

# Two new species of *Strongyloopsis* Brauns (Hymenoptera, Ichneumonidae, Pimplinae) from Beijing, and a key to all species

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## Abstract

Two new species of the genus *Strongyloopsis* Brauns, 1896, are described and illustrated, *S. propodealis* Sheng & Sun, **sp. nov.** and *S. punctata* Sheng & Sun, **sp. nov.**, both collected from Mentougou, Beijing, China. An identification key to all known species of *Strongyloopsis* is provided.

## Keywords

China, key, new species, Pimplini, taxonomy

## Introduction

*Strongyloopsis* Brauns, 1896, a small genus of the tribe Pimplini in the subfamily Pimplinae (Hymenoptera, Ichneumonidae), comprises seven species (Yu et al. 2016) from the Palearctic Region, of which six from the Eastern Palearctic Region (two of them also occur in the Western Palearctic region) (Kuzin 1950; Viktorov 1958; Momoi 1973; He et al. 1996; He and Liu 2013), three from the Western Palearctic Region (Brauns 1896; Kasparyan 1974). Two species of *Strongyloopsis* have previously been known from China (He et al. 1996; He and Liu 2013).

Kasparyan (1974) first provided an identification key to the species of *Strongylopsis*. He and Liu (2013) modified the key with descriptions of one new species, which was collected from the area near the southern border of the Eastern Palearctic part of China. The diagnostic characters of the genus were revised by He and Liu (2013) and Townes (1969).

The hosts of *Strongylopsis* are still unknown, but other genera of Pimplini are known to be koinobiont endoparasitoids of (predominantly) Lepidoptera and Hymenoptera pupae (Gauld et al. 2002).

In the last ten years the authors have been exploring the forests of Beijing: Mentougou, Fangshan, Yanqing, Pinggu, and have collected large numbers of ichneumonids. In the present research two new species of *Strongylopsis*, collected in this area, are described.

## Material and methods

### Institutional abbreviations

- GSFGPM** General Station of Forest and Grassland Pest Management, National Forestry and Grassland Administration, China
- SCAUG** Department of Entomology, South China Agricultural University, Guangzhou, China
- ZJUH** Institute of Insect Sciences, Zhejiang University, Hangzhou, China.

### Specimen collection

Specimens were collected with interception traps (IT), as described by Li et al. (2012), in Mentougou forest (Fig. 1), which comprises mixed deciduous angiosperms and evergreen conifers, mainly *Betula dahurica* Pallas (Betulaceae), *Celtis bungeana* Blume (Cannabaceae), *Platyclusus orientalis* (L.) Franco (Cupressaceae), *Ephedra equisetina* Bunge (Ephedraceae), *Castanea* spp., *Quercus wutaishanica* Mayr, *Quercus* spp. (Fagaceae), *Juglans regia* L. (Juglandaceae), *Larix* spp., *Pinus tabulaeformis* Carr. (Pinaceae), *Rubus saxatilis* L., *Prunus* spp., *Pyrus* spp., *Rosa* spp. (Rosaceae), *Populus* spp., *Salix* spp. (Salicaceae), *Acer* spp. (Sapindaceae) and *Ulmus pumila* L. (Ulmaceae).

Photos of the types of *Strongylopsis chinensis* He, 1996 and *S. xizangensis* He & Liu, 2013 (deposited in ZJUH) taken by Dr. Jing-Xian Liu (SCAUG), were checked and compared to the new species by the corresponding author.

Images were taken using a Leica M205A stereo microscope with LAS Montage Multi-Focus. Morphological terminology is mostly based on Broad et al. (2018). Type specimens are deposited in GSFGPM, National Forestry and Grassland Administration, China.



**Figure 1.** Habitat of *Strongyloopsis propodealis* Sheng & Sun, sp. nov. and *S. punctata* Sheng & Sun, sp. nov. The forest in Mentougou, Beijing.

## Taxonomy

### *Strongyloopsis* Brauns, 1896

*Strongyloopsis* Brauns, 1896: 274. Type-species: *Strongyloopsis anomala* Brauns.

**Diagnosis.** (After Townes 1969; He and Liu 2013). Face (Figs 3, 12) evenly convex, strongly protuberant dorsally in female. Clypeal sulcus present. Upper tooth of mandible slightly longer than lower tooth. Antenna (Figs 2, 11) short and stout, second flagellomere shorter than its width in female. Legs of female stout, outer profile of tibia usually with strong pegs (Figs 2, 11, also see figure in Kuzin 1950: 253). Ovipositor sheath very short, hardly surpassing tip of metasoma. Ventral valve of ovipositor with vertical ridges (Fig. 10).

The key (females) of eight species of *Strongyloopsis* is included, the female of *S. abdominalis* Kasparyan, 1974 is still unknown (Kasparyan 1974; He and Liu 2013).

Key to world species of *Strongylopsis* (females only)

- 1 Propodeum without transverse wrinkles, smooth, finely punctate (Fig. 7). Tergites almost entirely black (Fig. 8). Face laterad of a median third polished and scarcely punctate (Fig. 3). “Discocubital” cell without ramellus (Fig. 2). Hind tarsus (Fig. 2) dark brown..... ***S. propodealis* Sheng & Sun, sp. nov.**
- Propodeum with transverse wrinkles dorsally (Fig. 17). Other characters not entirely as above..... **2**
- 2 Metasomal tergites almost entirely black (Fig. 8)..... **3**
- At least metasomal tergites 2 and 3 red (Fig. 18)..... **5**
- 3 Hind and middle femora black; hind tibia blackish brown. 1 m-cu with ramellus on anterior end. Malar space 1.5 as long as basal width of mandible ..... ***S. xizangensis* He & Liu, 2013**
- Hind and middle femora reddish brown; hind tibia pale rufous. Ramellus in fore wing present or absent ..... **4**
- 4 Fore wing hyaline, radial cell weakly darkened along anterior margin. 1 m-cu with ramellus on anterior end. Malar space 0.60–0.95 as long as basal width of mandible ..... ***S. belua* Kuzin, 1950**
- Fore wing evenly hyaline. 1 m-cu without ramellus. Malar space much longer than basal width of mandible ..... ***S. chinensis* He, 1996**
- 5 Face with dense punctures. Head 1.5–1.6 × as wide as length from lower margin of clypeus to upper margin of face (Fig. 12)..... **6**
- Face with sparse fine punctures. Head about 1.7–2.0 × as wide as length from lower margin of clypeus to upper margin of face..... **7**
- 6 Metasomal tergites (1)2–4 red, tergites 5–8 black (Fig. 18)..... ***S. punctata* Sheng & Sun, sp. nov.**
- Metasomal tergites all red (except base of tergite 1)..... ***S. rufiventris* Viktorov, 1958**
- 7 Fore wing dark brown, shorter than metasoma ..... ***S. victorovi* Kasparyan, 1974**
- Fore wing hyaline, longer than metasoma..... ***S. anomala* Brauns, 1896**

***Strongylopsis propodealis* Sheng & Sun, sp. nov.**

<http://zoobank.org/A020A605-7EAE-4ADC-80E8-00CEDC6FAB36>

Figures 2–10

**Diagnosis.** Propodeum (Fig. 7) large, evenly convex, carinae almost entirely absent, with even, fine punctures. Propodeal spiracle elongate, 2.5 × as long as maximum width. Metasomal tergites with relatively dense, fine punctures. Second tergite 0.75–0.8 × as long as posterior width. Ovipositor almost straight, ventral valve with 10 strong ridges (Fig. 10). All tergites black.

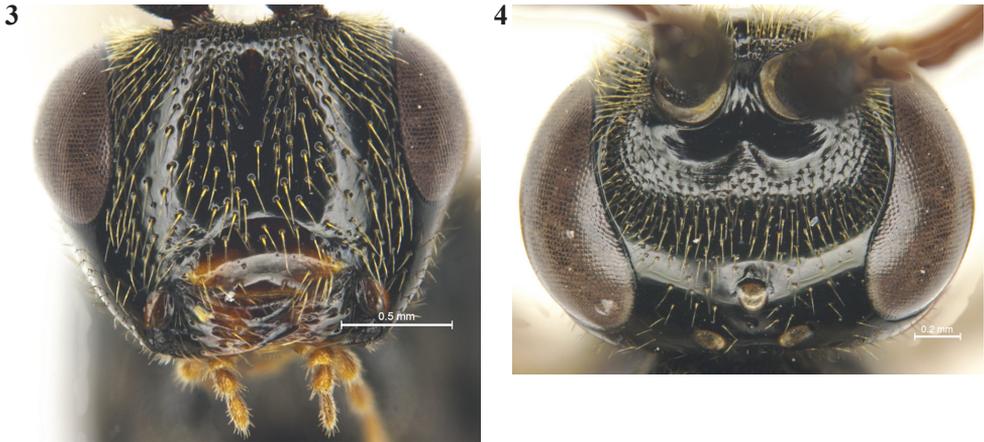
**Description.** Body length 8.0–8.5 mm. Fore wing length 5.0–6.0 mm.



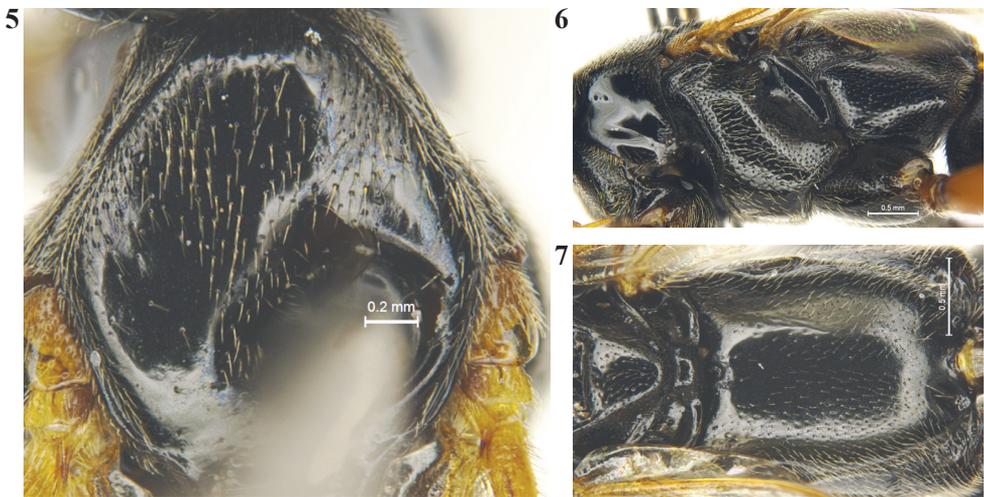
**Figure 2.** *Strongylopsis propodealis* Sheng & Sun, sp. nov. Holotype. Female. Habitus, lateral view.

**Head.** Head  $1.6 \times$  as wide as length from lower margin of clypeus to upper margin of face. Inner margins of eyes almost parallel. Face (Fig. 3)  $1.4\text{--}1.5 \times$  as wide as long, shiny, evenly convex, with sparse (upper median portion dense) distinct punctures and yellowish brown setae. Clypeal sulcus vestigial. Clypeus  $2.6\text{--}2.7 \times$  as wide as long, shiny, median portion distinctly convex transversely, dorsal margin and lower lateral portions with yellowish brown setae; apical margin almost truncate. Mandible with large sparse punctures and yellowish brown setae, upper tooth slightly longer than lower tooth. Malar space  $1.0\text{--}1.1 \times$  basal width of mandible. Gena with sparse fine punctures. Vertex (Fig. 4) smooth, shiny, with fine sparse punctures. Postocellar line  $0.8 \times$  as long as ocular-ocellar line; ocular-ocellar line  $1.7 \times$  as long as maximum diameter of posterior ocellus. Frons (Fig. 4) evenly slightly concave, median portion with dense even yellowish brown setae. Antenna  $1.4\text{--}1.5 \times$  as long as mesosoma, with 33 flagellomeres. Ratios of lengths from first to fifth flagellomeres:  $7:6:6:5:5$ . Occipital carina complete, reaching hypostomal carina slightly above base of mandible, distance to base of mandible  $0.2$  as long as basal width of mandibles.

**Mesosoma.** Lateral concavity of pronotum (Fig. 6) wide, deep, smooth, shiny, anterior margin with dense fine brown setae; dorsoposterior portion with dense fine punctures and brown setae. Epomia absent. Mesoscutum (Fig. 5) almost flat, shiny, anterior portion with fine punctures and yellowish brown setae. Notaulus indistinct. Scutellum almost shiny, with fine sparse punctures. Postsutellum with indistinct fine punctures. Mesopleuron (Fig. 6) with irregular fine punctures. Speculum and its surrounding area smooth, shiny. Upper end of epicnemial carina reaching subtegular ridge. Meta-pleuron with almost even fine punctures. Juxtacoxal carina absent. Legs stout. Outer



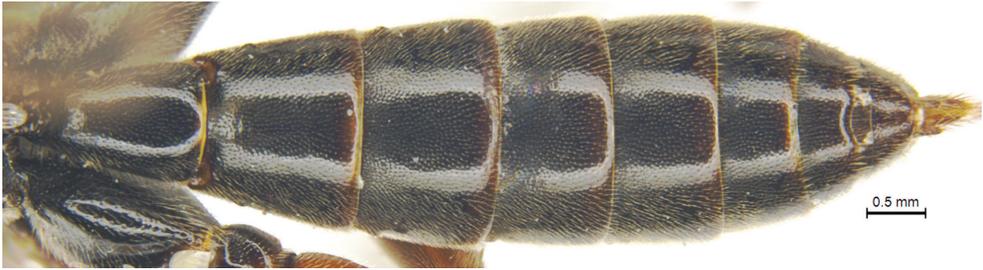
**Figures 3, 4.** *Strongyloopsis propodealis* Sheng & Sun, sp. nov. Holotype. Female **3** head, anterior view **4** head, dorsoanterior view.



**Figures 5–7.** *Strongyloopsis propodealis* Sheng & Sun, sp. nov. Holotype. Female **5** mesoscutum **6** mesosoma, lateral view **7** scutellum, postscutellum and propodeum, dorsal view.

profiles of tibiae with strong pegs (Fig. 2). Ratios of length of hind tarsomeres from first to fifth approximately: 3.6:2.8:2.0:1.3:2.2. Claw simple. Fore wing 1.05–1.1 × as long as metasoma, slightly brownish, hyaline. Vein 1cu-a opposite M&RS. Areolet pentagonal, receiving vein 2m-cu approximately 0.6 × distance from vein 2rs-m to 3rs-m. Postnervulus intercepted at lower 0.25. Hind wing vein 1-cu 0.2–0.25 × as long as cu-a. Propodeum (Fig. 7) evenly convex, shiny, with even, fine punctures (anterior and posterior portions almost sparsely punctate). Anterior of median longitudinal carina present as vestige. Propodeal spiracle elongate, 2.5 × as long as maximum width.

**Metasoma.** Metasomal tergites (Figs 8, 9) slightly shiny, with even fine punctures. First tergite 1.6–1.7 × as long as apical width, evenly widened posteriorly, anterior por-



**Figure 8.** *Strongyloopsis propodealis* Sheng & Sun, sp. nov. Holotype. Female. Metasoma, dorsal view.



**Figures 9, 10.** *Strongyloopsis propodealis* Sheng & Sun, sp. nov. Female **9** holotype, apical portion of metasoma, lateral view **10** paratype, apical portion of metasoma, lateral view.

tion almost impunctate; spiracle slightly convex, located at anterior 0.35. Second tergite 0.75–0.8 × as long as posterior width. Third tergite approximately 0.6 × as long as posterior width. Fourth tergite approximately 0.5 × as long as posterior width. Hind margin of seventh tergite slightly concave dorsally. Apex of ovipositor sheath slightly beyond apex of metasoma. Ovipositor almost straight, ventral valve with 10 strong ridges (Fig. 10).

**Coloration** (Fig. 2). Black, except for following: ventral profile of flagellum, apical half of clypeus, subapical portion of mandible, maxillary palpi, labial palpi, tegulae brown to reddish brown. Legs (except coxae black) red; apex of hind tibia and apical portion of each hind tarsomere slightly dark brown. Posterior margins of tergites slightly brownish. Pterostigma and veins dark brown.

**Male.** Unknown.

**Etymology.** The specific name is derived from the large, oblong, smooth propodeum (Fig. 7).

**Material examined.** *Holotype:* CHINA • ♀; Beijing, Xiaolongmen, Mentougou; 23.VI.2012; IT by Shi-Xiang Zong. *Paratypes:* CHINA • 1 ♀; same data as for holotype except 16.VI.2009. • 3 ♀♀; same data as for holotype except 8–30.VI.2012; IT by Tao Wang, Shi-Xiang Zong. • 2 ♀♀; same data as for holotype except 28–29.VI.2013.

**Host.** Unknown.

**Distribution.** China.

**Differential diagnosis.** The new species is similar to *Strongyloopsis chinensis* He, 1996, but can be distinguished from the latter by the following combination of char-

acters: frons without median carina; fore wing vein 1cu-a opposite M&RS; areolet pentagonal, receiving vein 2m-cu approximately  $0.6 \times$  distance from vein 2rs-m to 3rs-m; propodeum without wrinkles, without median longitudinal concavity; first tergite  $1.6\text{--}1.7 \times$  as long as posterior width; apical half of clypeus reddish brown. *Strongylopsis chinensis*: frons with median carina; vein 1cu-a distal of M&RS; areolet quadrate, receiving vein 2m-cu approximately  $0.72 \times$  distance from vein 2rs-m to 3rs-m; propodeum with transverse wrinkles, with median longitudinal concavity; first tergite  $1.45 \times$  as long as apical width; clypeus entirely black.

***Strongylopsis punctata* Sheng & Sun, sp. nov.**

<http://zoobank.org/C8BDB6FD-1390-4C28-9ADB-3E8D899F2A87>

Figures 11–18

**Diagnosis.** Face (Fig. 12) with dense punctures and yellow brown setae. Occipital carina reaching hypostomal carina distinctly above base of mandible, distance to base of mandible  $0.5 \times$  as long as basal width of mandible. Fore wing vein 1cu-a distal to M&RS by  $0.3 \times$  length of 1cu-a. Areolet quadrate, receiving vein 2m-cu approximately  $0.7 \times$  distance from vein 2rs-m to 3rs-m. Median area of propodeum (Fig. 17) with fine transverse wrinkles, laterally with fine punctures. Posterior portion of first tergite, tergites 2–3 and anterior portion of tergite 4 red to brownish red.

**Description.** Body length 11.5–12.0 mm. Fore wing length 8.5–9.0 mm.

**Head.** Head  $1.6 \times$  as wide as length from lower margin of clypeus to upper margin of face. Inner margins of eyes slightly convergent ventrally. Face (Fig. 12)  $1.2\text{--}1.3 \times$  as wide as long, shiny, evenly convex, with dense punctures (in lateral portion punctures sparser than upper median portion) and yellow brown setae. Clypeal sulcus weak, as vestige. Clypeus  $2.5\text{--}2.6 \times$  as wide as long, shiny, subbasal portion distinctly convex transversely, with sparse yellow brown setae; apical margin almost truncate. Mandible with sparse punctures and yellowish brown setae, upper tooth slightly longer than lower tooth. Malar space  $1.1\text{--}1.2 \times$  as long as basal width of mandible. Gena with sparse irregular fine punctures. Vertex (Fig. 13) smooth, shiny, with sparse punctures. Stemmaticum with relatively dense punctures. Postocellar line  $0.9 \times$  as long as ocular-ocellar line. Ocular-ocellar line  $1.4\text{--}1.5 \times$  as long as maximum diameter of posterior ocellus. Frons (Fig. 13) slightly concave, with dense brown setae and weak median longitudinal sulcus. Antenna stout, with 36–37 flagellomeres. Ratios of lengths from first to fifth flagellomeres: 10:8:8:7:7. Occipital carina complete, reaching hypostomal carina distinctly above base of mandible, distance to base of mandible  $0.5 \times$  as long as basal width of mandible.

**Mesosoma.** Lateral concavity of pronotum (Figs 14, 15) wide, smooth, shiny, lower anterior and dorsoposterior portions with distinct punctures and brown setae; subdorsal-median and lower posterior portions with distinct transverse wrinkles. Epomia vestigial. Mesoscutum (Fig. 13) almost flat, shiny, with fine punctures and yellowish brown setae. Notaulus indistinct. Scutellum almost shiny, with fine punctures. Postscutellum transverse, slightly convex, with indistinct fine punctures. Mesopleuron (Fig. 15) with even fine punctures; speculum and its surrounding area smooth and



**Figure 11.** *Strongyloopsis punctata* Sheng & Sun, sp. nov. Holotype. Female. Habitus, lateral view.

shiny. Upper end of epicnemial carina almost reaching to subtegular ridge. Metapleuron with even, fine punctures. Juxtacoxal carina absent. Legs stout. Outer profiles of tibiae with strong pegs (Fig. 11). Ratios of length of hind tarsomeres from first to fifth approximately: 3.6:2.4:1.8:1.0:2.0. Claw simple. Fore wing 1.2–1.3 × as long as metasoma, brownish, hyaline. Vein 1cu-a inclivous, distal to M&RS by 0.3 × length of 1cu-a. Areolet quadrate, receiving vein 2m-cu approximately 0.7 × distance from vein 2rs-m to 3rs-m; postnervulus intercepted at lower 0.2–0.25. Hind wing vein 1-cu 0.2 × as long as cu-a. Propodeum (Fig. 17) evenly convex, shiny, median area with irregular fine wrinkles, lateral areas with fine punctures; posteromedian portions almost smooth, sparsely punctate. Median longitudinal carina present as vestige anteriorly. Propodeal spiracle elongate, 2.3 × as long as maximum width.

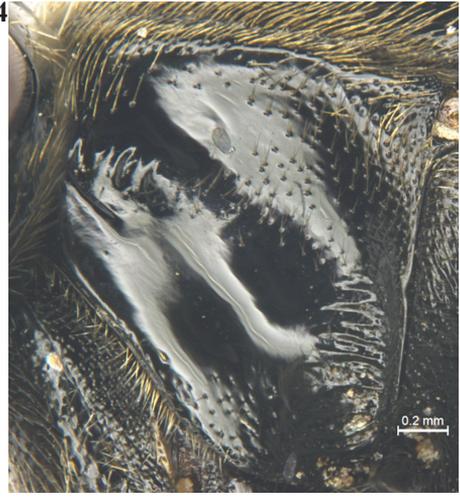
**Metasoma.** Metasomal tergites (Fig. 18) with even, fine punctures, evenly widened from base to fifth tergites. First tergite 1.5–1.6 × as long as posterior width, evenly widened posteriorly, anterior portion weakly punctate; spiracle slightly convex, located at anterior 0.3. Second tergite 0.8–0.9 × as long as posterior width. Third tergite 0.65–0.7 × as long as posterior width. Fourth tergite 0.55–0.60 × as long as posterior width. Lateral sides of fifth tergite parallel. Apex of ovipositor sheath slightly beyond apex of metasoma.

**Coloration** (Fig. 11). Black, except for following: ventral profile of flagellum, apical half of clypeus, mandible except teeth, maxillary palpi, labial palpi, tegulae, legs except coxae, trochanters and hind tarsus, posterior portion of first tergite, tergites 2–3 and anterior portion of tergite 4 red to brownish red. Hind tarsus black. Pterostigma and veins brownish black.

12



14



13



**Figures 12–14.** *Strongylopsis punctata* Sheng & Sun, sp. nov. Holotype. Female **12** head, anterior view **13** head and mesoscutum dorsal view **14** pronotum, lateral view.

**Male.** Unknown.

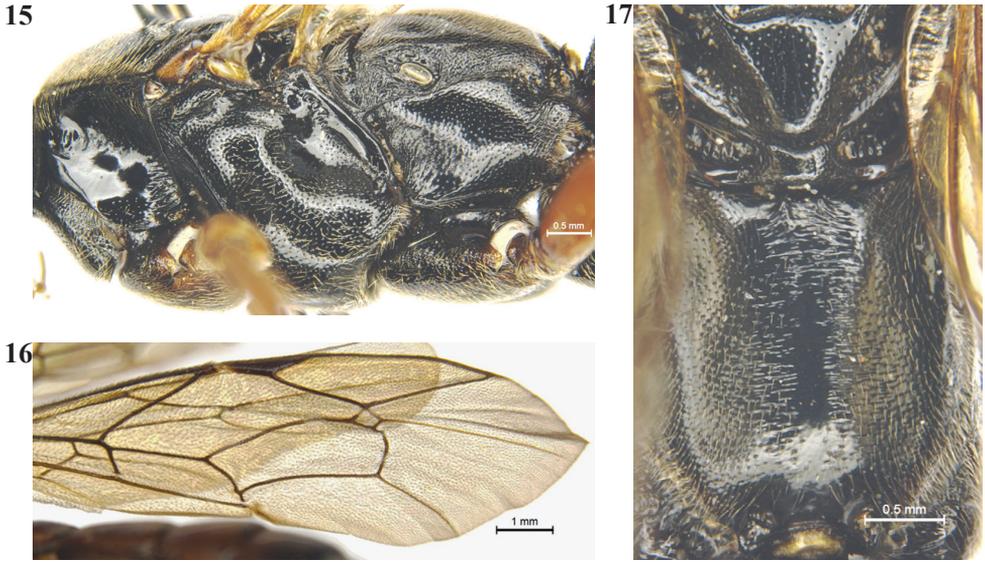
**Etymology.** The specific name is derived from the densely punctate face (Fig. 12).

**Material examined.** *Holotype:* CHINA • ♀; Beijing, Xiaolongmen, Mentougou; 13.VI.2008; IT by Tao Wang. *Paratypes:* CHINA • 1♀; same data as for holotype except 23.VI.2012. • 1♀; same data as for holotype except 31.V.2013; Mao-Ling Sheng leg. • 2♀♀; same data as for holotype except 25.VI.–9.VII.2014.

**Host.** Unknown.

**Distribution.** China.

**Differential diagnosis.** The new species is similar to *Strongylopsis anomala* Brauns, 1896, but can be distinguished from the latter by the following combination



**Figures 15–17.** *Strongyloopsis punctata* Sheng & Sun, sp. nov. Holotype. Female **15** mesosoma, lateral view **16** fore wing **17** scutellum, postscutellum and propodeum, dorsal view.



**Figure 18.** *Strongyloopsis punctata* Sheng & Sun, sp.n. Holotype. Female. Metasoma, dorsal view.

of characters: head  $1.6 \times$  as wide as length from lower margin of clypeus to upper margin of face; face (Fig. 12) with dense punctures; areolet quadrate; propodeum with distinct transverse wrinkles; second tergite distinctly trapezoidal. *Strongyloopsis anomala*: head at least  $1.7 \times$  as wide as length from lower margin of clypeus to upper margin of face; face with sparse fine punctures; propodeum without transverse wrinkles; second tergite square.

## Discussion

It is known that the males of Ichneumonids are often more easily caught using interception traps (IT) or Malaise traps. Even though the authors have been exploring the mountains around Beijing for ten years and have collected/ obtained large numbers of ichneumonids, males of *Strongyloopsis* have still not been found.

Maybe the males of *Strongylopsis* are less distinctive than females, some parts with more or less different coloration from female, but they can be recognised by the strong spine-like setae on the tibia; the gradually narrowed first tergite, with rounded edges and antenna with tyloids.

The males of some ichneumonid groups are not easy to match with females based on morphological characters (Hilpert 1992). For further research on males, as well as females, more accurate assessments will be helped by molecular methods.

## Acknowledgements

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