A new species in the genus *Ropalophorus* Curtis (Hymenoptera: Braconidae) from China, parasitizing adults of the bark beetle *Ips subelongatus* (Coleoptera: Scolytidae), with a key to world species of the genus

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Key words: Hymenoptera; Braconidae; Euphorinae; *Ropalophorus*; Coleoptera; Curculionidae; Scolytinae; *Ips*; *Larix*; distribution; world; China; new species.
A new species of the genus *Ropalophorus* Curtis (Hymenoptera: Braconidae: Euphorinae) from Palaearctic China is described and illustrated. A key to world species is added.

Introduction

The larch bark beetle, *Ips subelongatus* (Motschulsky) (Coleoptera: Curculionidae: Scolytinae), is a serious pest in *Larix* forests in China, especially in cultivated forest stands. It often attacks the apparent healthy trees and kills them, up to 35% may be attacked in Jinlin Province (Yu, 1992). During the investigation of the natural enemies of the pest in northeastern China, a new species of the genus *Ropalophorus* Curtis, 1837 (Hymenoptera: Braconidae: Euphorinae) was found. It is an endoparasitoid of the adult bark beetle. Recently, two new species have been reported from China (Yang, 1989, 1996). The new species is described and illustrated below; a key to the world species is added.

For the identification of the genus *Ropalophorus*, see Chen & van Achterberg (1997). The type specimens of the new species are deposited in the Insect Museum of Chinese Academy of Forestry, Beijing (CAFB) and the Nationaal Natuurhistorisch Museum, Leiden (RMNH).

Systematics

Key to world species of the genus *Ropalophorus* Curtis

1. Antenna of ♀ with 9 segments (fig. 13); vein cu-a of fore wing more or less postfurcal by its own length; area between stemmaticum and eyes largely smooth; parasitic in *Polygraphus polygraphus* (Linnaeus); China ..... ***R. polygraphus*** Yang, 1989
- Antenna of ♀ with 10-11 segments (figs 3, 14); vein cu-a of fore wing distinctly less postfurcal (fig. 11); area between stemmaticum and eyes more or less punctuate;

parasitic in other bark beetle species 2

2. Area between stemmaticum and eyes rather sparsely punctate, near stemmaticum with interspaces wider than punctures (fig. 2); postero-laterally mesosternum comparatively tuberculate convex; separation between 10th and 11th segment of antenna of ♀ distinct (fig. 3); vein 1r-m of hind wing 2.2-2.5 times as long as vein1-M (fig. 12); parasitic in *Ips subelongatus* (Motschulsky); China ..... ***R. subelongatae*** Yang, spec. nov.

- Area between stemmaticum and eyes distinctly punctate, near stemmaticum with interspaces about equal to width of punctures; postero-laterally mesosternum moderately convex; separation between 10th and 11th segment of antenna of ♀ incomplete, rarely nearly complete (fig. 14); vein 1r-m of hind wing 1.8-2.5 times as long as vein 1-M 3

3. Vein 1r-m of hind wing about 1.8 times as long as vein 1-M; medio-posterior depression of scutellum with several short weak carinae; precoxal sulcus crenulate; parasitic in *Polygraphus squameus* Yin & Huang; China ..... ***R. sichuanicus*** Yang, 1996

- Vein 1r-m of hind wing 2.0-2.5 times as long as vein 1-M, rarely less; medio-posterior depression of scutellum with one short median carina; precoxal sulcus more or less reticulate; parasitic in *Ips typographus* (Linnaeus), *I. amitinus* (Eichhoff) and *Leperismus fraxini* (Panzer); Europe, U.S.A., Canada ..... ***R. clavicornis*** (Wesmael, 1835)

Note.— Dr C. van Achterberg (Leiden) kindly informed us that *R. wisconsinensis* Shenefelt, 1960, belongs to this species (**syn. nov.**).

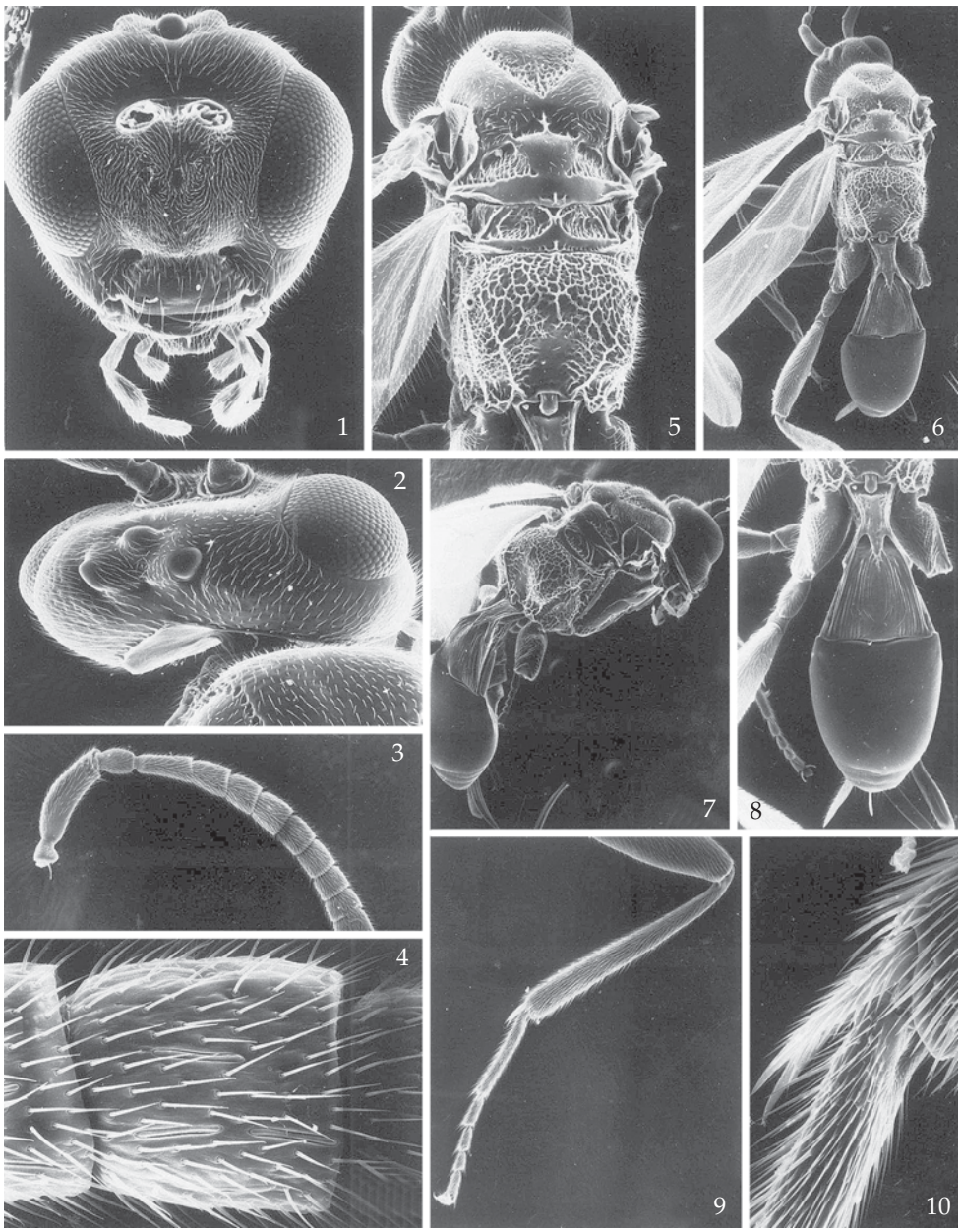
Ropalophorus subelongatae Yang, spec. nov.
(figs 1-12)

Material.— Holotype, ♀ (CAFB), [**China**:] Jilin province, Changbaisan Mts, Erdaobaihe, 15.vii.1998, Yang Zhong-qi & Sheng Mao-ling, reared from cocoon collected next to a mummy of an adult *Ips subelongatus* in gallery in *Larix gmelinii olgensis* (Henry). Paratypes (15♀♀; CAFB, RMNH): 2♀♀, same data as holotype; 7 ♀♀, same data, but collected in the bark beetle galleries; 6♀♀, Jiagedaqi, Daxinanling Mts, Heilongjiang province, 20.vii.1998, Yang Zhong-qi, Gu Ya-qin & Song Yu-xiang, collected from the galleries of the bark beetle in logs of *Larix gmelinii* (Ruprecht).

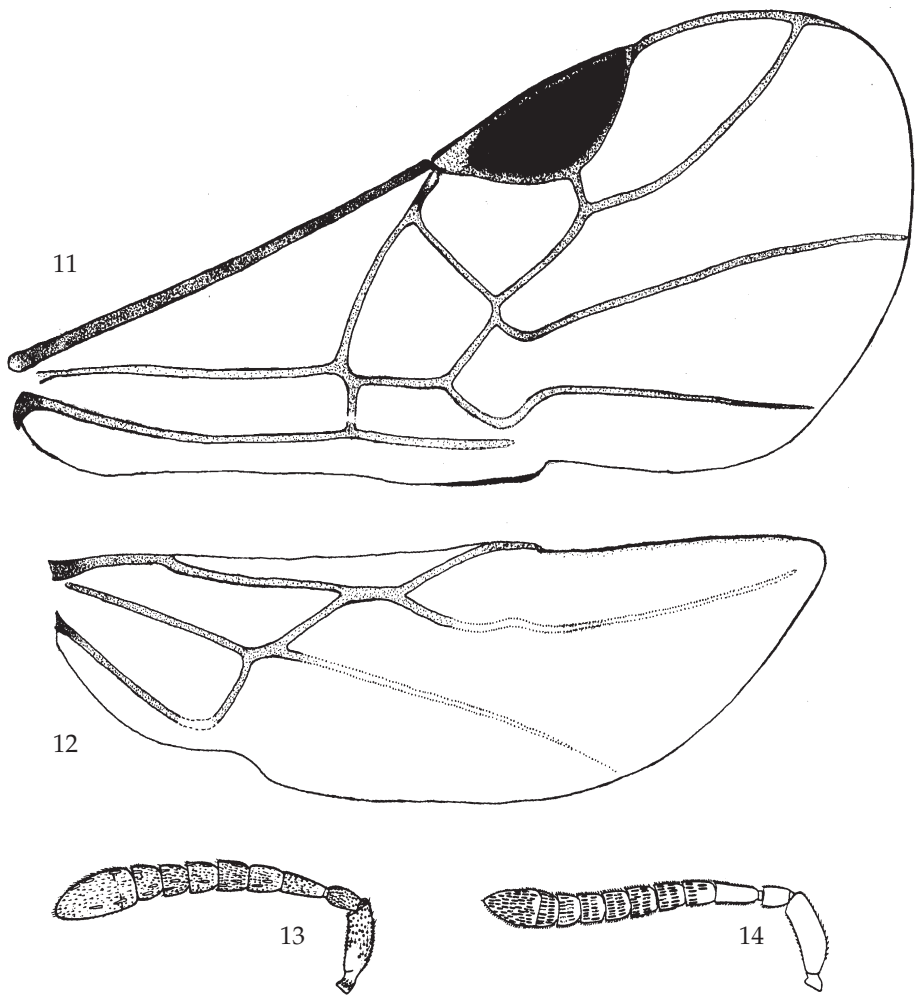
Diagnosis.— The new species is unique in the genus *Ropalophorus* with its 11-segmented antenna of the female (fig. 3; also in *R. sichuanicus* but both apical segments are closely attached to each other), the species can be distinguished from the closely related *R. sichuanicus* Yang, 1996, besides by its antenna by having: 1) the medio-posterior depression of the scutellum with only one distinct longitudinal carina medially (fig. 5; *R. sichuanicus* has several weak ridges); 2) vein 1r-m of the hind wing 2.5 times as long as vein 1-M (fig. 12; 1.8 times in *R. sichuanicus*); 3) the precoxal sulcus coarsely rugose (in *R. sichuanicus* with seven short transverse carinae, crenulate).

Holotype, ♀, length of body 3.1 mm, of fore wing 2.7 mm.

Head.— Antennae (figs 3, 4) 11-segmented, geniculate and stout, with dense (obviously sensory) setae, and flagellum having scattered elongate narrow sensillae (fig. 4), apically clavate, moderately compressed from fourth segment onwards; length of antenna 1.8 times width of head, and combined length of pedicellus and flagellum



Figs 1-10, *Ropalophorus subelongatae* spec. nov., ♀, paratype. 1, head, frontal aspect; 2, head, dorso-lateral aspect; 3, antenna; 4, medial segment of antenna; 5, mesosoma, dorsal aspect; 6, body, dorsal aspect; 7, body, dorso-lateral aspect; 8, metasoma, dorsal aspect; 9, tibia and tarsus of hind leg; 10, hind tibial spurs.



Figs 11, 12, *Ropalophorus subelongatae* spec. nov., ♀, paratype; fig. 13, *R. sichuanicus* Yang, ♀, holotype. fig. 14, *R. polygraphus* Yang, ♀, holotype; 11, fore wing; 12, hind wing; 13, 14, antenna.

1.4 times width of head in lateral view; pedicellus subspherical (fig. 3), third antennal segment trapezoidal; length of third segment 1.5 times fourth segment, length of third, fourth and penultimate segments 2.5, 1.4 and 0.7 times their width, respectively (measured at flattened side). In dorsal view width of head twice its length; temple behind eyes roundly narrowed, 0.6 times as long as eye; occipital carina present but descended at about half way from vertex to foramen magnum; OOL:diameter of ocellus:POL = 15:8:13; vertex, temple and frons densely setose (fig. 1). In frontal view, height of head 0.9 times its width; antennae inserted at upper third of head; inner orbits of eye moderately convergent (fig. 1); face convex medially and superficially rugose, densely setose above tentorial pits, width of face 0.9 times its height, and with

a small median prominence at its upper quarter; tentorial pits large and deep (fig. 1); intertentorial line 3.3 times tentorio-ocular line (fig. 1); clypeus distinctly convex, smooth and shiny, with tiny setiferous punctulation, its ventral margin slightly curved forwards; maxillary palp 5-segmented, its length 0.8 times height of head, its second segment enlarged 1.6 times longer than wide.

Mesosoma.— Length of mesosoma 1.4 times its height; middle lobe of mesoscutum sharply angularly truncate anteriorly, slightly concave medio-anteriorly; pronotum with longitudinal carinae medially, its posterior half glabrous; side of pronotum smooth and shiny, but coarsely rugose ventrally. Mesopleuron slightly convex medially and posteriorly; prepectal carina weak and short, only reaching third of anterior height of mesopleuron; epicnemial area trough-like, with weak reticulation; precoxal sulcus rather wide, distinctly crenulate, complete posteriorly; episternal scrobe absent; mesosternum medially with coarsely rugose sulcus, posteriorly distinctly convex sublaterally and densely setose. Metapleuron irregularly rugose. Mesoscutum moderately convex, smooth, densely setose (figs 5-7); notauli complete, meeting at posterior 0.4 of mesoscutum, before meeting crenulate and afterward rugose; transscutal articulation reduced; scutellar sulcus deep, bi-foveolate because of the median carina; scutellum convex and smooth, sparsely setose; medio-posterior depression small, with a distinct median carina (fig. 5). Metanotum rather protruding medially (fig. 7). Propodeum 0.9 times as long as mesoscutum, its surface largely coarsely reticulate and largely glabrous (figs 5, 6), its anterior half evenly convex and its posterior face steeply descending and medially concave, postero-laterally with two distinct tubercles.

Wings.— Fore wing (fig. 11): 1-SR 1.8 times as long as r; r-m absent; marginal cell along its anterior border as long as pterostigma; r:2-SR:3-SR+SR1 = 6:34:80; 1-CU1 shortly postfurcal; 2+3-M distinctly curved basally; 3-CU1 connected to CU1a and considerably sinuate; CU1b absent. Hind wing (fig. 12): 1-M:1r-m = 10:17.

Legs.— Hind coxa smooth and setose, dorsally with a few weak and oblique carinae; length of femur, tibia and basitarsus of hind leg 2.5, 8.9 and 6.3 times their width, respectively; both hind tibial spurs equal and 0.4 times as long as hind basitarsus (figs 9, 10).

Metasoma.— Considerably arched (fig. 7) and elongate oval in dorsal view (fig. 8), as long as head and mesosoma combined; length of first tergite 1.2 times its apical width, basally about 0.6 times as wide as its apical width, constricted at basal quarter and behind it widened towards apex; dorsope large and deep, removed from each other and situated in front of spiracles, with about 14 longitudinal carinae; glymma well developed (fig. 7); second and following tergites smooth and shiny; fourth-eighth tergites with a row of setae; combined second and third tergite enlarged, about 1.1 times as long as first tergite, 2.4 times combined length of following tergites, and 0.4 times as long as metasoma. Ovipositor bent downwards apically; its sheath notably compressed and densely setose, blunt apically, 7.4 times as long as its maximum width, and 0.4 times as long as metasoma, about as long as first tergite, and 0.25 times as long as fore wing.

Colour.— Black; face dark brown; ventral half of clypeus and mandible yellowish-brown, palpi yellow, antenna brown with four basal segments paler; legs yellow but tibiae, tarsi and hind coxa dorsally somewhat infuscate; wings subhyaline; fore wing with vein C+SC+R and pterostigma brown and other veins infuscate; veins of hind wing pale infuscate.

Variation.— Length of body 2.9-3.2 mm, of fore wing 2.5-2.8 mm.

Biology.— The new species is a solitary endoparasitoid of the adult bark beetle *Ips subelongatus* (Motschulsky). During the emergence period of the bark beetle, the adult wasp walks on the larch tree trunk attacked by the bark beetle and goes deep into the host galleries to look for newly emerged beetles to oviposit in. It is difficult to observe the wasps on the bark; they could only be observed at the moment of going from one host gallery into another one.

Distribution.— At present it has been found in the forests of northeastern China, i.e. the Changbaisan and Daxing'anling Mountains. Probably the species occurs everywhere in China where its host occur on larch trees.

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References

Chen, X. & C. van Achterberg, 1997. Revision of the subfamily Euphorinae (excluding the tribe Meteorini Cresson) (Hymenoptera: Braconidae) from China.— Zool. Verh., Leiden 313: 1-217.

Nuorteva, M. 1957. Zur Kenntnis der parasitischen Hymenopteren der Borkenkafer Finlands.— Suomen hyönt. Aikak. [Annales Entomologici Fennici] 23 (2): 47-71.

Shenefelt, R.D. 1960. *Ropalophorus* Haliday - a genus new to North America (Hymenoptera: Braconidae: Euphorinae).— Ann. Ent. Soc. Amer. 53: 542-546.

Yang Zhong-qi, 1989. A new species of *Ropalophorus* Curtis (Hymenoptera: Braconidae) parasitizing *Polygraphus polygraphus* adult (Coleoptera: Scolytidae) with a key to the world species of the genus.— Entomotaxonomia 11(1-2): 91-96 (In Chinese with English abstract).

Yang Zhong-qi, 1996. Parasitic wasps on bark beetles in China: 1-363, pls. 11.— Beijing.

Yu Cheng-ming, 1992. *Ips subelongatus* Motschulsky: 626-628. In: Xiao Gang-rou (ed.) Forest Insects of China: 1-1362.— Beijing.

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