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Six new species of the spider family Ochyroceratidae Fage 1912 (Arachnida: Araneae) from Southeast Asia

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Abstract

Five new *Altheopus* species and one new *Psilodermes* species of the family Ochyroceratidae are described from Southeast Asia: *Altheopus erectus* **spec. nov.** (male) and *A. nophaseudi* **spec. nov.** (male, female) from Laos, *A. flabellaris* **spec. nov.** (male, female) from Thailand, *A. reduncus* **spec. nov.** (male) from Myanmar, *A. spiralis* **spec. nov.** (male) from Malaysia, and *Psilodermes dicellocerus* **spec. nov.** (male) from Indonesia. Primary types are deposited in the Senckenberg Research Institute in Frankfurt, Germany (SMF).

Key words: taxonomy, cave, Haplogynae, Laos, Thailand, Myanmar, Malaysia, Indonesia

Introduction

The spider family Ochyroceratidae Fage 1912 is distributed worldwide with 14 genera and 161 species (Platnick 2013). Members are common inhabitants of tropical forest litter and caves in South Africa, the Caribbean and Asia, especially species rich in the Indo-Pacific (Deeleman-Reinhold 1995). Ochyroceratidae is considered the sister group of Leptonetidae Simon 1890 and Telemidae Fage 1913 (Platnick 1991). Representatives construct either irregular webs or fine sheet webs in or above the litter layer. *Altheopus* species prefer dark, shady and humid spots and are frequently found among tree buttresses, river embankments and cave entrances.

So far, the pholcid-like genera *Altheopus* Thorell 1898 and *Psilodermes* Simon 1892 are confined to the Indomalaya ecozone. Sixteen species of the genus *Altheopus*—thirteen of which were described by Deeleman-Reinhold (1985, 1995)—and twenty-six species of the genus *Psilodermes*—twenty of which were described by Deeleman-Reinhold (1995)—were known from Southeast Asia before the current study. In this paper, six new species of the genera are described from Laos, Myanmar, Thailand, Malaysia, and Indonesia.

Material and methods

The specimens were observed and preserved in 80% ethanol. Specimens were examined and measured using a Leica M205 C stereomicroscope. Further details were studied under an Olympus BX41 compound microscope. All drawings were made using a drawing apparatus attached to an Olympus BX41 compound microscope, and then inked on ink jet plotter paper. Type specimens examined are deposited in the Research Institute Senckenberg, Frankfurt, Germany (SMF) and in the Institute of Zoology, Chinese Academy of Sciences in Beijing, China (IZCAS). Methods are the same as in Wang and Li (2011), terminology follows that of Tong and Li (2007) and Deeleman-Reinhold (1995). The right palp of male spiders was illustrated. All measurements are given in millimetres. Leg and palp measurements are shown as: total length (femur, patella, tibia, metatarsus, tarsus). Leg segments were measured from their dorsal side. Abbreviations of morphological structures: CO, conductor; EM, embolus; and SP, spermatheca.

Taxonomy

Family Ochyroceratidae Fage 1912

Genus *Althepus* Thorell 1898

Type species. *Althepus pictus* Thorell 1898

Diagnosis. The genus *Althepus* belongs to the Psilodercinae and can be distinguished from other genera of this subfamily by the combination of following characters: retromargin of chelicerae with 2 teeth or denticles; ratio dorsal prosoma length / clypeus length > 3; tarsus of male palp with lateral protrusion bearing a lanceolate apophysis (= modified seta), short bulb with embolus and conductor widely separated (Deeleman-Reinhold 1995).

Althepus erectus spec. nov.

Figs 1–6, 47

Type material. Holotype: Male, LAOS: Houaphan Province, Vieng Thong district, Tham Mak Sak, 20°27'01.8"N, 103°23'34.7"E, 840 m altitude, Helmut Steiner leg. 20.I.2012, F48-123-008, Northern Lao-European cave project 2010 (SMF).

Etymology. The specific name is derived from the Latin word “*erectus*” meaning “upright, straight” and refers to the upright conductor of the male; adjective.

Diagnosis. This new species can be easily recognised from all the other species by the straight conductor (Fig. 2) and the triple of lamellar structures on the distal conductor (Figs 1–6).

Description. Male (holotype). Total length 5.24; prosoma 1.96 long, 1.67 wide; opisthosoma 3.28 long, 1.80 wide. Dorsal prosoma round, yellow, with three longitudinal brown bands of different width, among them, the middle shortened to triangular band around eyes. Anterior margin of thoracic region distinctly elevated. Clypeus reddish-brown. Cheliceral lamina reduced, promargin with three teeth, retromargin with two small teeth, posterior surface of fang with 23 small denticles. Labium brown. Sternum yellow, with two brown lines each side. Opisthosoma elongate, with complex patterns dorsally and ventrally. Legs brown, femur and tibia annulated with white. Leg measurements: I—(9.95, 0.69, 10.75, 10.85, -), II—(7.35, 0.65, 7.25, 10.35, -), III 18.86 (5.42, 0.62, 4.85, 6.24, 1.73), IV 26.26 (7.62, 0.62, 7.32, 8.84, 1.88); palp 2.03 (0.85, 0.24, 0.39, 0.55), bulb 0.25 long, 0.26 wide. Male palp (Figs 1–6): tarsus with three slightly curved, serrated bristles distally and one twisty spine with tip directed towards proximally; bulb bright yellow, ovate; conductor (Fig. 2) arising distally from bulb, straight, distad; embolus (Fig. 2) arising retrolatero-proximally from bulb, slightly sigmoid, distad; embolus and conductor widely separated (distance almost equal to diameter of bulb).

Female: Unknown.

Distribution. Known only from the type locality (Fig. 47).

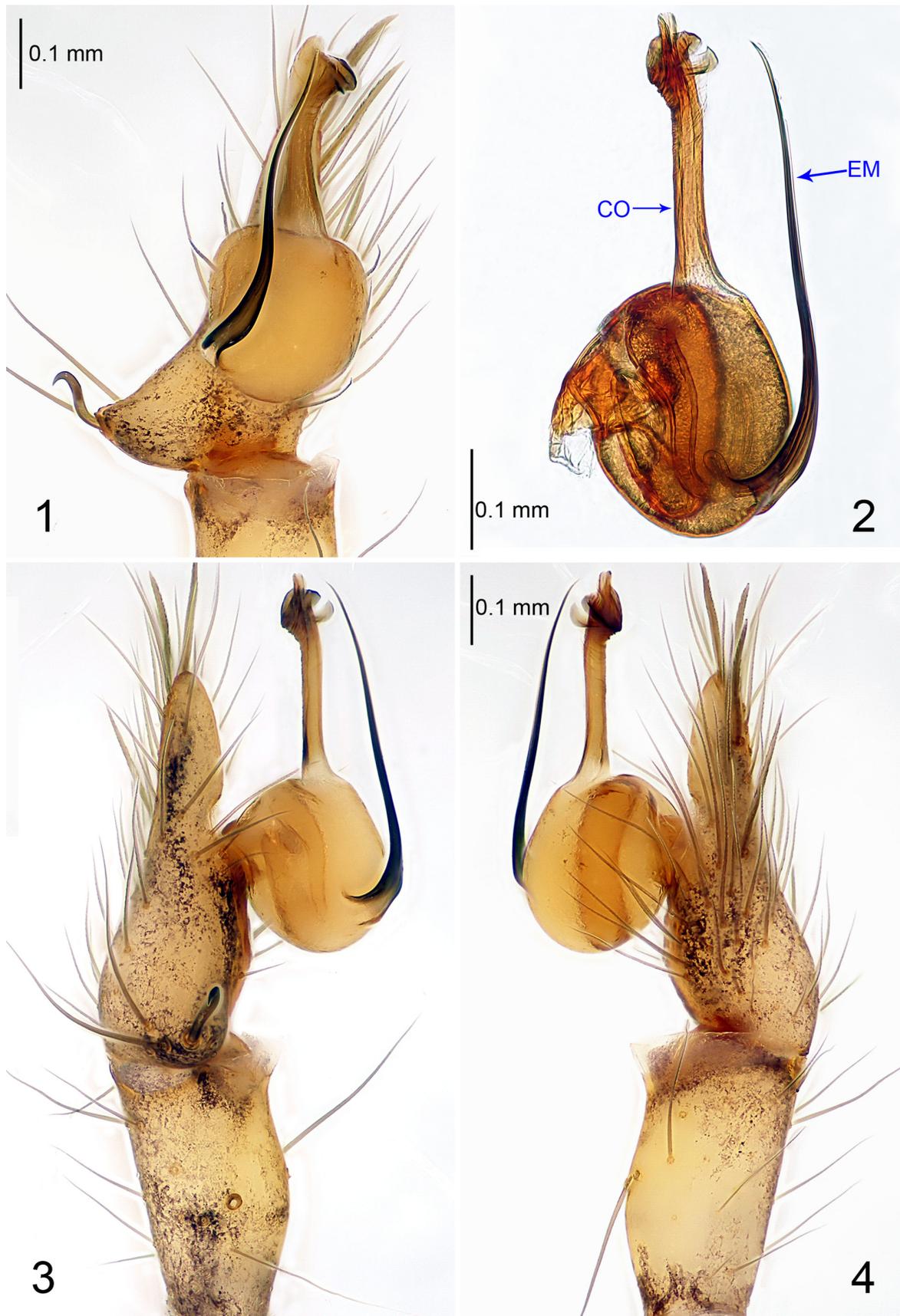
Althepus flabellaris spec. nov.

Figs 7–17, 47

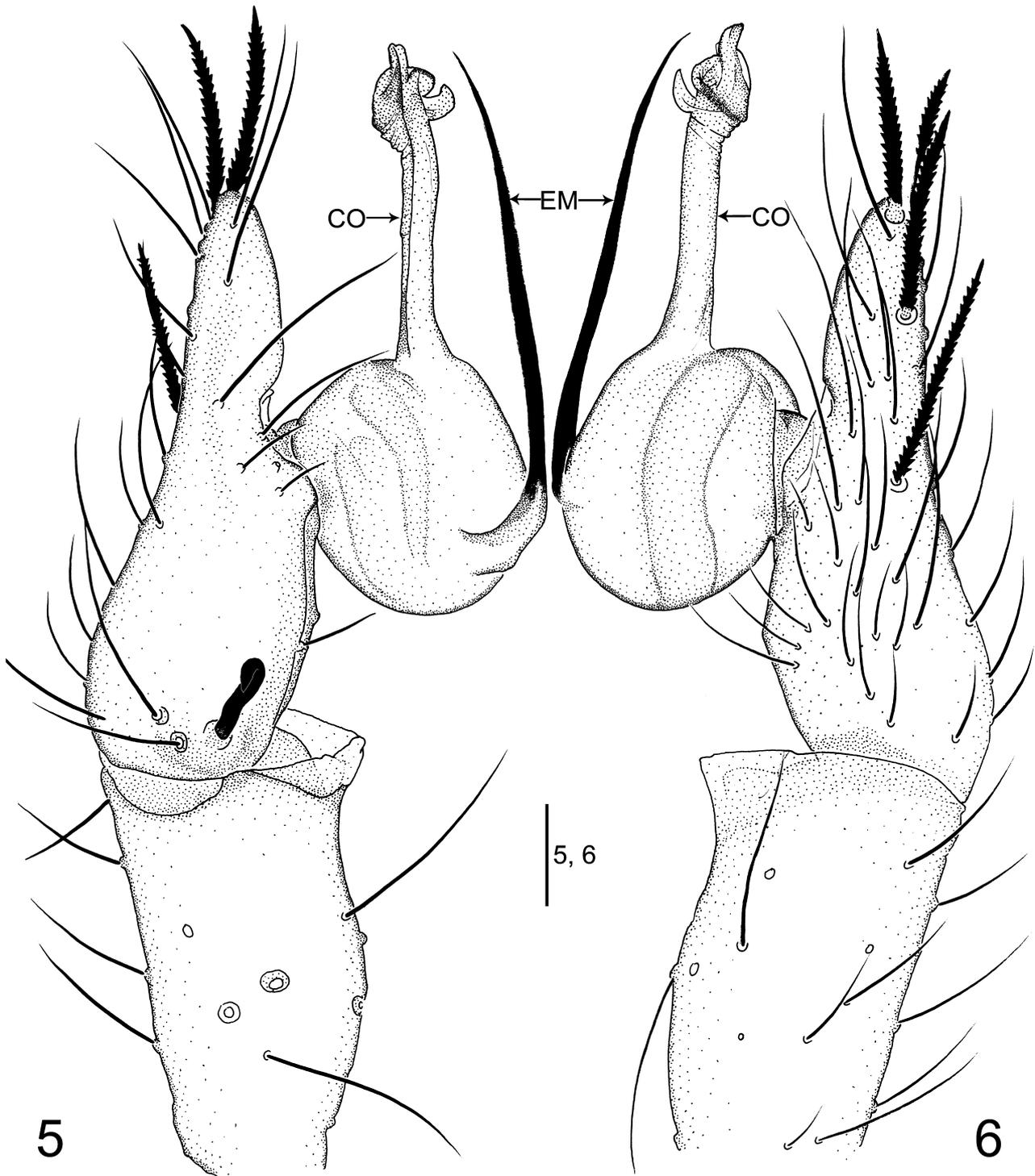
Type material. Holotype: Male, THAILAND: Trat Province, Gulf of Thailand, Ko Chang, Hat Sai Kao, 12°06'46.7"N, 102°16'15.2"E, 48 m altitude, Peter Jäger and Steffen Bayer leg. 31.X.2009, underpass, batter, forest with stream, at night, by hand (SMF). **Paratypes: 1 male, 7 females,** with same data as for holotype (SMF). **1 male, 1 female,** with same data as for holotype (IZCAS).

Etymology. The specific name is derived from the Latin “*flabellaris*” which means “flabellate”, referring to the fan-shaped distal part of the conductor of the male; adjective.

Diagnosis. This new species is similar to *Althepus stonei* Deeleman-Reinhold 1995 in having similarly shaped conductor and embolus in males and wound copulatory ducts in females. Males of the new species can be distinguished by the fan-shaped large distal part of the conductor (Fig. 8) as well as by the small distal part distad (Figs 7–10, 15–16; large distal part roundish, small distal part proximad in *A. stonei*) and the presence of only one



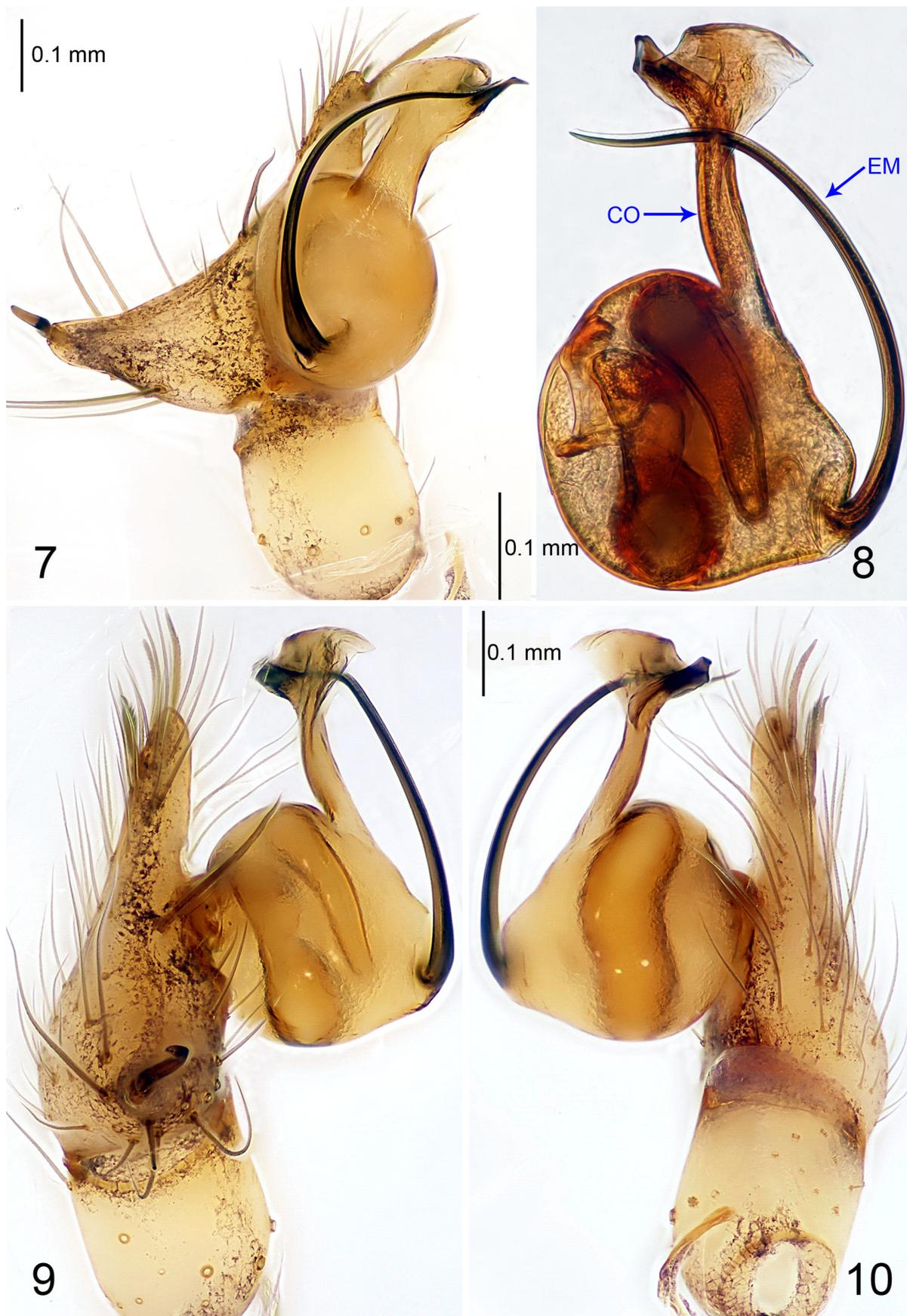
FIGURES 1–4. *Althepus erectus* **spec. nov.** male holotype. 1 palp, ventral view; 2 palpal bulb, retrolateral view; 3 palp, retrolateral view; 4 palp, prolateral view.



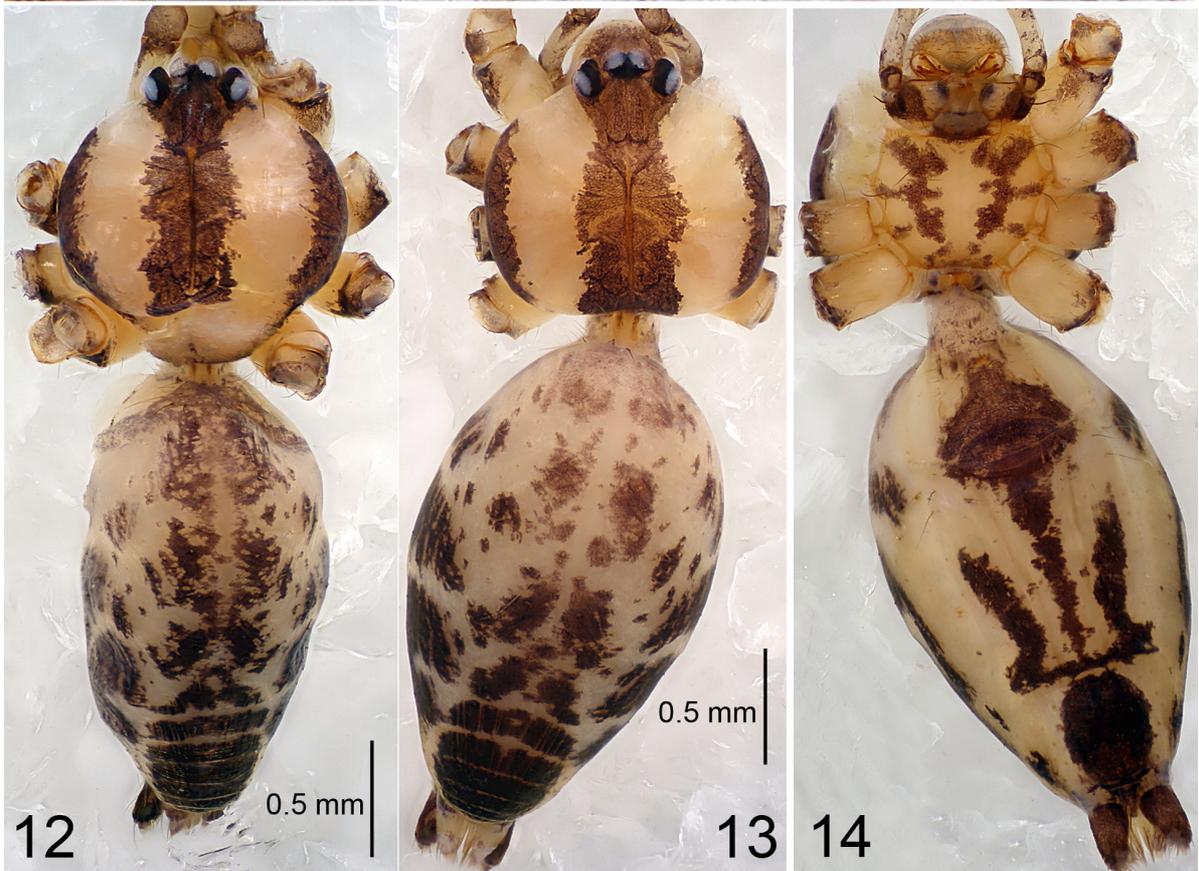
FIGURES 5–6. *Althepus erectus* spec. nov., male holotype. 5 palp, retrolateral view; 6 palp, prolateral view; Scale bar: 0.10 mm.

pair of copulatory ducts and spermathecae (Figs 11, 17; two pairs in *A. stonei*). Moreover, dorsal prosoma with broad longitudinal median band (Figs 12–14; without or with only very indistinct narrow band in *A. stonei*).

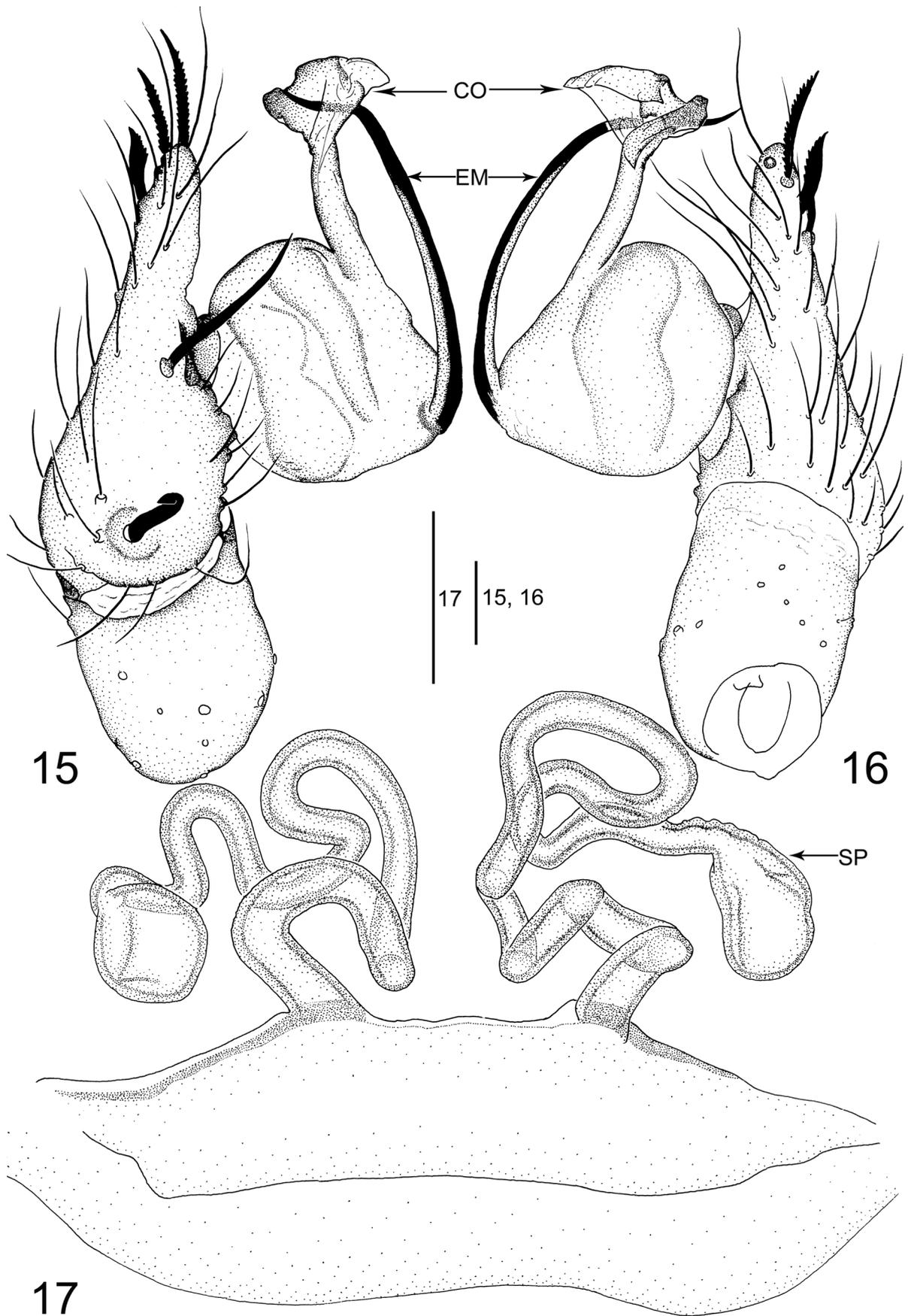
Description. Male (holotype). Total length 3.05; prosoma 1.47 long, 1.22 wide; opisthosoma 2.17 long, 1.07 wide (Fig. 12). Dorsal prosoma round, yellow, with narrow marginal bands and one broad median band (Fig. 12). Anterior margin of thoracic region distinctly elevated. Clypeus with a semi-circular brown band medially. Cheliceral lamina reduced, promargin with three teeth, retromargin with two small teeth, the posterior surface of fang with 26 small denticles. Labium brown with two light rounded areas basally. Sternum yellow, with two brown



FIGURES 7–10. *Althepus flabellaris* spec. nov., male holotype. 7 palp, ventral view; 8 palpal bulb, retrolateral view; 9 palp, retrolateral view; 10 palp, prolateral view.



FIGURES 11–14. *Althepus flabellaris* **spec. nov.**, male holotype and female paratype. 11 spermathecae, dorsal view. 12 male habitus, dorsal view; 13 female habitus, dorsal view; 14 female habitus, ventral view.



FIGURES 15–17. *Althepus flabellaris* **spec. nov.**, male holotype and female paratype. 15 palp, retrolateral view; 16 palp, prolateral view; 17 spermathecae, dorsal view. Scale bars: 0.1 mm.

slender lines each side. Opisthosoma elongate, with complex patterns dorsally and ventrally (Fig. 12). Legs brown, femur and tibia annulated with white. Leg measurements: I—(8.84, 0.47, 9.12, 13.75, -), II 22.59 (6.24, 0.46, 6.14, 8.15, 1.60), III 15.84 (4.58, 0.44, 4.15, 5.45, 1.22), IV 21.46 (5.44, 0.44, 6.38, 7.96, 1.24); leg formula: 2 4 3; palp 1.53 (0.51, 0.23, 0.31, 0.48), bulb 0.26 long 0.29 wide. Male palp (Figs 7–10, 15–16): tarsus with three slightly curved, serrated bristles distally (in *A. flabellaris* the serrated bristles are much stouter than in *A. erectus*) and one hooked spine with tip directed towards dorsally; bulb bright yellow, ovate; conductor (Fig. 8) arising distally from bulb, oblique, distad; embolus (Fig. 8) arising retrolatero-proximally from bulb, observably sigmoid, distad; embolus and conductor widely separated (the distance is almost equal to diameter of bulb).

Female (one of the paratypes). Similar to male in colouration and general features (Figs 13–14), but with larger body size. Measurements: total length 3.86; prosoma 1.32 long, 1.23 wide; opisthosoma 2.35 long, 1.27 wide. Leg measurements: I—(6.45, 0.45, 7.05, 10.45, -), II missing, III missing, IV 16.96 (4.74, 0.40, 4.75, 5.70, 1.37); palp 1.12 (0.40, 0.16, 0.22, 0.34). Internal genitalia with a pair of transparent copulatory ducts and spermathecae (Figs 11, 17).

Variation. Prosoma: males 1.25–1.74 long, 1.14–1.58 wide; tibia I: 9.10 (leg I lost in third male). Prosoma: females 1.55–1.88 long, 1.30–1.62 wide; tibia I: 4.25–7.05 (n=3; leg I lost in other specimens).

Distribution. Known only from the type locality (Fig. 47).

Althepus nophaseudi spec. nov.

Figs 18–28, 47

Type material. Holotype: Male, LAOS: Bolikhamsay Province, Nam Kading National Protected Area, 18°21'34.4"N, 104°09'15.5"E, 219 m altitude, Peter Jäger and Liphone Nophaseud leg. 24.III.2011, primary forest, stream bed, rock boulders, gravel, by hand, at day (SMF). **Paratypes: 1 male, 2 females,** with same data as for holotype (SMF).

Etymology. The species is named after the collector Mr. Liphone Nophaseud; noun (name) in genitive case.

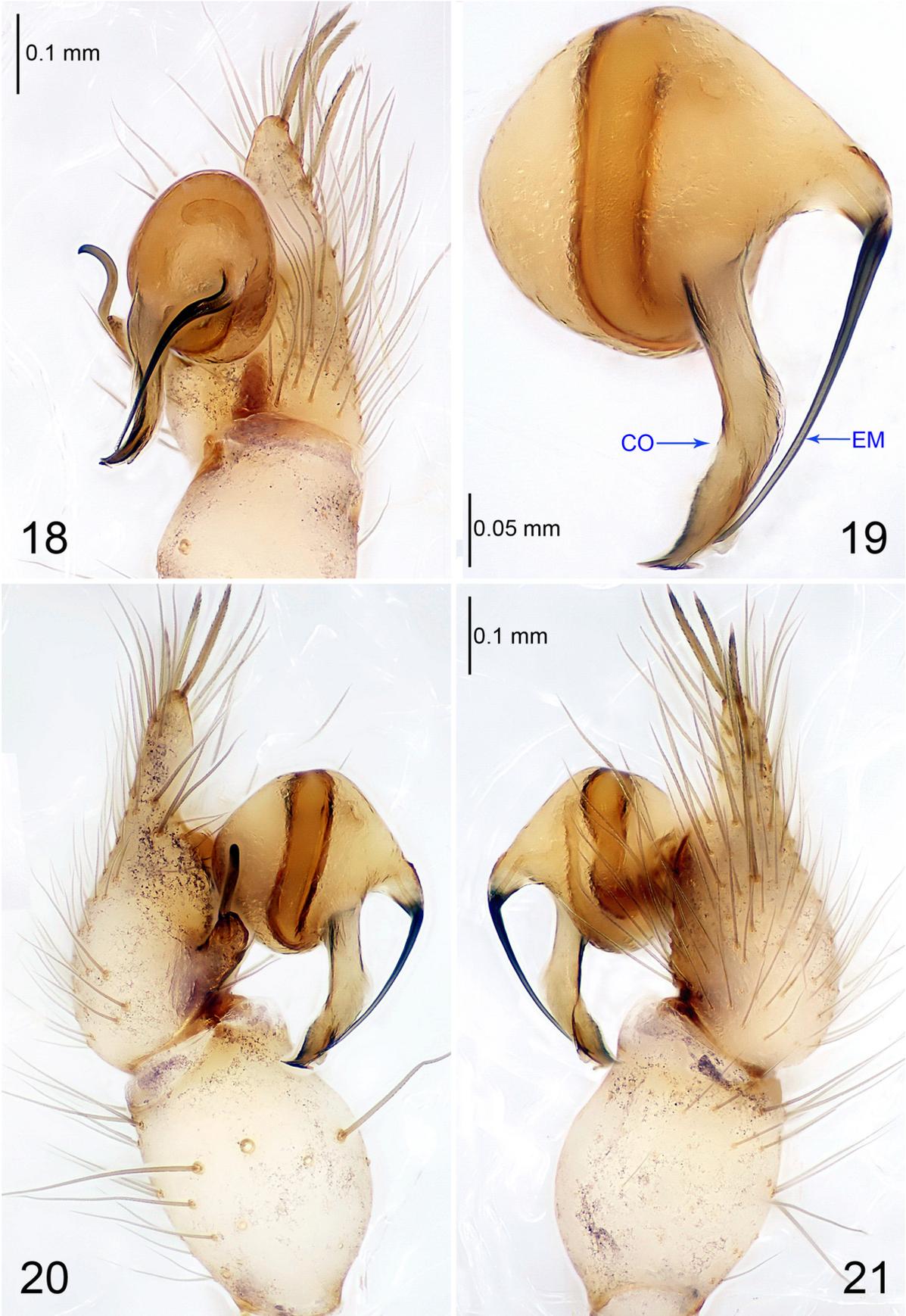
Diagnosis. Males of this new species are similar to those of *A. lehi* Deeleman-Reinhold 1985 in having conductor and embolus proximad, but can be distinguished by the straight and short distal part of the conductor (Fig. 19), the cone-shaped tegular base of the embolus (Fig. 19) and the presence of more than one distal cymbial spine (Figs 18–21, 26–27; conductor tip widened, embolus without such tegular base and one long distal spine in *A. lehi*). Females can be distinguished from those of *A. lehi* by the laterad spermathecae and narrow bursae (Figs 22–28; mediad spermathecae and wide bursae in *A. lehi*). Moreover, the dorsal prosoma exhibiting only a triangular dark patch posterior to the eye region (Figs 23–24; margins and entire median line coloured in *A. lehi*).

Description. Male (holotype). Prosoma 1.65 long, 1.32 wide; opisthosoma missing (Fig. 23). Dorsal prosoma sub-circular, pale yellow, with triangular brown patch behind ocular area (Fig. 23). Anterior margin of thoracic region distinctly elevated. Clypeus without any band. Cheliceral lamina reduced, promargin with three teeth, retromargin with two small teeth, the posterior surface of fang with 18 small denticles. Labium pale yellow. Sternum pale yellow. Legs yellow. Leg measurements: I missing, II missing, III 13.47 (4.18, 0.44, 3.55, 4.52, 0.78), IV 18.29 (5.35, 0.47, 5.08, 5.75, 1.64); palp 1.68 (0.62, 0.25, 0.40, 0.41), bulb 0.31 long 0.24 wide. Male palp (Figs 18–21, 26–27): tarsus with three slightly curved, serrated bristles at the top and one spine strongly bent with tip retrolaterad; bulb bright yellow, ovate, conductor (Fig. 19) arising proximally from bulb, observably sigmoid, proximad; embolus (Fig. 19) arising retrolatero-distally from bulb, observably sigmoid, proximad; embolus and conductor widely separated (the distance is less than diameter of bulb).

Female (one paratype). Similar to male in colouration and general features (Figs 24–25). Internal genitalia with a pair of transparent copulatory ducts and spermathecae (Figs 22, 28). Measurements: Total length 3.55, prosoma 1.58 long, 1.17 wide; opisthosoma 2.12 long, - wide. Leg measurements: I missing, II 27.11 (7.18, 0.61, 7.15, 9.82, 2.35), III 18.62 (5.55, 0.61, 4.95, 5.87, 1.64), IV missing; palp 1.30 (0.50, 0.19, 0.25, 0.36).

Variation. Prosoma: males 1.89 long, 1.70 wide; females 1.51 long, 1.34 wide (leg I lost in other specimen).

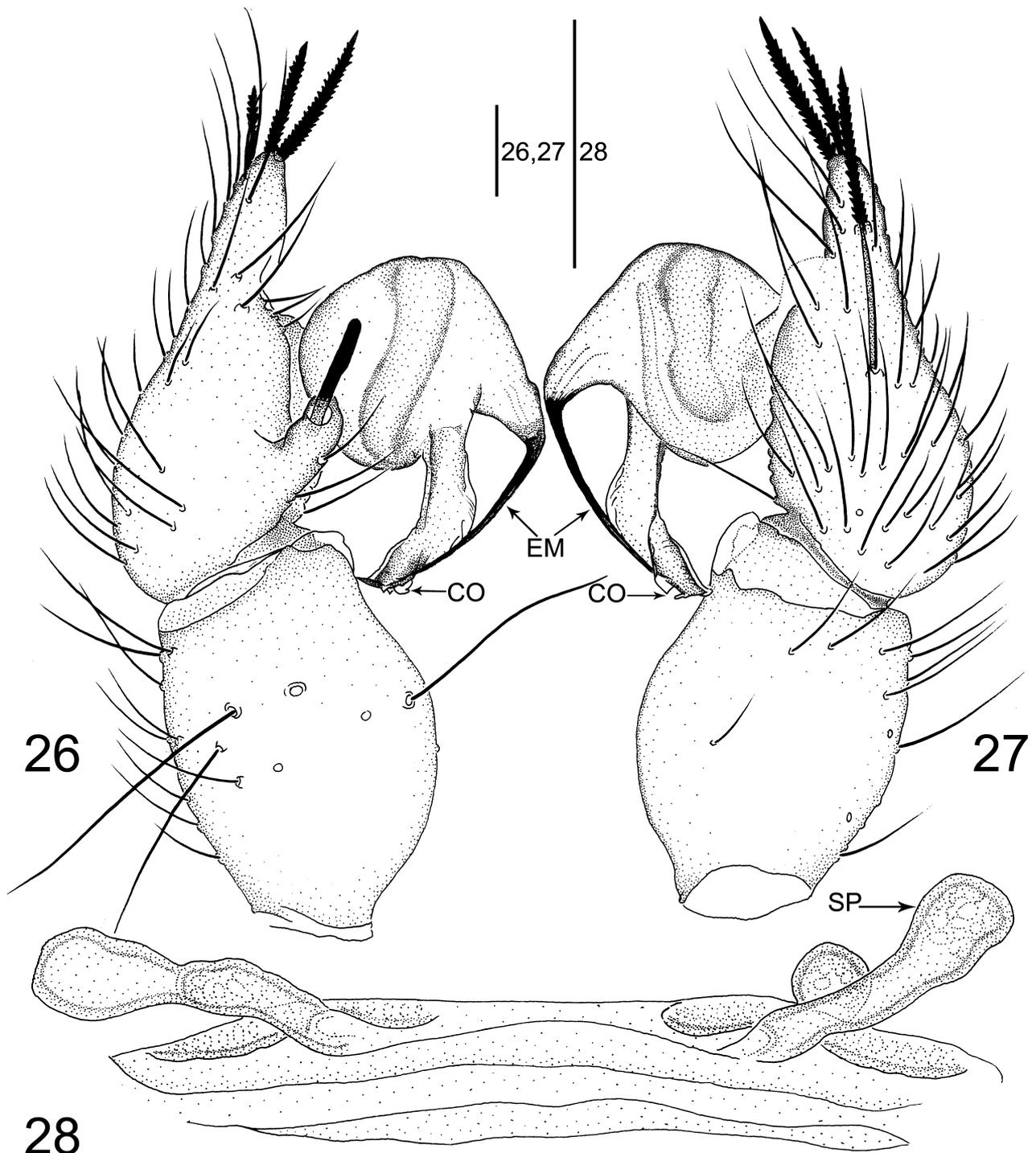
Distribution. Known only from the type locality (Fig. 47).



FIGURES 18–21. *Althepus nophaseudi* **spec. nov.**, male holotype. 18 palp, ventral view; 19 palpal bulb, retrolateral view; 20 palp, retrolateral view; 21 palp, prolateral view.



FIGURES 22–25. *Althepus nophaseudi* **spec. nov.**, male holotype and female paratype. 22 spermathecae, dorsal view; 23 male habitus, dorsal view; 24 female habitus, dorsal view; 25 female habitus, ventral view.



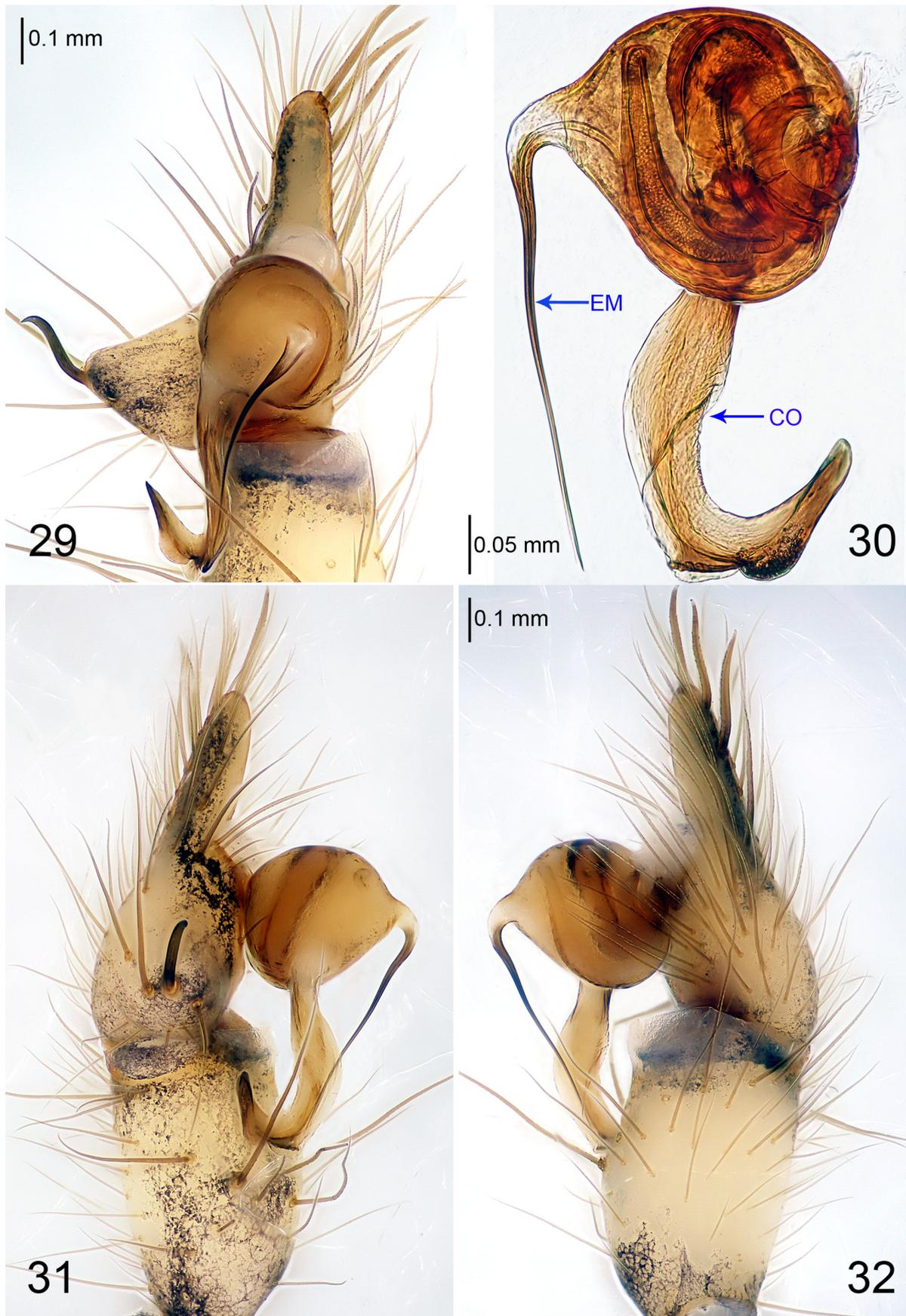
FIGURES 26–28. *Althepus nophaseudi* **spec. nov.**, male holotype and female paratype. 26 palp, retrolateral view; 27 palp, prolateral view; 28 spermathecae, dorsal view. Scale bars: 0.1 mm.

***Althepus reduncus* spec. nov.**

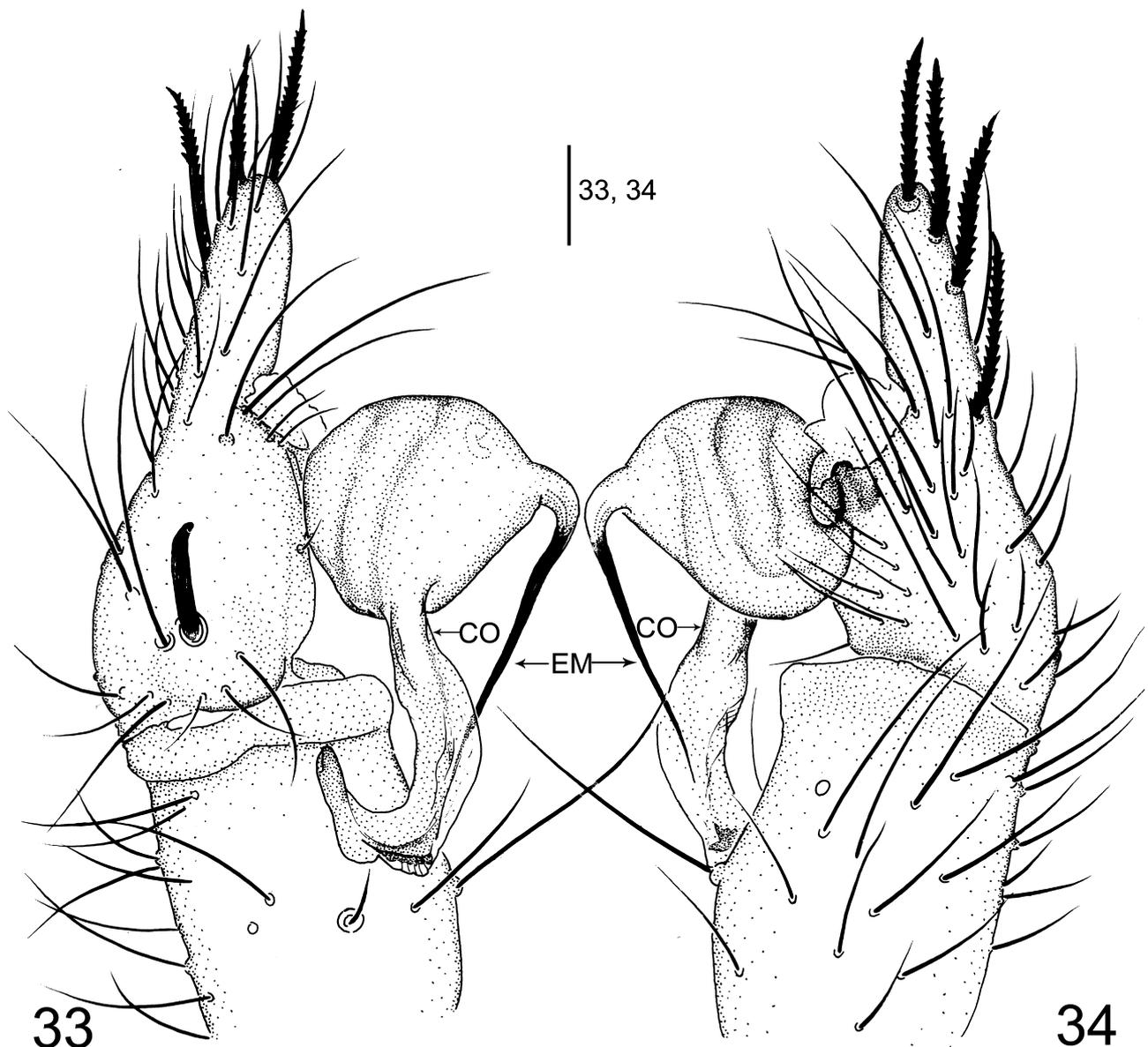
Figs 29–34, 47

Type material. Holotype: Male, MYANMAR: Southern Shan State, Pinlaung, Tupaia Cave, 20°08'12.5"N, 96°47'39.0"E, Helmut Steiner leg. 2.II.2012, NF47-13-105, Myanmar Cave Documentation Project 2012.

Paratypes: 3 males, with same data as for holotype (SMF). **1 male**, with same data as for holotype (IZCAS).



FIGURES 29–32. *Althepus reduncus* **spec. nov.**, male holotype. 29 palp, ventral view; 30 palpal bulb, prolateral view; 31 palp, retrolateral view; 32 palp, prolateral view.



FIGURES 33–34. *Althepus reduncus* spec. nov., male holotype. 33 palp, retrolateral view; 34 palp, prolateral view; Scale bar: 0.10 mm.

Etymology. The specific name is derived from the Latin “*reduncus*”, meaning “bound inward, dished”, and refers to the unciform distal part of the conductor of the male; adjective.

Diagnosis. This new species is similar to *A. lehi* Deeleman-Reinhold 1985 in having conductor and embolus proximad, but can be distinguished by the hook-shaped distal part of the conductor (Fig. 30), the presence of more than one distal cymbial spine (Figs 29–34), by the longer palpal tibia and longer legs as well as by the larger body size (conductor not bent inwards, with one long distal cymbial spine, with shorter palpal tibia in *A. lehi*).

Description. Male (holotype). Total length 6.16; prosoma 2.44 long, 2.19 wide; opisthosoma 3.72 long, 2.32 wide. Dorsal prosoma sub-circular, pale yellow, with dark lateral marginal bands and broad median band. Anterior margin of thoracic region distinctly elevated. Clypeus yellow, with two round brown bands separated medially. Cheliceral lamina reduced, promargin with three teeth, retromargin with two small teeth, the posterior surface of fang with 21 small denticles. Labium dark brown. Sternum yellow, with a brown wide line on the periphery. Opisthosoma elongate, with complex patterns dorsally and ventrally. Legs brown, femur and tibia annulated with white. Leg measurements: I 52.76 (12.15, 0.94, 12.75, 22.10, 4.82), II 34.00 (8.55, 0.85, 8.65, 13.15, 2.80), III 23.14 (6.85, 0.84, 6.05, 7.45, 1.95), IV 33.97 (9.55, 0.91, 9.05, 11.85, 2.61); leg formula: 1 2 4 3; palp 2.26 (0.86, 0.29, 0.55, 0.56), bulb 0.26 long 0.25 wide. Male palp (Figs 29–34): tarsus with three slightly curved, serrated

bristles at the top and one spine slightly bent with tip retrolaterad; bulb bright yellow, ovate; conductor (Fig. 30) arising proximally from bulb, observably sigmoid, proximad; embolus (Fig. 30) arising retrolatero-distally from bulb, slightly sigmoid, proximad; embolus and conductor widely separated (the distance is almost equal to diameter of bulb).

Female: Unknown.

Variation. Prosoma: males 2.91–2.97 long, 2.62–2.84 wide; tibia I: 14.45–15.35 (n=2; leg I lost in other specimens).

Distribution. Known only from the type locality (Fig. 47).

Althepus spiralis spec. nov.

Figs 35–40, 47

Type material. Holotype: Male, MALAYSIA: Malaya Peninsula, Pahang State, Fraser's Hill, Mager and Abu Suradi Trail, 3°42'35.13"N, 101°44'0.96"E, 1250 m altitude, Peter Jäger leg. 18.VI.2013, disturbed primary forest, by hand, at night (SMF).

Etymology. The specific name is derived from the Latin word "*spiralis*" meaning "spiral" and refers to the helical wrinkles on the distal part of the conductor; adjective.

Diagnosis. This new species can be easily recognised from all the other *Althepus* species by the shorter conductor (Fig. 36) and the helical wrinkles on the distal part of the conductor (Figs 35–40).

Description. Male (holotype). Total length 4.06; prosoma 1.50 long, 1.32 wide; opisthosoma 2.56 long, 1.25 wide. Dorsal prosoma round, yellow, with three longitudinal brown bands of different width, among them, the middle shortened to triangular band around eyes. Anterior margin of thoracic region distinctly elevated. Clypeus yellow, with two oval brown patches separated medially. Cheliceral lamina reduced, promargin with three teeth, retromargin with two small teeth, posterior surface of fang with 18 small denticles. Labium brown. Sternum yellow, with two brown lines on each side. Opisthosoma elongate, with complex patterns dorsally and ventrally. Legs brown, femur and tibia annulated with white. Leg measurements: I 33.34 (8.65, 0.54, 8.85, 14.05, 1.25), II 21.52 (5.95, 0.45, 5.62, 7.82, 1.68), III 14.15 (4.15, 0.44, 3.85, 4.61, 1.10), IV missing; leg formula: 1 2 3; palp 1.62 (0.60, 0.16, 0.38, 0.48), bulb 0.25 long, 0.33 wide. Male palp (Figs 35–40): tarsus with three slightly curved, serrated bristles distally and one hooked spine with tip proximad; lateral protrusion slender; bulb yellow, sub-oval; conductor (Fig. 36) arising distally from bulb, short embolus (Fig. 36) arising distally from bulb, cambered, prolaterad; embolus and conductor slightly separated (the distance is less than one third of diameter of bulb).

Female: Unknown.

Distribution. Known only from the type locality (Fig. 47).

Genus *Psilodermes* Simon, 1892

Type species. *Psilodermes egeria* Simon, 1892

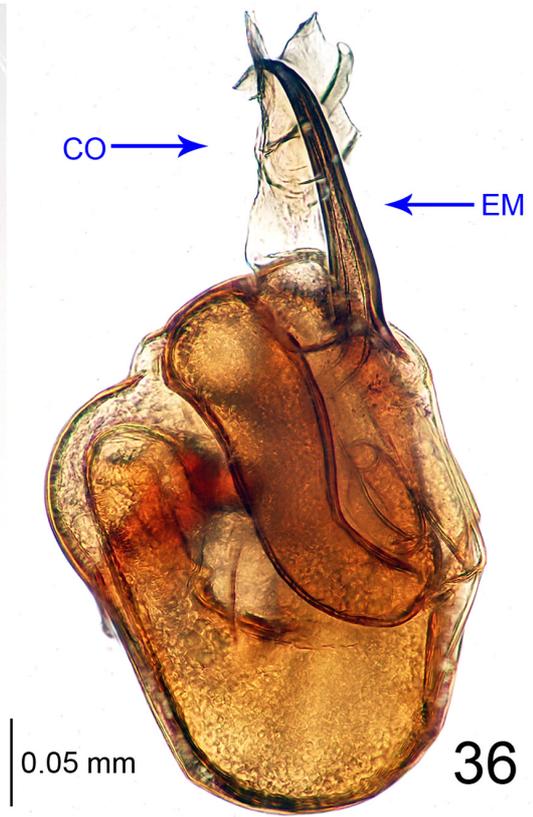
Diagnosis. The retromargin of chelicerae without teeth; male palpal tibia without lateral protrusions; male palpal bulb usually longer than wide: with distal embolus; with or without conductor, if present, its base close to embolus; female copulatory organ with 1 pair or 2 pairs of spermathecae (Deeleman-Reinhold 1995).

Psilodermes dicellocerus spec. nov.

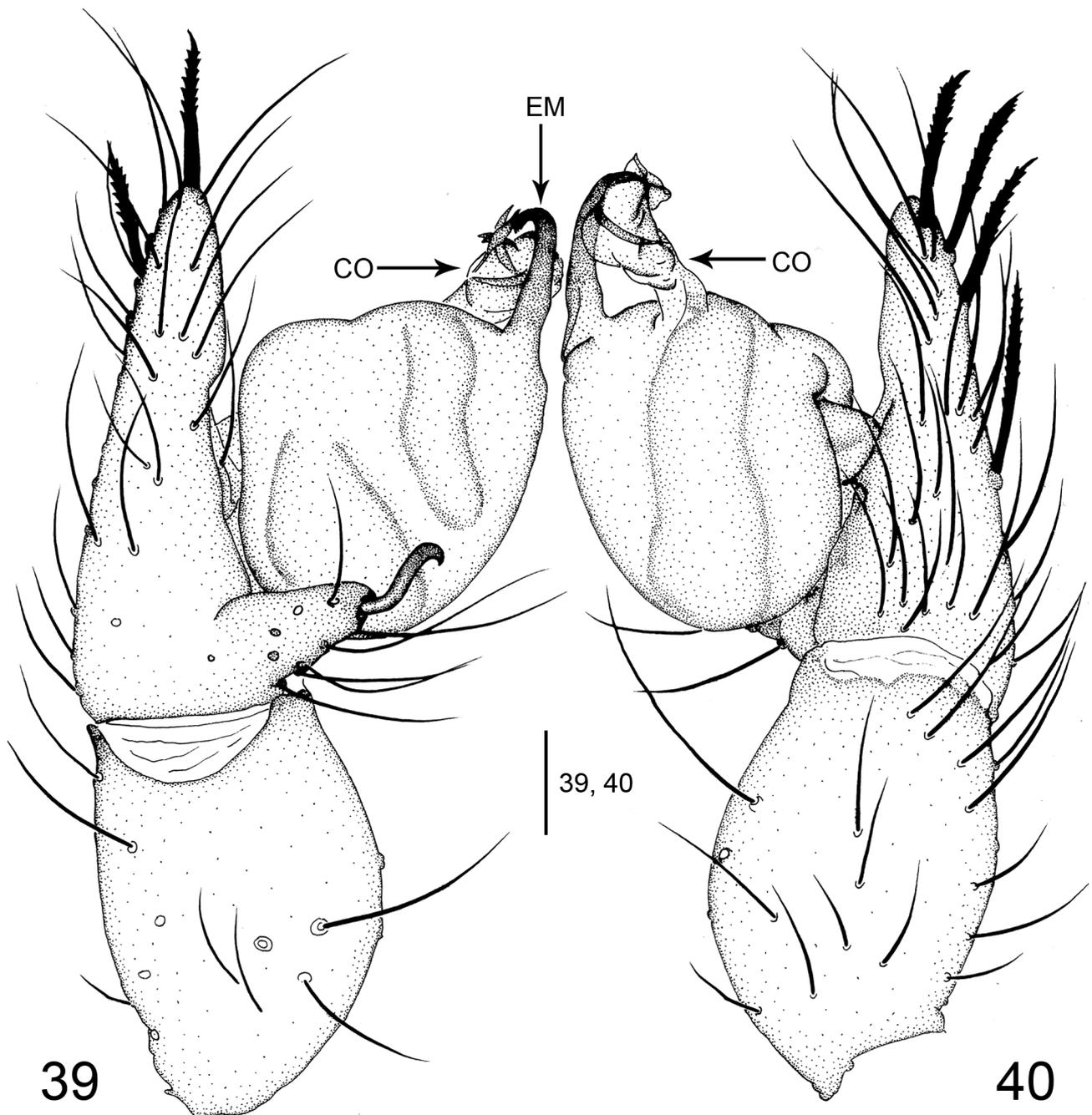
Figs 41–47

Type material. Holotype: Male, INDONESIA: East Nusa Tenggara, Flores, Pulau Babi, 8°27'S, 122°30'E, E. Jacobson leg. IV.1913 (SMF).

Etymology. This specific name is derived from the originally Greek words "*dikella*" and "*keros*" which means "two-pronged", referring to the needle-like conductor and embolus of the male; adjective.



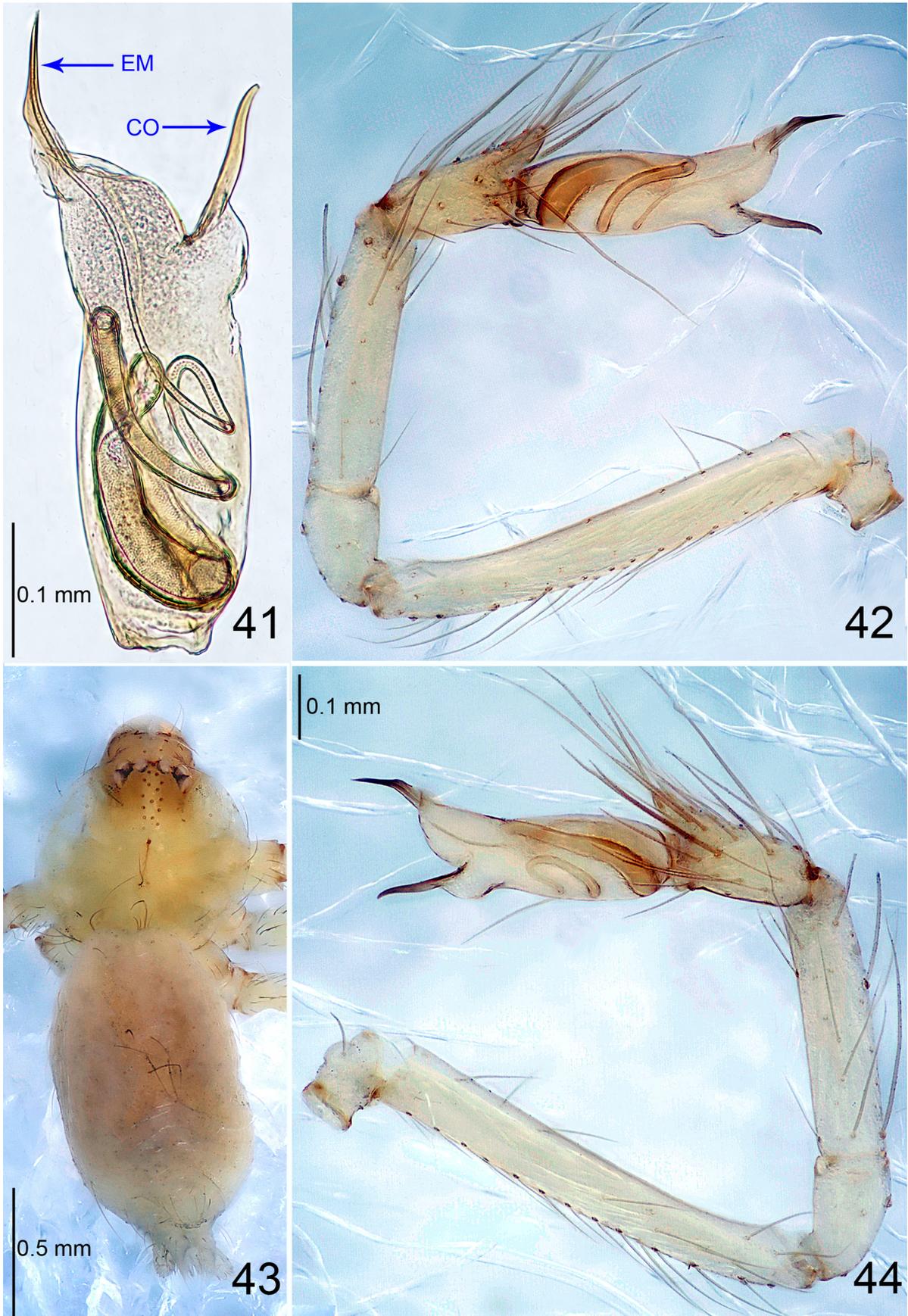
FIGURES 35–38. *Althepus spiralis* **spec. nov.** male holotype. 35 palp, ventral view; 36 palpal bulb, retrolateral view; 37 palp, retrolateral view; 38 palp, prolateral view.



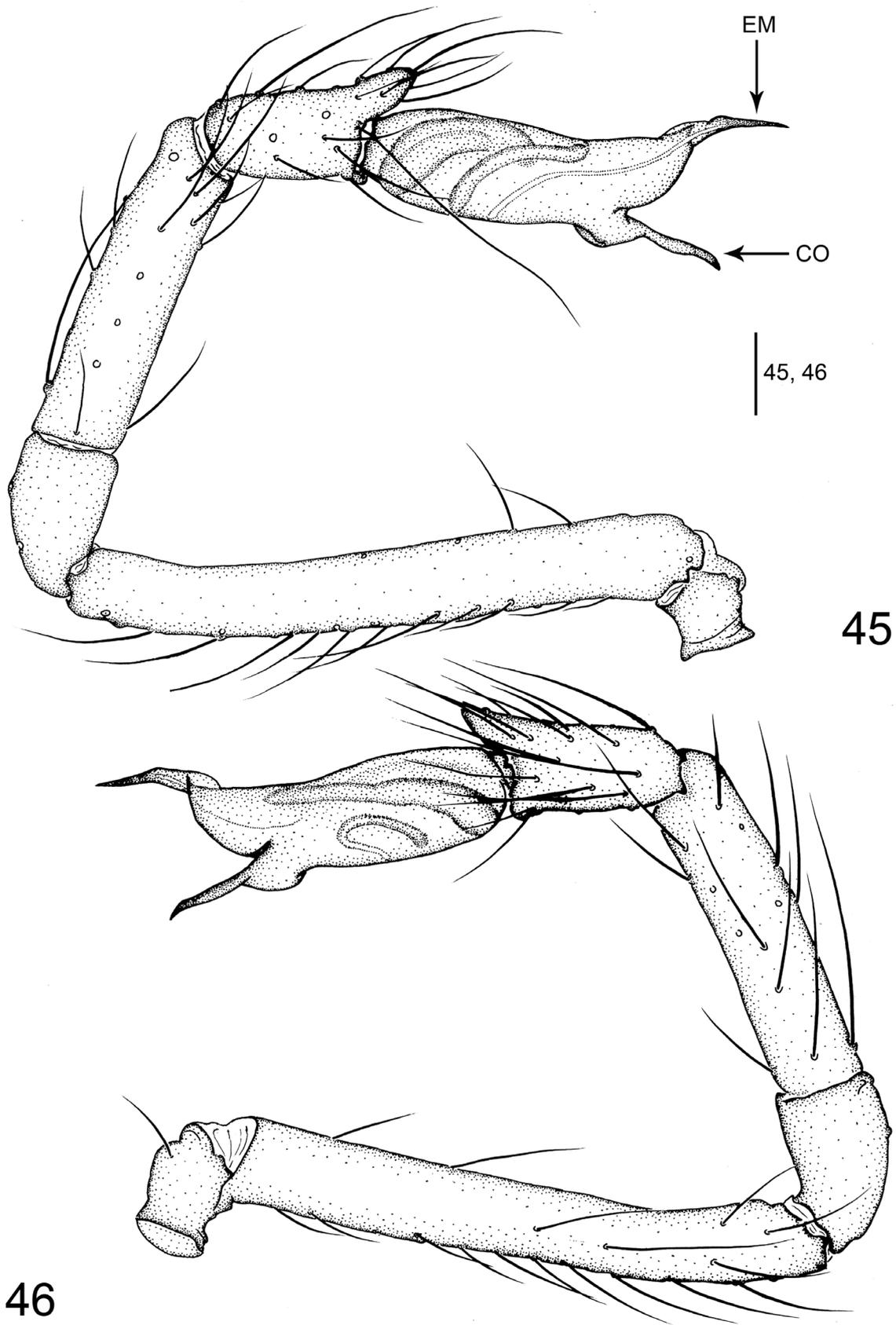
FIGURES 39–40. *Althepus spiralis* spec. nov., male holotype. 39 palp, retrolateral view; 40 palp, prolateral view; Scale bar: 0.10 mm.

Diagnosis. This new species is similar to *P. vallicola* Deeleman-Reinhold 1995 in the male bulb provided with a sub-distal conductor (Fig. 41) and a distal embolus (Fig. 41) and the ratio embolus length: conductor length roughly 1:1, but can be distinguished by the promargin of chelicerae with 2 teeth (the promargin of chelicerae toothless in *P. vallicola*), the spindly embolus, and bulb clearly longer than tarsus (bulb of same length as tarsus in *P. vallicola*) (Figs 41–42, 44–46) in the male.

Description. Male (holotype). Total length 2.05; prosoma 1.06 long, 0.83 wide; opisthosoma 1.19 long, 0.68 wide (Fig. 43). Prosoma, suborbicular, yellow, decorated with numerous hairs on the middle of clypeus, and the region behind eyes (Fig. 43). Chelicera yellow, promargin with lamina and two small teeth, and retromargin without teeth, posterior surface of fang provided with 13 small denticles. Sternum palp brown. Opisthosoma yellowish, ovoid (Fig. 43). Legs yellow. Leg measurements: I missing, II 12.94 (3.80, 0.35, 3.81, 3.88, 1.10), III 7.78 (2.08, 0.32, 2.52, 2.64, 0.22), IV 12.98 (3.64, 0.30, 4.05, 3.90, 1.09); leg formula: 4 2 3; palp 2.03 (0.66,



FIGURES 41–44. *Psilodermes dicellocerus* **spec. nov.** male holotype. 41 palpal bulb, retrolateral view; 42 palp, retrolateral view; 43 palp, prolateral view; 44 habitus, dorsal view; D. palp, retrolateral view.



FIGURES 45–46. *Psiloderces dicellocerus* **spec. nov.** holotype male. 45 palp, retrolateral view; 46 palp, prolateral view; Scale bar: 0.10 mm.

0.17, 0.38, 0.23), bulb 0.39 long, 0.13 wide. Male palp (Figs 41–42, 44–46): Male palp: femur, patellar, tibia and tarsus with numerous long, strong spines, bulb pale yellow elongate, conductor (Fig. 41) dark, needle-like, embolus (Fig. 41) slender, embolus and conductor slightly diverging.

Female: Unknown.

Distribution. Known only from the type locality (Fig. 47).

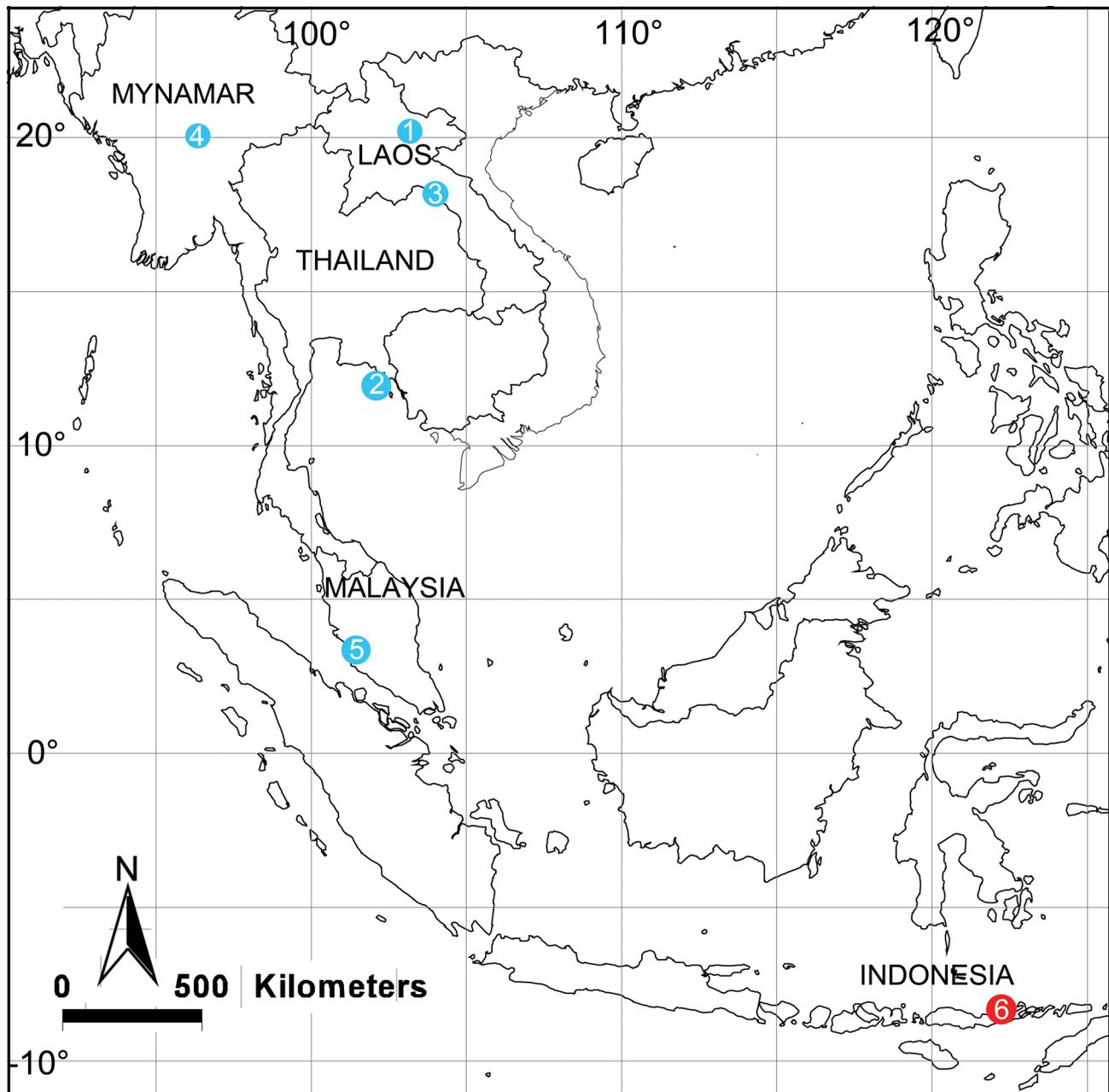


FIGURE 47. Known distribution of new *Althepus* species from Southeast Asia. ① *Althepus erectus* spec. nov.; ② *A. flabellaris* spec. nov.; ③ *A. nophaseudi* spec. nov.; ④ *A. reduncus* spec. nov.; ⑤ *A. spiralis* spec. nov.; ⑥ *Psiloderces dicellocerus* spec. nov.

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