

Four new cave-dwelling species of *Telema* (Arachnida, Araneae, Telemidae) from Guizhou Province, China

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ABSTRACT

Four new species of the spider genus *Telema* from caves in Guizhou Province, China, are diagnosed, described and illustrated. Three of these, *Telema circularis* n. sp., *T. claviformis* n. sp. and *T. grandidens* n. sp. are slightly troglomorphic species, with relatively long legs and without eyes. They differ from congeners and from each other in the male palpal structure, the female spermathecae, the shape of colulus, the distinctive large tooth at the middle of fang furrow (*T. grandidens* n. sp.) and the nearly rounded carapace (*T. circularis* n. sp.). A further species, *T. oculata* n. sp., has a clearly pigmented body, relatively shorter legs and distinctive eyes. It differs from congeners, except *T. nipponica* (Yaginuma, 1972), by the presence of eyes, and from *T. nipponica* by the different shape of sternum, the relatively long legs, the larger body size and the symmetric spermatheca.

KEY WORDS

Arachnida,
Araneae
Telemidae,
troglomorphy,
caves,
Yunnan-Guizhou
Plateau,
new species.

RÉSUMÉ

Quatre nouvelles espèces de *Telema* (Arachnida, Araneae, Telemidae) provenant de grottes de la province de Guizhou, Chine.

Quatre nouvelles espèces d'araignées du genre *Telema* sont décrites et illustrées à partir de spécimens provenant de grottes de la province de Guizhou en Chine. Trois d'entre elles, *Telema circularis* n. sp., *T. claviformis* n. sp. et *T. grandidens* n. sp., présentent quelques caractères cavernicoles comme des pattes relativement longues et la perte des yeux. Elles diffèrent légèrement de leurs congénères et les unes des autres quant à la structure du palpe mâle, la spermatheque femelle, la forme du colulus, la grande dent caractéristique au milieu de la marge des crochets (*T. grandidens* n. sp.) et la carapace presque arrondie (*T. circularis* n. sp.). L'autre espèce nouvelle, *T. oculata* n. sp., a un corps de couleur claire, des pattes relativement plus courtes et des yeux caractéristiques. Elle diffère de ses congénères, excepté *T. nipponica* (Yaginuma, 1972), par la présence d'yeux, et de *T. nipponica* par la forme du sternum, les pattes relativement plus longues, le corps plus grand et la spermatheque symétrique.

MOTS CLÉS

Arachnida,
Araneae
Telemidae,
troglomorphy,
grottes,
plateau du
Yunnan-Guizhou,
espèces nouvelles.

INTRODUCTION

Guizhou, with an area of more than 170 000 km², is located in the eastern part of Southwest China's Yunnan-Guizhou Plateau. The province is more than 1000 m above sea level, adding to its rich mountainous topography. Owing to folds, faults and erosion, the plateau is intersected with mountains, hills, basins and valleylands, giving it a very rugged topography. Indeed, in many areas of the province the world-famous karst rock is found with numerous caverns. However, research on cave spider fauna is not yet sufficiently developed, only a few species has been reported (Wang & Ran 1998; Wang *et al.* 1999; Zhu *et al.* 1999, 2001; Chen *et al.* 2000; Huang *et al.* 2002; Zhu & Chen 2002; Chen & Zhu 2004, 2005), whereas at least several times as more can be expected to occur in this area. Recently, an intensive survey to Guizhou Province with the objective of collecting cave spider fauna has been done. Several papers will be published to describe the spider fauna collected from this expedition, including four new *Telema* Simon, 1882 species (family Telemididae Fage, 1913) reported in the current paper.

The spider family Telemididae contains only seven genera and 22 species (Yaginuma 1972, 1973; Song & Zhu 1994; Platnick 2007), but is widely distributed from tropical Africa, Europe, East and South East Asia to North and Central America (Brignoli 1977). The spiders of this family are of small size (usually < 2 mm), and can be distinguished from other spiders by a transverse zigzag ridge located anterodorsally on the abdomen. They are usually found in moist conditions, such as in leaf litter, under rocks and in caves.

The genus *Telema* was erected by Simon in 1882, based on a tiny eyeless spider, *T. tenella* Simon, 1882. Up to the present, six species were described under *Telema*, all of them are known only from caves. All the specimens studied in this paper were caught in caves too. This suggests that *Telema* is likely to be an entirely troglomorphic genus. Three of the four new *Telema* species (*T. circularis* n. sp., *T. claviformis* n. sp. and *T. grandidens* n. sp.) have slightly troglomorphic characters, with relatively long legs and without eyes. A further species, *T. oculata* n. sp., is however not troglomorphic, with clearly pigmented body, relatively short legs and large eyes.

The known *Telema* species has a disjunctive distribution pattern. The type species, *T. tenella*, is recorded in Europe (France and Spain), *T. mayana* occurs in South America (Guatemala), and the other species are all distributed in East Asia (China, Japan). This pattern is based on a poor taxonomic study of this group. However, if this is true, it suggests an ancestral widespread distribution, with subsequent extinction in the intervening area. Caves might have played the role of refuges during the extinction event. This is another interesting scientific question.

MATERIAL AND METHODS

Specimens were examined using an Olympus SZX12 stereomicroscope. Further details were studied under an Olympus BX51 compound microscope. All illustrations were made using a drawing tube and inked on ink jet plotter paper. Photos were made with an Olympus C7070 wide zoom digital camera (7.1 megapixels) mounted on an Olympus SZX12 stereomicroscope. Male palps and female genitalia were examined and illustrated after they were dissected from the spider's bodies. Vulvae of female were cleared in lactic acid.

All measurements were made using an Olympus BX51 compound microscope and are given in millimeters. Leg measurements are shown as: total length (femur, patella, tibia, metatarsus, tarsus).

ABBREVIATIONS

AL	anterior lateral eyes;
AM	anterior median eyes;
IZCAS	Institute of Zoology, Chinese Academy of Sciences, Beijing;
MNHN	Muséum national d'Histoire naturelle, Paris.

SYSTEMATICS

Family TELEMIDAE Fage, 1913

Genus *Telema* Simon, 1882

Telema Simon, 1882: 205.

TYPE SPECIES. — *Telema tenella* Simon, 1882.

DIAGNOSIS. — Six eyes, anterior row nearly straight, laterals contiguous; or degenerate to eyeless. Labium wider than long. Cymbium usually with an apophysis prolaterally; bulb oval, embolus simple. Female genitalia

simple, with a long unpaired tube-like spermatheca.

DISTRIBUTION. — East Asia (China, Japan), Central America (Guatemala), Europe (France, Spain).

KEY TO SPECIES OF *TELEMA* SIMON, 1882

(*T. mayana* Gertsch, 1973, only known from female, is not included)

1. Eyes present 2
— Eyes absent 3
2. Sternum outer margin triangular, obtusely inserted into coxae IV *T. nipponica*
— Sternum outer margin smooth, not inserted into coxae IV *T. oculata* n. sp.
3. Male cymbium without prolateral apophysis 4
— Male cymbium with prolateral apophysis 5
4. Embolus long, distal half strongly narrowed *T. wunderlichi*
— Embolus short and small, smoothly narrowed towards tip *T. tenella*
5. Chelicerae with tiny teeth, or without teeth 6
— Chelicerae at least with one distinct tooth 7
6. Male palpal embolus long; female spermatheca with distally swollen end *T. liangxi*
— Male palpal embolus short; female spermatheca with distal end spiral, curved posteriorly *T. dongbei*
7. Angle of embolus to the bulb smaller than 90°; female spermatheca strong, curved posteriorly *T. grandidens* n. sp.
— Embolus nearly straight to the bulb; female spermatheca otherwise 8
8. Embolus with acute tip; spermatheca boot-shaped in lateral view *T. circularis* n. sp.
— Embolus with blunt tip; spermatheca narrow and long, stick-shaped ... *T. claviformis* n. sp.

Telema circularis n. sp.

(Figs 1A; 2)

TYPE MATERIAL. — Holotype: China, Guizhou Province, Guanling Bouyeizu Miaozi Autonomic County, Shangguan Town (25°48'N, 105°40'E), Gan-Zhi-Shu-Dong Cave, 8.V.2005, leg. Y. F. Tong & Y. C. Lin, ♂ (MNHN)

Paratypes: same data as holotype, 2 ♂♂, 16 ♀♀ (IZCAS); 1 ♂, 2 ♀♀ (MNHN).

ETYMOLOGY. — The specific name is from Latin *circularis*, round, and refers to the nearly round carapace.

DIAGNOSIS. — The new species is similar to *T. dongbei* Wang & Ran, 1998, but can be distinguished by the distinctive straight embolus of males (the angle of embolus to the bulb is smaller than 90° in *T. dongbei*), the different shapes of spermathecae of females (the spermatheca with distal end spiral in *T. dongbei*, but straight in the new

species), the relatively distinctive promarginal teeth of fang furrow, the nearly rounded carapace and the relatively smaller body size.

DESCRIPTION

Male (*n* = 4)

Total length 1.33–1.36 (average: 1.34). Carapace 0.65–0.66 (average: 0.65) long, 0.59–0.61 (average: 0.60) wide; abdomen 0.64–0.70 (average: 0.68) long, 0.57–0.58 (average: 0.57) wide. Carapace, legs, sternum (Fig. 2A), labium, endites and chelicerae yellowish white. Carapace (Fig. 1A) nearly round, with a pair of setae on the clypeus, in the place of eyes and in the middle. No eyes. Promargin of fang furrow with one large tooth, one relatively small tooth and three barely visible granulous denticles, retromargin with four barely visible denticles (Fig. 2H). Legs with a

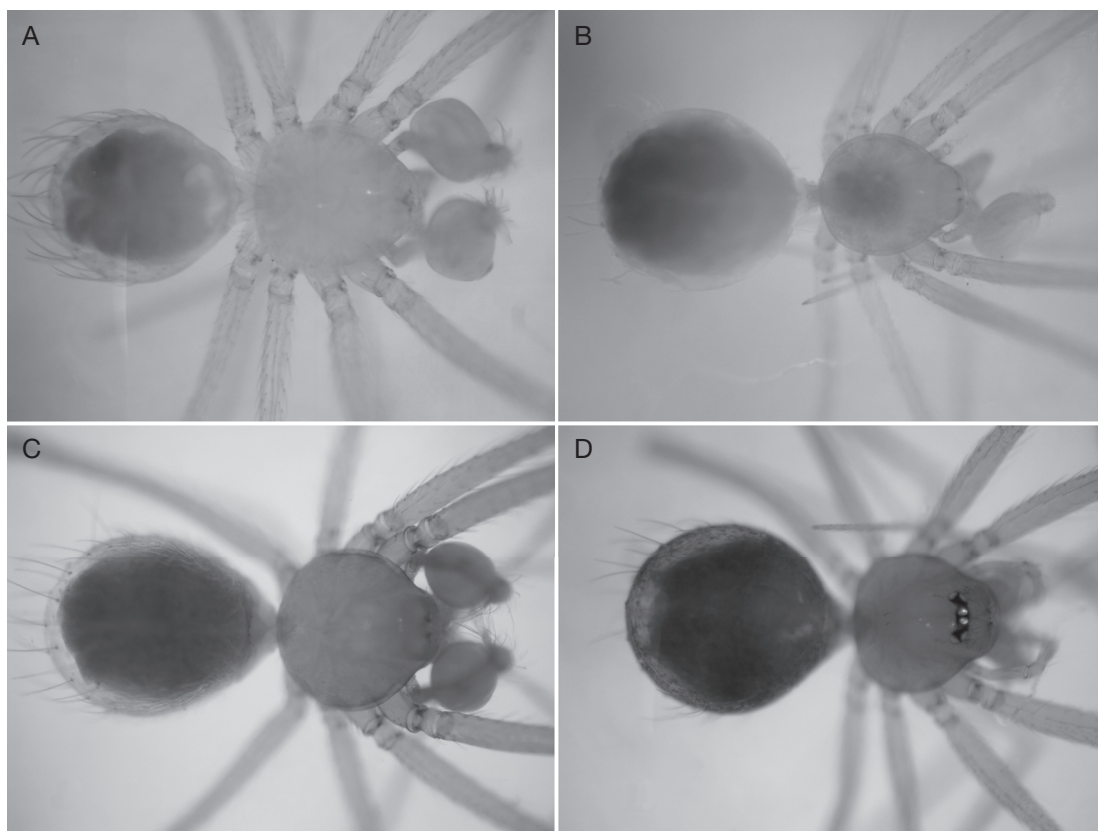


FIG. 1. — **A**, *Telema circularis* n. sp., dorsal view; **B**, *T. claviformis* n. sp., dorsal view; **C**, *T. grandidens* n. sp., dorsal view; **D**, *T. oculata* n. sp., dorsal view.

dorsal spine at the distal end of patella as well as in the middle of tibia. Leg measurements: I 5.44 (1.61, 0.23, 1.71, 1.16, 0.73); II 4.74 (1.48, 0.24, 1.44, 0.94, 0.64); III 3.39 (1.11, 0.22, 0.92, 0.63, 0.51); IV 4.03 (1.36, 0.22, 1.17, 0.71, 0.57). Leg formula: I-II-IV-III. Abdomen globular, gray; colulus as in Figure 2F. Palp with prolateral cymbial apophysis (Fig. 2C); bulb oval with one simple embolus (Fig. 2B).

Female ($n = 18$)

Total length 1.35-1.87 (average: 1.68). Carapace 0.61-0.82 (average: 0.75) long, 0.56-0.69 (average: 0.64) wide; abdomen 0.74-0.95 (average: 0.82) long, 0.72-0.88 (average: 0.79) wide. Eyes and chelicerae as in male. Leg measurements: I 5.50 (1.69, 0.25, 1.77, 1.12, 0.67); II 4.83 (1.52, 0.25,

1.54, 0.94, 0.58); III 3.55 (1.15, 0.23, 0.99, 0.69, 0.49); IV 4.43 (1.44, 0.24, 1.29, 0.90, 0.56). Leg formula: I-II-IV-III. Genital area with one row of hairs on epigynal plate, and another row behind epigastric furrow (Fig. 2G). Spermatheca boot-shaped in lateral view (Fig. 2D, E).

Telema claviformis n. sp.
(Figs 1B; 3)

TYPE MATERIAL. — Holotype: China, Guizhou Province, Xingyi City, Malinghe Town (25°12'N, 104°53'E), Qiu-Xiang-Dong Cave, 12.V.2005, leg. Y. F. Tong & Y. C. Lin, ♂ (MNHN).

Paratypes: same data as holotype, 1 ♂, 10 ♀♀ (IZCAS); same data as holotype, 2 ♀♀ (MNHN).

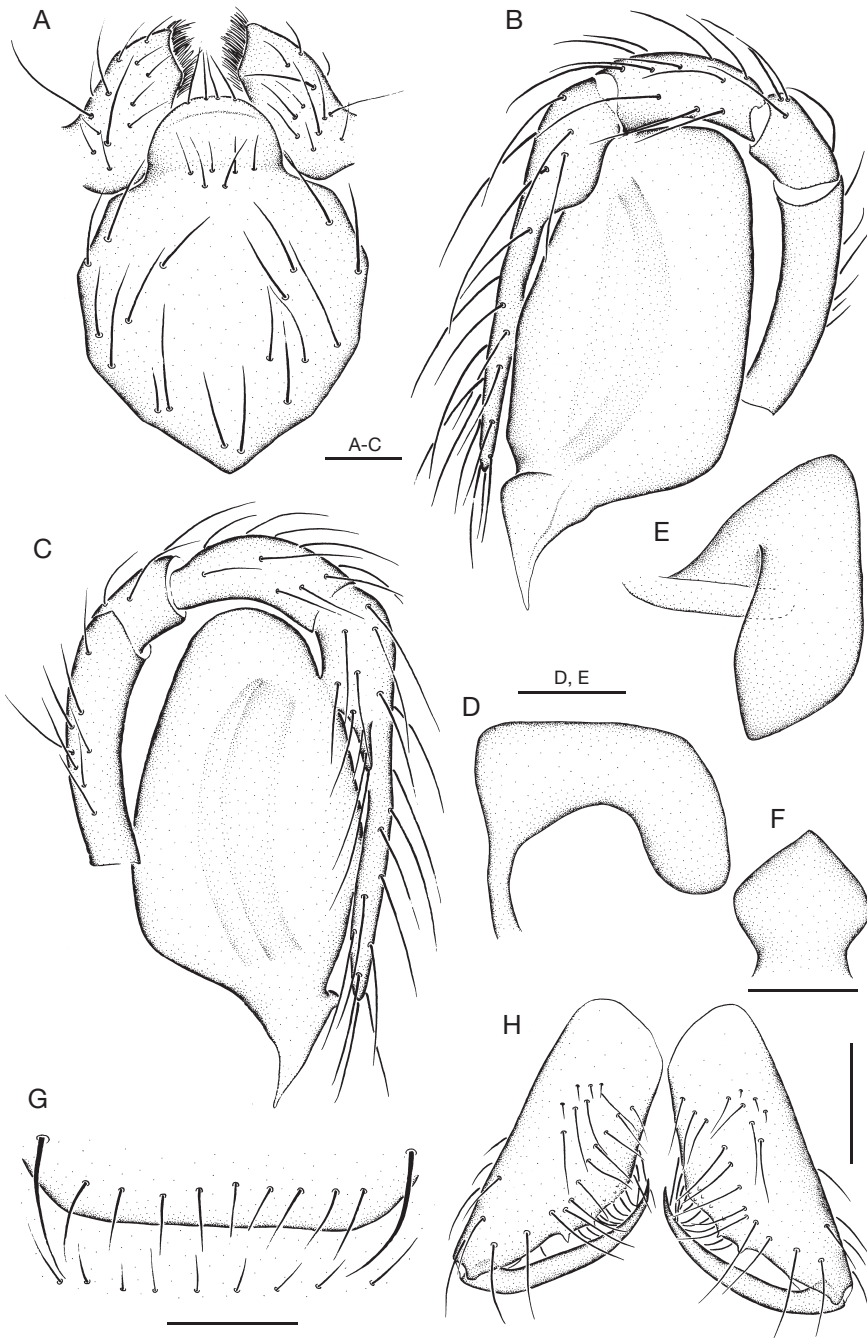


FIG. 2. — *Telema circularis* n. sp.: **A**, female endites, labium and sternum in ventral view; **B**, male left palp in retrolateral view; **C**, male left palp in prolateral view; **D**, spermatheca in lateral view; **E**, female genitalia in dorsal view; **F**, colulus; **G**, female genitalia in ventral view; **H**, chelicerae in ventral view. Scale bars: A-C, F, G, 0.1 mm; D, E, H, 0.2 mm.

ETYMOLOGY. — The specific name is from Latin *claviformis*, stick-shaped, indicates the narrow and long spermatheca of female.

DIAGNOSIS. — The new species is similar to *T. wunderlichi* Song & Zhu, 1994, but can be distinguished by the presence of a small prolateral cymbial apophysis on male palpal tarsus, the different shapes of embolus and the posteriorly curved spermatheca of female.

DESCRIPTION

Male (holotype)

Total length 1.67. Carapace 0.67 long, 0.56 wide; abdomen 0.88 long, 0.81 wide. Carapace, legs, sternum (Fig. 3A), labium, endites and chelicerae yellowish. Carapace (Fig. 1B) with pair of setae on the clypeus, in the place of eyes and in the middle. No eyes. Promargin of fang furrow with one large tooth, one relatively small tooth and three barely visible granulous denticles, retromargin with four barely visible denticles, in which the one near the base of fang larger (Fig. 3H). Legs with a dorsal spine at the distal end of patella as well as in the middle of tibia. Leg measurements: I 5.53 (1.66, 0.23, 1.75, 1.19, 0.70); II 5.11 (1.48, 0.23, 1.51, 1.06, 0.83); III 3.55 (1.12, 0.22, 0.98, 0.71, 0.52); IV 4.33 (1.39, 0.22, 1.22, 0.93, 0.57). Leg formula: I-II-IV-III. Abdomen globular, yellowish-gray; colulus as in Figure 3F. Palp with prolateral cymbial apophysis (Fig. 3C); bulb oval with one simple embolus (Fig. 3B).

Female (n = 12)

Total length 1.42-1.85 (average: 1.75). Carapace 0.62-0.77 (average: 0.72) long, 0.55-0.65 (average: 0.61) wide; abdomen 0.93-1.05 (average: 0.98) long, 0.75-0.98 (average: 0.83) wide. Eyes and chelicerae as in male. Leg measurements: I 5.40 (1.66, 0.27, 1.67, 1.13, 0.67); II 4.82 (1.49, 0.24, 1.47, 1.00, 0.62); III 3.41 (1.09, 0.22, 0.94, 0.68, 0.48); IV 4.26 (1.39, 0.23, 1.20, 0.90, 0.54). Leg formula: I-II-IV-III. Genital area with one row of hairs on epigynal plate, and another row behind epigastric furrow (Fig. 3G). Spermatheca narrow and long, with distal end curved posteriorly (Fig. 3D, E).

Telema grandidens n. sp. (Figs 1C; 4)

TYPE MATERIAL. — Holotype: China, Guizhou Province,

Duyun City, Dushan County, Xiasi Town (25°26'N, 107°25'E), Ba-You-Dong Cave, 21.V.2005, Leg. Y. F. Tong & Y. C. Lin, ♂ (MNHN).

Paratypes: same data as holotype, 13 ♂♂, 16 ♀♀ (IZCAS); same data as holotype, 2 ♂♂, 2 ♀♀ (MNHN).

ETYMOLOGY. — The species name is from Latin *grand*, large and *dens*, tooth and refers to the large tooth present at the middle of fang furrow.

DIAGNOSIS. — The new species is similar to *T. dongbei* Wang & Ran, 1998, but can be distinguished by the slightly broader apical part of palpal embolus, the different shapes of spermathecae of females and the distinctive large tooth at the middle of fang furrow.

DESCRIPTION

Male (n = 16)

Total length 1.65-1.76 (average: 1.71). Carapace 0.72-0.77 (average: 0.75) long, 0.67-0.71 (average: 0.69) wide; abdomen 0.86-0.95 (average: 0.92) long, 0.77-0.82 (average: 0.79) wide. Carapace, legs, sternum (Fig. 4A), labium, endites and chelicerae yellow. Carapace (Fig. 1C) with pair of setae on the clypeus, in place of eyes and in the middle. No eyes. Promargin of fang furrow with one distinctive large tooth, one relatively small tooth and three barely visible granulous denticles, retromargin with four barely visible denticles (Fig. 4H). Legs with a dorsal spine at the distal end of patella as well as in the middle of tibia. Leg measurements: I 6.18 (1.85, 0.26, 2.00, 1.34, 0.73); II 5.26 (1.64, 0.26, 1.60, 1.10, 0.66); III 3.85 (1.25, 0.22, 1.10, 0.74, 0.54); IV 4.59 (1.53, 0.21, 1.32, 0.95, 0.58). Leg formula: I-II-IV-III. Abdomen globular, gray; colulus as in Figure 4F. Palp with prolateral cymbial apophysis (Fig. 4C); bulb oval with one simple embolus (Fig. 4B).

Female (n = 18)

Total length 1.70-2.05 (average: 1.92). Carapace 0.72-0.82 (average: 0.78) long, 0.65-0.74 (average: 0.71) wide; abdomen 0.86-1.09 long, 0.82-1.05 wide. Eyes and chelicerae as in male. Leg measurements: I 6.68 (2.10, 0.28, 2.13, 1.41, 0.76); II 5.69 (1.80, 0.27, 1.76, 1.17, 0.69); III 4.16 (1.38, 0.25, 1.18, 0.81, 0.54); IV 5.09 (1.70, 0.25, 1.49, 1.04, 0.61). Leg formula: I-II-IV-III. Genital area with one row of hairs on epigynal plate and another row behind epigastric furrow (Fig. 4G). Spermatheca strong, curved posteriorly (Fig. 4D, E).



FIG. 3. — *Telema claviformis* n. sp.: **A**, female endites, labium and sternum in ventral view; **B**, male left palp in retrolateral view; **C**, male left palp in prolateral view; **D**, spermatheca in lateral view; **E**, female genitalia in dorsal view; **F**, colulus; **G**, female genitalia in ventral view; **H**, chelicerae in ventral view. Scale bars: A-E, H, 0.2 mm; F, G, 0.1 mm.

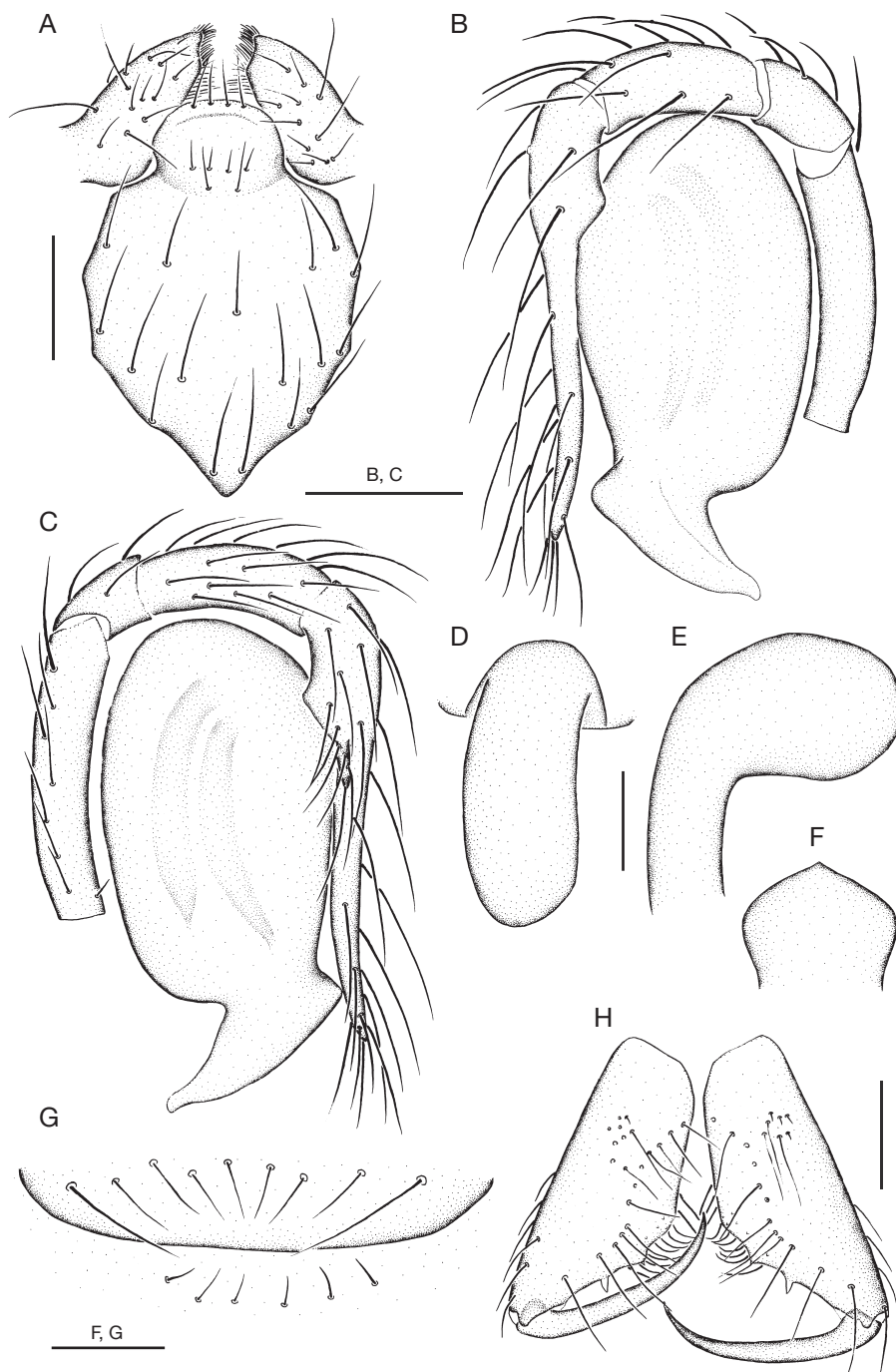


FIG. 4. — *Telema grandidens* n. sp. **A**, female endites, labium and sternum in ventral view; **B**, male left palp in retrolateral view; **C**, male left palp in proteral view; **D**, female genitalia in dorsal view; **E**, spermatheca in lateral view; **F**, colulus; **G**, female genitalia in ventral view; **H**, chelicerae in ventral view. Scale bars: A-E, H 0.2 mm; F, G, 0.1 mm.

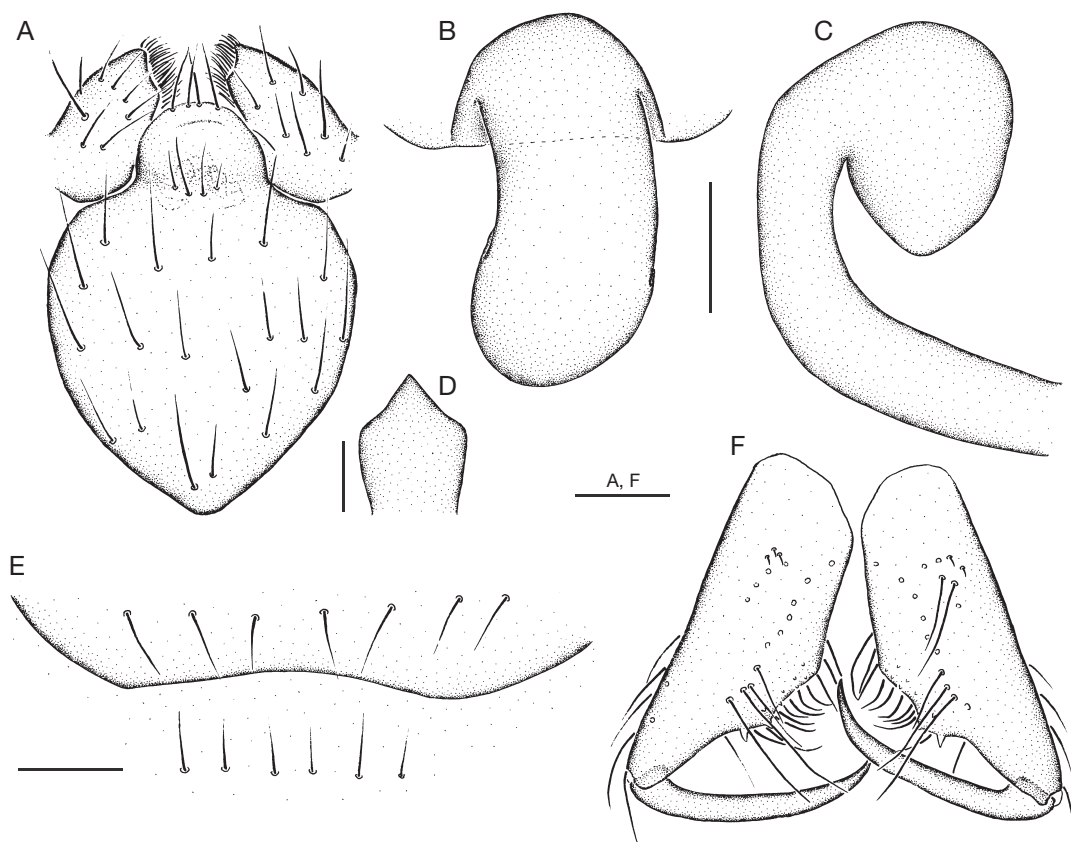


FIG. 5. — *Telema oculata* n. sp.: **A**, female endites, labium and sternum in ventral view; **B**, female genitalia in dorsal view; **C**, spermatheca in lateral view; **D**, colulus; **E**, female genitalia in ventral view; **F**, chelicerae in ventral view. Scale bars: A-C, F 0.1 mm; D, E, 0.05 mm.

Telema oculata n. sp.
(Figs 1D; 5)

TYPE MATERIAL. — Holotype: China, Guizhou Province, Duyun City, Dushan County, Xiasi Town (25°29'N, 107°27'E), Guo-Jia-Fen-Dong Cave, 24.V.2005, Leg. Y. F. Tong & Y. C. Lin, ♀ (MNHN).

Paratypes: same data as holotype, 3 ♀♀ (IZCAS), 2 ♀♀ (MNHN); same locality and collector as holotype, Liang-Shui-Jing-Dong Cave, 21.V.2005, 3 ♀♀ (IZCAS), 2 ♀♀ (MNHN).

ETYMOLOGY. — The specific name is from Latin *oculata*, with eyes and refers to the presence of eyes in this species, for all recorded telema species from Guizhou are eyeless.

DIAGNOSIS. — The new species is closely similar to the female of *T. nipponica* (Yaginuma, 1972), distributed in Japan. However, in *T. nipponica* the sternum is triangular,

and obtusely inserted into coxae IV, but this new species with a smoothly outer margin. This new species also has relatively longer legs (the shortest leg of the new species is nearly as long as the longest leg of *T. nipponica*), the body size is larger, and the spermatheca is symmetrical in the new species (the spermatheca of *T. nipponica* is without figure, but described as asymmetrical thick curved tube [Yaginuma 1973]).

DESCRIPTION

Female ($n = 11$)

Total length 1.40-1.45 (average: 1.42). Carapace 0.57-0.61 (average: 0.59) long, 0.51-0.53 (average: 0.52) wide; abdomen 0.79-0.83 (average: 0.81) long, 0.71-0.73 (average: 0.72) wide. Carapace, legs, labium, endites and chelicerae yellow. Sternum (Fig. 5A) deep brown. Carapace (Fig. 1D) nearly

round, with pair of setae on the clypeus, behind eyes and at middle. Six eyes, anterior row of four eyes nearly straight, AM close together, nearly touching, separated from AL by 1/2 diameter of AL, lateral eyes contiguous. Promargin of fang furrow with one large tooth, one relatively small tooth and three barely visible granulous denticles, retromargin with four barely visible denticles (Fig. 5F). Legs with a dorsal spine at the distal end of patella as well as in the middle of tibia. Leg measurements: I 3.57 (1.12, 0.19, 1.10, 0.68, 0.48); II 3.12 (0.97, 0.18, 0.91, 0.58, 0.48); III 2.28 (0.72, 0.17, 0.60, 0.41, 0.38); IV 2.85 (0.92, 0.17, 0.81, 0.54, 0.41). Leg formula: I-II-IV-III. Abdomen globular, bluish-gray, the ventral surface being purplish-brown; colulus as in Figure 5D. Genital area with one row of hairs on epigynal plate, and another row behind epigastric furrow (Fig. 5E). Spermatheca distal end swollen, curved downwards (Fig. 5B, C).

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