

A STUDY ON CHINESE SPECIES OF *AULOGYMNUS* FÖRSTER (HYMENOPTERA: EULOPHIDAE)*

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Abstract This paper treats Chinese species of *Aulogymnus* Förster which is newly recorded from China. Four new species, *A. elevatus* sp. nov., *A. hyalopterus* sp. nov., *A. insculptus* sp. nov., and *A. longicalcar* sp. nov. are described. All type specimens are deposited in the Zoological Museum, Institute of Zoology, Chinese Academy of Sciences.

Key words Hymenoptera, Eulophidae, *Aulogymnus*, new species

INTRODUCTION

Aulogymnus Förster, 1851, a moderate sized genus of Eulophinae, was erected for *Aulogymnus aceris* Förster, 1851. Later, the same author erected *Olynx* for *Ichneumon gallarum* Linnaeus (1761). *Olynx* was placed in synonymy of *Aulogymnus* by Bouček (1965) and regarded as a subgenus of *Aulogymnus* by Bouček and Graham (1978) and Bouček (1988). Ashmead (1904) erected *Scotolinx* to include *S. gallicola* Ashmead. Bouček (1988) confirmed Gordh (1977)'s finding that this genus is really another synonym of *Aulogymnus*. Askew (1959) revised this genus under the name of *Olynx* for six British species. Pujade i Villar (1991) reviewed and keyed out 8 species of this genus from Iberian Peninsula. At present, *Aulogymnus* has 27 species worldwide.

In China, no taxonomic or biological studies have been done on this genus. Recent investigation has newly recorded this genus from China, and revealed four new species, which are described in this paper. One European species, *A. skianeuros* (Ratzeburg) and a Japanese species *A. japonicus* (Ashmead) were included in the key for comparison.

Genus *Aulogymnus* Förster

Aulogymnus Förster, 1851: 24. Type species *Aulogymnus aceris* Förster, by monotypy.

Olynx Förster, 1856: 72. Type species *Ichneumon gallarum* Linnaeus, by original designation. Synonymized with *Aulogymnus* by Bouček (1965: 551).

Cyniphoctonus Reinhard, 1858: 22. Type species *Ichneumon gallarum*, by original designation. Synonymized with *Aulogymnus* by Bouček and Askew (1968: 28).

Olinx Reinhard, 1858: 22. Emendation.

Ophelinoideus Ashmead, 1904: 163. Type species *Ophelinoideus japonicus* Ashmead, by original designation. Synonymized with *Aulogymnus* by Kamiyo (1976: 482).

Scotolinx Ashmead, 1904: 354. Type species *Scotolinx gallicola* Ashmead, by original designation. Syn-

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onymized with *Aulogymnus* by Bouček (1988: 609).

Pseudiglyphella Girault, 1913: 255. Type species *Pseudiglyphella caelestis* Girault, by original designation. Description supplemented by Girault, 1915 (230): 264. Synonymized with *Aulogymnus* by Bouček (1988: 609).

Mirolynx Girault, 1916: 131. Type species *Mirolynx flavitibiae* Girault, by original designation. Synonymized with *Aulogymnus* by Schauff and LaSalle (1993: 491).

Pseudolynx Girault, 1916: 152. Type species *Pseudolynx io* Girault, by original designation. Synonymized with *Aulogymnus* by Schauff and LaSalle (1993: 491).

Scotolynx Girault, 1916: 218-219. Type species *Scotolynx gallicola* Girault, by original designation. Based on the same material as *Scotolynx gallicola* Ashmead. Synonymized with *Aulogymnus* by Bouček (1988: 609).

Diagnosis: Scutellum with sublateral grooves faint, indistinct or absent; axillae slightly advanced; petiole very short, without dorsal ridge; notauli posteriorly almost straight; funicle 2 or 3-segmented in females, 3 or 4-segmented in males; pronotum rounded anteriorly; propleuron separated posteriorly, exposing prosternum.

It is closely related to *Cirrospilus* Westwood. The latter has the funicle 2-segmented and scutellum with distinct sublateral grooves. If *Aulogymnus* has faint sublateral grooves on scutellum, the distance between the grooves is quite narrower than that in *Cirrospilus*, and the grooves posteriorly being equidistant from each other as from the axillular grooves on sides of scutellum; *Aulogymnus* with axillae only slightly advanced, while *Cirrospilus* with axillae slightly to strongly advanced. It is also similar to *Dichatomus* Förster. But *Aulogymnus* has the uncus removed well away from apex of stigma, while *Dichatomus* has stigma rounded.

A. elevatus sp. n., examined under scanning electronic microscope, has transverse grooves just below median ocellus. This character is difficult to observe under stereo-microscope.

Hosts: Askew (1961) studied the biology of the British species of the genus *Olynx*. He stated that all species of *Olynx* are parasitoids of cynipid galls on oak (Fagaceae; *Quercus*). The common cynipid genera are *Neuroterus*, *Andricus*, *Adleria*, *Callirhytis*, *Biorhiza*, *Cynipis*, *Pediaspis*, *Synergus* and *Trigonaspis*. Although this is true for most species, other host records, according to Bouček and Askew (1968) include *Hylesinus fraxini* (Panzer) of Curculionidae (Coleoptera) and *Phyllonorycter* sp. of Gracillariidae (Lepidoptera). Other associated plants include maple (Aceraceae; *Acer*) and willow (Salicaceae; *Salix*). The Oriental species, *A. indicus* (Arifa and Khan), is associated with leaf-miners. Based on the data available so far, the species of this genus are solitary larval-nymphal ectoparasitoids.

Distribution: Most species of the genus are Palearctic. Seven species have been found in Nearctic region, 4 in Australian/ Pacific region, and 1 in Oriental region. This genus is newly recorded from China (Beijing, Heilongjiang, Yunnan).

Key to Species (Female)

1. Body bichromatic, metallic green with yellow patches; hind tibiae with one spur slightly longer than basitarsus (Fig. 13) *A. longicalcar* sp. nov.
Body completely metallic green, without yellow patches; hind tibiae with one spur usually less than half length of basitarsus (except *A. hyalopterus*) (Figs. 3, 8, 10) 2
2. Speculum closed posteriorly 3

- Speculum partly to completely open posteriorly (Figs 5, 6, 9) 4
3. F1 more than twice length of pedicel; occiput without dark line behind posterior ocelli
 *A. japonicus* (Ashmead) (not examined)
- F1 less than twice length of pedicel; occiput with dark line behind posterior ocelli
 *A. skianeuros* Ratzeburg
4. Femora mostly dark, pale apically; hind tibiae with spur nearly as long as basitarsus (Fig 8)
 *A. hyalopterus* sp. nov.
- Femora completely pale; hind tibiae with spur less than 1/2 length of basitarsus (Figs. 2, 10)
 5
5. Scutellum with raised reticulation; forewing with speculum large, completely open posteriorly (Fig. 5); funicles equal in length *A. elevatus* sp. nov.
- Scutellum with engraved reticulation; forewing with speculum narrow, partly closed posteriorly (Fig. 9); first funicle distinctly longer than others *A. insculptus* sp. nov.

***Aulogymnus elevatus* sp. nov.** (Figs. 1–5)

Diagnosis: Scutellum with raised reticulation; femora completely pale; funicle with all segments sub-equal in length; speculum open posteriorly; body completely metallic green, without yellow patches.

It is similar to *Aulogymnus gallarum* (L.) in having entire thorax dark; legs yellow; F1 longer than pedicel; speculum open posteriorly; marginal vein more than 2.0 times longer than stigmal vein. But for this species, it does not have two parallel, longitudinal grey or blue lines on scutellum; all legs yellow; gaster with a transverse, yellow, basal stripe; forewing hyaline, without any fuscous marks near parastigma or stigmal vein.

Female: Body length 1.94 mm, forewing length 1.69 mm.

Body (Fig. 1) metallic blue-green. Eyes white. Ocelli reddish. Clypeus yellowish brown. Mandibles brown. Antennae yellowish brown except scape yellow. Setae yellow except those on mesoscutum, scutellum black. Marginal fringe, setae on forewing brown. Acropleuron yellowish brown. Upper mesepimeron, lower mesepimeron, metepimeron brown. Legs (Figs. 3, 4) yellow. Gaster T1 yellow, with rest metallic blue-green.

Head (Fig. 2) wider than high. Vertex with transverse, engraved reticulation. Setae on eyes sparse. Postoccipital carina absent. Toruli placed above lower eye margin. Scape cylindrical. Flagellum usually about same width. Clava longer than each funicular segment. Relative measurements; head width 58, head length 30, head height 46, POL 13, OOL 7, eye length 21, eye width 14, distance between eyes 32, malar space 13, mouth opening 25, toruli to median ocelli 18, toruli to mouth margin 21, scape 24, pedicel 7, F1 13, F2 10, F3 12, clava 21.

Mid lobe of mesoscutum with 3 pairs of setae, without scattered setae, with isodiametric, raised reticulation. Notauli straight, converging, ending at inner angles of axillae. Axillae with tip anterior to transscutal suture, reticulate. Scutellum as long as mesoscutum, with 2 pairs of setae, without sublateral grooves, with elongate, superficial reticulation. Dorsellum with isodiametric, superficial reticulation, with posterior margin rectangular. Propodeum shorter than scutellum, medially distinctly longer than dorsellum, with isodiametric, superficial reticulation. Callus with 8 setae. Median carina present, linear posteriorly. Plicae absent. Relative measurements: thorax length 20, thorax width 17, pronotum 4, mesoscutum 11, scutellum 11, dorsellum 2.5, propodeum 3.5.

Forewing (Fig. 5) hyaline. Costal cell with one line of setae complete on lower sur-

face, with setae on upper surface only appearing after the middle point. Submarginal vein with 6 setae on dorsal surface. Cubital vein straight at base. Basal cell bare below submarginal vein. Speculum large, completely open posteriorly. Hindwing rounded apically. Relative measurements: forewing length 55, forewing width 23, submarginal vein 44, costal cell 59, parastigma 18, marginal vein 40, postmarginal vein 28, stigmal vein 18.

Gaster sub-rotund, as broad as thorax. Apex of gaster not acute. Tip of ovipositor sheath visible. Relative measurements: gaster length 29, gaster width 17.

Male: unknown.

Material Examined: Holotype ♀ Beijing, Tanzhe Temple, May 30, 1984 (Dawei Huang). Paratypes: 3 ♀♀, Beijing, Tanzhe Temple, May 30, 1984 (Dawei Huang).

Biology: unknown

Distribution: China: Beijing.

***Aulogymnus hyalopterus* sp. nov.** (Figs. 6–8)

Diagnosis: Hind femora (Fig. 8) mostly dark, pale apically; speculum partly open posteriorly; body completely metallic green, without yellow patch.

This species is close to *A. gallarum* (L.), *A. trilineatus* (Mayr), and *A. euedoreschus* (Walker) in having dark femora. But it has hyaline forewings, while the latter three species all have dark pattern on forewing. It is also similar to *A. skianeuros* (Ratzeburg) in having all coxae metallic green; femora dark, with some metallic shine. But the latter is different by having speculum closed posteriorly.

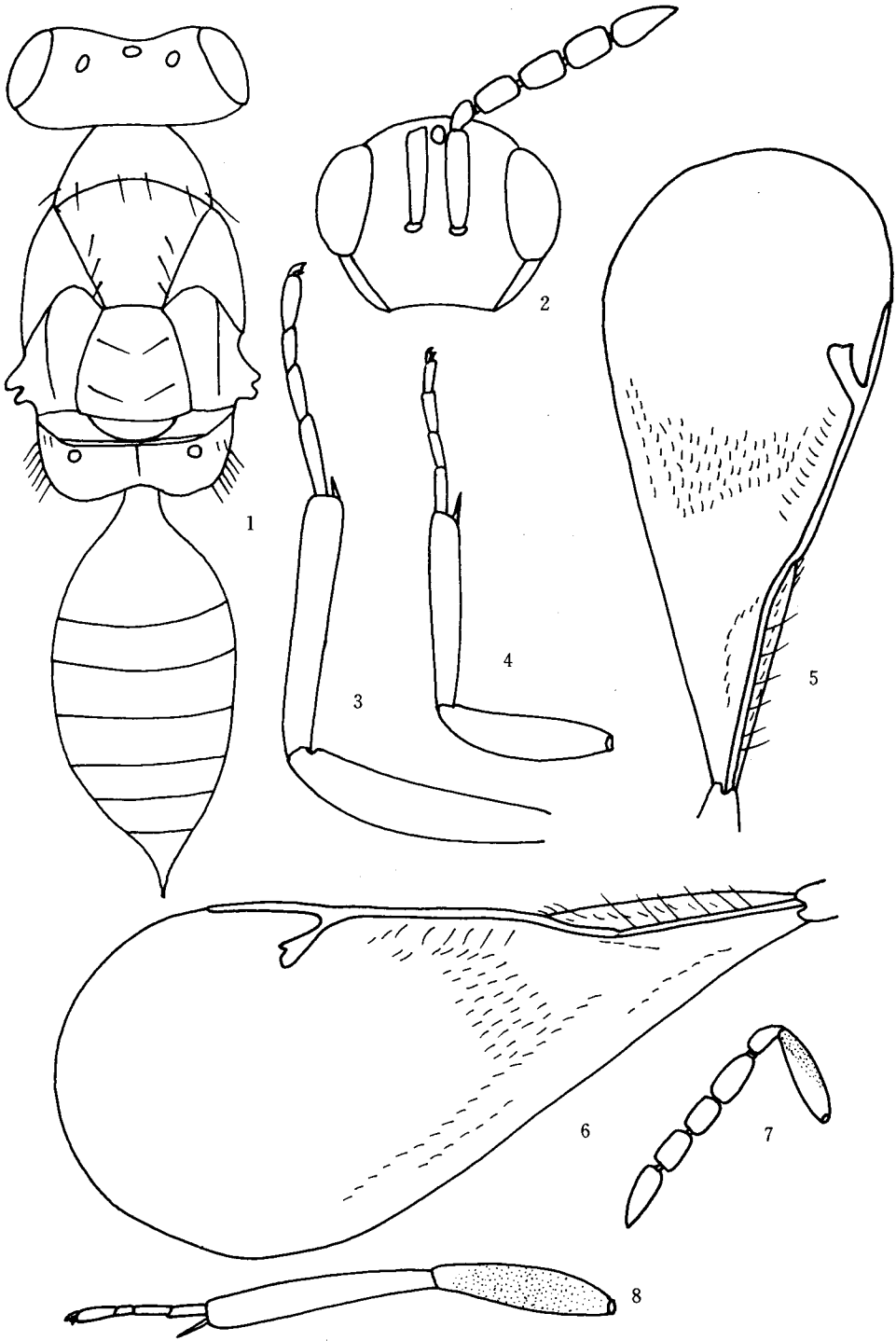
Female: Body length 2.28 mm, forewing length 1.97 mm.

Body metallic blue-green. Eyes grey. Ocelli brown. Antennae (Fig. 7) brown except scape partly yellow. Clypeus brown. Setae mostly brown, except those on pronotum, mesoscutum, and scutellum black, those on callus yellow. Legs mostly yellow. Coxae blue-green except hind ones yellow at apex. Femora bluish brown. Tarsus IV brown.

Head wider than high. Vertex with isodiametric, superficial reticulation. Eyes bare. Toruli placed above lower eye margin. Scape cylindrical. Flagellum becoming wider apically. Clava longer than each funicular segment. Relative measurements: head width 60, head length 18, head height 50, POL 14, OOL 9, eye length 26, eye width 15, distance between eyes 37, malar space 14, scape 25, pedicel 8, F1 14, F2 10, F3 10, clava 18.

Mid lobe of mesoscutum with 3 pairs of setae, without scattered setae, with isodiametric, raised reticulation. Notauli straight, converging, ending at inner angles of axillae. Axillae reticulate, with tip anterior to transscutal suture. Scutellum shorter than mesoscutum, with 2 pairs of setae, without sublateral grooves, with isodiametric, raised reticulation. Dorsellum with isodiametric, raised reticulation medially, smooth laterally, with posterior margin rectangular. Propodeum shorter than scutellum, medially as long as dorsellum, with isodiametric, engraved reticulation. Callus with 6 setae. Median carina present, linear posteriorly. Plicae absent. Relative measurements: thorax length 23, thorax width 19, pronotum 5, mesoscutum 12, scutellum 10, dorsellum 3, propodeum 2.5.

Forewing (Fig. 6) hyaline. Costal cell with a line of setae extending the entire length of the lower surface, with those on upper surface only appearing after the middle point. Submarginal vein with 6 setae on dorsal surface. Cubital vein straight at base. Basal cell



Figs. 1–5 *A. elevatus* sp. nov. (♀)
1. Dorsal view of body; 2. front view of head with antennae;
3. hind leg; 4. mid leg; 5. forewing.
Figs. 6–8 *A. hyalopterus* sp. nov. (♀)
6. forewing; 7. antenna; 8. hind leg.

bare below submarginal vein. Speculum bare, open posteriorly. Hind wing rounded apically. Relative measurements: forewing length 64, forewing width 28, submarginal vein 46, costal cell 67, parastigma 24, marginal vein 45, postmarginal vein 29, stigmal vein 19.

Gaster sub-rotund, as broda as thorax. Apex of gaster acute. Longer setae less than twice length of others. Tip of ovipositor sheath visible. Relative measurements: gaster length 43, gaster width 20.

Male: unknown.

Material Examined. Holotype ♀, Yunnan Prov., Liude, Yongsheng, July 8, 1984, 2 300 m (Changfang Li).

Biology: Unknown.

Distribution: China: Yunnan.

***Aulogymnus insculptus* sp. nov** (Figs. 9–11)

Diagnosis: Scutellum with engraved reticulation; femora (Fig. 10) completely pale; forewing with speculum partly open posteriorly (Fig. 9); body completely metallic green, without yellow patches.

It is close to *A. elevatus*, but the latter has raised reticulation on scutellum, forewing with speculum large, completely open posteriorly (Fig. 5); funicles equal in length. It is also similar to *Aulogymnus skianeuros* (Ratzeburg) in having speculum small, closed posteriorly by row of hairs; F1 longer than pedicel. But the latter has all coxae metallic green, femora dark with some metallic shine; entire dorsum metallic green.

Female: Body length 1.78 mm, forewing length 1.82 mm.

Body metallic blue-green. Eyes reddish. Ocelli black. Antennae (Fig. 11) yellowish brown except scape yellow. Mandible reddish. Most setae yellow, except those on vertex, upper face, marginal fringe, and those on forewing brown, those on pronotum, mesoscutum, scutellum black. Acropleuron, upper mesepimeron, lower mesepimeron, metepimeron metallic green. Legs yellow, except coxae, tarsus IV brown. Gaster with T1 yellow in anterior half, other segments brown with metallic tinge.

Head wider than high. Vertex with isodiametric, superficial reticulation. Setae on eyes sparse. Postoccipital carina absent. Toruli placed above lower eye margin. Scape cylindrical. Flagellum usually about same width. F1 longer than pedicel. Clava longer than each funicular segment. Relative measurements: head width 56, head length 13, head height 44, POL 13, OOL 10, eye length 20, eye width 9, distance between eyes 32, malar space 15, mouth opening 25, toruli to median ocelli 21, toruli to mouth margin 16, scape 24, pedicel 8, F1 14, F2 12, F3 12, clava 20.

Mid lobe of mesoscutum with 3 pairs of setae, without scattered setae, with isodiametric, raised reticulation. Notauli straight, converging, ending at inner angles of axillae. Axillae with tip anterior to transscutal suture, reticulate. Scutellum as long as mesoscutum, with 2 pairs of setae, without sublateral grooves, with elongate, engraved reticulation. Dorsellum with isodiametric, engraved reticulation, with posterior margin rectangular. Propodeum shorter than scutellum, medially distinctly longer than dorsellum, with very vague, isodiametric, superficial reticulation. Callus with 10 setae. Median carina present, linear posteriorly. Plicae absent. Relative measurements: thorax length 21, thorax width 16, pronotum 6, mesoscutum 10, scutellum 10, dorsellum 3, propodeum 4.

Forewing (Fig. 9) hyaline. Costal setae with a line of setae appearing after the middle point on lower surface, with those on upper surface only appearing after the middle point.

Submarginal vein with 3 setae on dorsal surface. Cubital vein straight at base. Basal cell bare below submarginal vein. Speculum bare, partly closed posteriorly. Hind wing nearly truncate apically. Relative measurements: forewing length 59, forewing width 26, submarginal vein 45, costal cell 63, parastigma 24, marginal vein 40, postmarginal vein 41, stigmal vein 20.

Gaster sub-rotund, longer than thorax, narrower than thorax. Longer setae less than twice length of others. Tip of ovipositor sheath visible. Relative measurements: gaster length 26, gaster width 12.

Male: unknown.

Material Examined. Holotype ♀, Yunnan, Lijiang, Yuhu, July 23, 1984, 2 750 m (Changfang Li).

Biology: Unknown.

Distribution: China; Yunnan.

***Aulogymnus longicalcar* sp. nov.** (Figs. 12–13)

Diagnosis: Body bichromatic, metallic green with yellow patches; hind tibiae (Fig. 13) with long spur at apex; separation between funicle and clava not readily discernible (Fig. 12).

It is similar to *Aulogymnus testaceoviridis* (Erdős) in having bichromatic head and thorax, but can be readily distinguished from the latter by having only parts of pleuron partly yellow, and hind tibiae with long spur at slightly as long as basitarsus.

Female: Body length unavailable for damage of gaster, Forewing length 1.91 mm.

Body metallic blue-green with yellow patches. Eyes reddish. Ocelli brown. Scape yellow with dorsal surface brown. Pedicel dark brown. Anelli yellowish brown. Flagellum brown. Vertex, antennal scrobe yellow and blue-green. Lower half of upper face, lower face, gena, and clypeus yellow. Ocelli triangle green. Occiput brown. Mandibles yellowish brown. Most setae brown, except those on lower face and callus yellow. Pronotum green dorsally, with propleuron yellow. Prepectus, acropleuron yellow. Mesepisternum with upper 1/3 yellow, lower 2/3 green. Upper mesepimeron, lower mesepimeron, metepimeron, mesoscutum, notauli, axillae, dorsellum green. Scutellum green with yellowish brown tinge near anterior and posterior end. Scapulae green anteriorly, yellow near junction between itself and axillae. Legs mostly yellow. Fore coxae yellow with a blue-green patch near base. mid coxae brown. mid femora bluish brown. Mid tibiae bluish brown with base yellow. Hind coxae blue-green with apex yellow. Hind femora blue-green with apical 1/3 yellow. Tarsus IV brown.

Head wider than high. Vertex with isodiametric, superficial reticulation. Setae on eyes sparse. Toruli placed above lower eye margin. Scape cylindrical. Flagellum (Fig. 12) becoming wider apically. Separation between funicle and clava not readily discernible. Clava longer than each funicular segment. Relative measurements: head width 80, head length 23, head height 65, POL 17, OOL 6, eye length 38, eye width 22, distance between eyes 30, malar space 20, mouth opening 33, toruli to median ocelli 27, toruli to mouth margin 18, scape 31, pedicel 11, F1 12, F2 10, F3 11, clava 20.

Mid lobe of mesoscutum with 6 pairs of setae, without scattered setae, with isodiametric, raised reticulation. Notauli straight, converging, ending at inner angles of axillae. Axillae with tip anterior to transscutal suture, reticulate. Scutellum shorter than mesoscutum, without sublateral grooves, with elongate, raised reticulation. Dorsellum with isodi-

ametric, superficial reticulation medially, smooth laterally, with posterior margin rectangular. Propodeum shorter than scutellum, medially slightly shorter than dorsellum, with superficial reticulation partly isodiametric, partly elongate. Callus with 12 setae. Median carina present, linear posteriorly. Plicae absent. Relative measurements: thorax length 35, thorax width 23, pronotum 9, mesoscutum 17, scutellum 15, dorsellum 5, propodeum 4.

Forewing hyaline. Costal cell with scattered setae only appearing after the middle point on lower surface, those on upper surface appearing after the middle point. Submarginal vein with 8 setae on dorsal surface. Cubital vein straight at base. Basal cell with several setae below submarginal vein. Speculum bare. closed. Hind wing rounded apically.

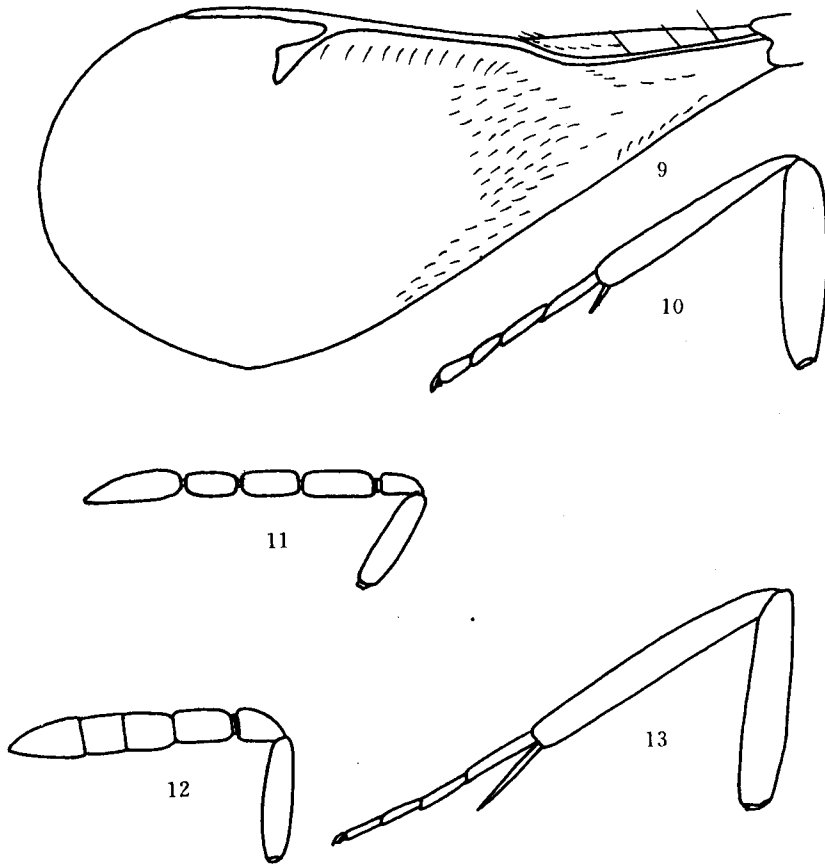
Gaster damaged.

Male: unknown.

Material Examined: holotype ♀, Harbin, Jun. 6, 1954 (Dingxi Liao).

Biology: Unknown.

Distribution: China; Heilongjiang.



Figs. 9–11 *A. insculptus* sp. nov. (♀) 9. forewing; 10. hind leg; 11. antennae.
Figs. 12–13 *A. longicalcar* sp. nov. (♀) 12. antennae; 13. hind leg.

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中国奥姬小蜂属 (*Aulogymnus* Förster) 研究 (膜翅目: 姬小蜂科)

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本文研究了中国的奥姬小蜂属 (*Aulogymnus* Förster), 该属在中国是首次发现。本文描述了 4 个新种, *A. elevatus* sp. nov., *A. hyalopterus* sp. nov., *A. insculptus* sp. nov., *A. longicalcar* sp. nov.。所有模式标本保存于中国科学院动物研究所动物标本馆。