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SIX NEW SPIDERS FROM CAVES OF NORTHERN VIETNAM (ARANEAE: TETRABLEMMIDAE: OCHYROCERATIDAE: TELEMIDAE: SYMPHYTOGNATHIDAE)

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***ABSTRACT.* –** Six new species, collected from caves of Cuc Phuong and Cat Ba National Parks, Northern Vietnam, are diagnosed, described and illustrated: *Lehtinenia bisulcus* (male, female) (Tetrablemmidae), *Speocera bulbiformis* (male, female) (Ochyroceratidae), *Telema cucphongensis* (male, female), *T. exiloculata* (male, female) (Telemidae), *Anapistula orbisterna* (female) and *Patu bispina* (male, female) (Symphytognathidae). The families Ochyroceratidae, Telemidae and Symphytignathidae are reported from Vietnam for the first time. All type specimens are deposited in the Institute of Zoology, Chinese Academy of Sciences in Beijing (IZCAS).

***KEY WORDS.* –** Taxonomy, troglobiont, cosmotropical regions, diagnosis, description.

INTRODUCTION

Early studies on the spiders of Vietnam were undertaken by Simon (1886, 1903, 1904, 1909) and Hogg (1922), who described species of the families Agelenidae, Araneidae, Ctenidae, Deinopidae, Hexathelidae, Liocranidae, Lycosidae, Mimetidae, Oonopidae, Philodromidae, Pholcidae, Pisauridae, Salticidae, Scytodidae, Sparassidae, Tetragnathidae, Theridiidae, Thomisidae, Uloboridae and Zodariidae. Later, Lehtinen (1981) described three new tetrablemmids and Zabka (1985) reported 100 Salticidae species, including 8 new genera and 51 new species. Recent work on spiders of Vietnam were done by Grismado & Ramírez (2004), Jäger (2003), Jäger & Vedel (2005), Tu & Li (2004, 2006), Wang, Li & Xu (2008), Wang & Jäger (2008) on families Amaurobiidae, Zodariidae, Sparassidae, and Linyphiidae. A total of 32 spider families, 159 genera and 320 species are recorded from Vietnam (Pham, Xu & Li, 2007).

The family Tetrablemmidae, erected by O. Pickard-Cambridge in 1873 and distributed mostly in tropical or subtropical regions, is known as “armoured spiders” because of the presence of abdominal scutum. Most of species live under leaf litter or beneath stones in caves. A total of 30 genera and 133 species have been described (Brignoli, 1972-1980; Shear, 1978, 1979; Bourne, 1980, 1981; Deeleman-Reinhold, 1980, 1993; Lehtinen, 1981; Schwendinger, 1989, 1994; Wunderlich, 1995; Burger, 2005; Tong & Li, 2008a; Platnick, 2009). Two subfamilies are recognized, the Pacullinae (medium sized species) and Tetrablemminae (minute to small species). Three species were reported from Vietnam by Lehtinen (1981), i.e. *Singaporemma adjacens*, *S. halongense* and *Tetrablemma vietnamense*.

The family Ochyroceratidae was erected by Fage in 1912 and is distributed mostly in cosmotropical regions. Ochyroceratids are very small (total length 0.6-3.0 mm) and web-spinning haplogyne spiders. Most of species are found in leave litter from the tropics or living as troglobites in the caves (Saaristo, 1998; Baptista, 2003). Deeleman-Reinhold (1995) studied ochyroceratids from the Indo-Pacific region. Dumitrescu and Georgescu (1992) reported three species from Cuba. Tong and Li (2007) described one new genus and eight species of ochyroceratids from tropical Hainan Island, China. As far, a total of 14 genera and 156 species are recorded worldwide (Platnick, 2009).

The family Telemidae, erected by Fage in 1913, is distributed from tropical Africa, Europe, East and South East Asia to North and Central America (Brignoli, 1977). Telemids are cryptozoa and live in moist and dark habitats, such as in leaf litter, under stones and especially abundant in caves. In recent years, several telemid species were described from Yunnan-Guizhou Plateau (Song & Zhu, 1994; Wang & Ran, 1998; Zhu & Chen, 2002; Tong & Li, 2008b) and tropical regions in southern China (Tong & Li, 2008c; Lin & Li, 2008). The family Telemidae contains 7 genera and 31 species worldwide (Platnick, 2009).

The family Symphytognathidae was established by Hickman in 1931 and redefined by Forster and Platnick in 1977. Symphytognathids mostly occur in the tropics of Central and South America, the Oceania and the Africa. Symphytonathids are the smallest spiders in the world. Male *Patu digua* from Colombia has a length of only 0.37 mm (Forster & Platnick, 1977). Baert and Jocqué (1993) described a smallest female symphytonathid from Ivory Coast, i.e. *Anapistula caecula*. If it was found, male of *A. caecula* may be smaller than male of *P. digua*. According to Platnick (2009), the Symphytognathidae includes 6 genera and 45 species. Three *Anapistula* species are reported from Asia (Ono, 2002; Tong & Li, 2006; Harvey, 1998). *Patu* occurs in Colombia, Oceania and Seychelles Islands of Africa. An undescribed species of the genus *Patu* is found in Japan with report on its web structure and web-building behavior (Hiramatsu & Shinkai, 1993; Ono, 1996).

Spiders from subterraneous habitats in Vietnam are poorly studied. During an exploration of four caves in Cuc Phuong and Cat Ba National Parks, some tiny spiders were collected and six new species are recognized. They belong to the families Tetrablemmidae, Ochyroceratidae, Telemidae and Symphytognathidae, and the last three families are newly recorded from Vietnam.

MATERIALS AND METHODS

Specimens were examined using a Leica M250 C stereomicroscope. Further details were studied under an Olympus BX51 compound microscope. All drawings were made using a drawing apparatus attached to the compound microscope. Male palpi and female genitalia were examined and illustrated after dissection. Vulvae of females were removed and treated in lactic acid before illustration. Male palpi and female vulva were illustrated after being embedded in Hoyer's Solution and illuminated with incident light against a white background. All type specimens are preserved in 80% ethanol solution and deposited in the Institute of Zoology, Chinese Academy of Sciences in Beijing (IZCAS). Type specimen photos of the species included in this paper can be viewed from website "Endemic Spiders in China" which was created and maintained by Shu-Qiang Li and Xin-Ping Wang (Li & Wang, 2009).

All measurements were made under an Olympus BX51 compound microscope and given in millimeters. Leg measurements are shown as: total length (femur, patella, tibia, metatarsus, tarsus). The following abbreviations are used in the text and figures: ALE-anterior lateral eye; AME-anterior median eye; AP-apical process; CA-copulatory antrum; CB-cymbium; CD-copulatory duct; E-embolus; ED-ejaculatory duct; EF-epiginal fold; EP-epiginal pit; FD-fertilization duct; IVP-inner vulval plate; LH-lateral horn; PA-preanal plate; PLE-posterior lateral eye; PME-posterior median eye; POG-postgenital plate; S-spermatheca; SR-seminal receptaculum; TS-tracheal spiracle; VP-ventral plate; VS-vulval stem.

TAXONOMY

Tetrablemmidae O. Pickard-Cambridge 1873

Lehtinenia Tong & Li 2008

Lehtinenia bisulcus new species

(Figs. 1A−B; 2A−F)

Material examined. – Holotype - Male (IZCAS), Prehistoric Man Cave (20°18'N, 105°40'E; Alt: 256 m), Cuc Phuong National Park, Vietnam, coll. S. Li, 19 July 2008.

Paratypes – 4 females (IZCAS), same data as holotype.

Diagnosis. – The new specie is similar to *L. bicornis* from Hainan Island, China (Tong & Li, 2008), but can be distinguished by the proximally wider and distally narrower palpal bulb, the distally furcate embolus, the swollen palpal femur, and the elevated ocular area in males; and the arcuate epiginal pit, the short and broad inner vulval plate, and the presence of translucent center process in frontal of inner vulval plate in females.

Etymology. – The specific name comes from Latin *bisulcus* = forked, in reference to the shape of the distal end of embolus.

Description. – Holotype male. Body orange. Total length 1.14. Carapace 0.50 long, 0.40 wide; Carapace 0.32 high. Abdomen 0.72 wide, 0.52 long. Clypeus 0.23 high. Sternum 0.32 long, 0.30 wide. Carapace diamond-shaped, highest anteriorly at the eye group, slightly sloping backwards and sharply down forwards, with finely reticulate modification. Six eyes in one group, with black ring, and a blunt, short process behind them. Ocular and cephalic areas bear hairs. ALE>PLE>PME. Posterior eyes row recurved. Cheliceral promargin with a large tooth and lamina, frontal-middle with a condyle, another in inside base, fang short and strong, basal boss large. Sternum with reticular ornaments, marginally rugose. Femora, tibiae, metatarsi and tarsi with obviously modified granula and serrate hairs. Tibia bears three trichobothria, and one on metatarsus. Leg measurements: I 1.23 (0.42, 0.08, 0.31, 0.20, 0.22); II 1.09 (0.36, 0.08, 0.26, 0.19, 0.20); III 0.96 (0.30, 0.07, 0.21, 0.19, 0.19); IV 1.33 (0.41, 0.11, 0.34, 0.24, 0.23). Leg formula: 4 1 2 3. Abdominal dorsal scutum long, oval, with smooth

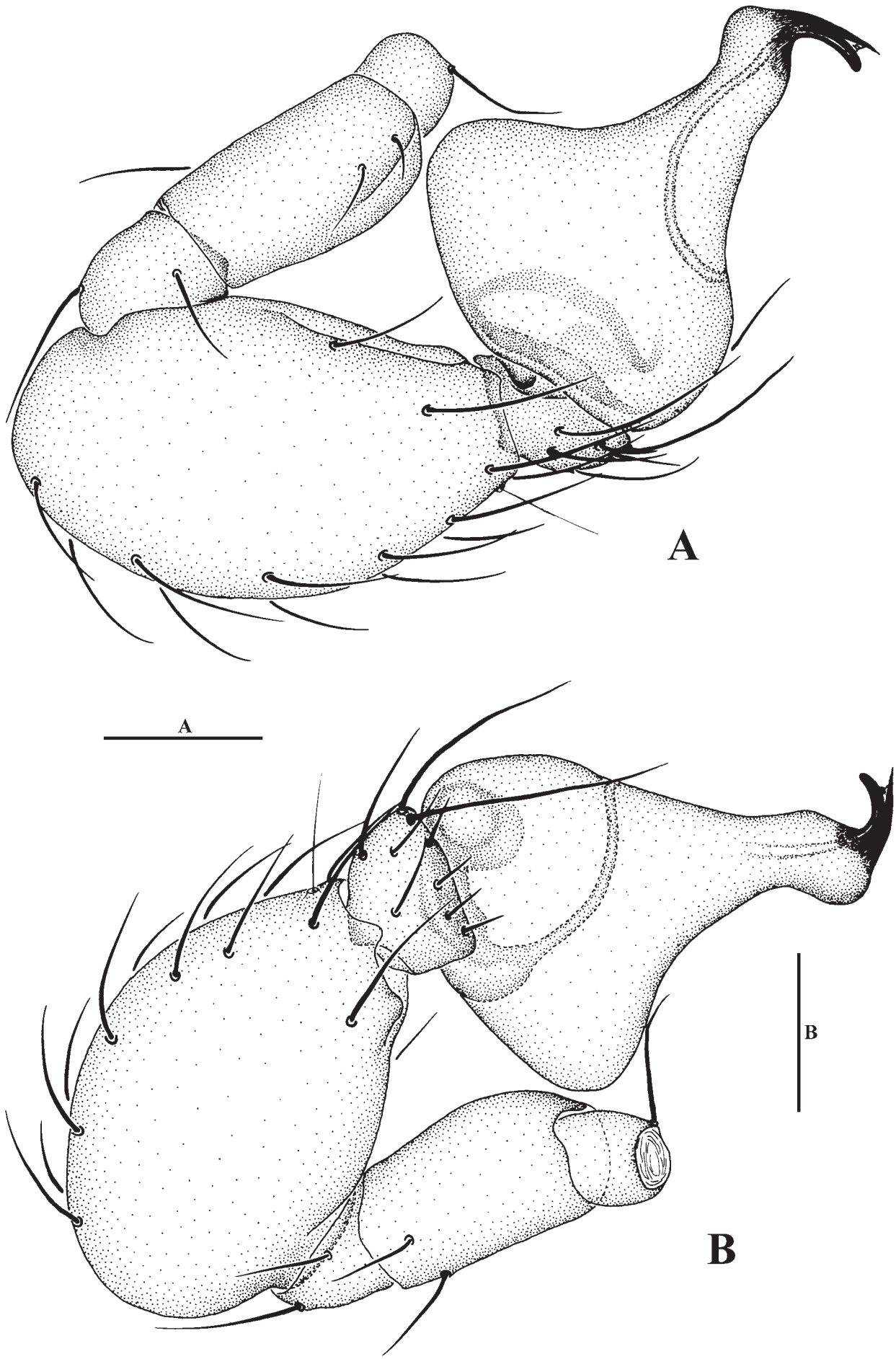

Fig. 1. *Lehtinenia bisulcus* new species: A. Male left palp, retrolateral view; B. Male left palp, prolateral view. Scale bars: 0.1 mm.

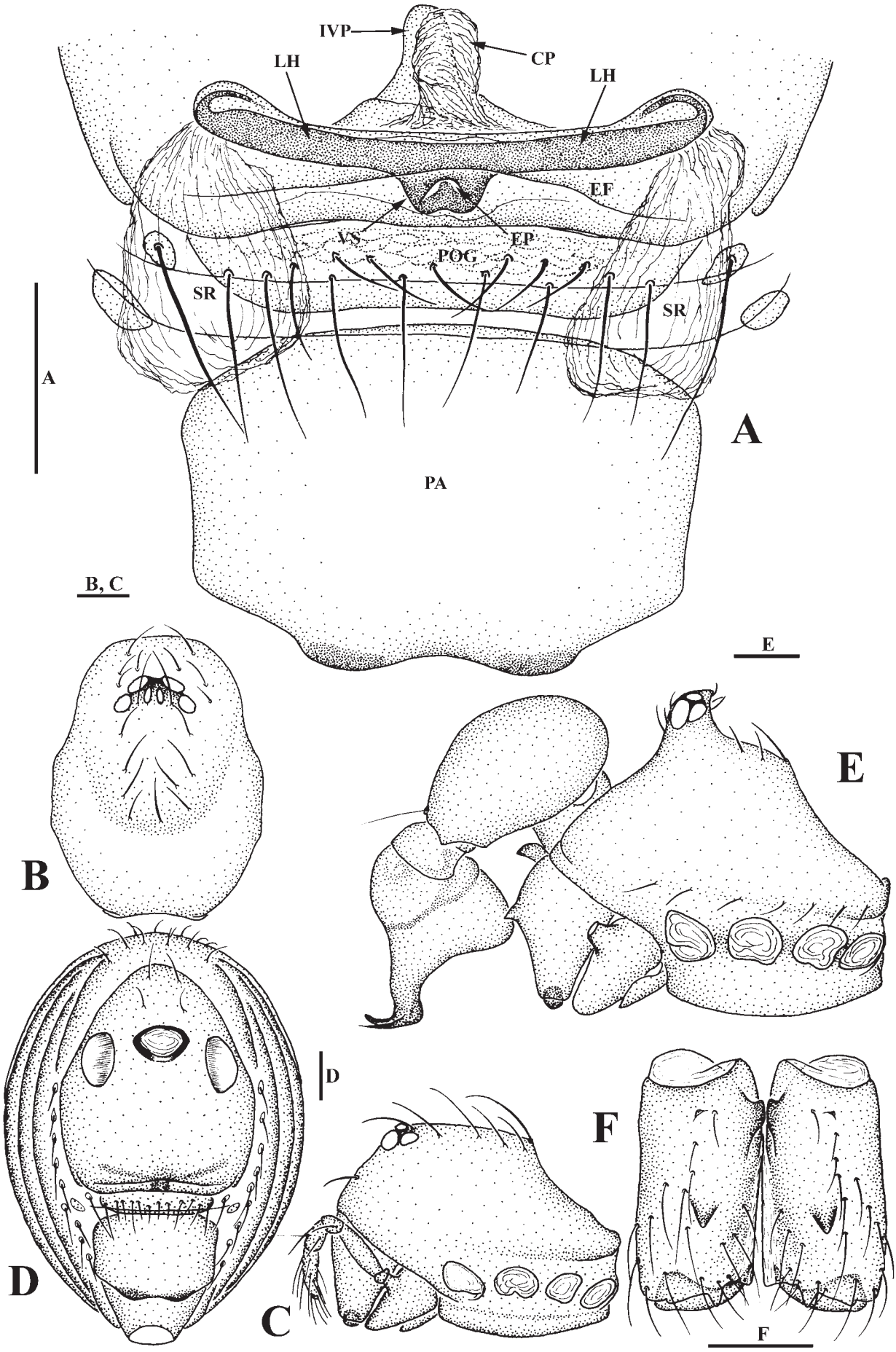

Fig. 2. *Lehtinenia bisulcus* new species: A. Female epiginal area and cleared vulva, ventral view; B. Female carapace, dorsal view; C. Ditto, lateral view; D. Female abdomen, ventral view; E. Male carapace and right palp, lateral view; F. Male chelicerae, frontal view. Scale bars: 0.1 mm.

surface. Lateral scutum I long, reaching the posterior margin of pulmonary plate. One pair of perigenital plates.

Male palpal bulbus proximally swollen, pear-shaped, distally continued by a narrow extension; embolus relatively wide, strongly sclerotized, with distal end forming an asymmetric furcation; tibia longer than femur, swollen, nearly two times larger than femur, with one dorsal trichobothrium on distal tibia (Fig. 1 A, B).

Female. Color as in male. Total length 1.24. Carapace 0.54 long, 0.42 wide. Carapace 0.27 high. Abdomen 0.82 long, 0.63 long. Clypeus 0.12 high. Sternum 0.31 long, 0.31 wide. Carapace and sternum reticular ornaments same as in male. Ocular area unmodified. Six eyes in one group, eyes smaller than corresponding eyes of male. ALE>PLE>PME. Cheliceral surface without modified process. Legs with granules. Ttrichobothria on legs same as in male. Leg measurements: I 1.19 (0.40, 0.08, 0.29, 0.20, 0.22); II 1.11 (0.37, 0.08, 0.26, 0.19, 0.21); III 0.98 (0.30, 0.07, 0.21, 0.20, 0.20); IV 1.37 (0.42, 0.13, 0.34, 0.24, 0.24). Leg formula: 4 1 2 3. Preanal plate larger than that of male, with a pair of sclerotized flakes on the posterolateral corners. Postgenital plate subequal to preanal plate in width, postgenital plate scale-shaped.

Epiginal pit transversely crescent, with vulval stem connected via a pair of long, laterally extending, strongly sclerotized horns; lateral horns with procurved distal tip connected to the spermathecae; center process with length subequal to the inner vulval plate, rugose membrane; inner vulval plate weakly sclerotized, with a broad base. Epiginal fold distinct, almost reaching the margin of epiginal shield (Fig. 2 A).

Distribution. **–** Known only from the type locality (Fig. 13).

Ochyroceratidae Fage 1912

Speocera **Berland 1914**

Speocera bulbiformis **new species**
(Figs. 3A−C, 4A−E)

Material examined. **–** Holotype **–** Male (IZCAS), Palace Cave (Dong Thien Cung) (20°18'N, 105°40'E; Alt: 256 m), Cuc Phuong National Park, Vietnam, coll. S. Li, 21 July 2008.

Paratypes – 4 males and 10 females (IZCAS), same data as holotype.

Diagnosis. **–** The new species is similar to *S. transleuser* from Sumatra (Deeleman-Reinhold, 1995), but can be distinguished by the spiral course of ejaculatory duct in bulb, the detailed structure of apical appendage on bulb, the absence of modified process on cheliceral surface and the asymmetrical "L" shape of paired chitinous ducts that connected to the spermathecae.

Etymology. **–** The specific name comes from Latin *bulbiformis* = globose, in reference to the shape of male palpal bulb.

Description. **–** Holotype male. Total length 1.12. Carapace 0.49 long, 0.41 wide; abdomen 0.57 long, 0.44 wide; clypeus 0.09 high; sternum 0.30 long, 0.30 wide. Carapace pear-shaped, smooth, pale yellow, with modified pigmental spots on thoracic margins. Ocular area dark. Six eye in a group, with black rings, anterior eyes row straight, PLE>ALE=AME. Chelicerae pale yellow, with broad lamina, six promarginal and two retromarginal teeth. Chelicerae laterally slightly excavated, modified with veins. Sternum pale yellow, smooth, without markings. Legs measurements: I 1.98 (0.63, 0.13, 0.60, 0.36, 0.26); II 1.76 (0.54, 0.12, 0.51, 0.34, 0.25); III 1.46 (0.45, 0.12, 0.37, 0.32, 0.20); IV 2.11 (0.62, 0.14, 0.58, 0.47, 0.30). Leg formula: 4 1 2 3. Palp measurements: 0.71 (0.22, 0.10, 0.18, 0.21), bulb 0.14 long, 0.18 wide. Abdomen pale, ovoid. Booklung invisible. One spiracle located ventrally at one third position to spinnerets.

Palpal femur narrower and longer than tibia and tarsus; tibia slightly swollen, shorter than tarsus, with three dorsal trichobothria. Tarsus obtuse. Bulb compressed, globose, with a small hooked appendage (Fig. 3 A-C).

Female. Total length 1.14. Carapace 0.53 long, 0.43 wide; abdomen 0.64 long, 0.43 wide. clypeus 0.07 high; sternum 0.32 long, 0.32 wide. Pattern of carapace same as in male. Sternum with modified pigmental markins. Chelicerae as in male. Leg measurements: I 1.76 (0.52, 0.14, 0.50, 0.37, 0.23); II 1.64 (0.50, 0.14, 0.46, 0.33, 0.21); III 1.36 (0.44, 0.12, 0.31, 0.29, 0.20); IV 1.90 (0.55, 0.15, 0.54, 0.40, 0.26). Leg formula: 4 1 2 3. Palp measurements: 0.54 (0.18, 0.09, 0.13, 0.14).

Vulval structure simple, a pair of asymmetrical spermathecae connected with "L"-shaped copulatory ducts, copulatory opening widely spaced with spermathecae, locating at bilateral genital area, chitinous ducts relatively short, converged on the median line (Fig. 4 E).

Distribution. **–** Known only from the type locality (Fig. 13).

Telemidae Fage 1913

Telema **Simon 1882**

Telema cucphongensis **new species**
(Figs. 5A−E, 6A−I)

Material examined. **–** Holotype - Male (IZCAS), Prehistoric Man Cave (20°18'N, 105°40'E; Alt: 256 m), Cuc Phuong National Park, Vietnam, coll. S. Li, 19 July 2008.

Paratypes **–** 19 males and 28 females (IZCAS), same data as holotype.

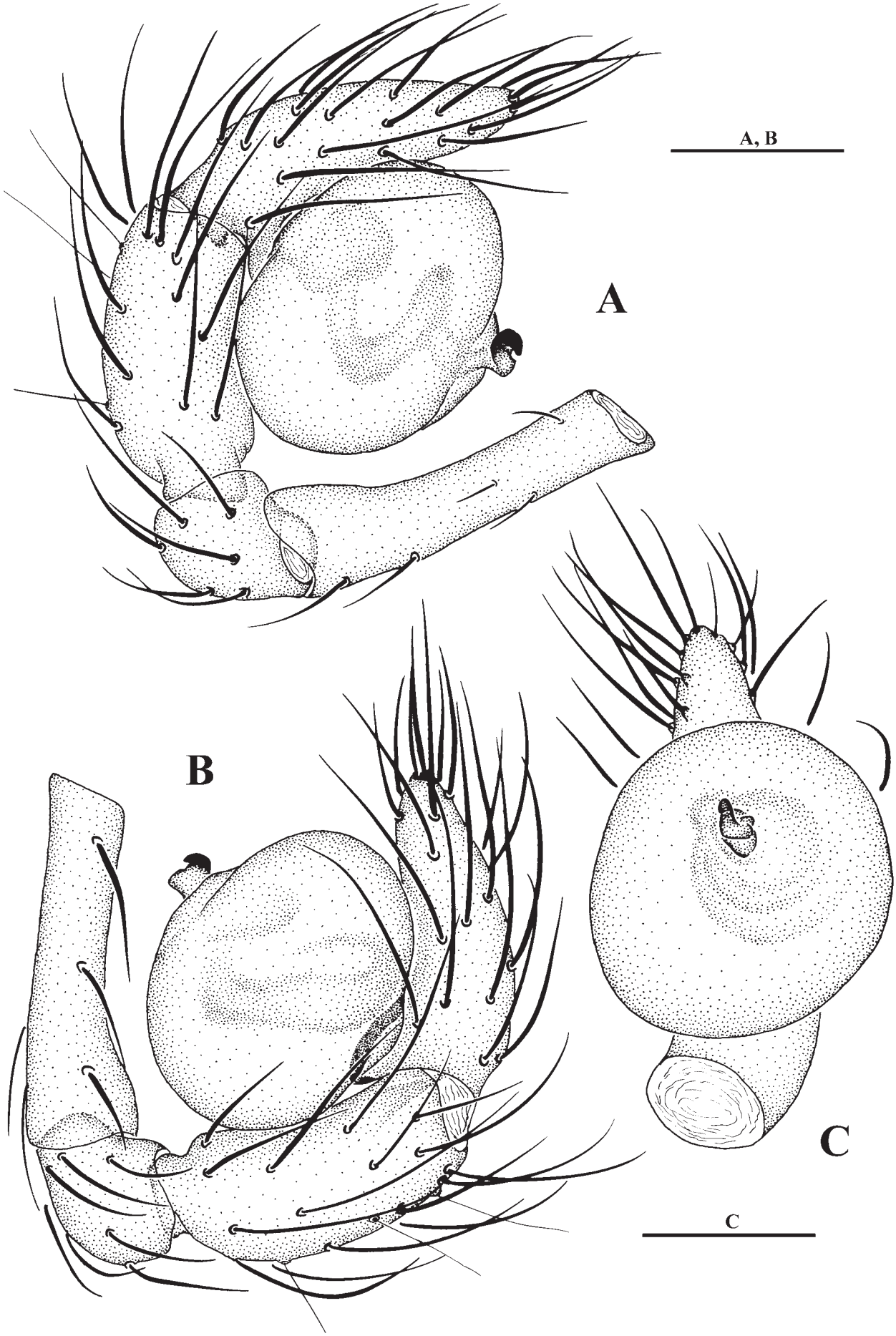

Fig. 3. *Speocera bulbiformis* new species: A. Male left palp, prolateral view; B. Ditto, retrolateral view; C. Ditto, ventral view. Scale bars: 0.1 mm.

***Diagnosis.* –** The new species is similar to *T. oculata* (Tong & Li, 2008), but can be distinguished by the large and elliptical palpal bulb (male unknown in *T. oculata*), the presence of four plumose setae at distal palpal tarsus, the annular and sclerotized pedicel in male, the short, distally swollen spermatheca in female. Both sexes of this new species have the modified pattern on carapace and purple-blue abdomen.

***Etymology.* –** The specific epithet derives from the name of the type locality.

***Description.* –** Holotype male. Total length 1.32. Carapace 0.50 long, 0.48 wide; clypeus 0.14 high; sternum 0.30 long, 0.30 wide; abdomen 0.82 long, 0.68 wide. Carapace, legs, labium, endites and chelicerae brown-yellow. Sternum dark. Carapace pear-shaped, with a pair of setae on clypeus behind eyes, with a large dark spot at middle thoracic area, margin dark and middle light brown, with distinctly radial stripes. Ocular area dark. Six eyes with black rings, anterior eye row nearly straight, separated from each by about ½ of AME diameter, lateral eyes contiguous. Chelicerae with a pigmental strip in the frontal midline area. Promargin of fang furrow with two large teeth, three small granular teeth and eleven plumose hairs, retromargin with four barely visible denticles. Legs with a dorsal spine at the distal patella and middle tibia. Leg measurements: I 3.14 (0.94, 0.18, 0.92, 0.60, 0.50); II 2.60 (0.82, 0.16, 0.74, 0.50,

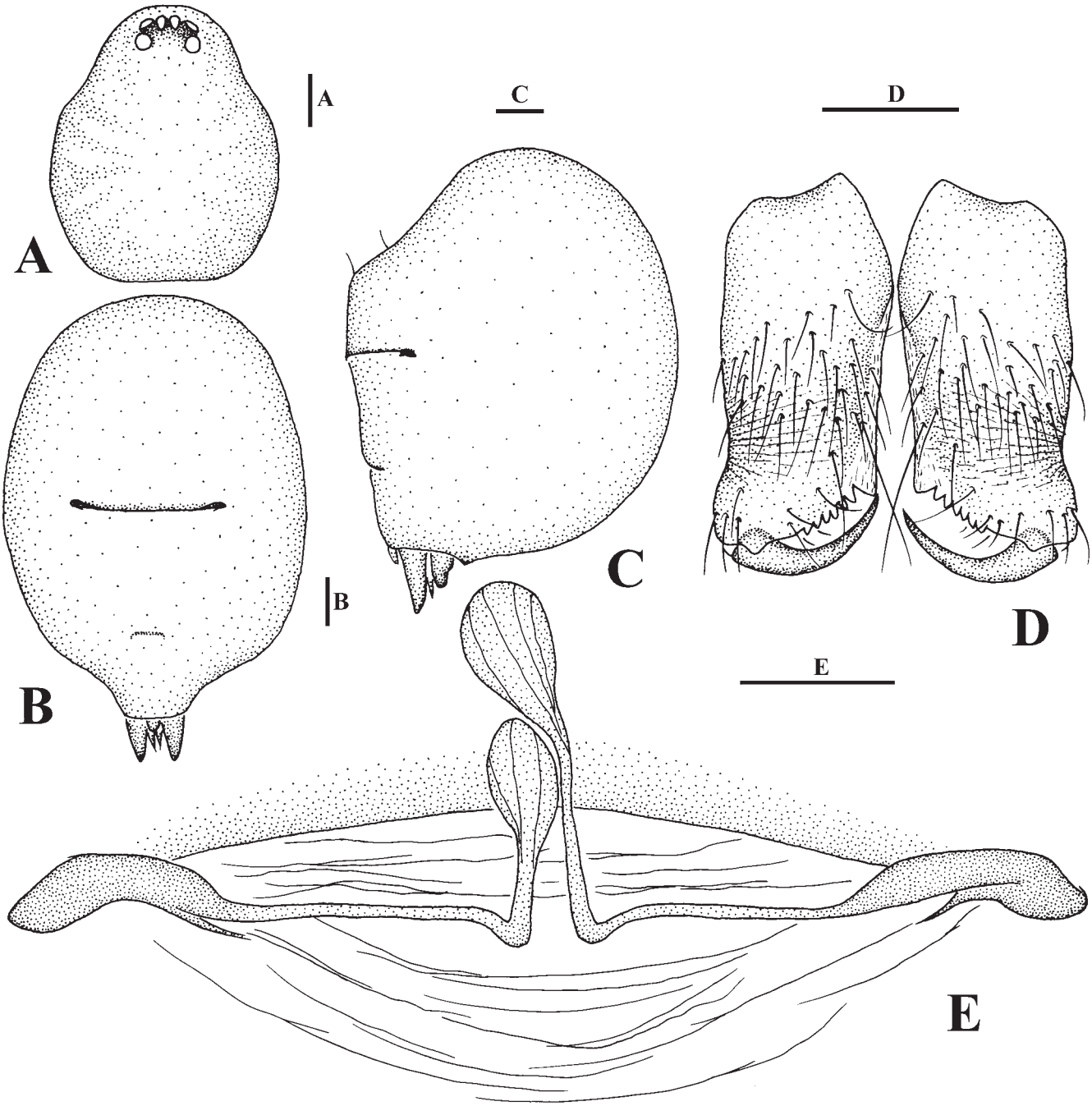

Fig. 4. *Speocera bulbiformis* new species: A. Male carapace, dorsal view; B. Female abdomen, ventral view; C. Ditto, lateral view; D. Male chelicerae, frontal view; E. Female vulva, dorsal view. Scale bars: 0.1 mm for A-D; 0.05 mm for E.

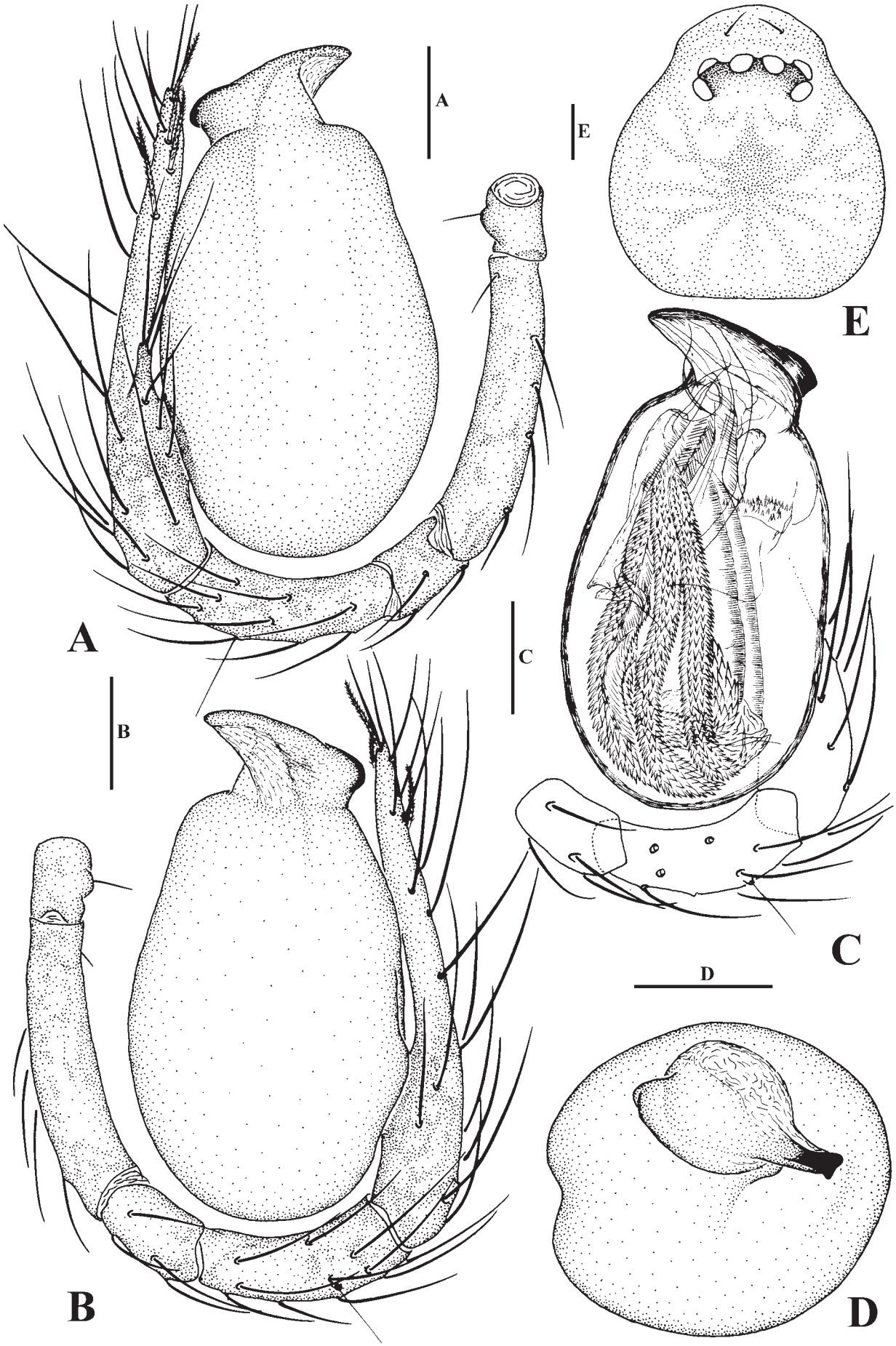

Fig. 5. *Telema cucphongensis* new species: A. Male left palp, prolateral view; B. Ditto, retrolateral view; C. Ditto (treated in lactic acid), retrolateral view; D. Male palpal bulb, apical view. Scale bars: 0.1 mm.

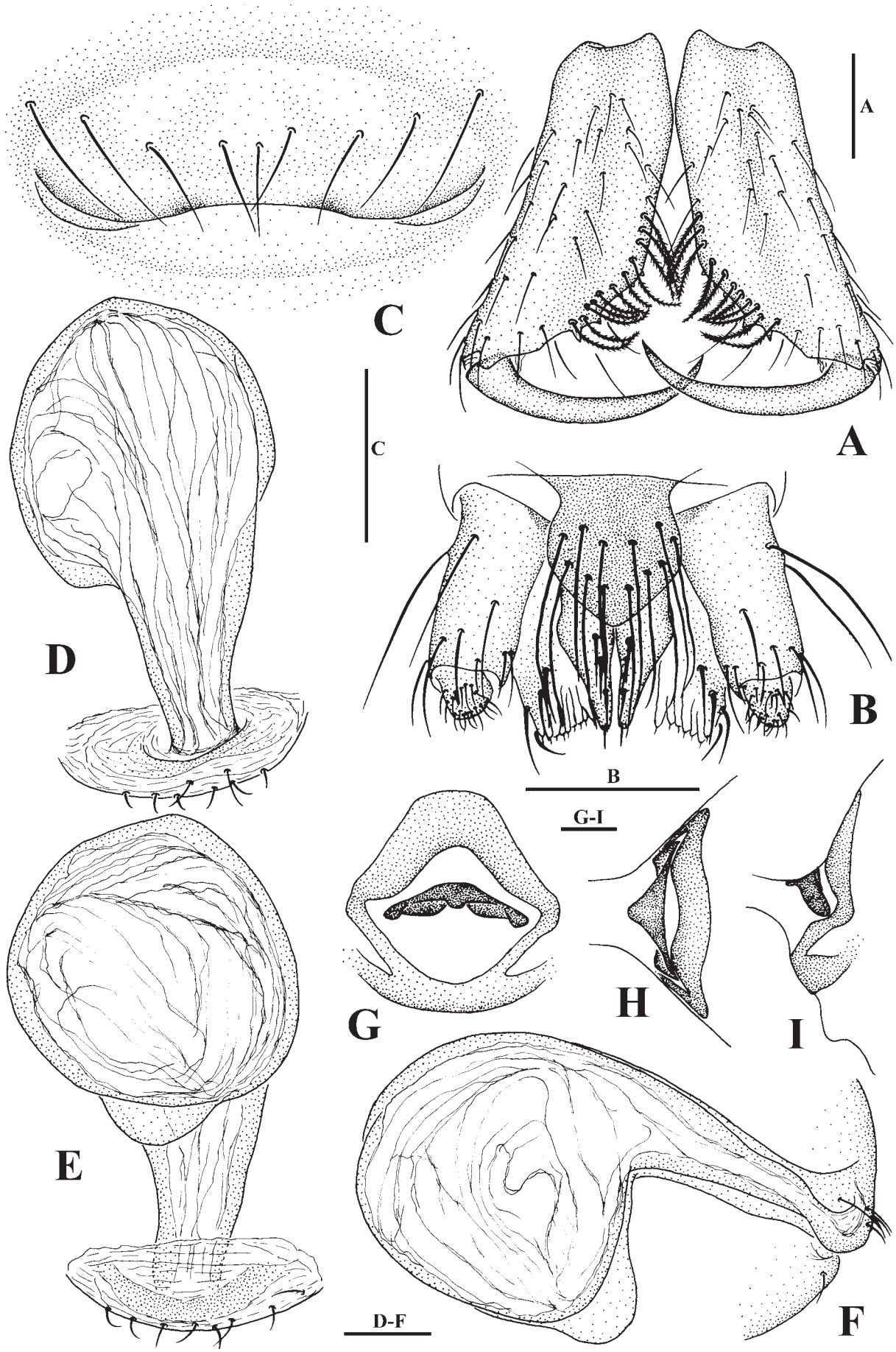

Fig. 6. *Telema cucphongensis* new species: A. Male chelicerae, frontal view; B. Female colulus and spinnerets, ventral view; C. Epiginal area, ventral view; D-F. Cleared spermatheca, anterior (D), posterior (E) and lateral view (F); G-I. Male abdominal pedicel, anterior (G), dorsal (H) and lateral view (I). Scale bars: 0.1 mm.

0.42); III 1.95 (0.60, 0.15, 0.52, 0.36, 0.32); IV 2.58 (0.82, 0.16, 0.72, 0.50, 0.38). Leg formula: I-II-IV-III. Abdominal dorsum blue, venter darkish. Pedicel with a trianglular and a rhombic anterodorsal sclerotized plates. Colulus pentagonal and dark. Spinnerets pale.

Palp with a prolateral cymbial apophysis and a trichobothrium near distal $^1/_3$ position of tibia. Femur, patella, tibia and tarsus modified by pigmental speckles. Distal tarsus with three prolateral plumose spines. Palpal bulb oval, apex with one broad embolus. The course of bulbous inner ejaculatory duct relatively complex (Fig. 5 A-D).

Female. Total length 1.22. Carapace 0.52 long, 0.48 wide; clypeus 0.14 high; sternum 0.32 long, 0.30 wide; abdomen 0.78 long, 0.66 wide. Coloration and modified pattern of body and legs same as in male. Leg measurements: I 2.82 (0.86, 0.16, 0.82, 0.52, 0.46); II 2.51 (0.80, 0.15, 0.72, 0.48, 0.36); III 1.94 (0.58, 0.14, 0.58, 0.34, 0.30); IV.2.46 (0.76, 0.16, 0.68, 0.46, 0.40). Leg formula: I-II-IV-III.

Genital area with one row of hairs, postmargin recurved. Vulval structure simple, spermatheca basally narrowed and distally swollen (Fig. 6 C-F).

Distribution. **–** Known only from the type locality (Fig. 13).

Telema exiloculata new species
(Figs. 7A−F, 8A−G)

Material examined. **–** Holotype - Male (IZCAS), Trung Trang Cave (20°48'N, 106°59'E; Alt: 256 m), Cat Ba National Park, Vietnam, coll. S. Li, G. Zheng & D.S. Pham, 16 July 2008.

Paratypes – 15 males and 43 females (IZCAS), same data as holotype.

Diagnosis. **–** The new species resembles to *T. spina* from China (Tong & Li, 2008) in having the similar palp, but can be distinguished by the underdeveloped eyespot, the lack of modified pigmentation in both sexes, the small and elliptic palpal bulb, the presence of seven plumose setae at distal palpal tarsus in male, the asymmetrical, distally swollen and basally narrowed spermatheca (female unknown in *T. spina*). *T. exiloculata* is similar to *T. cucphongensis* in the body size and the shape of palp, but different by the reduced eyespot, the narrower embolus, the longer and asymmetrical spermatheca.

Etymology. **–** The specific name is from Latin *exil-* = tiny, small and *oculata* = ocular, in reference to the vestigial eyespots on carapace of both sexes.

Description. **–** Holotype male. Total length 1.30. Carapace 0.60 long, 0.54 wide; clypeus 0.16 high; sternum 0.38 long, 0.34 wide; abdomen 0.76 long, 0.66 wide. Carapace, legs, sternum, labium, endites and chelicerae yellow. Abdomen pale yellow. Carapace smooth, without unmodified pattern, with paired of setae at clypeus, behind eyes and at thoracic fovea. Reduced six eyes remaining in white eyespots, almost same size, anterior eye row slightly recurved, separated from each other by about 1.5 times their diameter, lateral eyes contiguous. Cheliceral fang furrow with three large teeth, three barely visible granulous denticles and eleven plumose hairs on promargin, three barely visible denticles on retromargin. Legs with a dorsal spine at distal patella, three row of short spines on prolateral femur I. Tibia I-IV bear spines. Leg measurements: I 2.76 (0.85, 0.11, 0.86, 0.59, 0.35); II 2.33 (0.73, 0.11, 0.70, 0.48, 0.31); III 1.70 (0.56, 0.09, 0.49, 0.32, 0.24); IV 2.08 (0.70, 0.10, 0.61, 0.41, 0.26). Leg formula: I-II-IV-III. Abdomen pale yellow, almost globose, with sparse long hairs. Colulus pale and pentagonal, spinnerets pale, the anterior largest, the middle smallest.

Palp with a prolateral cymbial apophysis, elliptic bulb with a simple trigonal embolus that basally broad and distally bent (Fig. 7 A-C).

Female. Total length 1.56. Carapace 0.66 long, 0.58 wide; clypeus 0.16 high; sternum 0.38 long, 0.34 wide; abdomen 1.04 long, 0.94 wide. Eyes and chelicerae as in male. Leg measurements: I 2.66 (0.82, 0.11, 0.83, 0.55, 0.35); II 2.23 (0.70, 0.10, 0.68, 0.45, 0.30); III 1.67 (0.54, 0.09, 0.49, 0.31, 0.24); IV 2.07 (0.69, 0.10, 0.61, 0.41, 0.26). Leg formula: I-II-IV-III.

Genital area covered with long hairs on genital plate. A row of short spines present posterior epigastric furrow. Posterior margin of genital area straight, bilaterally slightly sclerotized. Spermatheca relatively large, with distinct shape, distorted two times medially, swollen distally, attaching to a distal-lateral vesicle (Fig. 8 C-G).

Distribution. **–** Known only from the type locality (Fig. 13).

Symphytognathidae Hickman 1931

Patu Marples 1951

Patu bispina new species
(Figs. 9A−E, 10A−F and 11A−F)

Material examined. **–** Holotype - Male (IZCAS), Mat Cave (20°21´N, 105°42´E; Alt: 18 m), Cuc Phuong National Park, Vietnam, coll. S. Li, 22 July 2008.

Paratypes – 13 males and 20 females (IZCAS), same data as holotype.

Diagnosis. **–** This new species is similar to *Patu silho* from Seychelles (Saaristo, 1996) and *Patu vitiensis* from Fiji (Marples, 1951), but can be distinguished by the presence of two large spurs on distal-ventral tibia II in male, the absence of a posterior protuberance on the globular abdomen, the modified spines and different shapes of palpal cymbium, the short and robust of embolus, the coiled copulatory ducts,

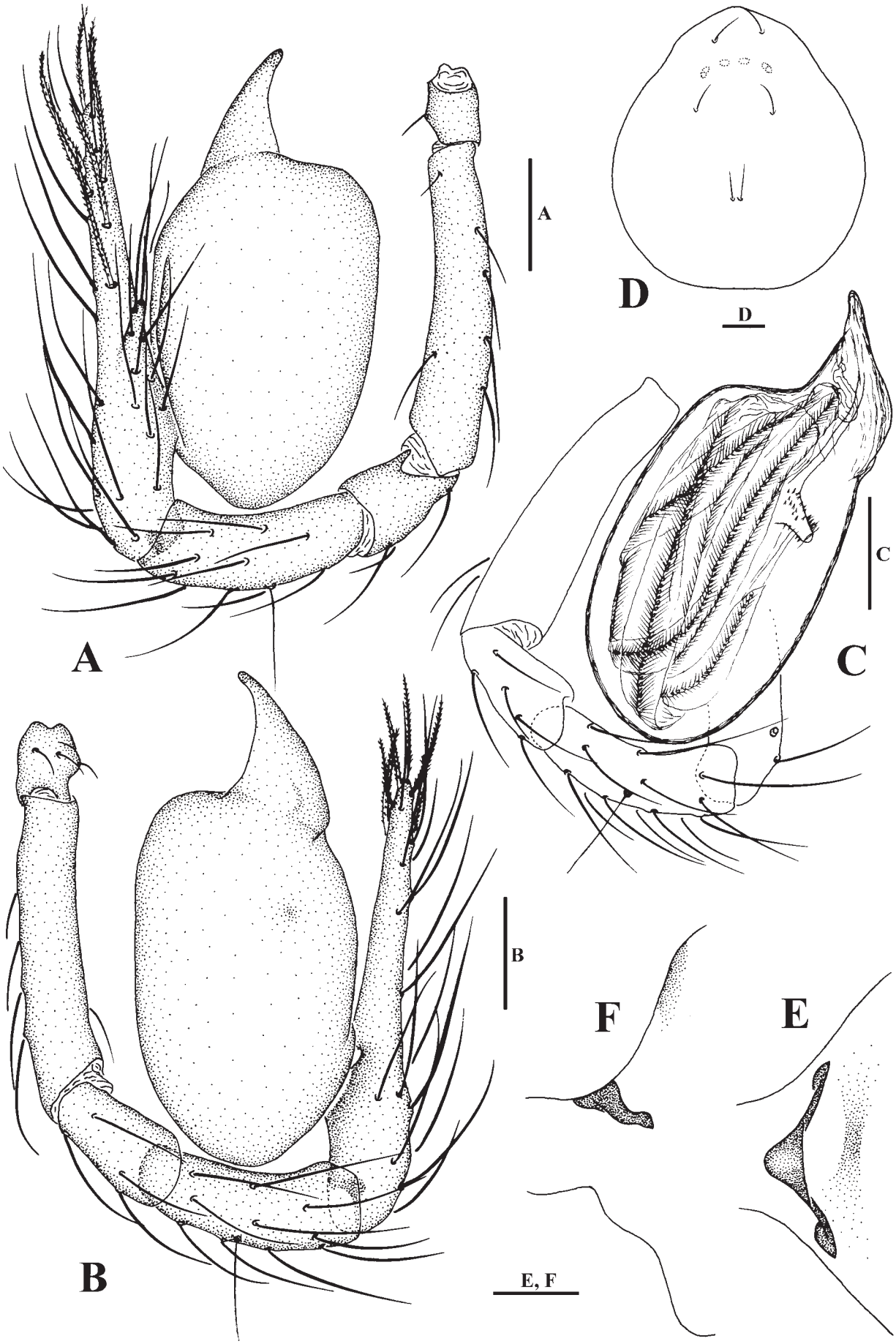

Fig. 7. *Telema exiloculata* new species: A. Male left palp, prolateral view; B. Ditto, retrolateral view; C. Ditto (treated in lactic acid), retrolateral view; D. Male carapace, dorsal view; E. Male abdominal pedicel, dorsal view; F. Ditto, lateral view. Scale bars: 0.1 mm.view; C-F. Male leg I-IV, prolateral view. Scale bars: 0.05 mm for A, B; 0.2 mm for C-F.

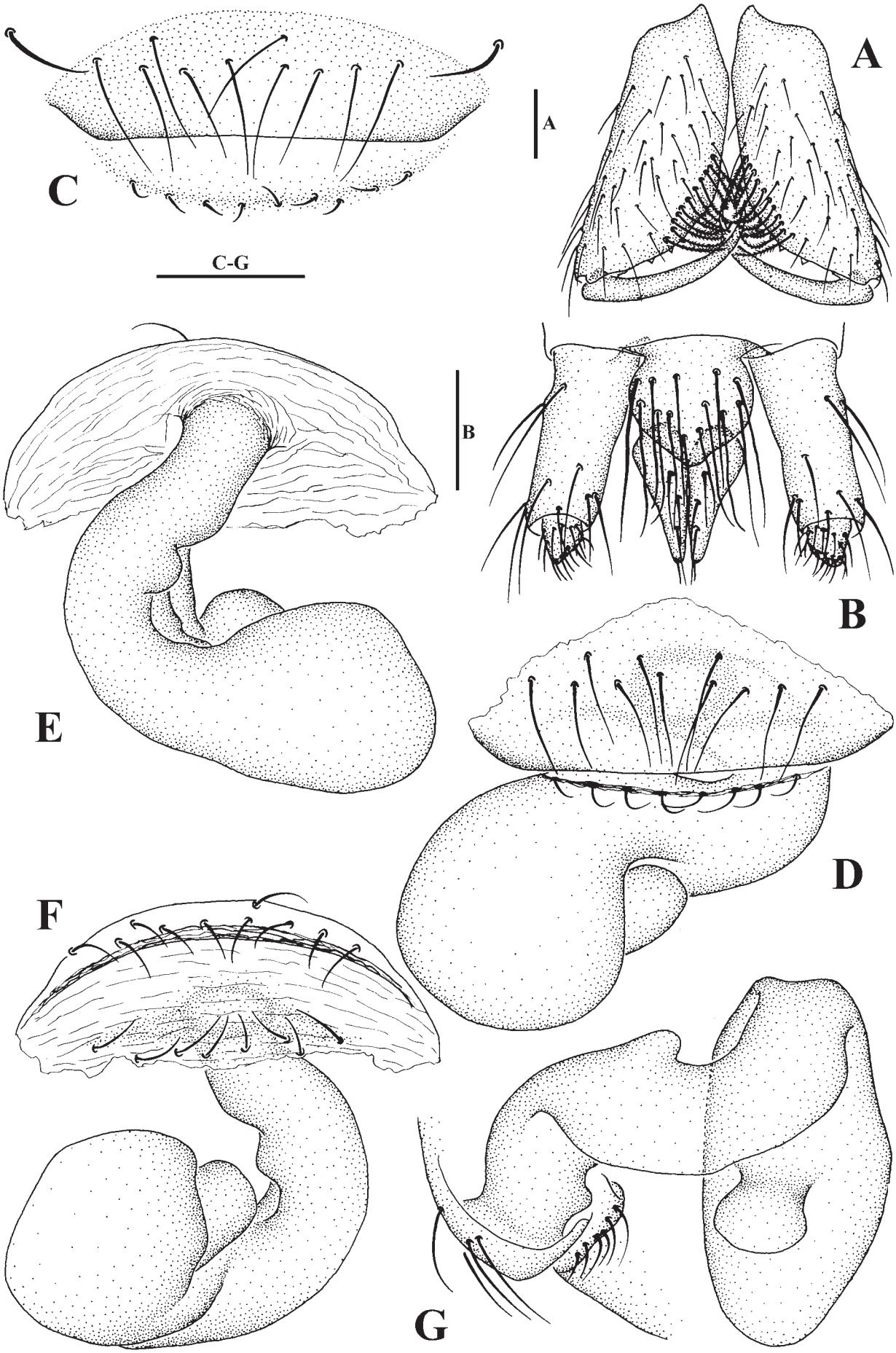

Fig. 8. *Telema exiloculata* new species: A. Male chelicerae, frontal view; B. Female colulus and spinnerets, ventral view; C. Female epiginal area, ventral view; D-G. Cleared spermatheca, ventral (D), anterior (E); posterior (F) and lateral view (G). Scale bars: 0.1 mm.

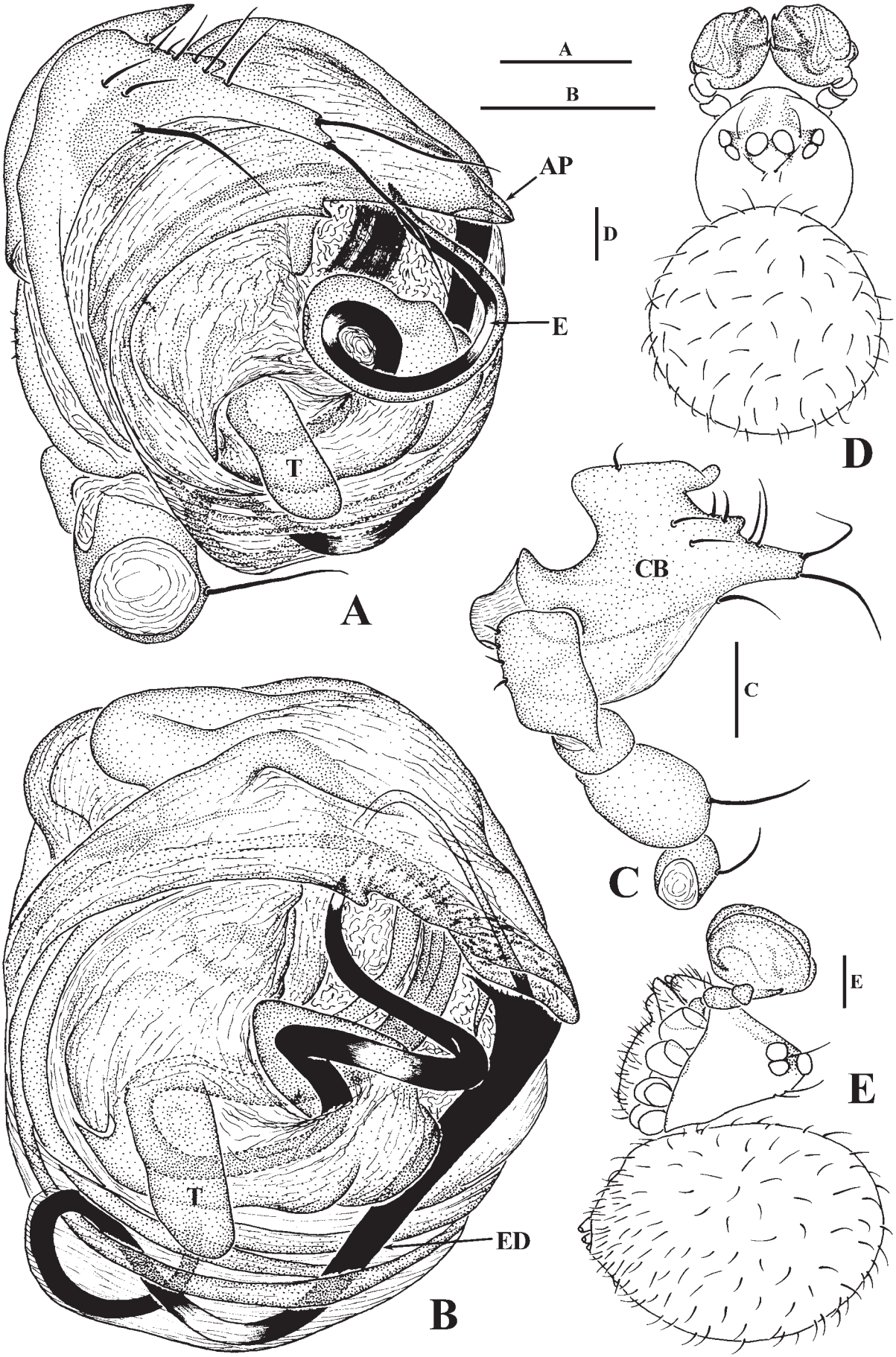

Fig. 9. *Patu bispina* new species: A. Male left palp, prolateral view; B. Palpal bulb, prolateral view; C. Palpal cymbium, dorsal view; D. Male body, dorsal view; E. Ditto, lateral view. Scale bars: 0.05 mm for A-C; 0.1 mm for D, E.view; C-F. Male leg I-IV, prolateral view. Scale bars: 0.05 mm for A, B; 0.2 mm for C-F.

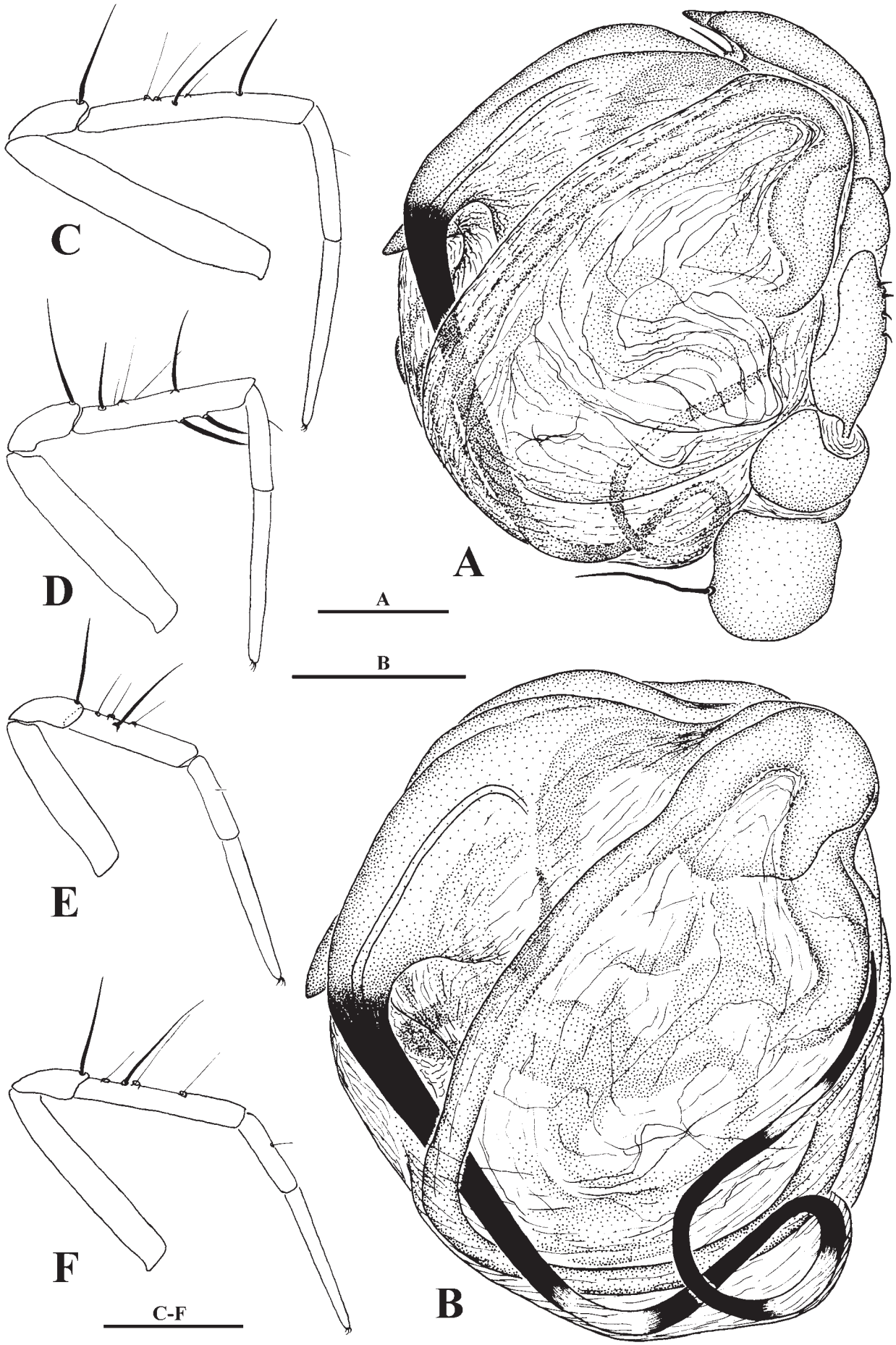

Fig. 10. *Patu bispina* new species: A. Male left palp, retrolateral view; B. Palpal bulb, retrolateral view; C-F. Male leg I-IV, prolateral view. Scale bars: 0.05 mm for A, B; 0.2 mm for C-F.

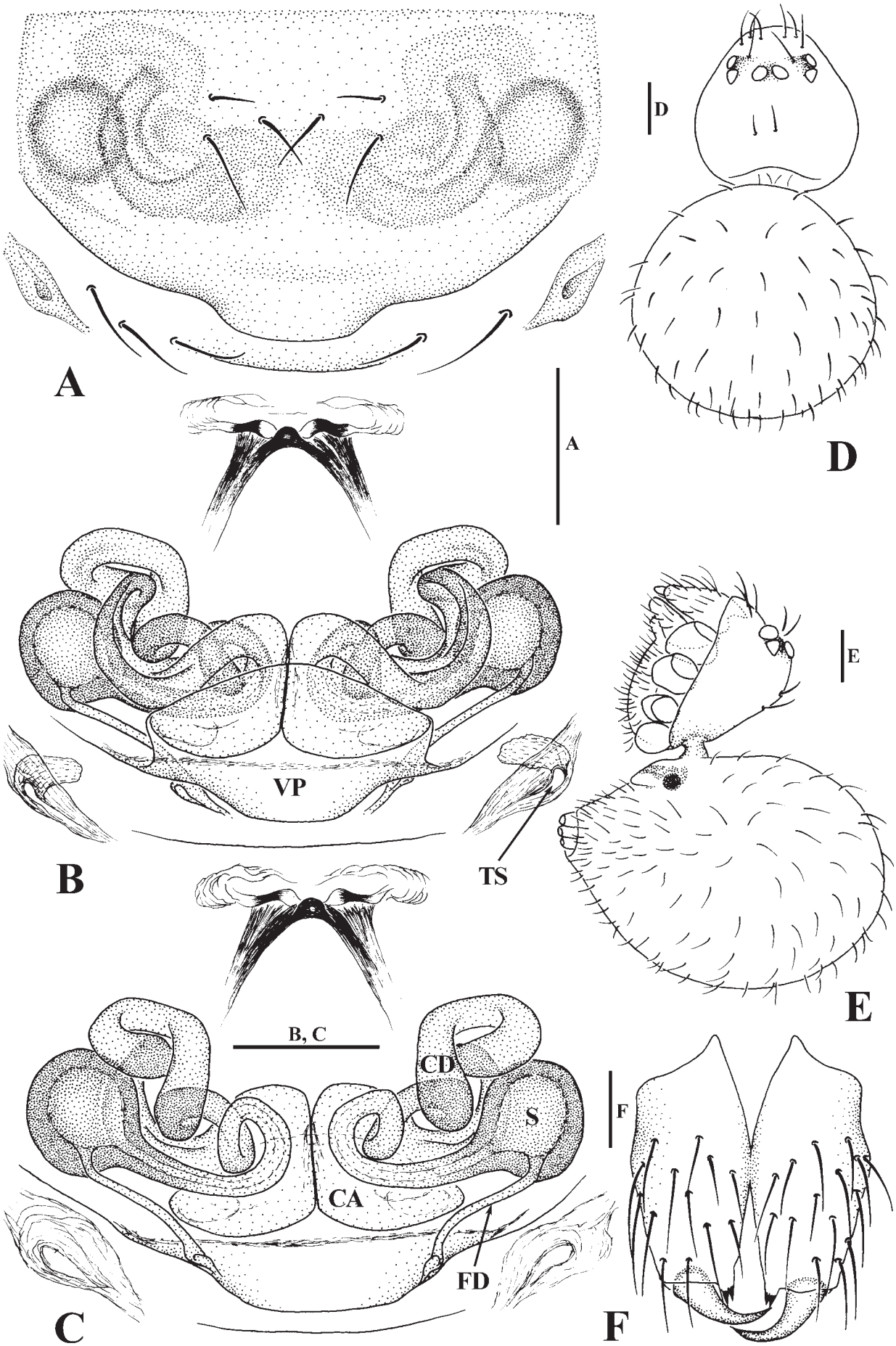

Fig. 11. *Patu bispina* new species: A. Female epigine, ventral view; B. Cleared vulva, ventral view; C. Ditto, dorsal view; D. Female body, dorsal view; E. Ditto, lateral view; F. Male chelicerae, frontal view. Scale bars: 0.05 mm for A, B, C and F; 0.1 mm for D and E.

the presence of a ventral plate, and the epigine with a wide lobe on posterior margin.

Etymology. **–** The specific epithet of the new species derives from Latin *bi-* = two, *spina* = spine, in reference to the presence of two strong spines on ventrally tibia II of male.

Description. **–** Holotype male. Total length 0.67. Carapace 0.30 long, 0.30 wide, 0.21 high. Sternum 0.22 long, 0.23 wide. Abdomen 0.44 long, 0.44 wide, 0.55 high. body pale yellow, without markings. Carapace bears two setae at the ocular area and thoracic area separately, with smooth margin. Six eyes in three diads; ALE diameter subequal to PLE's, smaller than PME's. Posterior eye row slightly recurved. Ocular area distinctly elevated. Clypeus width equal to three times ALE diameter. Chelicerae slender, fused at midline pars, shorter than endites, promargin with a pair of adnate teeth. Labium wider than long (length/width 0.29). Sternum wider than long (length/width 0.96), plump, bears tenuous hairs. Legs pale yellow, clothed with setae and bristles. Tibia II bears two strongly ventral spurs at distal end. Each tibia with three dorsal trichobothria. Legs measurement: I 1.31 (0.41, 0.12, 0.32, 0.19, 0.27); II 1.09 (0.33, 0.12, 0.25, 0.15, 0.24); III 0.87 (0.25, 0.10, 0.18, 0.13, 0.21); IV 1.01 (0.33, 0.11, 0.23, 0.13, 0.21). Leg formula: I-II-IV-III. Abdomen high (height/length 1.25), sparsely covered with long hairs, globular in dorsal view, posterior rear extended beyond spinnerets. Book lung absent. Anterior spinnerets larger than posterior ones, median spinnerets smallest; colulus absent.

Palp large. Femur, patella and tibia without any process. Tibia bears four short spines. Thin sclerotized cymbium with two outspread processes, two long hairs present on apex of a large process. Palpal bulb large, almost ovate. Radix haematodocha swollen with rugous membrane. Tegulum nearly rectangular and distinctly sclerotized. Embolus long, coiled and strongly sclerotized, intertwisted with conductor. Proximal conductor and most of embolus embedded in the radix haematodocha. Terminal apophysis large, smooth and sclerotized. Embolus arising from bottom of terminal apophysis (Fig. 9 A-C; 10 A, B).

Female. Total length 0.75. Carapace 0.32 long, 0.31 wide, 0.16 high. Sternum 0.23 long, 0.24 wide. Abdomen 0.45 long, 0.46 wide, 0.58 high. Coloration and modification of body and legs same as in male. Palp absent. Ocular area upheaved. Posterior median eye smaller than in male. Posterior eyes row straight. Clypeus lower than in male. Legs measurement: I 1.24 (0.39, 0.12, 0.31, 0.17, 0.25); II 1.05 (0.33, 0.12, 0.23, 0.14, 0.23); III 0.90 (0.26, 0.10, 0.19, 0.13, 0.22); IV 1.01 (0.32, 0.11, 0.22, 0.13, 0.23). Leg formula: I-II-IV-III. Abdomen covered with long hairs, globular, slightly longer than wide (length/width 0.98), very high (height/length 1.29) and posterior rear extending beyond spinnerets. Book lung absent. A pair of spiracles near epiginal furrow. Colulus absent.

Epigine surface smooth, bears three pairs of long hairs, with a broad, short lobe. Vulva complex. Fertilization ducts straight, short and thin, spermathecae widely spaced, globose, strongly sclerotized. Copulatory ducts long, coiled, with broad distal ends. Ventral plate rhombic, smooth, membranous, covered partially fertilization ducts and end of copulatory ducts (Fig. 11 A-C).

Distribution. **–** Known only from the type locality (Fig. 13).

Anapistula Gertsch 1941

Anapistula orbisterna new species
(Figs. 12A−F)

Holotype. **–** Female (IZCAS), Mat Cave (20°21'N, 105°42'E; Alt: 18 m), Cuc Phuong National Park, Vietnam, coll. S. Li, 22 July 2008.

Diagnosis. **–** This new species resembles *Anapistula secreta* from Panama (Gertsch, 1941), but can be distinguished by the globose spermathecae, the broad median epiginal median ducts and the long fertilization ducts.

Etymology. **–** The specific name derives from Greek *orbi-* = orbicular and *stern-* = sternum, referring to the nearly round sternum in female.

Description. **–** Holotype female. Total length 0.66. Carapace 0.28 long, 0.27 wide, 0.21 high. Sternum 0.21 long, 0.21 wide. Abdomen 0.36 long, 0.32 wide, 0.40 high. Carapace pale yellow, flat, smooth, with paired long hairs at ocular and thoracic areas respectively, without pigmental pattern. Four eyes in two diads, subequal in size, ovoid and white. Anterior margin of clypeus without short setae. Clypeus width subequal to 2.5 times ALE diameter. Palp absent. Chelicerae yellow, fused at midline pars, each with two sharp adnate teeth. Labium wider than long (length/width 0.45). Sternum length and width subeuqal (length/width 1.00). Legs clothed with setae and bristles. Each tibia bears a mesial-dorsal spine and three proximal trichobothria. Legs measurement: I 1.10 (0.34, 0.12, 0.24, 0.14, 0.26); II 1.02 (0.32, 0.12, 0.22, 0.14, 0.22); III 0.79 (0.24, 0.10, 0.14, 0.11, 0.20); IV 0.95 (0.29, 0.11, 0.19, 0.12, 0.24). Leg formula: I-II-IV-III. Abdomen pale, covered with long hairs, globular, slightly longer than wide (length/width 1.13), relatively high (height/length 1.11), and posterior rear expanded beyond spinnerets. Anterior spinnerets slightly larger than posterior ones; median spinnerets smallest; colulus absent. Book lung absent. Two pairs of spiracles.

Epigine relatively small, unsclerotized, surface smooth, bears sparse long hairs. Vulva relatively simple. Spermathecae widely spaced, globose, distinctly sclerotized. Fertilization ducts long, thin, derived from ventral spermathecae. Epiginal median ducts wide, with broad base and cupped

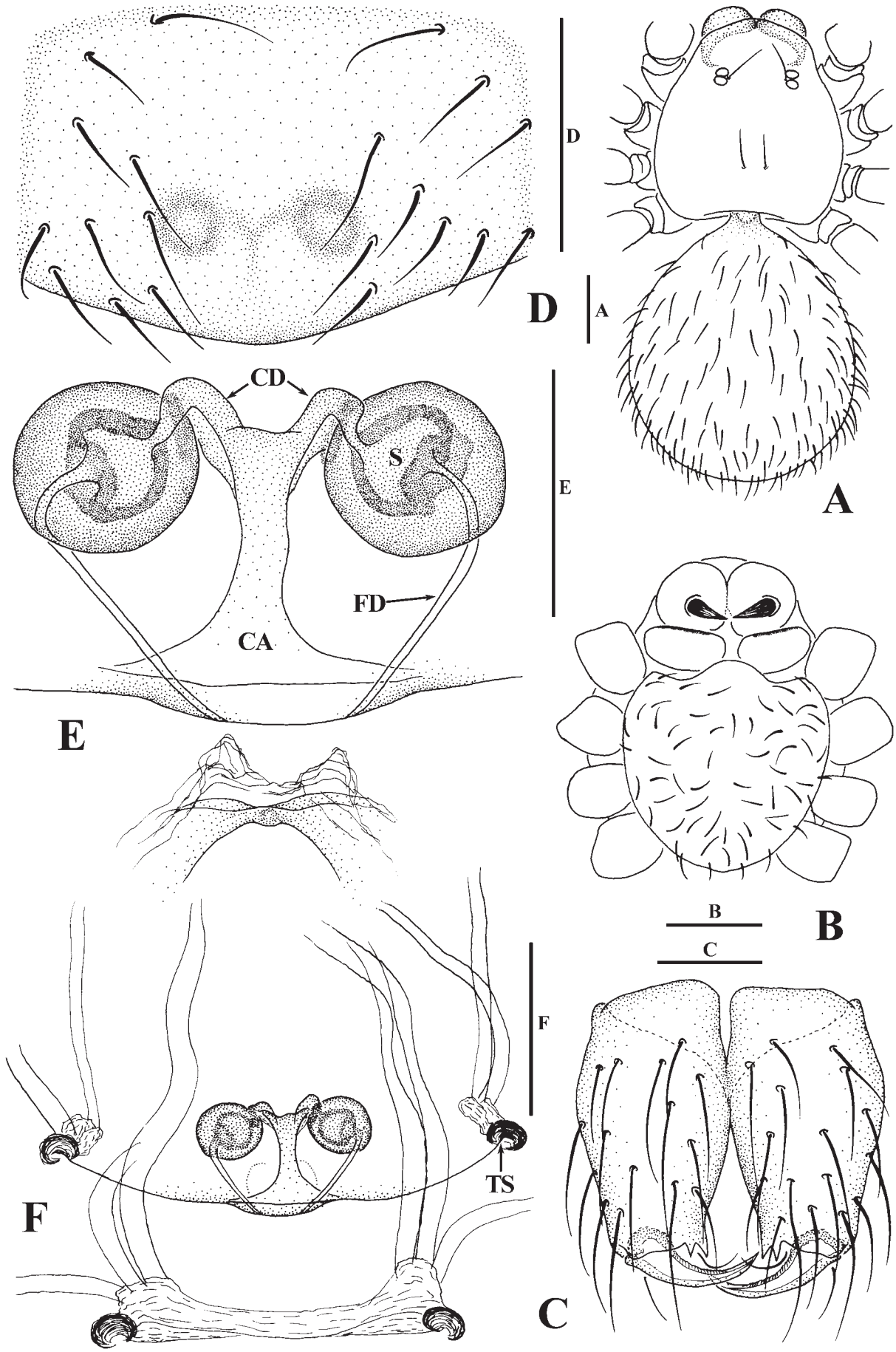

Fig. 12. *Anapistula orbisterna* new species: A. Female body, dorsal view; B. Sternum, coax, labium and maxillae, ventral view; C. Female chelicerae, frontal view; D. Epigine, ventral view; E. Cleared vulva, dorsal view; F. Cleared vulva and tracheal system, ventral view. Scale bars: 0.1 mm for A and B; 0.05 mm for C, D and F; 0.025 mm for E.

top. Bilateral branches short, directly connected to the spermathecae. Ventral plate absent (Fig. 12 D-F).

Male. Unknown.

Distribution. **–** Known only from the type locality (Fig. 13).

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LITERATURE CITED

Baert, L. & R. Jocqué, 1993. *Anapistula caecula* n. sp., the smallest known female spider (Araneae, Symphytognathidae). *Journal of African Zoology*, **107:** 187-189.

Baptista, R. L. C., 2003. *Speocera eleonorae* sp. n., the first troglomorphic spider from Brazilian caves (Araneae: Ochyroceratidae). *Revista Ibérica de Aracnolofía*, **7:** 221-224.

Bourne, J. D., 1980. New armored spiders of the family Tetrablemmidae from New Ireland and northern India (Araneae). *Revue suisse de Zoologie*, **87:** 301-317.

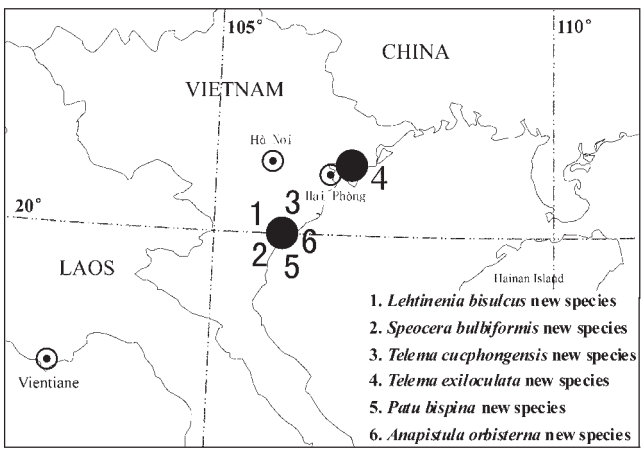

Fig. 13. Locality records of cave spiders in Vietnam.

Bourne, J. D., 1981. Two new armoured spiders of the genus *Paculla* Simon, 1887 from Sarawak (Araneae: Pacullidae). *Bulletin of the British Arachnological Society*, **5:** 217-220.

Brignoli, P. M., 1972a. Some cavernicolous spiders from Mexico (Araneae), in "Subterranean fauna of Mexico, Part I". *Quaderna Accademia Nazionale dei Lincei*, **171:** 129–155.

Brignoli, P. M., 1972b. Spinnen aus Nepal, I. *Paculla martensi* n. sp. (Arachnida: Araneae: Pacullidae). *Senckenbergiana biologica*, **53:** 95-100.

Brignoli, P. M., 1973. Ragni della Melanesia, I. Un nuovo *Tetrablemma* di Guadalcanal (Isole Salomone) (Araneae Tetrablemmidae). *Memorie della Societa Entomologica Italiana*, **52:** 79-88.

Brignoli, P. M., 1974. Tetrablemmidae (Araneae) dell'Angola e della Zaire. *Publicações culturais da Companhia de Diamantes de Angola*, **88:** 177-196.

Brignoli, P. M., 1975. Über die Gruppe der Haplogynae (Araneae). Proceedings of the 6th International Arachnology. Congress, 33-38.

Brignoli, P. M., 1976. On some recent papers about Indian spiders. *Bulletin of the British Arachnological Society*, **3:** 211-213.

Brignoli, P. M., 1977. Two new spiders from Sumatra (Araneae, Telemidae and Ochyroceratidae). *Zoologische Mededelingen Leiden*, **50:** 221-229.

Brignoli, P. M., 1978a. Contributions à l'étude de la faune terrestre des îles granitiques de l'archipel des Séchelles (Mission P.L.G. Benoit - J.J. Van Mol 1972). Araneae Tetrablemmidae. *Revue de Zoologie Africaine*, **92:** 431-435.

Brignoli, P. M., 1978b. Spinnen aus Brasilien IV. Zwei neue blinde Bodenspinnen aus Amazonien (Arachnida, Araneae). *Beiträge naturkundliche Forschungen Südwest-Deutschlands*, **37:** 143-147.

Brignoli, P. M., 1978c. A few notes on a remarkable South African troglobitic spider, *Cangoderces lewisi* Harington, 1951 (Araneae: Telemidae). *Revue Suisse de zoologie*, **85:** 111-114.

Brignoli, P. M., 1980. Ricerche nell'Asia sudorientale dell'Istituto di Zoologia de L'Aquila. I. Due nuovi ragni di Celebes (Araneae: Pacullidae, Mimetidae). *Bollettino della Societa Entomologica Italiana*, **112:** 162-166.

Burger, M., 2005. The spider genus *Indicoblemma* Bourne, with description of a new species (Araneae: Tetrablemmidae). *Bulletin of the British Arachnological Society*, **13:** 97-111.

Deeleman-Reinhold, C. L., 1980. Contribution to the knowledge of the southeast Asian spiders of the families Pacullidae and Tetrablemmidae. *Zoologische Mededelingen Leiden*, **56:** 65-82.

Deeleman-Reinhold, C. L., 1993. A remarkable troglobitic tetrablemmid spider from a cave in Thailand (Arachnida: Araneae: Tetrablemmidae). *Natural Historial Bulletin of the Siam Society*, **41:** 99-103.

Deeleman-Reinhold, C. L., 1995. The Ochyroceratidae of the Indo-Pacific region (Araneae). *The Raffles Bulletin of Zoology*, (suppl), **2**: 1-103.

Dumitrescu, M. & M. Georgescu, 1992. Ochyroceratides de Cuba (Araneae). *Mémoires de Biospéologie*, **19:**143-153.

Fage, L. 1912. Etudes sur les Araignées cavernicoles. I. Revision des Ochyroceratidae (n. fam.). Biospelogica, XXV, *Archives de Zoologie Expérimentale et Generale*, **10(5):** 97–162.

Fage L. 1913. Etudes sur les Araignées cavernicoles. II. Revision des Leptonetidae. Biospelogica, XXIX, *Archives de Zoologie Expérimentale et Generale*, **10(5):** 479-576.

Forster, R. R., 1958. Spiders of the family Symphytognathidae from North and South America. *American Museum Novitates*, **1885**: 1-14.

Forster, R. R. & N. I. Platnick, 1977. A review of the spider family Symphytognathidae (Arachnida, Araneae). *American Museum Novitates*, **2619:** 1-29.

Gertsch, W. J., 1941. Report on some arachnids from Barro Colorado Island, Canal Zone. *American Museum Novitates*, **1146**: 1-14.

Gertsch, W. J., 1973. A report on cave spiders from Mexico and Central America. *Bulletin of Association for Mexican Cave Studies*, **5:** 141-163.

Grismado, C. J. and M. J. Ramírez, 2004. A new species of the genus *Storenomorpha* Simon from Vietnam (Araneae: Zodariidae). *Zootaxa*, **453**: 1-7.

Harington, J. S., 1951. A new leptonetid spider, *Cangoderces lewisi*, n. gen., n. sp., from the Cango Caves, Oudtshoorn. *Annals of the Natal Museum*, **12:** 81-90.

Harvey, M. S., 1998. A review of the Australasian species of *Anapistula* Gertsch (Araneae: Symphytognathidae). *Records of the Western Australian Museum*, **19:** 111-120.

Hickman, V. V., 1931. A new family of spiders. *Proceedings of the Zoological Society of London (B)*, **1931:** 1321-1328.

Hiramatsu, T. & A. Shinkai, 1993. Web structure and web-building behavior of *Patu* sp. (Araneae: Symphytognathidae). *Acta Arachnologica*, **42:** 181-185.

Hogg, H. R., 1922. Some spiders from south Annam. *Proceeding of the Zoological Society of London*, 285-312.

Jäger, P., 2003. *Rhitymna* Simon 1897: an Asian, not an African spider genus. Generic limits and descriptions of new species (Arachnida, Araneae, Sparassidae). *Senckenbergiana biologica*, **82**: 99-125.

Jäger, P. & V. Vedel, 2005. *Pseudopoda fissa* sp. nov. – first recode of the genus from Vietnam (Araneae, Sparassidae). *Zootaxa*, **837**: 1-5.

Lehtinen, P. T., 1981. Spiders of the Oriental-Australian region. III . Tetrablemmidae, with a world revision. *Acta Zoologica Fennica*, **162**: 1-151.

Li, S. & X. Wang 2009. *Endemic spiders in China.* Online at http://www.ChineseSpecies.com & http://www.amaurobiidae.com/araneae/ (accessed: 7 March, 2009).

Lin, Y. & S. Li, 2008. A new species of the family Telemidae (Arachnida, Araneae) from Xishuangbanna rainforest, China. *Acta Zootaxonomica Sinica*, **33:** 650-653.

Marples, B. J., 1951. Pacific symphytognathid spiders. *Pacific Science*, **5**: 47-51.

O. Pickard-Cambridge., 1873. On some new genera and species of Araneida. *Procceeding of the Zoological Society of London*, 1873: 112-129.

Ono, H., 1996. A list of spider families of Japan. *In* Ishii, M., T. Ohtani & Y. Johki (eds.): *The Encyclopaedia of Animals of Japan*, 8 (Insects I): 25-27. Heibonsha, Tokyo. (In Japanese.)

Ono, H., 2002. First record of the genus *Anapistula* (Araneae, Symphytognathidae) from Asia. *Bulletin of tne National Science Museum: Tokyo (A)*, 28: 61-64.

Pham, D. S, X. Xu & S. Q. Li, 2007. A preliminary note on spider fauna of Vietnam (Arachnida: Araneae). *Acta Arachnologica Sinica*, **16**(2): 121-128.

Platnick, N. I., 2009. The world spider catalog, version 9.5. American Museum of Natural History, online at http://research.amnh.org/entomology/spiders/catalog/index.html (accessed: 28 January, 2009).

Saaristo, M. I., 1996. Symphytognathidae (Arachnida, Araneae), a new spider family for the granitic islands of Seychelles. *Phelsuma*, **4**: 53-56.

Saaristo, M. I., 1998. Ochyroceratid spiders of the granitic islands of Seychelles (Araneae, Ochyroceratidae). *Phelsuma*, **6:** 20-26.

Schwendinger, P. J., 1989. On three new armoured spiders (Araneae: Tetrablemmidae, Pacullinae) from Indonesia and Thailand. *Revue suisse de Zoologie*, **96:** 571-582.

Schwendinger, P. J., 1994. Four new *Perania* (Araneae: Tetrablemmidae, Pacullinae) from Thailand and Malaysia. *Revue suisse de Zoologie*, **101:** 447-464.

Shear, W. A., 1978. Taxomomic notes on the armored spiders of the families Tetrablemmidae and Pacullidae. *American Museum Novitates*, **2650:** 1-46.

Shear, W. A., 1979. *Pahanga*, a new tetrablemmid spider genus from Malaysia (Araneae, Tetrablemmidae). *Bulletin of the British Arachnological Society*, **4:** 294-295.

Simon, E., 1886. Arachnides recuellis par M. A. Pavie (sous chef du service des postes au Cambodge) dans le royaume de Siam, au Cambodge et en Cochinchine. *Actes de la Société linnéenne de Bordeaux*, **40:** 137-166.

Simon, E., 1903. Etudes arachnologiques 33e Mémoire. LIII. Arachnides recueillis à Phuc-Son (Annam) par M. H. Fruhstorfer (nov-dec. 1899). *Annales de la Societe Entomologica des France*, **71:** 725-736.

Simon, E., 1904. Arachnides recueillis par M. A. Pavie en Indochine. In *Mission Pavie en Indochine 1879-1895. III. Recherches sur l'histoire naturells de l'Indochine Orientale*. Paris, Pp. 270-295.

Simon, E., 1909. Etude sur les arachnides du Tonkin (lre partie). *Bulletin Scientifique de la France et de la Belgique*, **42:** 69-147.

Song, D. & M. Zhu, 1994. On some species of cave arachnids of China. In: Du X. H. (ed.), Collected Papers on Zoology in Celebration of the Sixtieth Anniversary of the Founding of the Zoological Society of China and in Honor of the Centenary of the Birth of Professor Zhen Chen. *Zoological Society of China*, Beijing, pp. 35-46.

Tong, Y. & S. Li, 2006. Symphytognathidae (Araneae), a spider family newly recorded from China. *Zootaxa*, **1259:** 33-38.

Tong, Y. & S. Li, 2007. First records of the family Ochyroceratidae (Arachnida: Araneae) from China, with descriptions of a new genus and eight new species. *The Raffles Bulletin of Zoology*, **55:** 63-76.

Tong Y. & S. Li, 2008a. Tetrablemmidae (Araneae), a new record family from China. *Organisms Diversity & Evolution*, **8**: 84-98.

Tong Y. & S. Li, 2008b. Four new cave-dwelling *Telema* spiders (Araneae, telemidae) from Guizhou Province, China. *Zoosystema*, **30**(2), 1-10.

Tong, Y. & S. Li, 2008c. The spiders of the genus *Telema* (Araneae: Telemidae) from Hainan Island, China. *The Raffles Bulletin of Zoology*, **56**(1): 59-66.

Tu, L. & S. Li, 2004. A preliminary study of erigonine spiders (Linyphiidae: Erigoninae) from Vietnam. *The Raffles Bulletin of Zoology*, **52**: 419-433.

Tu, L. & S. Li, 2006. Three new and four newly recorded species of Linyphiinae and Micronetinae spiders (Araneae: Linyphiidae) from Northern Vietnam. *The Raffles Bulletin of Zoology*, **54**: 117-131.

Wang, X. & J. Ran, 1998. A new cave spider of the genus *Telema* (Araneae: Telemidae) from China. *Acta Zoologica Taiwanica*, **9:** 93-96.

Wunderlich, J., 1995. Beschreibung bisher unbekannter Spinnenarten und -Gattungen aus Malaysia und Indonesien (Arachnida: Araneae: Oonopidae, Tetrablemmidae, Telemidae, Pholcidae, Linyphiidae, Nesticidae, Theridiidae und Dictynidae). *Beiträge zur Araneologie.* **4:** 559-579.

Zabka, M., 1985. Systematic and zoogeographic study on the family Salticidae (Araneae) from Vietnam. *Annales Zoologici*, Warszawa, **39**: 197-485

Zhu, M. & H. Chen, 2002. A new cave spider of the genus *Telema* from China (Araneae: Telemidae). *Acta Zootaxonomica Sinica*, **27:** 82-84.