

A TAXONOMIC STUDY ON THE FOUR GENERA OF THE SUBFAMILY ROPHITINAE FROM CHINA (HYMENOPTERA: HALICTIDAE)

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ABSTRACT. – The species of rophitine genera *Systropha*, *Morawitzella*, *Rhophitoides* and *Rophites* from China are redescribed and illustrated. A checklist and a key to five Chinese rophitine genera extending to species of those four genera studied are provided. *Rhophitoides canus* (Eversmann) and *Rophites quinquespinosus* Spinola are newly recorded in China.

KEY WORDS. – Hymenoptera, Halictidae, Rophitinae, *Systropha*, *Morawitzella*, *Rhophitoides*, *Rophites*.

INTRODUCTION

The subfamily Rophitinae is chiefly Holarctic in distribution, it is also represented in the Ethiopian, Oriental and Neotropical Regions by few species, no species inhabit in Australia (Pesenko et al., 2000). In the paper of “Phylogeny and Classification of the Family Halictidae Revised” (Pesenko, 1999), seven presumed synapomorphies can be served as the diagnosis of the subfamily Rophitinae. Antennal sockets placed on lower half of face; clypeus short, usually not longer than labrum, greatly convex and extending forward level of flat supraclypeal area; integument of upper paraocular areas of female differentiated by other kind of sculptures or coloration; lower lateral part of clypeus bent back about 45° relative to median part of clypeus; attachment of secondary tentorial bridges to posterior wall of head closed above hypostoma or fused to hypostoma; internal scrobal ridge (and external scrobal groove) present; S7 of male sclerotized laterally, usually with additional structures. The subfamily includes 208 known species (Michener, 2000) in the world. About half of the species are described from the Palearctic Region. Palearctic species belongs to the following genera: *Dufourea*, *Systropha*, *Trilia*, *Morawitzella*, *Rophites*, *Rhophitoides* and *Morawitzia*.

Chinese Rophitinae is represented by 5 genera and 31 species (Table 1), *Dufourea* (26 species), *Morawitzella* (1 species), *Rophites* (2 species), *Rhophitoides* (1 species) and *Systropha* (1 species). *Trilia* and *Morawitzia* have not been found yet in China. *Dufourea* (including *Halictoides*) has been already reported (Wu, 1982, 1983, 1985, 1987, 1990); the other known genera and species are reported in this paper.

In China, *Morawitzella*, *Rophites*, *Rhophitoides*, and

Systropha are chiefly distributed in the Xinjiang-Inner Mongolia region (Fig. 6.), *Dufourea* in the southern plateau and mountains region of Tibet, and in the Hengduan mountains region (Wu, 1987, 1990).

MATERIALS AND METHODS

One female of *Rophites gruenwaldti* and one male of *Rhophitoides canus* are deposited in the Zoological Reference Collection (ZRC) of the Raffles Museum of Biodiversity Research; other examined specimens are kept in the Institute of Zoology, Chinese Academy of Sciences. All specimens were examined under Leica M10 stereomicroscope. Male genitalia and associated sterna were anatomized directly in 10% KOH, and cleared in 10% KOH for about 12 hours, then washed with water for several minutes, and drew under Leica M10 stereomicroscope.

The morphological terminology mainly followed Michener (2000). Absolute measurements, in millimeters (mm), are used for body length. For all other structures, relative measurements are used. The following abbreviations are used in redescription: F1, F2, etc. for first, second, etc. segments of flagellum; S1, S2, etc. for first, second, etc. metasomal sterna; T1, T2, etc. for first, second, etc. metasomal terga.

TAXONOMY

Key to Genera and Species of the Rophitinae of China

1. Forewing with three submarginal cells (Fig. 1, A); five last flagellomeres of male rolled to triangular spiral (Fig. 1, C);

- metasomal terga with dense long hairs (Genus *Systropha*). [Female: 1st flagellomere as long as 2nd and 3rd combined (Fig. 1, B); pubescence of metasomal terga grayish white. Male: each of S2 and S3 with two long sharp lateral teeth (Fig. 1, D); T7 broadly emarginate posteriorly (Fig. 1, I) *Systropha curvicornis* (Scopoli, 1770)
- Forewing with two submarginal cells (Fig. 2, A; Fig. 5, B); flagellum of male not modified; metasomal terga without dense long hairs 2
 - 2. The first submarginal cell larger than the second one obviously (Fig. 2, A); body with yellow integumental markings (Genus *Morawitzella*). [Female: unknown. Male: body length 3.5–4.0mm; the head much broader than long (Fig. 2, D); the apical process of S8 not enlarged, the base of S8 truncate, not bilobed (Fig. 2, C)] *Morawitzella nana* (Morawitz, 1880)
 - The first submarginal cell nearly as large as the second one (Fig. 5, B); body without yellow integumental markings 3
 - 3. Metasomal terga with paler colored apical hair bands; dorsal surface of propodeum shorter than scutellum; S7 of male with distinct slender dorsal lobes (Fig. 3, C; Fig. 4, C; Fig. 5, A) 4
 - Metasomal terga without apical hair bands, only with transverse series of hairs; dorsal surface of propodeum as long as or longer than scutellum; S7 of male without distinct slender dorsal lobes. (Genus *Dufourea*) Key to species not included
 - 4. Labial palpus usual, its 1st and 2nd segments twice as long as 4th segment (Fig. 3, B); labial palpus shorter than maxillary palpus; frons of female only with usual hairs, without spines; S6 of male with blister-shaped thickenings, median part covered dense hairs, without longitudinal ridge (Genus *Rhophitoides*). [T1–T5 of both sexes with whitish apical hair bands; S6 of male sheet-like midapically, broad, two lateral teeth obvious; posterolateral margin of S6 of male with broad and round projection (Fig. 3, E)] *Rhophitoides canus* (Eversmann, 1852)
 - Labial palpus very long, its 1st and 2nd segments greatly elongate and flattened (Fig. 5, D); labial palpus longer than maxillary palpus; frons of female with modified hairs forming sharp and long spines; S6 of male flattened, without blister-shaped thickenings, median part with longitudinal ridge. (Genus *Rophites*) 5
 - 5. Female: frons with 20–25 radicles spines; 1st flagellomere longer than 2nd obviously; mesoscutum and scutellum covered densely long yellowish brown hairs; Male: median ridge of S6 high, only apex covered hairs, posterolateral margin of S6 with long, pointed, spin-shaped projection (Fig. 5, E); both sexes body length 9.0–10.0mm *Rophites quinquespinosus* Spinola, 1808
 - Female: frons with 32–38 radicles spines (Fig. 4, A); 1st flagellomere as long as 2nd; mesoscutum and scutellum covered sparsely short yellowish brown hairs; Male: median ridges of S6 low and piliferous throughout, posterolateral margin of S6 with short, tooth-shaped projection (Fig. 4, B); both sexes body length 8.0–9.0mm *Rophites gruenwaldti* Ebmer, 1978

Systropha Illiger, 1806

Systropha Illiger, 1806 : 145. Type species: *Andrena spiralis* Olivier, 1789 (*Eucera curvicornis* Scopoli, 1770) by monotypy.

Systropha (*Systrophidia*) Cockerell, 1936 : 477. Type species : *Systropha ogilviei* Cockerell, 1936, monotypy.

Diagnosis. – Forewing with three submarginal cells, 1st submarginal cell equal to 3rd one; metasomal terga covered with dense long dark hairs; body without yellow integumental

markings; five last flagellomeres of male rolled to triangular spiral.

Remarks. – The genus is widespread in the Palearctic Region; there are about 25 species in the world (Michener, 2000). The Palearctic species were revised by Ponomareva (1967); Palearctic and Oriental species were reviewed by Baker (1996); and African and tropical Asian species were listed by Ebmer (1994). In China, only one species, *Systropha curvicornis*, occurs.

Systropha curvicornis (Scopoli, 1770)

(Fig. 1, A–I)

Eucera curvicornis Scopoli, 1770: 9.

Andrena spiralis Olivier, 1789: 135.

Andrena labrosa Eversmann, 1852: 22.

Systropha curvicornis - Ponomareva, 1967: 681–682; Ebmer, 1988: 689; Pesenko et al., 2000 : 131–134.

Material examined. – 1 female, China, Xinjiang, Altay, coll. Shu-yong Wang, 16 Aug.1960; 1 male, China, Xinjiang, Fuhai, coll. not record, 16 Jul.1996.

Redescription. – Female: Body length 9.0–10.0 mm. Face, mesoscutum and metasomal terga black, without metallic reflections. Head wider than long, narrower than mesoscutal width. Antennal socket placed on lower half of face, separated from upper clypeal margin by little more than diameter of socket; upper end of subantennal suture directed towards lower margin of antennal socket. Flagellum 10 segmented; scape 4 times as long as the most width; F1 longer than F2 and F3, but as long as F2 and F3 combined (Fig. 1, B); F2 wider than long. Frons flattened, without longitudinal ridge medially; frontal carina present; frons only with usual hairs, without spines. Apex of labrum rounded; labral process absent. Clypeus 2 times as broad as long, basal half with dense and round punctures, apical half punctures sparser. Supraclypeus with smaller punctures than clypeal ones. Epistomal suture between the anterior tentorial pits being only weakly arched. Labial palpus with the third segment on same axis as the second and also rather broad basally, only the fourth being freely articulated; the second segment of labial palpus longer than the third or the fourth one, at least 5 times as long as the fourth one's length. Maxillary palpus six-segmented. Mandible with 2 preapical teeth. Distance of lateral ocellus to vertex 0.5 times as long as that of lateral ocellus to eye; distance between lateral ocelli 1.3 times as long as distance of lateral ocellus to eye. Gena nearly as wide as eye. Forewing with 3 submarginal cells; the second submarginal cell less than half of the first one; distal crossveins as strong as the first submarginal crossvein; basal vein slightly curved; marginal cell sharply pointed at distal end; distance from apex of stigma to apex of marginal cell longer than that from apex of marginal cell to wing tip. Tegula not enlarged, blackish brown. Dorsal surface of propodeum shorter than scutellum, 0.42 times as long as scutellar length, 1 time as long as metanotal length; dorsal enclosure of propodeum with irregular rugulose sculptures, intersculptures shagreened. Mesoscutum with round and deeper punctures,

Table 1: Checklist of Chinese species of the subfamily Rophitinae

Species	Male	Female
<i>Dufourea armata</i> Popov, 1959	√	√
<i>Dufourea chlora</i> Wu, 1990	unknown	√
<i>Dufourea lijiangensis</i> Wu, 1990	√	unknown
<i>Dufourea metallica</i> Morawitz, 1890	unknown	√
<i>Dufourea pseudometallica</i> Wu, 1990	√	unknown
<i>Dufourea tibetensis</i> Wu, 1990	√	√
<i>Dufourea versicola</i> Alfken, 1936	unknown	√*
<i>Dufourea yunnanensis</i> Wu, 1990	√	√
<i>Dufourea atrocoeruleus</i> (Morawitz, 1876)	√	unknown
<i>Dufourea calcaratus</i> (Morawitz, 1886)	√	√*
<i>Dufourea carbopilus</i> (Wu, 1986)	unknown	√
<i>Dufourea carinatus</i> (Popov, 1959)	√	√
<i>Dufourea clavicus</i> (Morawitz, 1889)	√*	√
<i>Dufourea clypeatus</i> (Wu, 1983)	unknown	√
<i>Dufourea glaboabdominalis</i> (Wu, 1986)	unknown	√
<i>Dufourea inermis</i> (Nylander, 1848)	√*	√
<i>Dufourea latifemurinis</i> (Wu, 1982)	√	√
<i>Dufourea longicornis</i> (Wu, 1982)	√	√*
<i>Dufourea longispinis</i> (Wu, 1987)	unknown	√
<i>Dufourea mandibularis</i> (Popov, 1959)	√*	unknown
<i>Dufourea megamandibularis</i> (Wu, 1983)	√	√
<i>Dufourea pilotibialis</i> (Wu, 1987)	√	√
<i>Dufourea sinensis</i> (Wu, 1982)	√	unknown
<i>Dufourea spiniventris</i> (Popov, 1959)	√	unknown
<i>Dufourea subclavicus</i> (Wu, 1982)	√	√
<i>Dufourea tridentatus</i> (Wu, 1987)	unknown	√
<i>Morawitzella nana</i> (Morawitz, 1880)	unknown	√
<i>Rophites gruenwaldti</i> Ebmer, 1978	√	√
<i>Rophites quinquespinosus</i> Spinola, 1808	√	√
<i>Rhophitoides canus</i> (Eversmann, 1852)	√	√
<i>Systropha curvicornis</i> (Scopoli, 1770)	√	√
Total: 31	22	25

√* represent the sex of the species is only recorded in literature, √ represent the sex of the species present in China.

doubly-punctate. Episternal groove not a real groove, but a shallow valley. Metasomal terga with 6 segments exposed, without hair bands, but with dense long dark hairs; posterior margin of metasomal terga blackish brown, transparent; T5 without longitudinal median zone, T5 with blackish hairs; T6 without pygidial plate. Middle tibial spur normal, 1/2 as long as basitarsus, pointed apically, pecten not obvious; hind basitarsus with apical process, the process without penicillus; hind trochanteral and femoral scopa reduced; metabasitibial plate present.

Male: Body length 8.5–9.5 mm. Face, mesoscutum and metasomal terga black, without metallic reflections. Head wider than long. Distance of lateral ocellus to vertex 0.83 times as long as distance of lateral ocellus to eye; distance between lateral ocelli 1.67 times as long as distance of lateral ocellus to eye. Labial palpus with the third segment on same axis as the second and also rather broad basally, only the fourth being freely articulated; the second segment of labial palpus longer than the third or the forth one, at least 5 times as long as the fourth one's length. Maxillary palpus six-segmented. Antennal socket placed on lower half of face, separated from upper clypeal margin by a little more than diameter of socket; upper end of subantennal suture directed towards lower margin of antennal socket; antenna five last

flagellomeres rolled to triangular spiral; flagellomere without special depressed area, lower surface without longitudinal groove; scape 2.4 times as long as its maximum width; F2 longer than wide, nearly as long as F3 (Fig. 1, C). Frons flattened, without longitudinal ridge medially; frontal carina absent. Mandible with 2 preapical teeth. Gena narrower than eye. Forewing with 3 submarginal cells (Fig. 1, A); the second submarginal cell less than half of the first one; basal vein slightly curved; distal crossveins as strong as the first submarginal crossvein; marginal cell sharply pointed at distal end; distance from apex of stigma to apex of marginal cell longer than that from apex of marginal cell to wing tip. Episternal groove not a real groove, but a shallow valley. Tegula not enlarged, blackish brown. Dorsal surface of propodeum shorter than scutellum, 0.45 times as long as scutellar length, 1 time as long as metascutellar length. Scutellum without lateral teeth on posterolateral extremities. Metasomal terga with 7 segments exposed, without hair bands, but with dense long dark hairs, posterior margin of metasomal terga not transparent; T5 normal, without lateral teeth; T7 broadly emarginate posteriorly (Fig. 1, I), T7 with pygidial plate not margined by sharp carina. Genitalia without lower gonostylus as appendage; gonostylus broader, partly or not separated from gonocoxite; volsella present, produced to a fingerlike hairy process, hairs shorter and sparser (Fig.

1, H). S2 and S3 with long sharp lateral teeth (Fig. 1, D); S4-S5 normal, S4 without yellow hairs, S5 weakly emarginate posteriorly; S6 flattened, without blister-shaped thickenings and median ridge, S6 sheet-like, emarginate midapically, without posterolateral marginal projection (Fig. 1, E); S7 and S8 usually elaborate, large, heavily sclerotized, often separated; S7 furcated apically, not covered with long hairs, and without distinct dorsal lobe (Fig. 1, F); S8 with a pairs of pointed basal lobes, and with enlarged apical process (Fig. 1, G). Middle tibia normal, not broadened distally, outer surface not concave; middle tibia only with one spiniform process apically; middle femur broadened; hind femur and tibia normal, not broadened.

Distribution. – Palearctic, from Spain to Altai and northwestern China, in Europe to Poland and southern Lithuania in the north. Common in South and Central Europe, southwestern and Central Asia (Pesenko et al, 2000)

***Morawitzella* Popov, 1957**

Morawitzella Popov, 1957: 916. Type species: *Epimethea nana* Morawitz, 1880, by original designation.

Diagnosis. – Forewing with two submarginal cells; the second submarginal cell less than half-length of the first one; body with yellow integumental markings.

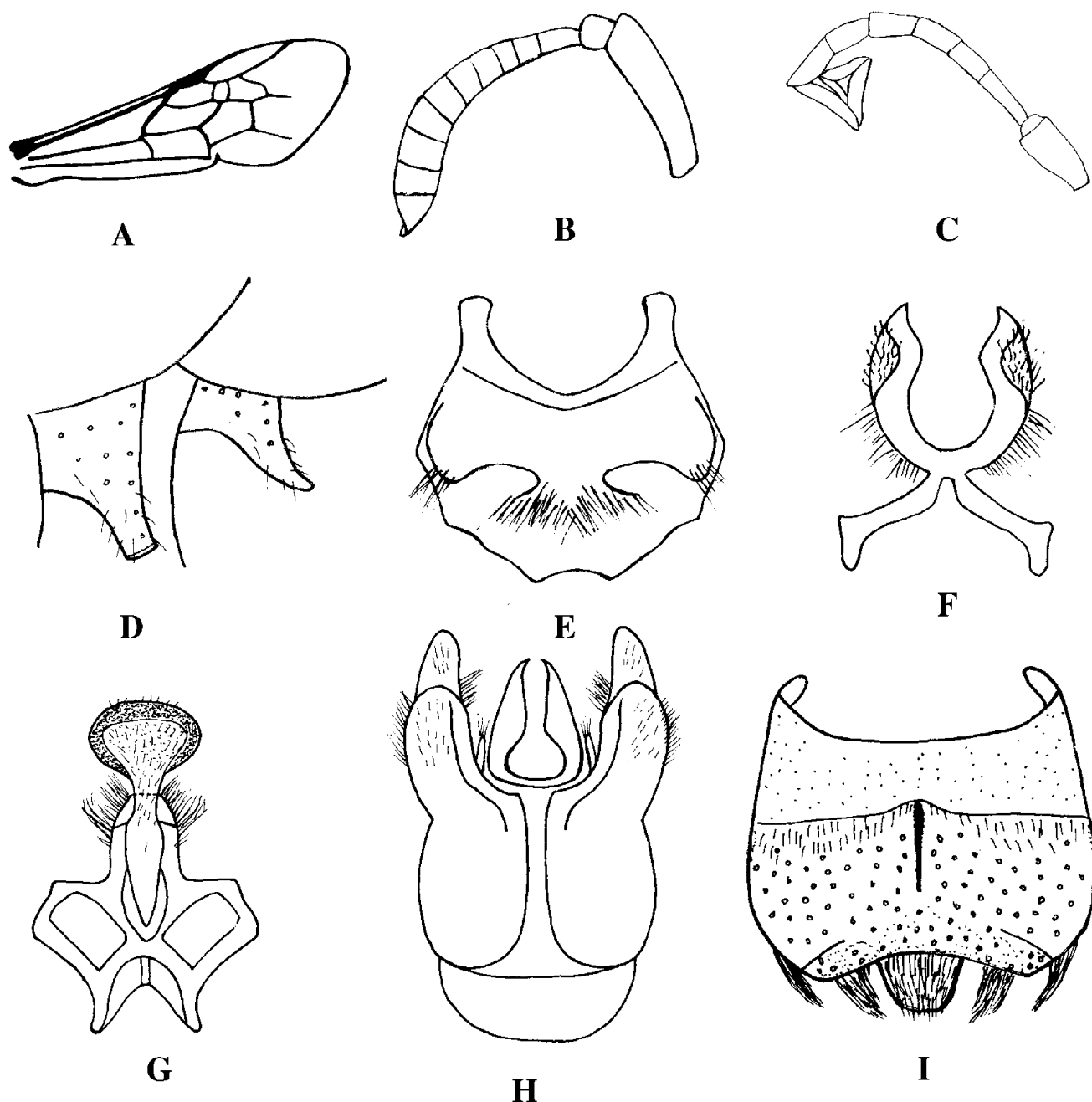


Fig. 1. *Systropha curvicornis* (Scopoli, 1770): A, male forewing; B, lateral view of female antenna; C, lateral view of male antenna; D, lateral view of male S2 and S3; E, ventral view of male S6; F, ventral view of male S7; G, ventral view of male S8; H, dorsal view of male genitalia; I, dorsal view of male T7.

Remarks. – The genus occurs in central Asia and Inner Mongolia of China. The single species is *Morawitzella nana* (Morawitz).

***Morawitzella nana* (Morawitz, 1880)**

(Fig. 2, A-F)

Epimethea nana Morawitz, 1880: 357.

Panurginus nanus - Dalla-Torre, 1896: 171; Friese, 1901: 29; Popov, 1957: 917-918.

Material examined. – 2 males, China, Inner Mongolia, Ordos, collector and collecting date not recorded.

Redescription. – Male: Body length 3.5–4 mm. Body with yellow integumental markings. Head much wider than long (Fig. 2, D). Antennal socket placed on lower half of face, separated from upper clypeal margin by much more than diameter of socket; upper end of subantennal suture directed towards inner margin of antennal socket. Antenna filiform; F2 longer than wide, nearly as long as F3 (Fig. 2, E). Frons flattened, without longitudinal ridge medially; frontal carina present. Forewing with 2 submarginal cells (Fig. 2, A); the second submarginal cell less than half of the first one; basal vein straight; distal crossveins as strong as the first submarginal crossvein. Scutellum without lateral teeth on posterolateral extremities. Genitalia without lower gonostylus as appendage (Fig. 2, F); gonostylus broader, partly or not

separated from gonocoxite; volsella present. S7 and S8 usually elaborate, large, heavily sclerotized, often separated; S7 furcated apically, covered with short hairs, without distinct dorsal lobe (Fig. 2, B); S8 broadly truncate basally, with strong apical process, but the apical process not enlarged at its tip (Fig. 2, C).

Female: unknown.

Distribution. – Central Asia (Michener, 2000); China: Inner Mongolia.

***Rhophitoides* Schenck, 1861**

Rhophitoides Schenck, 1861: 69. Type species: *Rhophitoides distinguendus* Schenck, 1861 (*Rhophites cana* Eversmann, 1852) by monotypy.

Diagnosis. – Forewing with two submarginal cells, the second submarginal cell more than half length of the first one; basal vein of forewing nearly straight; metasomal terga with apical hair bands; body without yellow integumental markings; dorsal surface of propodeum shorter than scutellum, forming a distinct angle with posterior vertical surface; S6 of male with blister-shaped thickenings, median part covered dense hairs, without longitudinal ridge; S7 of male with distinct slender dorsal lobes; labial palpus usual, its 1st and 2nd segments twice as long as 4th segment or shorter; frons of female only with usual hairs, without spines.

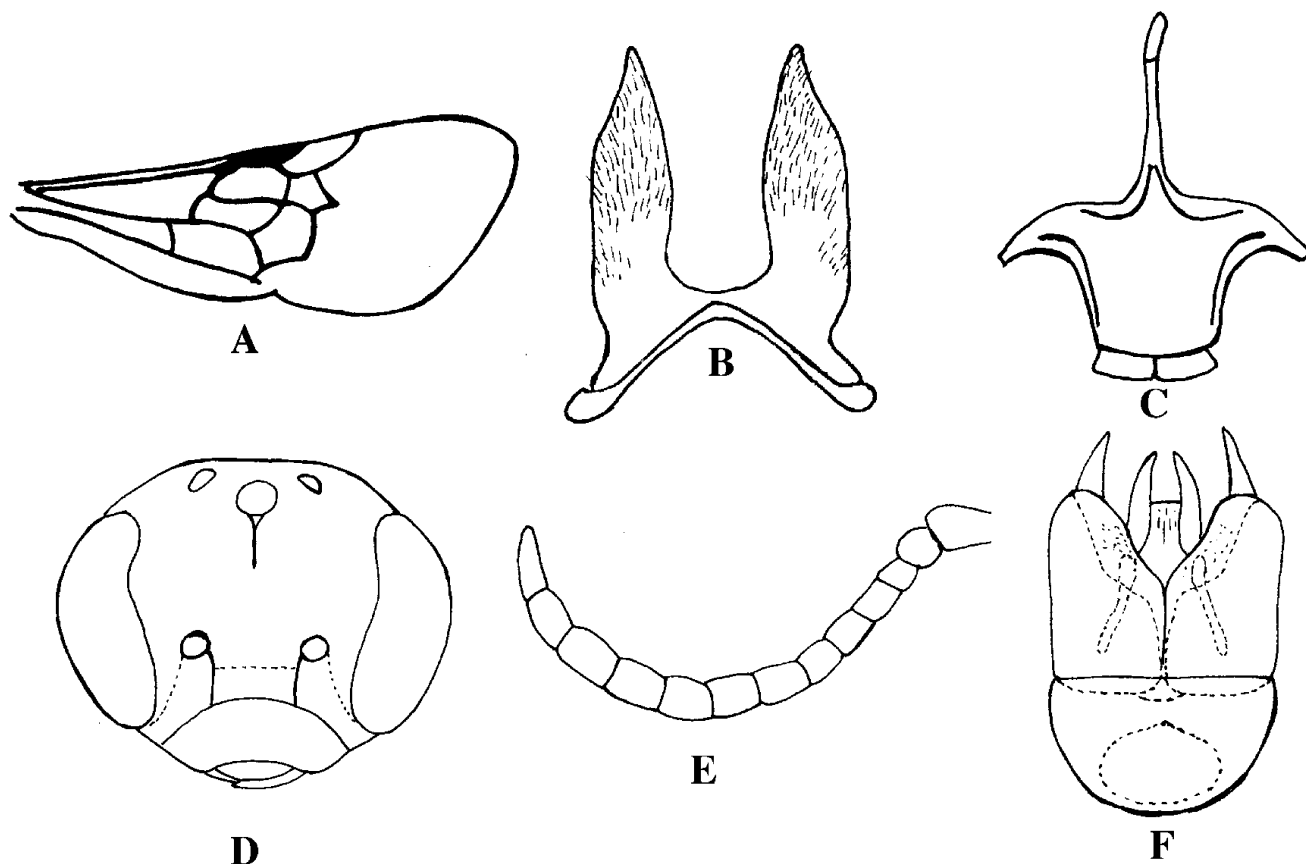


Fig. 2. *Morawitzella nana* (Morawitz, 1880): A, male forewing; B, ventral view of male S7; C, ventral view of male S8; D, frontal view of male head; E, lateral view of male antenna; F, dorsal view of male genitalia. (From popov, 1957: Fig. 1.)

Remarks. – The geographic range of the genus covers almost all the southern part of the Palearctic Region, from Morocco and France to Turkey and the Caucasus, in the east to central Mongolia and northwest of China. It contains four species; *Rhophitoides canus* (Eversmann) is only known species in China.

***Rhophitoides canus* (Eversmann, 1852)**
(Fig. 3, A-E)

Rophites cana Eversmann, 1852: 60.

Rhophites bifoveolatus Sichel, 1854: 74.

Rhophitoides distinguendus Schenck, 1861: 61, 171, 208.

Rhophitoides canus - Ebmer, 1988: 685; Pesenko et al., 2000: 121-124.

Material examined. – 1 female, China, Xinjiang, Ürümqi, coll. Wei-yi Yang, 14 Jul.1956; 1 female, China, Xinjiang, Wuquegou, coll. Wei-yi Yang, 14 Aug.1956; 2 males (one deposited in ZRC), China, Xinjiang, Zhaosu, coll. Cun-pei Hong, 11 Aug.1957; 2 males, China, Xinjiang, Dushanzi, coll. Guang Wang, 27 Jun.1957; 1 male, China, Xinjiang, Lucaogou, coll. Wei-yi Yang, 20 Jul.1956.

Redescription. – Female: Body length 7.5–8.0 mm. Face, mesoscutum and metasomal terga black, without metallic reflections. Head wider than long, narrower than mesoscutal width. Antennal socket placed on lower half of face, separated

from upper clypeal margin by a little more than diameter of socket; upper end of subantennal suture directed towards lower margin of antennal socket. Flagellum 10 segmented; scape 4 times as long as its maximum width; F1 longer than F2 or F3 respectively, slightly shorter than F2 and F3 combined; F2 wider than long. Frons flattened, with longitudinal ridge medially; frontal carina absent; frons only with usual hairs, without spines. Apex of labrum rounded; labral process absent. Clypeus 2.7 times as broad as long, basal half with dense, round punctures, apical half punctate sparsely. Supraclypeus with smaller punctures than clypeal ones. Epistomal suture between anterior tentorial pits being only weakly arched. Labial palpus with first two segments broad and flattened in contrast to the third and fourth segments, the second segment longer than the third or the fourth one, twice as long as the fourth one's length. Maxillary palpus six-segmented. Mandible with 1 preapical tooth. Distance of lateral ocellus to vertex 0.5 times as long as that of lateral ocellus to eye; distance between lateral ocelli 1 time as long as that of lateral ocellus to eye. Gena nearly as wide as eye. Forewing with 2 submarginal cells; the second submarginal cell as large as the first one; distal crossveins as strong as the first submarginal crossvein; basal vein slightly curved; marginal cell sharply pointed at distal end; distance from apex of stigma to apex of marginal cell longer than that from apex of marginal cell to wing tip. Tegula not enlarged, yellowish brown. Dorsal surface of propodeum shorter than

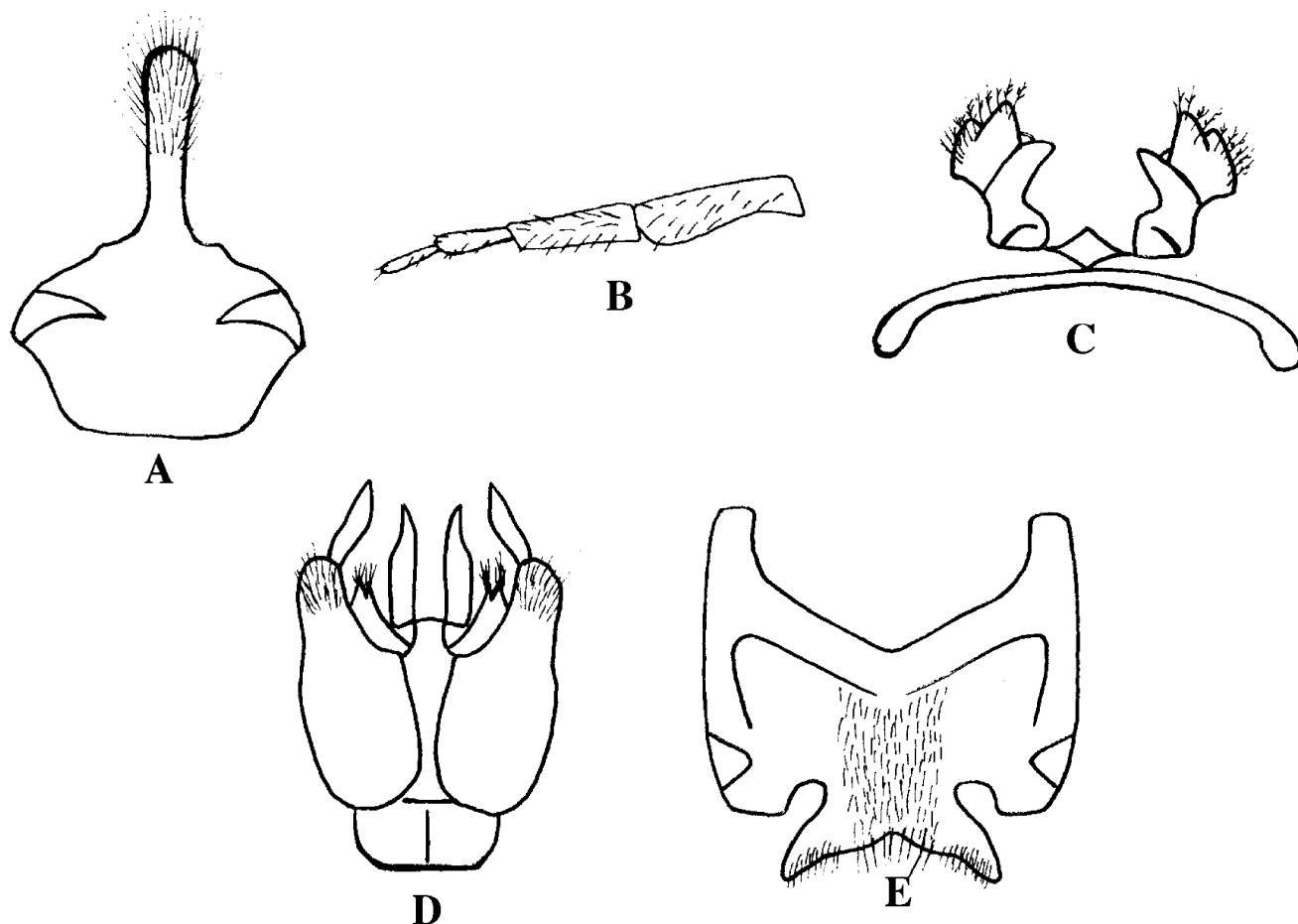


Fig. 3. *Rhophitoides canus* (Eversmann, 1852): A, ventral view of male S8; B, lateral view of male labial palpus; C, ventral view of male S7; D, dorsal view of male genitalia; E, ventral view of male S6.

scutellum, 0.64 times as long as scutellar length, 1 time as long as metanotal length; dorsal enclosure of propodeum with irregular rugose sculptures, intersculptures shagreened. Mesoscutum with round, deep punctures, interspace 0.2–0.5 times as large as diameter of puncture. Episternal groove distinct and directed strongly downward below scrobal groove. Metasomal terga with 6 segments exposed, and with dense apical hair bands, posterior margin of metasomal terga yellowish, transparent; T5 without longitudinal median zone; T5 with yellowish hairs; T6 with pygidial plate, pygidial plate not margined by sharp carina. Middle tibial spur normal, 1/2 as long as basitarsus, pointed apically, pecten not obvious; hind basitarsus with apical process, the process without penicillus; hind trochanteral and femoral scopa reduced; metabasitibial plate present.

Male: Body length 7.0–7.5 mm. Face, mesoscutum and metasomal terga black, without metallic reflections. Head wider than long. Distance of lateral ocellus to vertex 0.4 times as long as that of lateral ocellus to eye; distance between lateral ocelli 1 time as long as that of lateral ocellus to eye. Labial palpus with first two segments broad and flattened in contrast to the third and the fourth one, the second segment longer than the third or the fourth one, twice as long as the fourth one's length (Fig. 3, B). Maxillary palpus six-segmented. Antennal socket placed on lower half of face, separated from upper clypeal margin by a little more than diameter of socket; upper end of subantennal suture directed towards lower margin of antennal socket. Antenna filiform, short, only reaching scutellum; flagellomere without special depressed area, lower surface without longitudinal groove; scape 2 times as long as the maximum width; F2 longer than wide, nearly as long as F3. Frons flattened, with longitudinal ridge medially; frontal carina absent. Mandible with 1 preapical tooth. Gena narrower than eye. Forewing with 2 submarginal cells, the second submarginal cell as great as the first one; basal vein slightly curved; distal crossveins as strong as the first submarginal crossvein; marginal cell sharply pointed at distal end; distance from apex of stigma to apex of marginal cell longer than that from apex of marginal cell to wing tip. Episternal groove not a real groove, but a shallow valley. Tegula not enlarged, yellowish brown. Dorsal surface of propodeum shorter than scutellum, 0.54 times as long as scutellar length, 1 time as long as metanotal length. Scutellum without lateral teeth on posterolateral extremities. Metasomal terga with 7 segments exposed, and with sparse apical hair bands, posterior margin of metasomal terga transparent; T5 normal, without lateral teeth; T7 not emarginate posteriorly, with pygidial plate margined by sharp carina. Genitalia without lower gonostylus as appendage; gonostylus slender, partly separated from gonocoxite; inner surface of gonostylus without setae; volsella present, produced to a bifid apically hairy process, hairs shorter and sparser. S2 without special structure; S3–S5 normal, without special structure; S4 without yellow hairs; S5 straight posteriorly, without lateral projections; S6 with distinct blister-shaped thickenings, flattened medially, without median ridge, but median covered with dense hairs, S6 sheet-like midapically, broad, two lateral teeth obvious, posterolateral margin with broad and round projection (Fig. 3, E); S7 and S8 usually elaborate, large,

heavily sclerotized, longitudinal, often separated; S7 furcated apically, covered with long hairs, with distinct dorsal lobes (Fig. 3, C); S8 broadly truncate basally, with strong apical process (Fig. 3, A). Middle tibia normal, not broadened distally, outer surface not concave; middle tibia only with one spiniform process apically; middle femur, hind femur and tibia normal, not broadened.

Distribution. – Eurasian steppe species occurring from Central France in the west to Kyrgyzstan and central Mongolia in the east. In Central Europe inhabiting some warm localities, Asia Minor is known only in the north (Erzurum) (Pesenko et al., 2000). This is a new record from China.

Rophite Spinola, 1808

Rophite Spinola, 1808: 8, 72. Type species: *Rophites quinquespinosus* Spinola, 1808, by monotypy.
Rhophites Agassiz, 1846: 29, unnecessary emendation.

Diagnosis. – Forewing with two submarginal cells, the second submarginal cell more than half length of the first one; basal vein of forewing nearly straight; metasomal terga with apical hair bands; body without yellow integumental markings; dorsal surface of propodeum shorter than scutellum, forming a distinct angle with posterior vertical surface; S6 of male flattened, without blister-shaped thickenings, median part with longitudinal ridge; S7 of male with distinct slender dorsal lobes; labial palpus very long owing to greatly elongate and flattened 1st and 2nd segments, each of them at least 5 times as long as 4th segment; frons of female with modified hairs forming sharp long spines.

Remarks. – The genus ranges from Spain and Morocco to Asia Minor, southern Russia, and eastward to Mongolia, occurring north to 60° N in Europe (Michener, 2000). The 13 species were revised by Ebmer & Schwammberger (1986). Two species, *Rophites gruenwaldti* Ebmer and *Rophites quinquespinosus* Spinola, occur in China.

Rophites gruenwaldti Ebmer, 1978

(Fig. 4, A–E)

Rophites gruenwaldti Ebmer, 1978: 217; Ebmer & Schwammberger, 1986: 291.

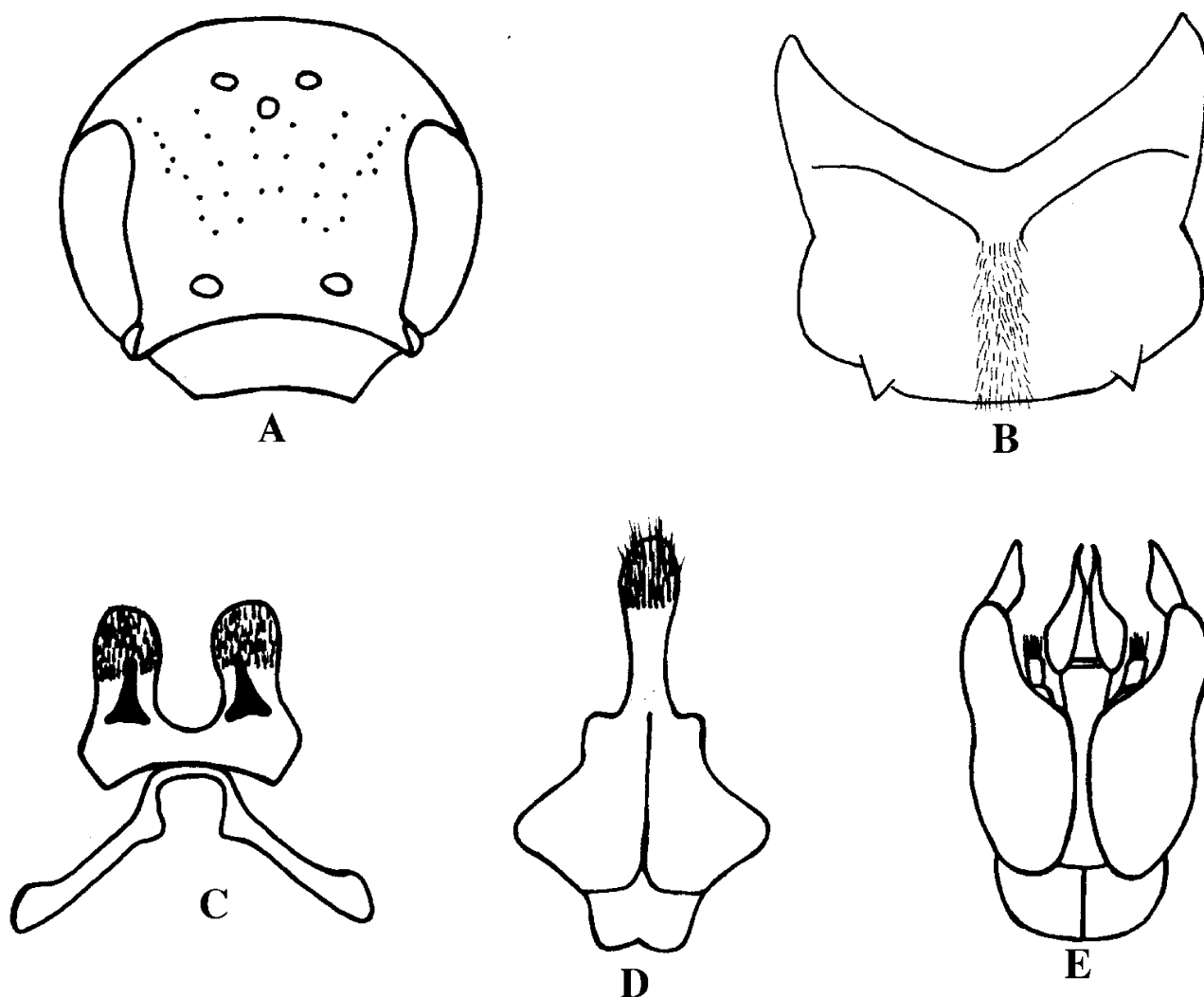
Material examined. – 2 females, 1 male, China, Heilongjiang, Harbin, coll. not record, 2 Aug.1970; 4 females (one deposited in ZRC), China, Inner Mongolia, Ulanqab Meng, coll. Xiao-Ping Zhang, 27 Jul.1987; 1 male, China, Inner Mongolia, Xilin Gol Meng, coll. Yun-Hu Xu, 15 Jul.1987; 1 male, China, Inner Mongolia, Hinggan Meng, coll. Long Zhang, 6 Jul.1983; 1 male, China, Hebei, Tianjin, collector not recorded, 27 Aug.1978.

Redescription. – Female: Body length 8.0–9.0 mm. Face, mesoscutum and metasomal terga black, without metallic reflections. Head as long as wide, narrower than mesoscutal width. Antennal socket placed on lower half of face, separated from upper clypeal margin by a little more than diameter of

socket; upper end of subantennal suture directed towards lower margin of antennal socket. Flagellum 10 segmented; scape 3.67 times as long as its maximum width; F1 nearly as long as F2; F2 wider than long. Frons depressed, without longitudinal ridge medially; frontal carina absent; frons with modified hairs forming sharp and long spines; frontal spine 32–38 radices. Apex of labrum rounded; labral process absent. Clypeus 2 times as broad as long, with dense, round and deep punctures throughout. Supraclypeus nearly shagreened. Epistomal suture between the anterior tentorial pits being only weakly arched. Labial palpus with the third segment on the same axis as the second and also rather broad basally, only the fourth being freely articulated, the second segment longer than the third or the fourth one, at least 5 times as long as the fourth one's length. Maxillary palpus six-segmented. Mandible with 2 preapical teeth. Distance of lateral ocellus to vertex 0.57 times as long as that of lateral ocellus to eye; distance between lateral ocelli 0.86 times as long as that of lateral ocellus to eye. Gena narrower than eye. Forewing with 2 submarginal cells; the second submarginal cell as large as the first one; distal crossveins as strong as the first submarginal crossvein; basal vein slightly curved; marginal

cell sharply pointed at distal end; distance from apex of stigma to apex of marginal cell less than that from apex of marginal cell to wing tip. Tegula not enlarged, yellowish brown. Dorsal surface of propodeum shorter than scutellum, 0.57 times as long as scutellar length, 1.14 times as long as metanotal length; dorsal enclosure of propodeum with longitudinal rugose sculptures, intersculptures shagreened. Mesoscutum with round and dense punctures, interspace 0.5 times as large as diameter of puncture. Episternal groove distinct and directed strongly downward below scrobal groove. Metasomal terga with 6 segments exposed, and with dense apical hair bands; posterior margin of metasomal terga reddish brown, transparent; T5 without longitudinal median zone; T5 with yellowish hairs; T6 with pygidial plate not margined by sharp carina. Middle tibial spur normal, 2/3 as long as basitarsus, pointed and curvetted apically, pecten obvious; hind basitarsus with apical process, the process without penicillus; hind trochanteral and femoral scopa reduced, femoral scopa usual; metabasitibial plate present.

Male: Body length 9.0–10.0 mm. Face, mesoscutum and metasomal terga black, without metallic reflections. Head



Figs. 4. *Rophites gruenwaldti* Ebmer, 1978: A, frontal view of female head; B, ventral view of male S6; C, ventral view of male S7; D, ventral view of male S8; E, dorsal view of male genitalia.

nearly as long as wide. Distance of lateral ocellus to vertex 0.67 times as long as that of lateral ocellus to eye; distance between lateral ocelli 0.75 times as long as that of lateral ocellus to eye. Labial palpus with the third segment on the same axis as the second and also rather broad basally, only fourth being freely articulated, the second segment longer than the third or the fourth one, at least 5 times as long as the fourth one's length. Maxillary palpus six-segmented. Antennal socket placed on lower half of face, separated from upper clypeal margin by a little more than diameter of socket; upper end of subantennal suture directed towards lower margin of antennal socket. Antenna filiform, long, reaching propodeum; flagellomere without special depressed area, lower surface without longitudinal groove; scape 1.88 times as long as the maximum width; F2 longer than wide, nearly as long as F3. Frons flattened, without longitudinal ridge medially; frontal carina absent. Mandible with 2 preapical teeth. Gena narrower than eye. Forewing with 2 submarginal cells; the second submarginal cell as great as the first one; basal vein slightly curved; distal crossveins as strong as the first submarginal crossvein; marginal cell sharply pointed at distal end; distance from apex of stigma to apex of marginal cell longer than that from apex of marginal cell to wing tip. Episternal groove not a real groove, but a shallow valley. Tegula not enlarged, yellowish brown. Dorsal surface of propodeum shorter than scutellum, 0.8 times as long as scutellar length, 1.6 times as long as metanotal length. Scutellum without lateral teeth on posterolateral extremities. Metasomal terga with 7 segments exposed, with dense apical hair bands; posterior margin of metasomal terga transparent; T5 normal, without lateral teeth; T7 not emarginate posteriorly; T7 with pygidial plate margined by sharp carina. Genitalia without lower gonostylus as appendage; gonostylus broader, partly or not separated from gonocoxite; inner surface of gonostylus without setae; volsella present, produced to a fingerlike hairy process, hairs longer and denser (Fig. 4, E). S2 without special structure; S3-S5 normal, without special structure; S4 without yellow hairs; S5 straight posteriorly, without lateral projections; S6 flattened, without blister-shaped thickenings, with lower and piliferous median ridge, posterolateral margin with short, tooth-shaped projection (Fig. 4, B); S7 and S8 usually elaborate, large, heavily sclerotized, often separated. S7 furcated apically, not covered with long hairs; S7 with distinct dorsal lobes (Fig. 4, C); S8 weakly bilobed basally, with strong apical process (Fig. 4, D). Middle tibia normal, not broadened distally, outer surface not concave; middle tibia only with one spiniform process apically; middle femur, hind femur and hind tibia normal, not broadened.

The frons of female paratype borrowed from Ebmer with 33 radixes spines (Fig. 4, A), different from 22 radixes spines of the original description, and with 34 radixes spines of all the Chinese specimens from Heilongjiang (2f, 1970 coll.) and Inner Mongolia (4f, 1987 coll.).

Distribution. – China: Heilongjiang, Inner Mongolia, Hebei.

***Rophites quinquespinosus* Spinola, 1808**

(Fig. 5, A-F)

Rophites quinquespinosus Spinola, 1808: 72.

Rhophites pillichii Móczár, 1967: 114.

Rophites moeschleri Schwammberger, 1971: 579.

Rophites bluethgeni Benedek, 1973: 272.

Rophites quinquespinosus Spinola: Ebmer & Schwammberger, 1986: 281-284; Ebmer, 1988: 696-687; Pesenko et al, 2000: 125-127.

Material examined. – 3 females, 2 males, China, Xinjiang, Altay, coll. Ze-Qing Niu, 28 Aug. 2002.

Redescription. – Female: Body length 8.5–10.5 mm. Face, mesoscutum and metasomal terga black, without metallic reflections. Head wider than long, and narrower than mesoscutal width. Antennal socket placed on lower half of face, separated from upper clypeal margin by a little more than diameter of socket; upper end of subantennal suture directed towards lower margin of antennal socket. Flagellum 10 segmented; scape 3.75 times as long as the maximum width; F1 longer than F2 or F3 respectively, slightly shorter than F2 and F3 combined; F2 wider than long. Frons flattened, without longitudinal ridge medially; frontal carina absent; frons with modified hairs forming sharp and long spines; frontal spine 20–25 radixes. Apex of labrum rounded; labral process absent. Clypeus 2 times as broad as long, with dense, large and round punctures throughout. Supraclypeus shagreened, with sparse punctures in lateral margin. Epistomal suture between the anterior tentorial pits being only weakly arched. Labial palpus with the third segment on the same axis as the second and also rather broad basally, only the fourth being freely articulated, the second segment longer than the third or the fourth one's length, at least 5 times as long as the fourth one's length (Fig. 5, D). Maxillary palpus six-segmented. Mandible with 2 preapical teeth. Distance of lateral ocellus to vertex 0.65 times as long as that of lateral ocellus to eye; distance between lateral ocelli 0.87 times as long as that of lateral ocellus to eye. Gena nearly as wide as eye. Forewing with 2 submarginal cells; the second submarginal cell as large as the first one (Fig. 5, B); distal crossveins as strong as the first submarginal crossvein; basal vein slightly curved; marginal cell sharply pointed at distal end; distance from apex of stigma to apex of marginal cell longer than that from apex of marginal cell to wing tip. Tegula not enlarged, yellowish brown. Dorsal surface of propodeum shorter than scutellar length, 0.53 times as long as scutellar length, 1 time as long as metanotal length; dorsal enclosure of propodeum with longitudinal rugose sculptures, intersculptures shagreened. Mesoscutum with round, deep and very dense punctures, interspaces 0.2 times as large as diameter of puncture. Episternal groove distinct and directed strongly downward below scrobal groove. Metasomal terga with 6 segments exposed, with dense apical hair bands; posterior margin of metasomal terga whitish yellow, transparent; T5 without longitudinal median zone; T5 with yellowish hairs; T6 with pygidial plate, not margined by sharp

carina. Middle tibial spur normal, $2/3$ as long as basitarsus, pointed and curved apically, pecten obvious; hind basitarsus with apical process, the process without penicillus; hind trochanteral and femoral scopa reduced, femoral scopa usual; metabasitibial plate present.

Male: Body length 8.5–10.5 mm. Face, mesoscutum and metasomal terga black, without metallic reflections. Head wider than long. Distance of lateral ocellus to vertex 0.8 times as long as that of lateral ocellus to eye; distance between lateral ocelli 1 time as long as that of lateral ocellus to eye. Labial palpus with the third segment on the same axis as the second and also rather broad basally, only the fourth being freely articulated, the second segment longer than the third or the fourth one, at least 5 times as long as the fourth one's length. Maxillary palpus six-segmented. Antennal socket placed on lower half of face, separated from upper clypeal margin by a little more than diameter of socket; upper end of subantennal suture directed towards lower margin of antennal socket. Antenna filiform, long, reaching metanotum; flagellomere without special depressed area, lower surface

without longitudinal groove; scape 2 times as long as its maximum width; F2 longer than wide, nearly as long as F3. Frons flattened, without longitudinal ridge medially; frontal carina absent. Mandible with 2 preapical teeth. Gena narrower than eye. Forewing with 2 submarginal cells; the second submarginal cell as great as the first one; basal vein slightly curved; distal crossveins as strong as the first submarginal crossvein; marginal cell sharply pointed at distal end; distance from apex of stigma to apex of marginal cell longer than that from apex of marginal cell to wing tip. Episternal groove not a real groove, but a shallow valley. Tegula not enlarged, yellowish brown. Dorsal surface of propodeum shorter than scutellum, 0.57 times as long as scutellar length, 1 time as long as metanotal length. Scutellum without lateral teeth on posterolateral extremities. Metasomal terga with 7 segments exposed, with dense apical hair bands; posterior margin of metasomal terga transparent; T5 normal, without lateral teeth; T7 not emarginate posteriorly; T7 with pygidial plate, margined by sharp carina. Genitalia without lower gonostylus as appendage; gonostylus broader, partly or not separated from gonocoxite; inner surface of gonostylus without setae;

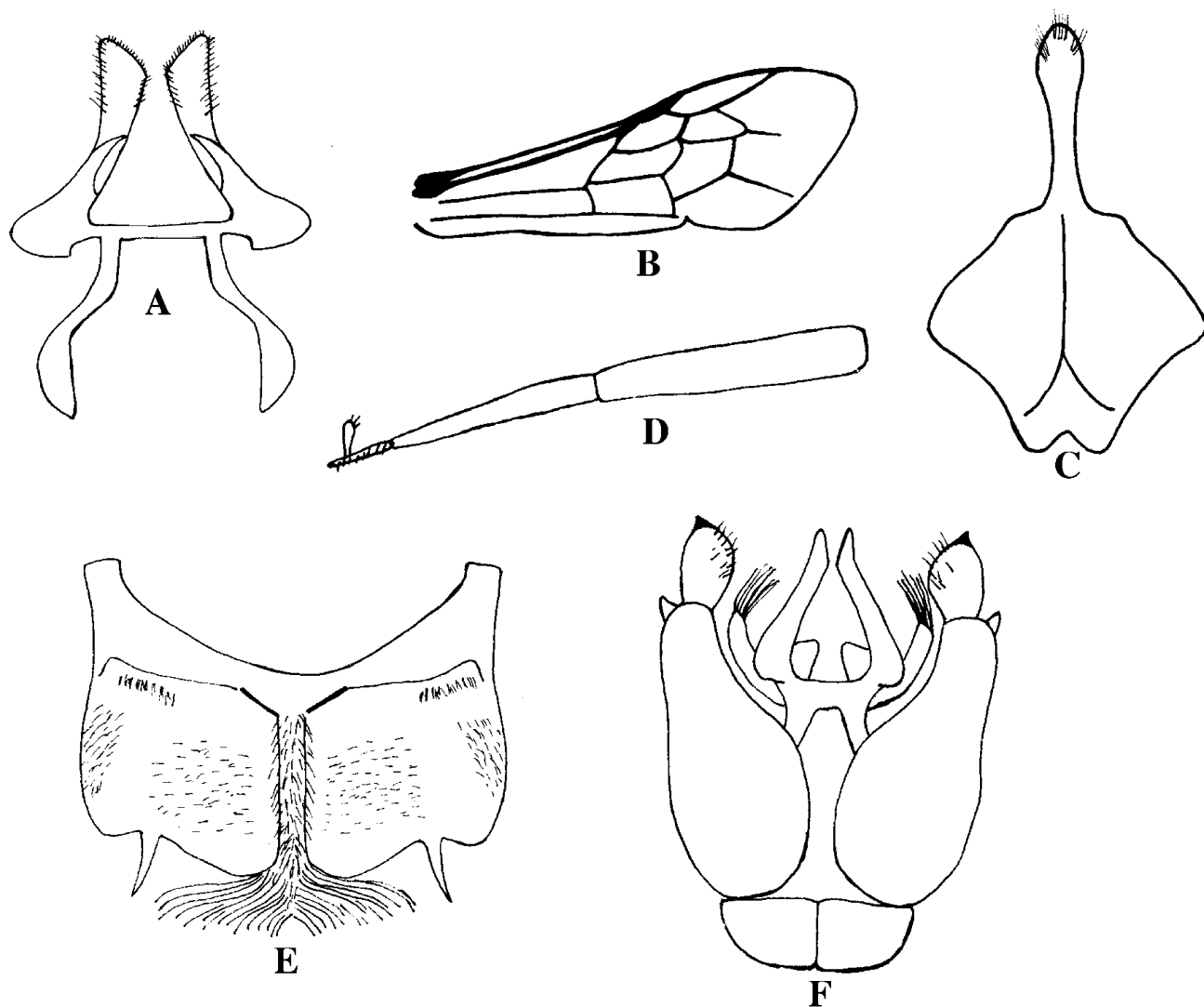


Fig. 5. *Rophites quinquespinosus* Spinola, 1808: A, ventral view of male S7; B, female forewing; C, ventral view of male S8; D, lateral view of female labial palpus; E, ventral view of male S6; F, dorsal view of male genitalia.

volsella present, produced to a fingerlike hairy process, hairs longer and denser (Fig. 5, F). S2 without special structure; S3-S5 normal, without special structure; S4 without yellow hairs; S5 straight posteriorly, without lateral projections; S6 flattened, without blister-shaped thickenings, with higher and bare median ridge, posterolateral margin with long, pointed, spin-shaped projection (Fig. 5, E); S7 and S8 usually elaborate, large, heavily sclerotized, longitudinal, often separated; S7 furcated apically, not covered with long hairs, with distinct dorsal lobes (Fig. 5, A); S8 weakly bilobed basally, with strong apical process (Fig. 5, C). Middle tibia normal, not broadened distally, outer surface not concave; middle tibia only with one spiniform process apically; middle femur, hind femur and tibia normal, not broadened.

Distribution. – Palearctic, in Europe almost throughout to southern Sweden in the north, in Asia to Kyrgyzstan and Chinese Altai Mountains. This is the new record from China.

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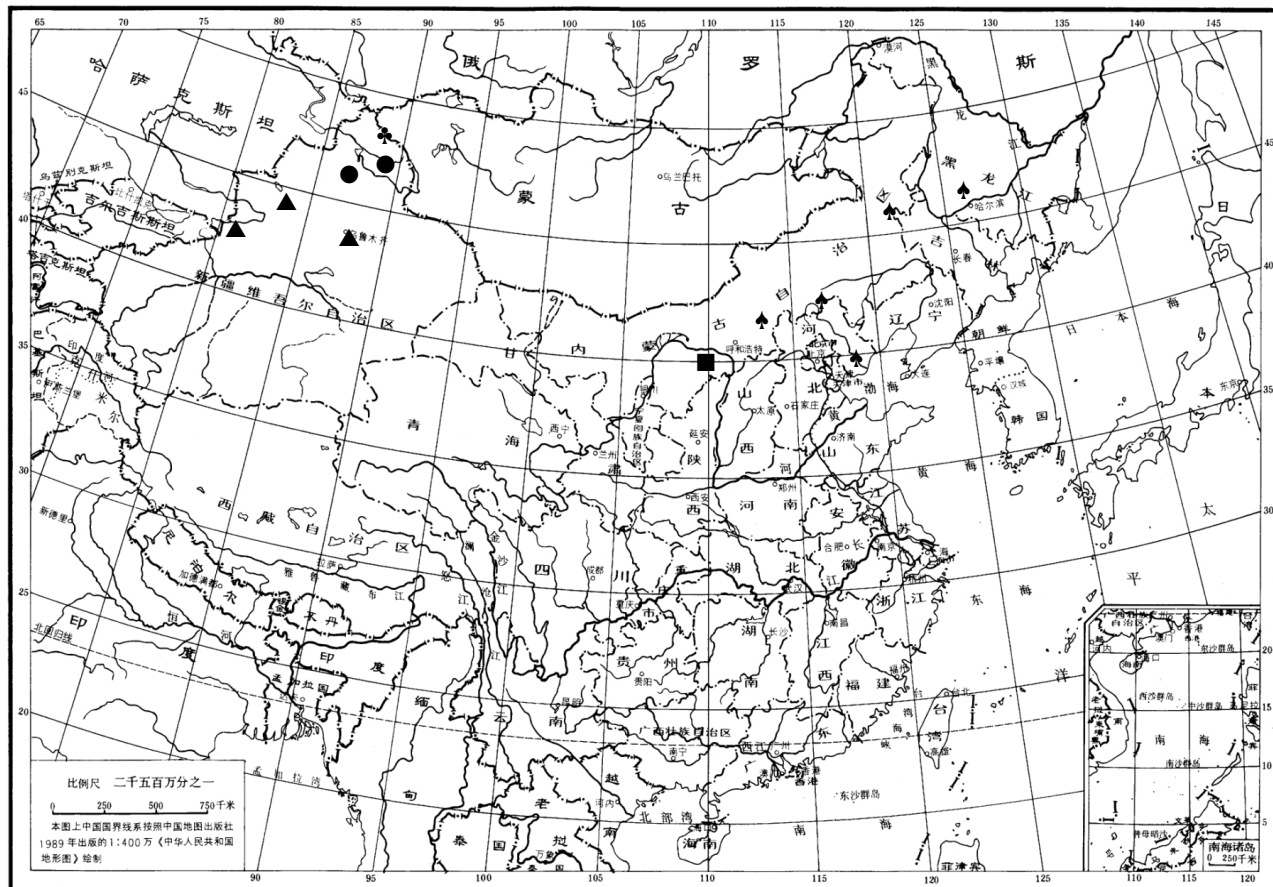


Fig. 6. Biogeographic Distribution of *Systropha*, *Morawitzella*, *Rophitoides*, *Rophites* in China. ■: *Morawitzella nana* (Morawitz), ◆: *Rophites gruenwaldti* Ebmer, ✱: *Rophites quinquespinosus* Spinola, ▲: *Rophitoides canus* (Eversmann), ●: *Systropha curvicornis* (Scopoli).

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