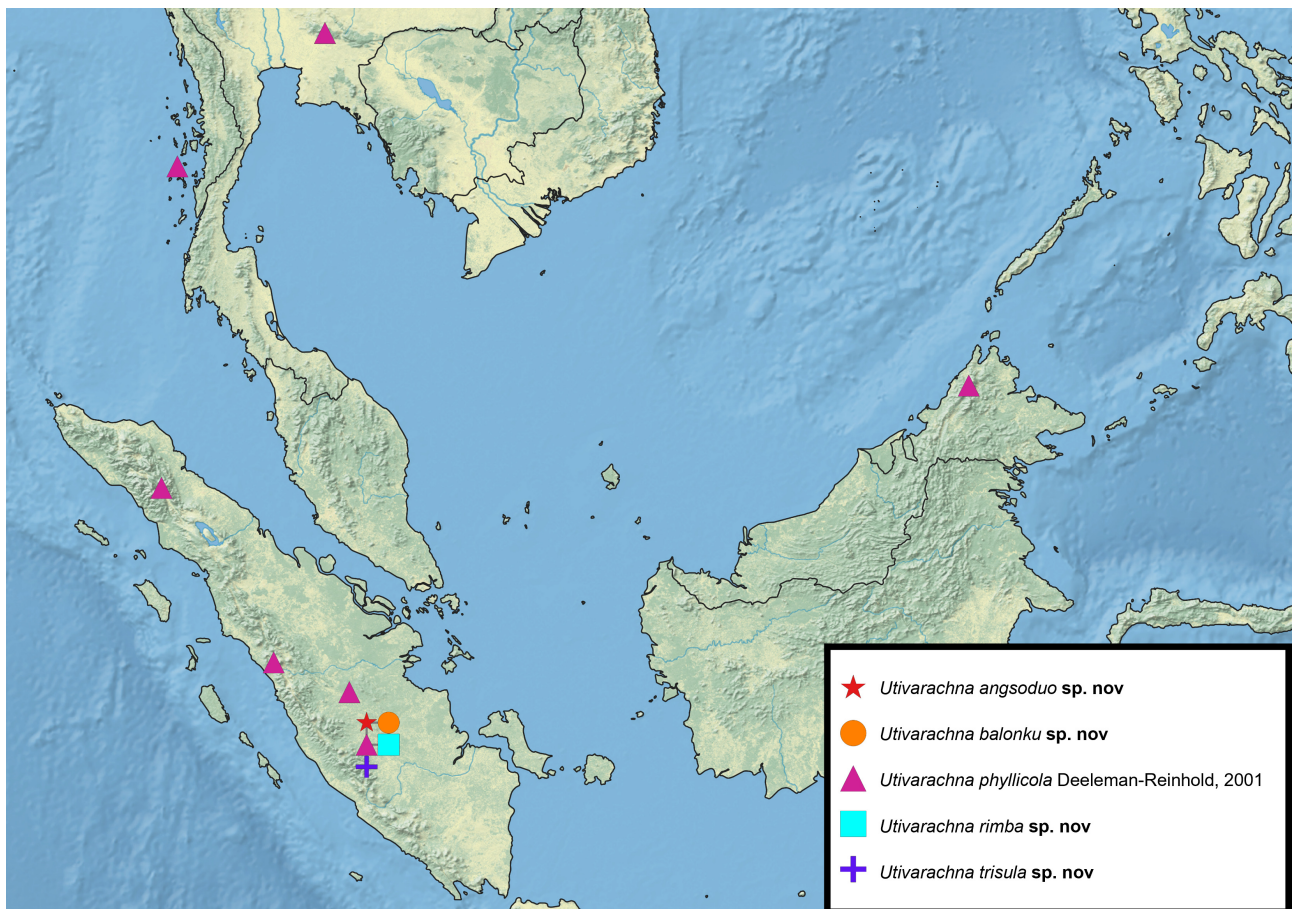
horizontally, looping twice, visible dorsally through cymbium. RTA rather large, extending retrolaterally, ending in wide arch and apical claw, lobes of arch thumb-shaped, dorsal lobe continuing into longer, thinner part; apical claw stout, thumb-shaped with wide base, positioned between arch-lobes, separated by narrow membranous area.

Female (Paratype). Total length 3.88. Carapace length 1.70; width 1.35. Eye diameters: AME 0.10; ALE 0.12; PLE 0.11; PME 0.11. Eye interdistances: AME–AME 0.06; AME–ALE 0.06; ALE–ALE 0.34; PME–PME 0.15; PME–PLE 0.15; ALE–PLE 0.09; AME–PME 0.06; PLE–PLE 0.63. MOA: length 0.27; anterior width 0.26; posterior width 0.34. Clypeus height 0.18. Abdomen length 2.18; width 1.71. General appearance as in male except abdomen not covered in dorsal scutum, with three pairs of dark lateral patches (Fig. 16A), longitudinal rows of sclerotized dots absent on venter (Fig. 16B). Leg cuspules absent (Fig. 16C). Leg measurements: leg I 3.98 (1.14, 0.46, 1.04, 0.83, 0.51); leg II (3.90; 1.18, 0.43, 0.99, 0.91); leg III 2.85 (0.79, 0.26, 0.68, 0.76, 0.36); leg IV 3.50 (0.89, 0.26, 0.84, 1.06, 0.45).

Copulatory organs (Fig. 17): Atrium wider than long. Copulatory openings located on anterior corners of atrium, roughly midway between pedicel and epigastric furrow. Copulatory ducts initially thick, narrowing anteriorly, extending into broad horizontal coil and then into three smaller helical coils, finally turning into straight tube towards middle of coils. Bursae slightly inflated, pear-shaped, anterior part curved. Connecting ducts thick, positioned in between the copulatory openings and bursae, broadening posteriorly, ending into bulbous, not clearly distinguishable spermathecae, together forming an S-shaped structure. Fertilization ducts extending from bulbous posterior end of spermathecae, as long as the latter, slightly curved.

Distribution. Jambi Province, Sumatra (Maps 1 and 2).

Remarks. All specimens were collected by fogging in jungle rubber plantations, and are considered arboreal. The genitalic similarity of *U. trisula* and *U. kinabaluensis* to members of the *fukasawana*-group (particularly in regards to the RTA-claw and coiling of the copulatory ducts) might suggest a closer relationship with them than towards other members of the *kinabaluensis*-group. Currently, the *kinabaluensis*-group is only distinguished from the *fukasawana*-group by a single character, which is the absence of an elongation of the carapace posterior end. Thus, a revision of the grouping of *Utivarachna* species is likely needed.



MAP 2. Global distribution map of the *Utivarachna* species treated in this paper.

Discussion

Utivarachna species tend to inhabit either the canopy or leaf litter (Deeleman-Reinhold 2001). All of the *Utivarachna* specimens listed in this study were collected using canopy fogging, including the known *U. phyllicola*. In absence of any observation of live animals of this genus, and absence of any *Utivarachna* specimens in soil monoliths and litter samples from the same research plots (Potapov *et al.* 2019), it seems likely that the *Utivarachna* species described here are largely, if not exclusively, arboreal. Some authors also remarked on the association between color variations and the habitat. *Utivarachna chamaeleon* is known to have at least two color-forms: a light-colored, spotted form associated with foliage and a dark form associated with leaf litter (Deeleman-Reinhold 2001). Chami-Kranon *et al.* (2007) also noted that only lightly colored juveniles of *U. rama* were obtained from foliage while the dark-colored adults were collected in either pitfall traps or by litter sifting, showing what might be a microhabitat separation between life stages. As our collection contains both light- (*U. angso duo* sp. nov., *U. phyllicola*, *U. trisula* sp. nov.) and dark-colored species (*U. balonku* sp. nov., *U. rimba* sp. nov.), we cannot confirm or reject any association between coloration and habitat.

Considering that more than 10,000 arboreal spiders (Ramos *et al.* 2022) and more than 2000 ground living spiders (Potapov *et al.* 2019) were collected from only 32 research sites in Jambi Province, it is safe to say that *Utivarachna* is a rarely encountered genus, with only 48 specimens across 96 individual canopy fogging events. It is noteworthy that the *Utivarachna* species newly described here were stratified among the land-use systems, contrasting with the only known species, *U. phyllicola*, as the most frequently encountered species of this genus with 31 specimens, which was found in lowland rainforest, extensively used rubber agroforestry, as well as monocultures of rubber and oil palm. In contrast, *U. rimba* sp. nov. (10 specimens) was found in a single rainforest and jungle rubber plot, *U. trisula* sp. nov. and *U. balonku* sp. nov. (three specimens each) exclusively in a single plot of rainforest and rubber, respectively, and *U. angso duo* sp. nov. from only a single plot in jungle rubber agroforestry. This suggests that the different *Utivarachna* species newly described here may have quite narrow ecological niches, mostly associated with natural ecosystems (but see *U. balonku* sp. nov. in intensive agriculture).

Acknowledgements

The authors sincerely thank the following: Nop, Yohanes Bayu Suharto, Yohanes Toni Rohaditomo, and Zulfi Kamal who helped during sample collection. We thank the village leaders, local plot owners, PT Humusindo, PT REKI, PT Perkebunan Nusantara VI, and Bukit Duabelas National Park for granting us access to and use of their properties. The study was conducted using specimens collected and exported using Collection Permit No. S.710/KKH-2/2013 issued by the Ministry of Forestry (PHKA) and export permit SK.61/KSDAE/SET/KSA.2/3/2019 issued by the Directorate General of Nature Resources and Ecosystem Conservation (KSDAE). Naufal Urfi Dhiya'ulhaq and Jochen Drescher were funded by the CRC990-EFForTS project via grant number 192626868 of the German Research Foundation DFG. Two anonymous reviewers improved the submitted version of this manuscript.

References

- Chami-Kranon, T., Likhitrakarn, N. & Wongsawad, C. (2007) *Utivarachna rama* sp. n., a new species of tracheline spiders (Araneae: Corinnidae) from Thailand. *Zootaxa*, 1446, 59–68.
<https://doi.org/10.11646/zootaxa.1446.1.5>
- Chu, C., Li, S. Q., Pham, D. S. & Yao, Z. Y. (2023b) Three new species of the spider genus *Utivarachna* Kishida, 1940 (Araneae, Trachelidae) from China and Vietnam. *ZooKeys*, 1181, 201–217.
<https://doi.org/10.3897/zookeys.1181.110628>
- Dankittipakul, P., Tavano, M. & Singtripop, T. (2011) Two new species of the spider genus *Utivarachna* Kishida, 1940 from Southeast Asia (Araneae, Corinnidae). *Annali del Museo Civico di Storia Naturale Giacomo Doria*, 103, 133–146.
- Deeleman-Reinhold, C.L. (2001) *Forest spiders of South East Asia: with a revision of the sac and ground spiders (Araneae: Clubionidae, Corinnidae, Liocranidae, Gnaphosidae, Prodidomidae and Trochanterriidae)*. Brill, Leiden, 591 pp.
<https://doi.org/10.1163/9789004475588>
- Drescher, J., Rembold, K., Allen, K., Beckschäfer, P., Buchori, D., Clough, Y., Faust, H., Fauzi, A.M., Gunawan, D., Hertel, D., Irawan, B., Jaya, I.N. S., Klarner, B., Kleinn, C., Knohl, A., Kotowska, M.M., Krashevskaya, V., Krishna, V., Leuschner,

- C., Lorenz, W., Meijide, A., Melati, D., Nomura, M., Pérez-Cruzado, C., Qaim, M., Siregar, I.T., Steinebach, S., Tjoa, A., Tschamtker, T., Wick, B., Wiegand, K., Kreft, H. & Scheu, S. (2016) Ecological and socio-economic functions across Tropical Land Use Systems after rainforest conversion. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 371, 1694.
<https://doi.org/10.1098/rstb.2015.0275>
- Hayashi, T. & Yoshida, H. (1993) Three new species of the family Clubionidae (Arachnida: Araneae) from Taiwan. *Acta Arachnologica*, 42, 47–53.
<https://doi.org/10.2476/asjaa.42.47>
- Jin, C., Yin, X.C. & Zhang, F. (2015) A new species of the genus *Utivarachna* Kishida, 1940 (Araneae: Trachelidae) from China, with the first description of the male of *U. fabaria* Zhao & Peng, 2014 and a redescription of *U. gui* (Zhu, Song & Kim, 1998). *Zootaxa*, 4057 (4), 569–581.
<https://doi.org/10.11646/zootaxa.4057.4.6>
- Kishida, K. (1940) Notes on two species of spiders, *Doosia japonica* and *Utivarachna fukasawana*. *Acta Arachnologica*, 5, 138–145.
<https://doi.org/10.2476/asjaa.5.138>
- Li, H.B., He, Y.Y., Zhang, J.S. & Yu, H. (2022a) A new species of *Utivarachna* Kishida, 1940 from Fanjing Mountain Nature Reserve, Guizhou, China (Araneae: Trachelidae). *Zootaxa*, 5094 (4), 587–594.
<https://doi.org/10.11646/zootaxa.5094.4.4>
- Lin, Y.J., Li, S.Q. & Pham, D.S. (2023) Taxonomic notes on some spider species (Arachnida: Araneae) from China and Vietnam. *Zoological Systematics*, 48, 1–99.
<https://doi.org/10.11865/zs.2023101>
- Liu, K.K., Yin, H.Q., Haddad, C.R., Xu, X. & Ma, Z.N. (2020) Two new species of *Utivarachna* Kishida, 1940 from southern China, with an updated key to the Chinese species (Araneae: Trachelidae). *Zootaxa*, 4803 (1), 87–102.
<https://doi.org/10.11646/zootaxa.4803.1.5>
- Ono, H. & Aung, M. M. (2022) A record of *Utivarachna phyllicola* (Araneae, Trachelidae) from Lampi Island, southern Myanmar. *Bulletin of the National Museum of Nature and Science, Tokyo, Series A*, 48, 29–34.
https://doi.org/10.50826/bnmnszool.48.2_29
- Pollierer, M.M., Drescher, J., Potapov, A., Kasmiatun, Mawan, A., Mutiari, M., Nazarreta, R., Hidayat, P., Buchori, D. & Scheu, S. (2023) Rainforest conversion to plantations fundamentally alters energy fluxes and functions in canopy arthropod food webs. *Ecology Letters*, 26, 1663–1675.
<https://doi.org/10.1111/ele.14276>
- Potapov, A.M., Dupérré, N., Jochum, M., Dreczko, K., Klärner, B., Barnes, A.D., Krashevskaya, V., Rembold, K., Kreft, H., Brose, U., Widyastuti, R., Harms, D. & Scheu, S. (2020) Functional losses in ground spider communities due to habitat structure degradation under tropical land-use change. *Ecology*, 101, e02957.
<https://doi.org/10.1002/ecy.2957>
- Ramírez, M.J. (2014) The morphology and phylogeny of dionychan spiders (Araneae: Araneomorphae). *Bulletin of the American Museum of Natural History*, 390, 1–374.
<https://doi.org/10.1206/821.1>
- Ramos, D., Hartke, T.R., Buchori, D., Dupérré, N., Hidayat, P., Lia, M., Harms, D., Scheu, S., & Drescher, J. (2022) Rainforest conversion to rubber and oil palm reduces abundance, biomass and diversity of canopy spiders. *PeerJ*, 10, e13898.
<https://doi.org/10.7717/peerj.13898>
- Simon, E. (1896) Descriptions d'arachnides nouveaux de la famille des Clubionidae. *Annales de la Société Entomologique de Belgique*, 40 (9), 400–422.
<https://doi.org/10.5962/bhl.part.2026>
- Simon, E. (1897) *Histoire naturelle des araignées. Deuxième édition, tome second*. Roret, Paris, pp. 1–192.
<https://doi.org/10.5962/bhl.title.51973>
- Simon, E. (1906) Voyage de M. Maurice Maindron dans l'Inde méridionale (mai à novembre 1901). 8me Mémoire. Arachnides (2e partie). *Annales de la Société Entomologique de France*, 75, 279–314.
- WSC (2023) *World Spider Catalog. Version 24.5*. Natural History Museum Bern. Online at: <http://wsc.nmbe.ch> (accessed 8 November 2023)
<https://doi.org/10.24436/2>
- Yamasaki, T., Hashimoto, Y., Endo, T., Hyodo, F., Itioka, T., Mohamed, M. & Meleng, P. (2023) Taxonomic study of Bornean species of *Utivarachna* Kishida, 1940 (Araneae: Trachelidae), with the description of a new species. *Zootaxa*, 5343 (1), 55–73.
<https://doi.org/10.11646/zootaxa.5343.1.3>
- Zhao, Y. & Peng, X.J. (2014) Spiders of the genus *Utivarachna* from China (Araneae: Corinnidae). *Zootaxa*, 3774 (6), 578–588.
<https://doi.org/10.11646/zootaxa.3774.6.6>