A taxonomic study of Chinese *Nematogmus* species (Araneae, Linyphiidae)

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**Abstract**

Four species of *Nematogmus* Simon, 1884 from China were studied: *N. sanguinolentus* (Walckenaer, 1842; the type species), *N. digitatus* Fei & Zhu, 1994 (re-examined from its type material), *N. longior* sp. n., and *N. membranifer* sp. n. Descriptions of the new and redescriptions of the previously known species are provided, as well as the recorded distributions of all four species in China.

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**Keywords:** Erigoninae; Morphological characters; Type material; New species

**Introduction**

The erigonine spider genus *Nematogmus* was created by Simon (1884) to accommodate *Theoridion sanguinolentus* Walckenaer, 1842 and *Erigone florens* O. P. Cambridge, 1875. In 1894, the same author transferred the latter species to *Hypselistes* Simon, 1894, which has also accommodated a few other species from the Old and New World. *Nematogmus sanguinolentus* was indicated as the type species of the genus by Simon (1894).

*Nematogmus* has housed a fluctuating number of species (van Helsdingen 1979). Currently it comprises six species (Platnick 2008): *N. dentimanus* Simon, 1886 (Sri Lanka to Malaysia, Java, Krakatau); *N. digitatus* Fei & Zhu, 1994 (China); *N. nigripes* Hu, 2001 (China); *N. rutilis* Oi, 1960 (Japan); *N. sanguinolentus* (Walckenaer, 1842) (Palaeartec, including China); and *N. stylitus* (Bösenberg & Strand, 1906) (Japan). Zhu (1983) recorded *N. stylitus* from China, but by examining the corresponding material we have found that to be the result of a misidentification of *N. digitatus*. Consequently, three *Nematogmus* species were known from China so far.

During our further study of *Nematogmus* material from China, two new species have been identified; these are described in the present paper. Therefore, a total of five *Nematogmus* species are currently known from China. Except for *N. nigripes*, the type material of which could not be located, these species are reviewed in the present paper.

**Material and methods**

All specimens studied here are deposited in the Institute of Zoology, Chinese Academy of Sciences (IZCAS), in Beijing or at Jilin University (JLU) in Changchun.

Specimens were examined under an Olympus SZ11 stereomicroscope, and illustrated using an Olympus...
BX41 compound microscope equipped with a drawing tube. Male left palps and female epigyna were illustrated after being separated from the body. Embolic divisions were dissected from the palpal bulb using sharp pins and tweezers. Genital organs were immersed in 75% alcohol and examined under a compound microscope; embolic divisions and vulvae were mounted in Hoyer’s Solution and examined in strong transmitted light against a white background. In addition, the ventral tegument of epigyna was removed with sharp pins and tweezers to study the duct system of the vulvae under a microscope.

Eye diameters were measured at the eyes’ widest points. Leg measurements are given as: total length (femur, patella, tibia, metatarsus, tarsus). All measurements are recorded in millimeters. The terminology for genitalic structures follows Hormiga (2000). In the sections on the individual species, only the respective original description is cited; for additional synonyms and references, see Platnick (2008).

Abbreviations of morphological structures

Somatic morphology. ALE = anterior lateral eye; AME = anterior median eye; PLE = posterior lateral eye; PME = posterior median eye; Tm I = position of first metatarsal trichobothrium; Tm IV = fourth metatarsal trichobothrium.

Male palp. C = column; DSA = distal suprategular apophysis; E = embolus; EM = embolic membrane; PC = paracymbium; PT = protegulum; R = radix; RTA = retrolateral tibial apophysis; RTT = retrolateral tibial tooth; SPT = suprategulum; ST = subtegulum; T = tegulum; TP = tailpiece of radix.

Epigynum. CD = copulatory duct; CO = copulatory opening; DP = dorsal plate; FD = fertilization duct; FO = fertilization opening; S = spermatheca; VP = ventral plate; VPD = ventral plate depression; VPS = ventral plate depression.

Taxonomic section

Family Linyphiidae Blackwall, 1859
Genus Nematogmus Simon, 1884

Nematogmus digitatus Fei & Zhu, 1994
(Figs. 1, 2 and 11)

Nematogmus digitatus Fei & Zhu – Fei and Zhu (1994, p. 293, figs. 1–5)

Material examined

Holotype (JLU): male; Manjiang (41.95°N, 127.61°E), Changbaishan Mountain, Jilin Province, China, 28 June 1990. Paratypes (JLU): 2 males and 2 females; same data as holotype.

Additional material (JLU): 2 males; data as holotype, except 30 June 1990.

Diagnosis

This species can be distinguished by a stout tubercle on the dorsal side of the cymbium (Fig. 1F), the presence of an additional finger-like, strongly curved apophysis on the ventral side of the paracymbium (Fig. 1D), the rectangular retrolateral tibial apophysis (Fig. 1B), the large, slender retrolateral tibial tooth, the presence of a small fragile triangular lamina on the dorsal side of the tibia (Fig. 1B), the somewhat oblong ventral plate with deeply concave posterior margin (Fig. 2E), and the dorsal plate visible in ventral view (Fig. 2E). The simple copulatory ducts are similar to those in N. sanguinolentus, but much more slender (Fig. 2G).

Description

Male (holotype). Total length 1.48. Carapace 0.78 long, 0.70 wide, bright reddish-orange, bearing a fairly large cephalic lobe and cephalic pits within the postocular sulci, as well as several hairs scattered in the ocular area (Fig. 1A). Abdomen grayish. Clypeus 0.26 high. AME diameter 0.04, ALE 0.06, PME 0.06, PME 0.06, AME interdistance 0.50 times their diameter, AME–ALE interdistance 1.11 times ALE diameter, PME interdistance 0.94 times their diameter, PME–PLE interdistance 1.53 times PLE diameter. Sternum 0.45 long, 0.50 wide. Coxa IV interdistance 1.48 times their width. Chelicerae with 5 promarginal and 5 retromarginal teeth (Fig. 1C). Tibia of leg I 8.00 times longer than deep. Tm I 0.37, Tm IV absent. Legs straw yellow. Dorsal spine in tibia of leg IV: 1-1-1-1; dorsal spine in patella of leg IV: 1-1-1-1. Leg measurements: I: 2.50 (0.72, 0.19, 0.60, 0.59, 0.39); II: 2.29 (0.59, 0.19, 0.56, 0.57, 0.38); III: 1.99 (0.58, 0.19, 0.43, 0.46, 0.34); IV: 2.49 (0.73, 0.20, 0.59, 0.60, 0.37).

Palp: tibia short, widened distally, with one retrolateral and one prolateral trichobothrium (Fig. 1B). Paracymbium with the most slender basal arm of all known Nematogmus species. Instead of an obvious cone-shaped apophysis, the cymbium (Fig. 1F) has an evenly curved ridge like in N. membranifer. Protegulum gradually narrowing from wide base (Fig. 1F). Tegulum mesal to subtegulum in unexpanded palp, with obtuse ventral tip (Fig. 1E). Suprategulum (Fig. 1E) narrower and shorter than in N. sanguinolentus and N. longior. Tailpiece of radix blunt at tip, twisted slightly upwards (Fig. 1E). Embolic membrane slightly sclerotized, strongly narrowed, basally widened, with a long lamina erected upwards (Figs. 2A and D). Embolus long, coiled (Fig. 2D).
Female (paratype). Total length 2.03. Carapace 0.81 long, 0.69 wide, similar to male in coloration, but without any cephalic lobe and pits. Clypeus 0.19 high. AME diameter 0.05, ALE 0.07, PME 0.06, PLE 0.07, AME interdistance 0.50 times their diameter, AME–ALE interdistance 0.39 times ALE diameter, PME interdistance 0.75 times their diameter, PME–PLE interdistance 0.86 times PLE diameter. Sternum 0.46 long, 0.53 wide. Coxa IV interdistance 1.52 times their width. Chelicerae with 4 promarginal and

Fig. 1. (A–F) Nematogmus digitatus: (A) Male carapace, lateral view. (B) Tibia of male left palp, dorsal view (arrow points to a small fragile triangular lamina). (C) Male left chelicera, posterior view. (D) Male left palp, ventral view. (E) Male left palp, prolateral view. (F) Male left palp, retrolateral view (bold arrow points to stout tubercle on dorsal side of cymbium; regular arrow points to evenly curved ridge). Scale bars: 0.1 mm. For abbreviations of morphological structures, see text.
4 retromarginal teeth (Fig. 2F). Tibia of leg I 7.00 times longer than deep. Tm I 0.36, Tm IV absent. Dorsal spine in tibia of leg IV: 1-1-1-1; dorsal spine in patella of leg IV: 1-1-1-1. Leg measurements: I: 2.46 (0.74, 0.23, 0.57, 0.56, 0.38); II: 2.31 (0.69, 0.23, 0.54, 0.51, 0.35); III: 1.89 (0.56, 0.21, 0.40, 0.44, 0.29); IV: 2.49 (0.78, 0.22, 0.58, 0.55, 0.36).

In posterior view, ventral and dorsal plates are fused together forming a narrow ‘bridge’, which measures nearly one-third of dorsal plate width (Fig. 2C).
Nematogmus longior sp. n.
(Figs. 3, 4 and 11)

Etymology
The specific epithet (Latin: longior = longer) refers to the protégulum and embolus being longer than in the similar species, *N. sanguinolentus*. It is to be treated as a noun in apposition for the purposes of nomenclature.

Material examined
Holotype (IZCAS): male; Yushu Town (30.09°N, 101.93°E), Kangding County, Sichuan Province, China, 13 July 2004, leg. L. Tu, S. Li and Y. Song.

Paratypes (IZCAS): 1 male and 5 females; same data as holotype. 1 male, Sanhe Town (30.08°N, 101.95°E), Kangding County, Sichuan Province, China, 19 July 2004, leg. L. Tu, S. Li and Y. Song.

Diagnosis

*Nematogmus longior* and *N. sanguinolentus* share a number of characters, including the same somatic appearance and similar genital structures, but differ in details. Males of the two species can be distinguished by the following features: (1) the two retrorotal teeth on the male palp are widely separated and can be clearly seen from retrorotal in *N. longior* (Fig. 3F), whereas in *N. sanguinolentus* the teeth are much closer to each other and the smaller one is covered by the larger one and invisible from retrorotal (Fig. 9F); (2) proximal end of cymbium pointed in *N. longior* (Figs. 3C and F), blunt in *N. sanguinolentus* (Fig. 9F); (3) conspicuous outwardly curved cymbial apophysis (Figs. 3C and 9D) slightly shorter in *N. longior*; (4) protégulum rather long in *N. longior* (Fig. 3F), shorter and thicker in *N. sanguinolentus* (Fig. 9F); (5) slightly sclerotized embolic membrane slightly curved upwards and nearly three times longer than wide in *N. longior* (Figs. 3D and 4D), only two times longer than wide in *N. sanguinolentus* (Fig. 10E); and (6) embolus nearly nine times longer than its tailpiece in *N. longior* (Fig. 4A), only six times in *N. sanguinolentus* (Fig. 10E). Females can be distinguished further by: (7) the presence of one deep depression in the low middle of the ventral plate in *N. longior* (Fig. 4G), versus two shallow depressions in *N. sanguinolentus* (Fig. 10D); (8) the width of the fusion region between dorsal plate and ventral plate being nearly one-third the width of the dorsal plate in *N. longior* (Fig. 4C), whereas that width ratio equals one-fifth in *N. sanguinolentus* (Fig. 10C); and (9) the copulatory duct having two coils in anterior direction in *N. longior* (Fig. 4B), but only one in *N. sanguinolentus* (Fig. 10B).

Description

**Male (holotype).** Total length 1.92. Carapace 0.94 long, 0.82 wide, lemon yellow, bearing a shallow cephalic lobe and cephalic pits within the post-ocular sulci (Fig. 3A). Abdomen light orange in middle, becoming deep orange towards posterior margin. Clypeus 0.37 high. AME diameter 0.03, ALE 0.06, PME 0.04, PLE 0.07, AME-interdistance 2.00 times their diameter, AME–ALE interdistance 1.42 times ALE diameter, PME interdistance 1.21 times their diameter, PME–PLE interdistance 1.50 times PLE diameter. Sternum 0.51 long, 0.57 wide. Coxa IV interdistance 1.27 times their width. Chelicerae with 5 promarginal and 4 retromarginal teeth. Legs lemon yellow proximally, gradually changing to gray yellow distally. Tibia I 9.93 times longer than deep. Tm I 0.35, Tm IV absent. Dorsal spine in tibia of leg IV: 1-1-1-1; dorsal spine in patella of leg IV: 1-1-1-1. Leg measurements: I: 3.51 (0.96, 0.26, 0.87, 0.83, 0.59); II: 3.33 (0.96, 0.26, 0.78, 0.76, 0.57); III: 2.66 (0.78, 0.26, 0.58, 0.60, 0.44); IV: 3.20 (0.97, 0.24, 0.79, 0.74, 0.46).

Palp: tibia short, widened distally, with one rectangular retrorotal apophysis, two strong retrorotal teeth, as well as one retrorotal and one prolateral trichobothrium (Fig. 3B). Paracymbium duck-shaped (Fig. 3F). Cymbium of peculiar shape, with a conspicuous outwardly curved apophysis; dorsal side of cymbium with a row of minute warts, each bearing a seta (Fig. 3F). Tegulum mesal to subtegulum in unexpanded palp, with a thumb-shaped ventral apophysis (Fig. 3E). Protégulum ribbonlike, accommodating one proximal section of embolus (Fig. 3E). Column cone-shaped in ventral view (Fig. 3D). Tailpiece
of radix nearly straight, with a pointed end (Fig. 4D). Distal suprategular apophysis (Figs. 3D and F) with indented outer margin, arranged closely to base of slightly sclerotized embolic membrane (Fig. 4D), which has a triangular lamina extending upright. Embolus long, coiled.

**Female (paratype).** Total length 2.28. Carapace 0.86 long, 0.85 wide, light orange, without any cephalic lobe.
and pits. Abdomen coloration similar to male. Clypeus 0.41 high. AME diameter 0.05, ALE 0.07, PME 0.06, PLE 0.07, AME interdistance 0.60 times their diameter, AME–ALE interdistance 0.83 times ALE diameter, PME interdistance 0.84 times their diameter, PME–PLE interdistance 0.95 times PLE diameter. Sternum 0.51 long, 0.59 wide. Coxa IV interdistance 1.41 times their width. Chelicerae with 6 promarginal and 5 retro-marginal teeth. Legs light orange proximally, gradually changing to tan distally. Tibia of leg I 10.64 times longer.

Fig. 4. (A–G) Nematogmus longior sp. n. (A) Embolic division (with DSA), dorsal view. (B) Vulva, ventral view. (C) Epigynum, posterior view. (D) Embolic division (with DSA; arrow points to a mini lamina extended upright), ventral view. (E) Vulva, dorsal view. (F) Epigynum, lateral view. (G) Epigynum, ventral view. Scale bars: 0.2 mm. For abbreviations of morphological structures, see text.
than deep. TmI 0.42, Tm IV absent. Dorsal spine in tibia of leg IV: 1-1-1-1; dorsal spine in patella of leg IV: 1-1-1-1. Leg measurements: I: 3.80 (1.08, 0.28, 0.93, 0.89, 0.61); II: 3.56 (1.03, 0.28, 0.82, 0.83, 0.59); III: 2.74 (0.81, 0.25, 0.59, 0.64, 0.45); IV: 3.46 (1.10, 0.26, 0.82, 0.79, 0.49).

There is a deep depression bounded posteriorly and laterally by a thicker lip-like structure (Fig. 4G). Ventral plate with a short scape (Fig. 4F). Dorsal plate trapezoidal, fused with ventral plate in posterior view (Fig. 4C). Copulatory ducts (Figs. 4B and E) similar to those in *N. membranifer*, but with two coils in *N. longior* instead of one and a half. Spermathecae U-shaped. Fertilization ducts short, mesally oriented (Fig. 4E).

**Variation**

Four males and 22 females have been measured. Total length varies from 1.91 to 2.00 in males and from 2.03 to 2.34 in females. The carapace ranges in length from 0.94 to 0.97 in males and from 0.81 to 0.84 in females; in width from 0.81 to 0.83 in males and from 0.69 to 0.70 in females.

**Distribution**

Known only from Sichuan and Yunnan Provinces, China (Fig. 11).

**Habitat**

The species occurs near the grass roots in marshes or in mountains at high altitudes.

**Nematomus membranifer** sp. n.

(Figs. 5–8 and 11)

**Etymology**

The specific epithet (Latin: membranifer = carrying a membrane) refers to the narrow membrane along the inner margin of the long, curled embolus. It is to be treated as a noun in apposition for the purposes of nomenclature.

**Material examined**

Holotype (IZCAS): male; Fucai Village (28.00°N, 98.52°E), Bingzhongluo Town, Gongshan County, Yunnan Province, China, 23 August 2006, leg. Jeremy A. Miller.

Paratype (IZCAS): 1 female; same data as holotype.

**Diagnosis**

The male can be easily distinguished from all other *Nematomus* species by the presence of a patch of short, densely distributed hairs in the middle of the cephalic lobe (Fig. 5A); the slightly sclerotized embolic membrane with anterior and retrolateral margins extended upright forming a semiclosure structure (Figs. 5D–F); and the presence of a membrane along the inner margin of the proximal half of the embolus (Fig. 5F). The female can be distinguished from *N. dentimanus*, *N. nigripes*, *N. longior* and *N. sanguinolentus* by the absence of a ventral plate scape; from *N. digitatus* and *N. nigripes* by the presence of two copulatory duct coils (Figs. 6A and B); and from *N. stylitus* by the dorsal plate being completely hidden in ventral view (Fig. 6G).

**Description**

**Male (holotype).** Total length 2.48. Carapace 1.17 long, 1.09 wide, clear orange, bearing a large cephalic lobe and cephalic pits within the post-ocular sulci, as well as a patch of short, densely distributed hairs in the center of the cephalic lobe (Fig. 5A). Abdomen grayish white in middle, darker towards outer margin. Clypeus 0.38 high. AME diameter 0.07, ALE 0.07, PME 0.06, PLE 0.07, AME–ALE interdistance 0.45 times their diameter, AME–AME interdistance 1.45 times ALE diameter, PME–PME interdistance 1.45 times their diameter, PME–PLE interdistance 1.18 times PLE diameter. Sternum 0.68 long, 0.68 wide. Coxa IV interdistance 1.41 times their width. Chelicerae with 4 promarginal and 4 retro-marginal teeth (Fig. 6C). Proximal two-thirds of femur segments clear orange, gradually changing to pitch-black distally. Tibia of leg I 7.47 times longer than deep. Tm I 0.24, Tm IV present. Dorsal spine in tibia of leg IV: 1-1-1-1; dorsal spine in patella of leg IV: 1-1-1-1. Leg measurements: I: 6.66 (1.88, 0.34, 1.75, 1.70, 0.98); II: 6.20 (1.72, 0.34, 1.58, 1.59, 0.97); III: 4.53 (1.33, 0.34, 1.08, 1.13, 0.66); IV: 5.70 (1.45, 0.34, 1.64, 1.48, 0.78).

Palp: tibia short, somewhat cylindrical, with one triangular retrolateral apophysis, one small, strongly curved retrolateral tooth and one retrolateral trichobothrium (Fig. 5B). Paracymbium with the ventral part extended upwards forming a triangular lamina, basal arm upheaved (Fig. 5C). Cymbium (Fig. 5F) of peculiar shape, with a cone-shaped tubercle on the dorsal side, shorter than those in *N. sanguinolentus* and *N. longior* but longer than in *N. digitatus*; dorsal side of proximal half of cymbium with evenly curved ridge. Pro tegulum elongated with nearly parallel margins (Fig. 5F). Tegulum memsal to subtegulum in unexpanded palp, with a highly sclerotized and rather complicated ventral structure, through which the sperm duct runs (Figs. 5E and F). Tailpiece of radix foot-shaped (Figs. 5D and E). Distal suprategular apophysis broad, with several parallel folds (Fig. 5D). Embolic membrane slightly sclerotized, swollen near the connection of column, radix and distal suprategular apophysis. Embolus long, coiled, with narrow membrane along inner margin of proximal half of embolus (Fig. 5F).

**Female (paratype).** Total length 2.98. Carapace 1.30 long, 1.17 wide, bright reddish-orange, without cephalic lobe and pits. Clypeus 0.29 high. Abdomen grayish white in middle, darker towards outer margin. AME...
diameter 0.07, ALE 0.08, PME 0.07, PLE 0.07, AME interdistance 0.30 times their diameter, AME–ALE interdistance 1.28 times ALE diameter, PME interdistance 1.48 times their diameter, PME–PLE interdistance 1.52 times PLE diameter. Sternum 0.72 long, 0.80 wide. Coxa IV interdistance 1.36 times their width. Chelicerae with 5 promarginal and 5 retro-marginal teeth (Fig. 6E). Proximal two-thirds of femur
segments bright reddish-orange, gradually changing to pitch-black distally. Tibia of leg I 4.95 times longer than deep. Tm I 0.27, Tm IV present. Dorsal spine in tibia of leg IV: 1-1-1-1; dorsal spine in patella of leg IV: 1-1-1-1. Leg measurements: I: 6.05 (1.80, 0.41, 1.55, 1.44, 0.86); II: 5.75 (1.73, 0.39, 1.48, 1.33, 0.81); III: 4.50 (1.39, 0.39, 1.05, 1.02, 0.66); IV: 5.36 (1.72, 0.41, 1.34, 1.19, 0.70).

Ventral plate with two small shallow semirounded depressions, posterior margin nearly straight in ventral view (Fig. 6G), hardly protruding from ventral surface.
in lateral view, and fused with dorsal plate forming a narrow 'bridge', which measures nearly one-half of dorsal plate width (Fig. 6D). Dorsal plate small, trapezoidal (Fig. 6F). Copulatory ducts running along outer margins of encapsulated double helix, which narrows from a broad base, showing one and a half coils in anterior direction, clockwise through one helix, reversing direction at the distal end, and running posteriorly through the second helix, still in clockwise direction (Figs. 6A and B). Spermathecae distinctly U-shaped; one arm long and oblong, the other small and almost globular (Fig. 6B). Fertilization ducts short, mesally oriented (Fig. 6B).

**Distribution**
Known only from Yunnan Province, China (Fig. 11).

**Habitat**
These spiders occur in a forest at an altitude of 2800 m, preferring to build sheet webs under rocky outcrops covered with thick moss (Figs. 7 and 8).

**Nematogmus sanguinolentus** *(Walckenaer, 1842)*
(Figs. 9–11)


*Nematogmus sanguinolentus* Simon – Simon (1884, p. 615, figs. 431 and 432).

**Material examined**
Six females and 1 male (JLU); Jinshan Forestland (51.78°N, 126.35°E), Huma County, Heilongjiang Province, China, 22 June 1990. Two males (JLU); no detailed data. Fifteen females and 4 males (JLU);

Dajiuhu Basin and Panshui Village, Shennongjia Forest Region (31.72°N, 110.75°E), Hubei Province, China, 4–8 August 1986. One female and 1 male (IZCAS); Hachioji (35.71°N, 139.25°E), Tokyo, Japan, 29 May 2004, leg. Andoh Akihisa.

**Diagnosis**
See diagnosis of *N. longior* sp. n.

**Description**
*Male.* Total length 1.69. Carapace 0.78 long, 0.69 wide, bearing a shallow lobe and cephalic pits within the post-ocular sulci (Fig. 9A). Abdomen grayish. Clypeus 0.28 high. AME diameter 0.04, ALE 0.07, PME 0.06, PLE 0.07, AME interdistance 0.92 times their diameter, AME–ALE interdistance 0.67 times ALE diameter, PME interdistance 0.60 times their diameter, PME–PLE interdistance 0.81 times PLE diameter. Sternum 0.44 long, 0.48 wide. Coxa IV interdistance 1.23 times their width. Chelicerae with 4 promarginal and 4 retromarginal teeth. Tibia of leg I 14.27 times longer than deep. Tm I 0.33, Tm IV absent. Dorsal spine in tibia of leg IV: 1-1-1-1; dorsal spine in patella of leg IV: 1-1-1-1. Leg measurements: I: 3.78 (0.98, 0.24, 0.98, 1.02, 0.57); II: 3.39 (0.91, 0.23, 0.83, 0.91, 0.51); III: 2.56 (0.74, 0.21, 0.56, 0.66, 0.38); IV: 3.18 (0.93, 0.21, 0.78, 0.84, 0.42).

Palp: tibia short, widened distally, with one retro-lateral and one prolateral trichobothrium; with a semirounded retrolateral apophysis and two closely arranged retrolateral teeth (Fig. 9B). Paracymbium duck-shaped (Fig. 9F). Cymbium with a horn-shaped apophysis and a longitudinal ridge bearing numerous...
warts, each carrying a seta (Figs. 9E and F). Tegulum mesal to subtegulum in unexpanded palp, with a thumb-shaped ventral apophysis (Figs. 9C–F). Protegulum comparatively long, slightly twisted, tapering, nearly perpendicular to long, coiled embolus (Fig. 9F).

**Female.** Total length 1.88. Carapace 0.68 long, 0.69 wide. Clypeus 0.29 high. Abdomen grayish. AME diameter 0.04, ALE 0.06, PME 0.06, PLE 0.06, AME interdistance 0.64 times their diameter, AME–ALE interdistance 0.65 times ALE diameter, PME interdistance 1.82 times their diameter, PME–PLE interdistance 0.80 times PLE diameter. Sternum 0.48 long, 0.52 wide. Coxa IV interdistance 0.88 times their width. Chelicerae with 5 promarginal and 4 retromarginal

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**Fig. 9.** (A–F) *Nematognus sanguinolentus*. (A) Male carapace, lateral view. (B) Tibia of male left palp, dorsal view. (C) Male left palp, ventral view. (D) Cymbium, dorsolateral view. (E) Male left palp, prolateral view. (F) Male left palp, retrolateral view. Scale bars: 0.2 mm. For abbreviations of morphological structures, see text.
teeth. Tibia of leg I 13.73 times longer than deep. Tm I 0.37, Tm IV absent. Dorsal spine in tibia of leg IV: 1-1-1-1; dorsal spine in patella of leg IV: 1-1-1-1. Leg measurements: I: 3.73 (1.04, 0.24, 0.91, 0.94, 0.58); II: 3.49 (1.06, 0.24, 0.83, 0.83, 0.53); III: 2.68 (0.83, 0.23, 0.58, 0.64, 0.41); IV: 3.46 (1.09, 0.24, 0.88, 0.80, 0.45).

Ventral plate with two shallow depressions in ventral view (Fig. 10D) and a comparatively long scape in lateral view (Fig. 10G). Dorsal plate trapezoidal (Fig. 10F), fused with ventral plate forming a narrow 'bridge', which measures one-fifth of dorsal plate width (Fig. 10C). Copulatory ducts similar to those of

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**Fig. 10.** (A–G) *Nematogmus sanguinolentus.* (A) Vulva, ventral view. (B) Vulva, dorsal view. (C) Epigynum, posterior view. (D) Epigynum, ventral view. (E) Embolic division (with DSA; arrow points to a mini lamina erected upwards), ventral view. (F) Epigynum, dorsal view. (G) Epigynum, lateral view. Scale bars: 0.1 mm. For abbreviations of morphological structures, see text.
N. digitatus, but shorter and thicker at the beginning (Figs. 2G and 10A). Spermathecae somewhat U-shaped, with short globular arms totally overlapping with long, oblong arms (Figs. 10A and B). Fertilization ducts short, mesally oriented (Fig. 10B).

Variation

Five males and 20 females have been measured. Total length varies from 1.67 to 1.72 in males and from 1.81 to 2.13 in females. The carapace varies in length from 0.77 to 0.80 in males and from 0.63 to 0.72 in females; in width from 0.69 to 0.71 in males and from 0.66 to 0.75 in females. Coloration of carapace varies from lemon yellow to bright reddish-orange. Legs vary from lemon yellow to bright reddish-orange proximally, gradually changing to dark greenish distally.

Distribution

Palaearctic (Platnick 2008). In China, the species has been recorded from Beijing, Jilin, Hebei, Heilongjiang, Hubei, Liaoning, Xinjiang, and Zhejiang Provinces (Hu and Wu 1989; Chen and Zhang 1991; Song et al. 1999) (Fig. 11).

Habitat

This species occurs in grass or under leaves on the ground in marshes. It becomes sexually mature in late July and early August, and probably overwinters as adults (Oi 1960).

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References


