

***Kollasmosoma* gen. nov. and a key to the genera of the subfamily Neoneurinae (Hymenoptera: Braconidae)**

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The new genus *Kollasmosoma* (Braconidae: Neoneurinae; type species: *Elasmosoma platamonense* Huddleston, 1976, from the Mediterranean area) is described and illustrated. New combinations are: *Kollasmosoma cubiceps* (Huddleston, 1976), *K. marikovskii* (Tobias, 1986), and *K. platamonense* (Huddleston, 1976). A key to the genera of Neoneurinae is added, and the type species of the known genera are illustrated.

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Introduction

The subfamily Neoneurinae Bengtsson, 1918 (Hymenoptera: Braconidae) has been known for long to consist of two Holarctic genera, *Elasmosoma* Ruthe, 1858, and *Neoneurus* Haliday, 1838. Recently two East Palaearctic genera *Euneoneurus* Tobias & Yuldashev, 1979, and *Parelasmosoma* Tobias & Yuldashev, 1979, have been described. The junior author collected a series of specimens in Israel of an aberrant new genus which is described in this paper. It has the wing venation largely absent (fig. 1), the hind trochantellus distinctly differentiated (fig. 2), and the outer spur of the hind tibia of female much longer than the inner spur, as long as the hind basitarsus and truncate apically (fig. 3). The biology of the new genus is not precisely known, but the genera *Elasmosoma* and *Neoneurus* contain endoparasites of adult ants, as far as the scanty biological information allows a conclusion (Shaw & Huddleston, 1991). The type species of the new genus was observed to approach the formicine ant *Cataglyphus bicolor* (Fabricius, 1793) from behind and remained in contact with the tip of the abdomen of the ant for less than one second (R.D. Harkness in Huddleston, 1976). The known hosts of species of *Elasmosoma* (the sister-group of the new genus) belong predominantly to the genus *Formica* Linnaeus, 1758 (*Formica rufa* Linnaeus, 1758, *F. pratensis* (Retzius, 1783), *F. sanguinea* Latreille, 1798, *F. fusca* Linnaeus, 1758, and *F. rufibarbis* Fabricius, 1793), infrequently also *Lasius niger* (Linnaeus, 1758), and species of *Camponotus* Mayr, 1861, and *Polyergus* Latreille, 1804, are parasitized (Schmiedeknecht, 1914; Tobias, 1971, 1986; Marsh, 1979; Huddleston, 1976). With few exceptions Neoneurinae have been found in association with formicine ants (Shenefelt, 1969; Marsh, 1979); these ants exude formic acid which is a powerful attractant for predatory ant species and it seems likely that this exudate could serve also as a kairomonal stimulant to host-seeking hymenopterous parasites (Huddleston, 1976; G.J. de Bruyn, pers. obs.). The strongly curved ovipositor, almost hook-shaped and forward-pointing when exerted, gives support to the supposition that eggs are laid,

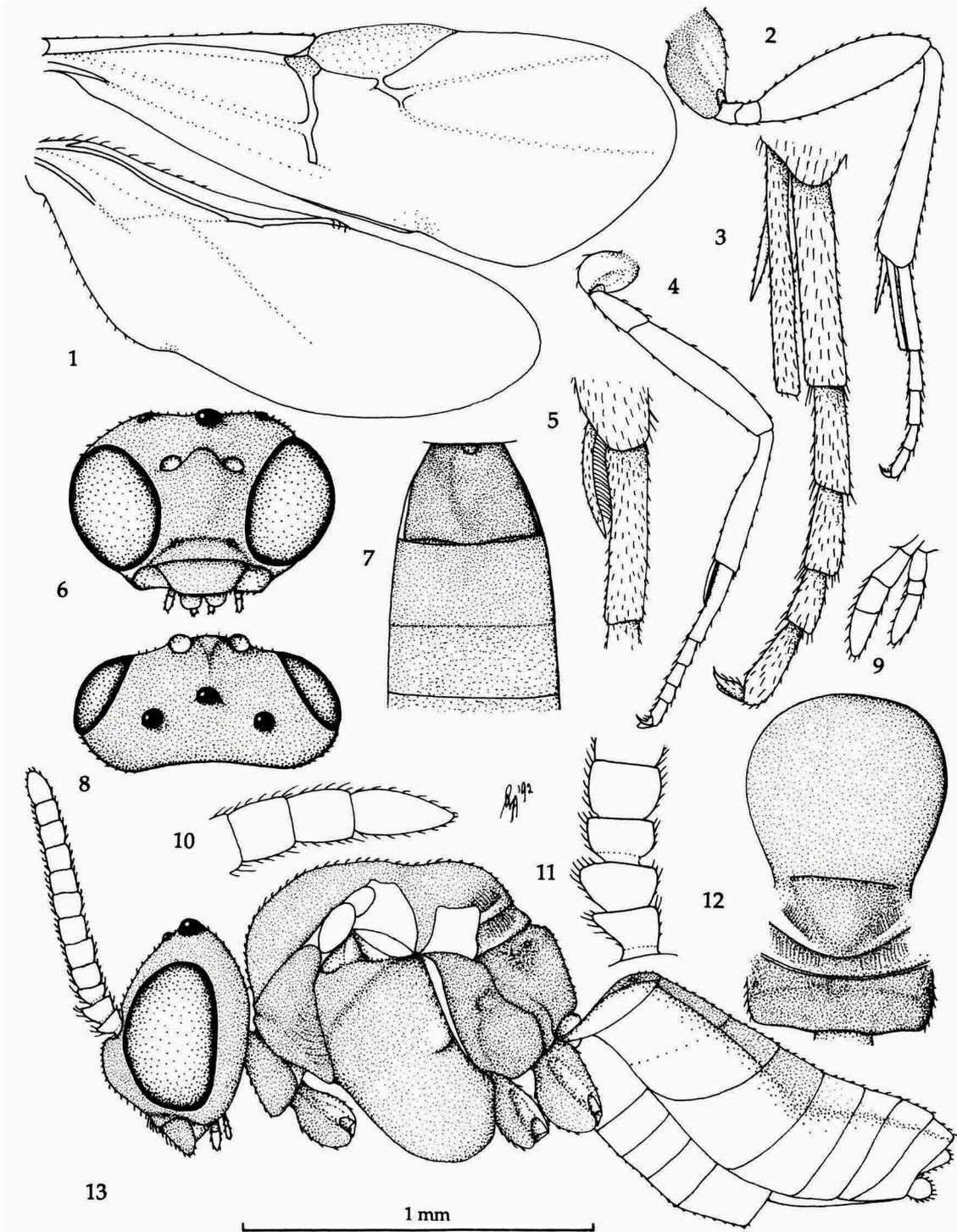
possibly through the anus, into the abdomen of adult ant workers (Huddleston, 1976). The record by Tobias (1971) of *Neoneurus auctus* (Thomson, 1895) found in bark-beetle galleries (Scolytidae) probably relates to hibernating specimens.

For the terminology used in this paper, see van Achterberg (1988), and for a key to the subfamilies of Braconidae, see van Achterberg (1990). RMNH stands for the Nationaal Natuurhistorisch Museum (formerly the Rijksmuseum van Natuurlijke Historie), Leiden and BMNH for the Natural History Museum, London.

Descriptions

Key to genera of the subfamily Neoneurinae

1. Antennal segments of ♀ 12, robust (figs 13, 61, apical antennal segment may be subdivided, antennal segments of ♂ 14-15); veins cu-a and SR1 of fore wing absent (fig. 1); outer or inner spur of hind tibia of ♀ apically truncate (figs 3, 61, except of *E. marikovskii*), of ♂ normal, acute apically; ocellar triangle (= stemmaticum) obtuse anteriorly (fig. 8); scapus shorter than pedicellus (figs 11, 61, except of *E. marikovskii*); third antennal segment shorter than fourth segment (figs 11, 61, except of *E. marikovskii*); no trace of vein 1-R1 (= metacarp) of fore wing (fig. 1); South Palaearctic *Kollasmosoma* gen. nov.
- Antennal segments of both sexes 13-22 (♀ unknown of *Euneoneurus*), and more slender (figs 25, 36, 44, 55); vein cu-a of fore wing and part of vein SR1 sclerotized (figs 14, 26, 37, 48); both spurs of hind tibia of both sexes apically acute (figs 15, 27, 39, 49); stemmaticum more or less right angled anteriorly (figs 22, 32, 47, 54); scapus longer than pedicellus (figs 25, 36, 44, 55); third antennal segment about as long as fourth segment (figs 25, 36), or longer than fourth segment (figs 44, 55); vein 1-R1 of fore wing variable, frequently present (figs 37, 48); Holarctic 2
2. Hind wing without closed cells (fig. 37); antennal segments of ♀ 13 and antenna short (fig. 44), of ♂ 14 and somewhat longer; vein cu-a of fore wing strongly reclivous (fig. 37); arolium of ♀ comparatively long compared to claw (fig. 41); Holarctic *Elasmosoma* Ruthe, 1858
- Hind wing with two closed cells (figs 14, 26, 48); antennal segments of ♀ 15-16 (unknown of *Euneoneurus*) and antenna longer (figs 36, 55), of ♂ 16-22 (figs 19, 25); vein cu-a of fore wing vertical to moderately reclivous (figs 14, 26, 48); arolium of ♀ normal, somewhat longer than claw (fig. 50) 3
3. Marginal cell of fore wing closed apically by a vertical part of vein SR1 (fig. 48); antennal segments of both sexes 16, antenna (very) slender (fig. 55); mesoscutum (rugulose-)coriaceous (fig. 52); transverse suture of mesoscutum absent (fig. 52); fore femur and tibia of ♀ more or less compressed and sparsely setose; fore coxa enlarged, about as long as hind coxa (fig. 60); Holarctic . *Neoneurus* Haliday, 1838
- Marginal cell of fore wing open apically and no vertical part of vein SR1 (fig. 14); antennal segments of ♀ 15 (unknown of *Euneoneurus*) and of ♂ 18-22 (unknown of *Parelasmosoma*), antenna less slender (figs 19, 25, 36); mesoscutum coarsely punctate (figs 18, 29); transverse suture of mesoscutum indicated (fig. 29); fore femur and tibia of ♀ normal (fig. 30); fore coxa normal, shorter than hind coxa (figs 25, 36); East Palaearctic 4



Figs 1-13, *Kollasmosoma platamonense* (Huddleston), ♀, Israel, Eilat. 1, wings; 2, hind leg; 3, hind tarsus and spurs, outer aspect; 4, fore leg; 5, fore tibial spur; 6, head, frontal aspect; 7, first-third metasomal tergites, dorsal aspect; 8, head, dorsal aspect; 9, palpi; 10, apex of antenna; 11, basal segments of antenna; 12, mesosoma, dorsal aspect; 13, habitus, lateral aspect. 1, 2, 4, 6-8, 12, 13: 1 x scale-line; 3, 5, 9-11: 2.2 x.

4. Veins 1-SR+M (except its base) and m-cu of fore wing unsclerotized (fig. 14); palpi rather slender, at most somewhat flattened (fig. 25); posterior face of propodeum (sub)vertical (fig. 25); maxillary palp with 3 segments; scutellar sulcus curved and crenulate laterally (fig. 18); hind wing without distinct veins SC+R1 and R1 (fig. 14); vein 3A of fore wing present (fig. 14); hind tarsus about as long as hind tibia (fig. 15); shape of hypopygium of ♀ unknown
 *Euneoneurus* Tobias & Yuldashev, 1979
 Veins 1-SR+M and m-cu of fore wing completely sclerotized (fig. 26); palpi rather strongly flattened, lamelliform (figs 21, 36); posterior face of propodeum oblique (fig. 36); maxillary palp with 2 segments; scutellar sulcus straight and obsolescent laterally (fig. 29); veins SC+R1 and R1 of hind wing present (fig. 26); vein 3A of fore wing absent (fig. 26); hind tarsus 1.1-1.2 times as long as hind tibia (fig. 27); hypopygium of ♀ deeply emarginate medio-posteriorly (fig. 35)
 *Parelasmosoma* Tobias & Yuldashev, 1979

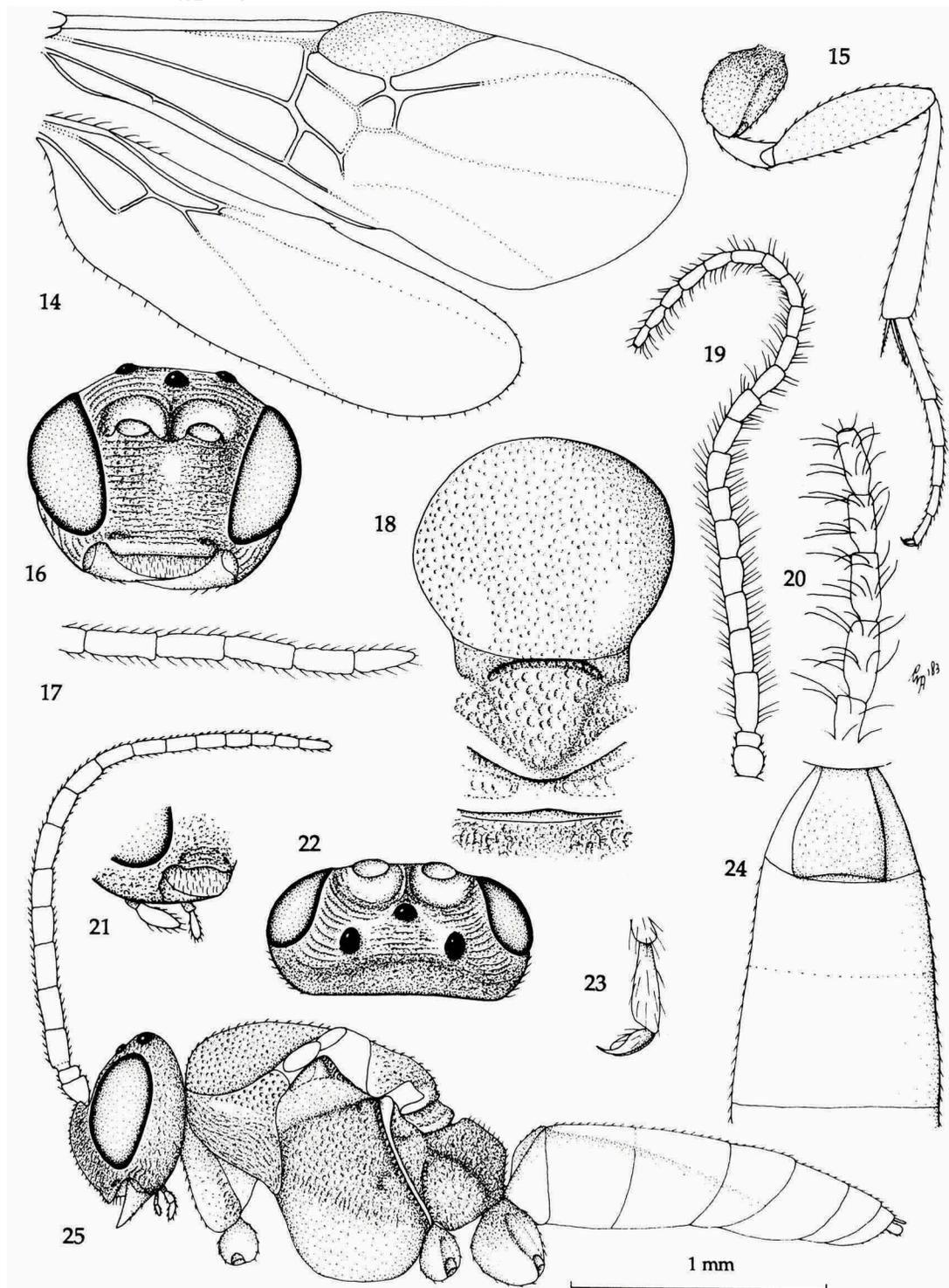
Kollasmosoma gen. nov.

Type species: *Elasmosoma platamonense* Huddleston, 1976.

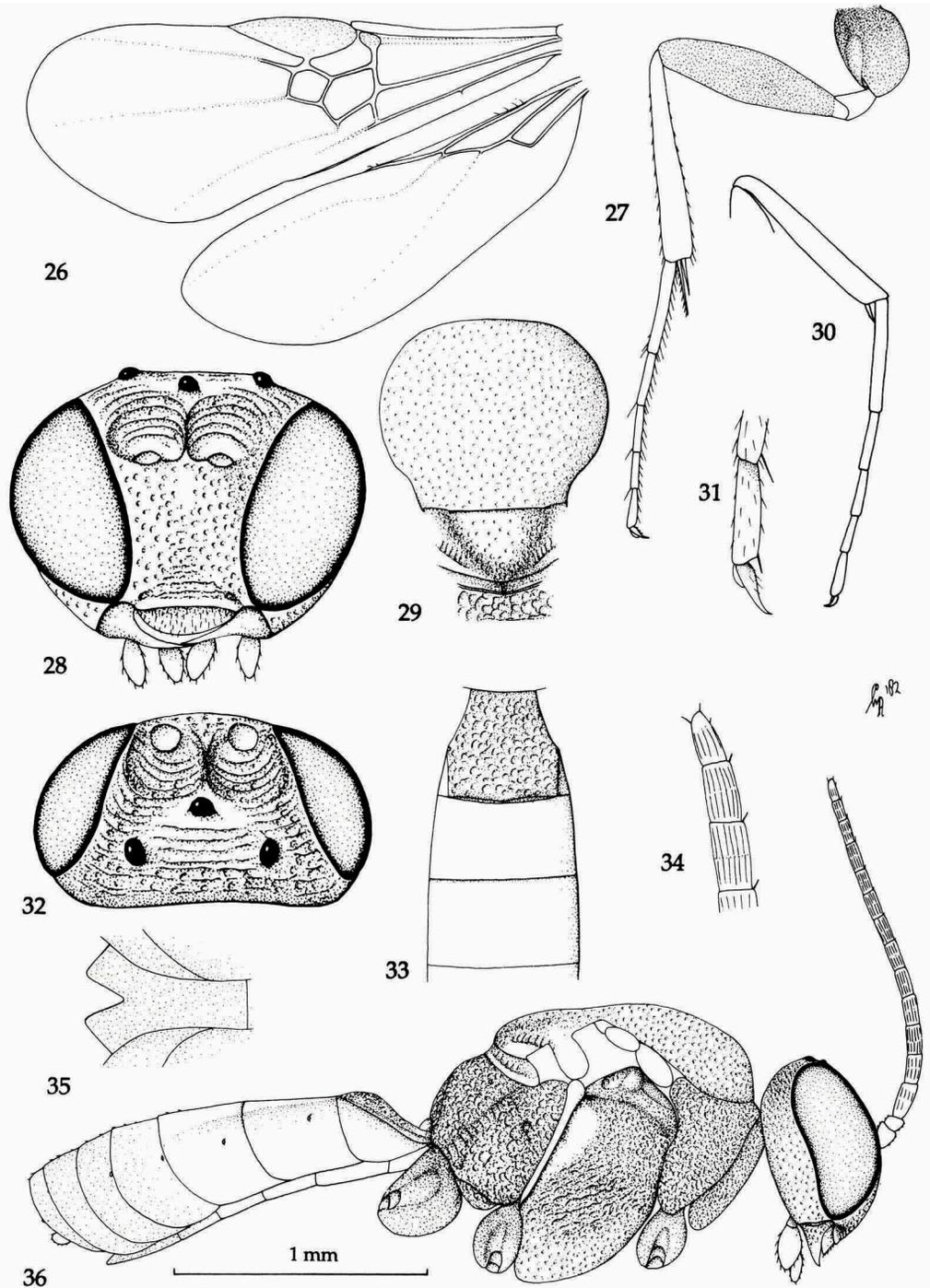
Etymology.— From “kolos” (Greek for shortened, incomplete) and the generic name “*Elasmosoma*”, because the new genus is closely related to the genus *Elasmosoma*, but has the antenna very short, the venation is incomplete, and in the type species the dorsal face of the propodeum is shortened. Gender: neuter.

Diagnosis.— Antenna of ♀ with 12 segments (but apical segment may be subdivided), and segments short (fig. 13); scapus shorter than pedicellus and pedicellus widened apically (fig. 11), except in *K. marikovskii*; third antennal segment shorter than fourth segment (fig. 11), except in *K. marikovskii*; head and mesosoma granulate; angle of stemmaticum obtuse anteriorly (fig. 8); palpi short, robust with 3 segments each (fig. 9; division between segments sometimes hard to see); labrum large, covering most of mandibles (figs 6, 13); anterior subalar depression with triangular, convex and smooth, area medially (fig. 13); transverse suture of mesoscutum absent; scutellar sulcus narrow, straight and largely smooth (fig. 12); precoxal sulcus and notauli absent; dorsal face of propodeum of type species about as long as metanotum and its posterior face oblique (fig. 13), but in both other species much longer than metanotum; fore and hind wings without closed cells (fig. 1); vein M+CU1 of fore wing only pigmented; no trace of vein 1-R1 (= metacarp) of fore wing (fig. 1); marginal cell of fore wing open apically, without vertical part of vein SR1 (fig. 1); vein cu-a of fore wing slightly inclivous (fig. 1); hind wing with 3 hamuli; fore coxa shorter than hind coxa (fig. 13); outer (*K. platamonense*) or inner (*K. cubiceps*) spur of hind tibia of ♀ as long as hind basitarsus and apically truncate (figs 2, 3; but acute in *K. marikovskii*); fore tibia and its spur normal (fig. 4), sparsely setose; fore tarsus 1.0-1.3 times as long as middle tarsus; hind trochantellus differentiated (fig. 2), absent in fore and middle legs (fig. 4); hind tarsus nearly as long as hind tibia (fig. 2); glymma and laterope of first tergite absent; hypopygium of ♀ far retracted (fig. 13), apically truncate, without medial depression or long setae; ovipositor strongly compressed, wide in lateral view; ovipositor sheath wide, protruding part subcircular (fig. 13).

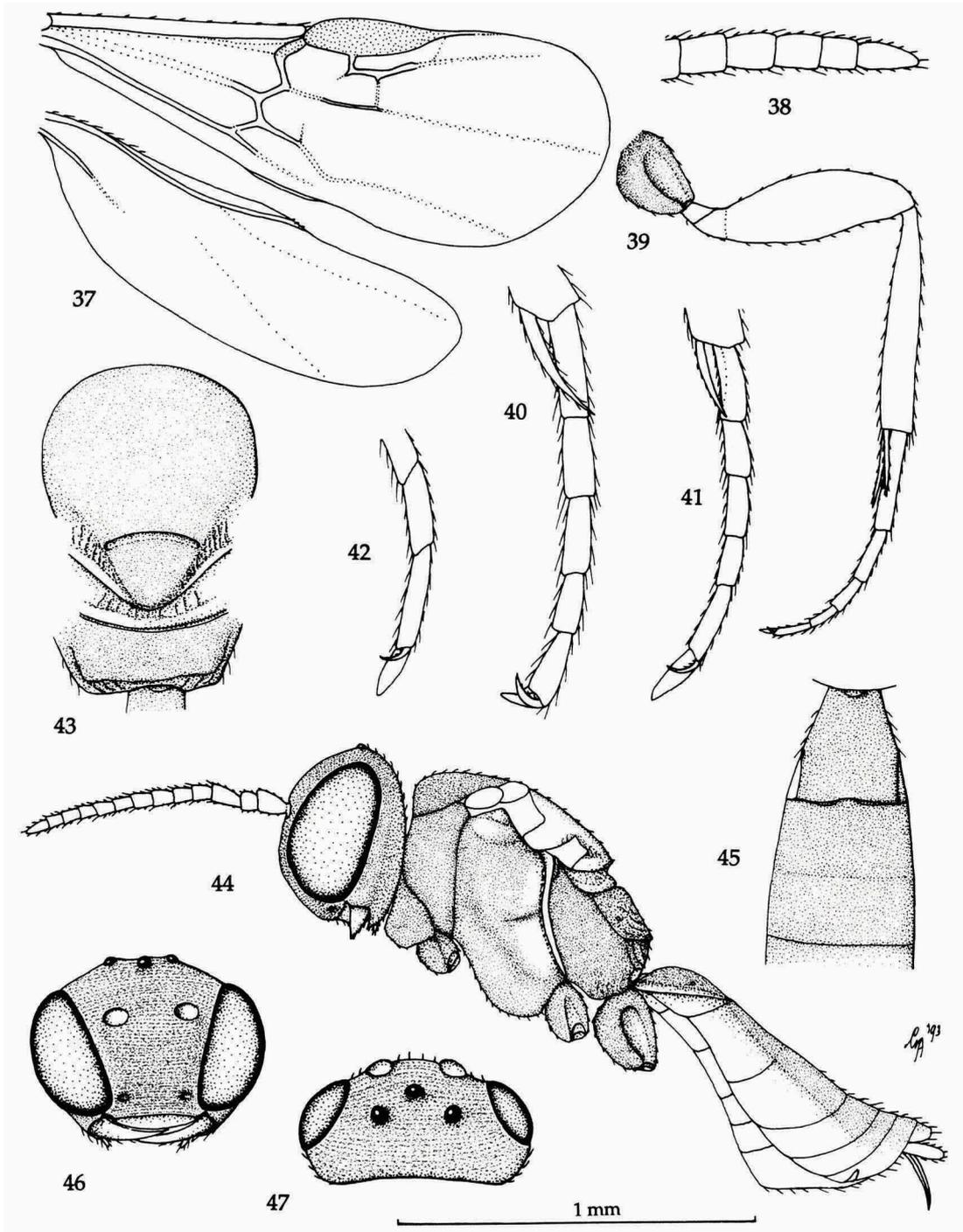
Biology.— The type species of the new genus was observed to approach the



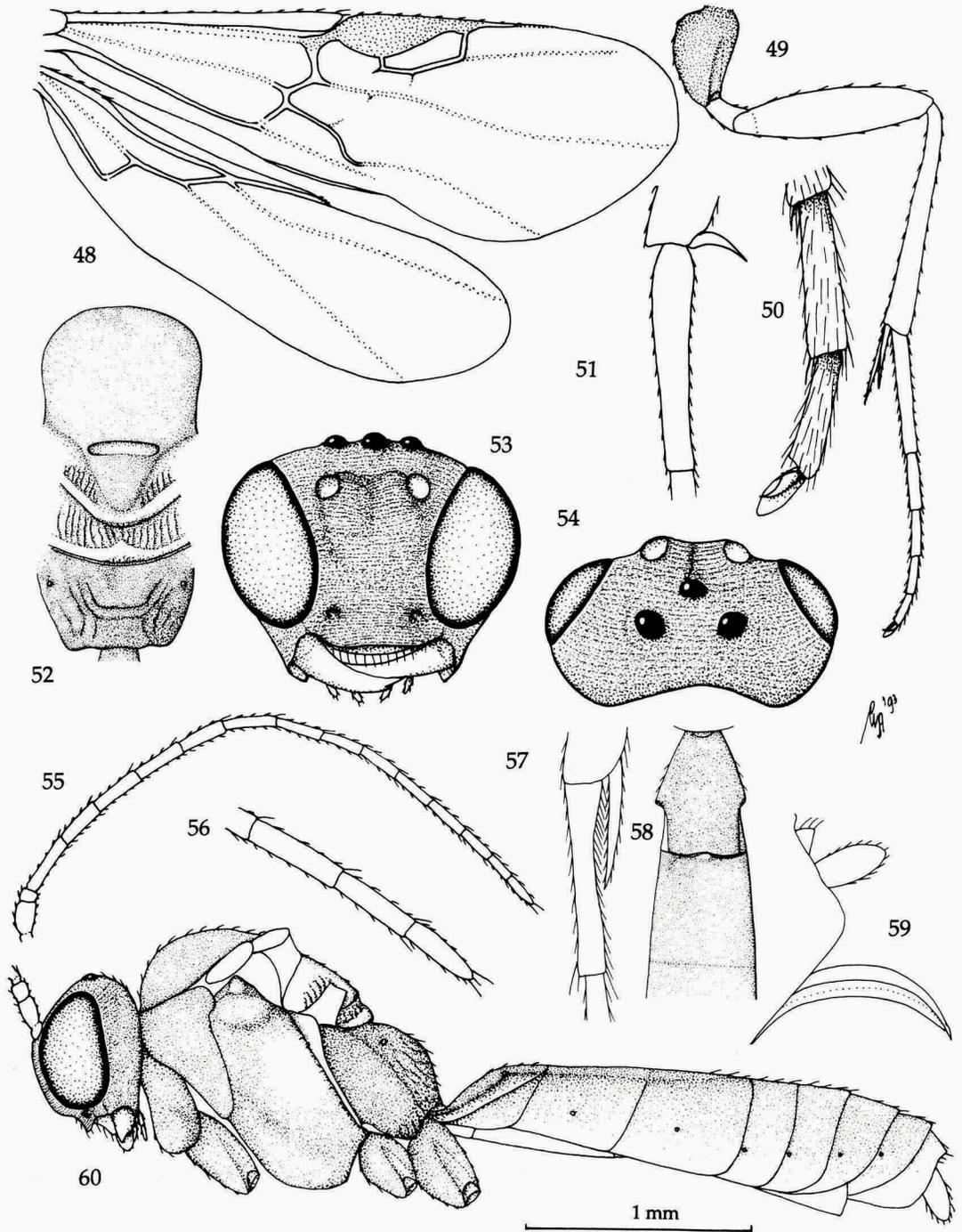
Figs 14-18, 22-25, *Euneoneurus asiaticus* Tobias & Yuldashev, ♂, holotype; figs 19-21, *Parelasmosoma antennatus* Tobias & Yuldashev, ♂, holotype. 14, wings; 15, hind leg; 16, head, frontal aspect; 17, apex of antenna; 18, mesosoma, dorsal aspect; 19, antenna; 20, subapical part of antenna; 21, detail of palpi; 22, head, dorsal aspect; 23, hind claw; 24, first-third metasomal tergites, dorsal aspect; 25, habitus, lateral aspect. 14, 15, 25: 1 x scale-line; 16, 18, 19, 21, 22, 24: 1.3 x; 17, 23: 2.5 x; 20: 3.2 x.



Figs 26-36, *Parelasmosoma palpator* Tobias & Yuldashev, ♀, holotype. 26, wings; 27, hind leg; 28, head, frontal aspect; 29, mesosoma, dorsal aspect; 30, fore tibia and tarsus; 31, hind claw; 32, head, dorsal aspect; 33, first-third metasomal tergites, dorsal aspect; 34, apex of antenna; 35, hypopygium, ventral aspect; 36, habitus, lateral aspect. 26, 27, 29, 33, 36: 1 x scale-line; 28, 30, 32: 1.4 x; 31, 34: 2.5 x; 35: 2 x.



Figs 37-47, *Elasmosoma berolinense* Ruthe, ♀ (but 40 of ♂), Netherlands, Meijendel. 37, wings; 38, apex of antenna; 39, hind leg; 40, 41, fore tarsus; 42, inner hind claw; 43, mesosoma, dorsal aspect; 44, habitus, lateral aspect; 45, first-third metasomal tergites, dorsal aspect; 46, head, frontal aspect; 47, head, dorsal aspect. 37, 43-47: scale-line (= 1 ×); 38-42: 2.5 ×.



Figs 48-60, *Neoneurus auctus* (Thomson), ♀ (but 57 of ♂), Finland, Enontekiö, and 55, 56, 59 of ♀, Austria, Aschbach. 48, wings; 49, hind leg; 50, outer hind claw; 51, 57, fore spur and basitarsus; 52, mesosoma, dorsal aspect; 53, head, frontal aspect; 54, head, dorsal aspect; 55, antenna; 56, apex of antenna; 58, first and second metasomal tergites, dorsal aspect; 59, ovipositor, lateral aspect; 60, habitus, lateral aspect. 48, 49, 55, 60: scale-line (= 1 ×); 50, 51, 56, 57: 2.5 ×; 52, 58: 1.1 ×; 53, 54: 1.5 ×; 59: 1.8 ×.

formicine ant *Cataglyphus bicolor* (Fabricius, 1793) from behind and remained in contact with the tip of the abdomen of the ant for less than one second (R.D. Huddleston, 1976). May be also associated with harvester ants of the genus *Messor* Forel, 1890 (Formicidae: Myrmicinae) or with their inquilines. The specimens collected in the Miramare Hotel garden at Mikhmoret (Israel) about 500 m from the shore of the Mediterranean Sea were captured flying around or gliding to the nest entrance crater of *Messor semirufus* (André, 1882). It resembled by its size and behaviour eucharitine chalcidoids (Chalcidoidea: Eucharitidae). However, the oviposition was not observed.

Distribution.— South Palaearctic (Mediterranean, Kazakhstan, Mongolia): three species.

Key to species of the genus *Kollasmosoma*

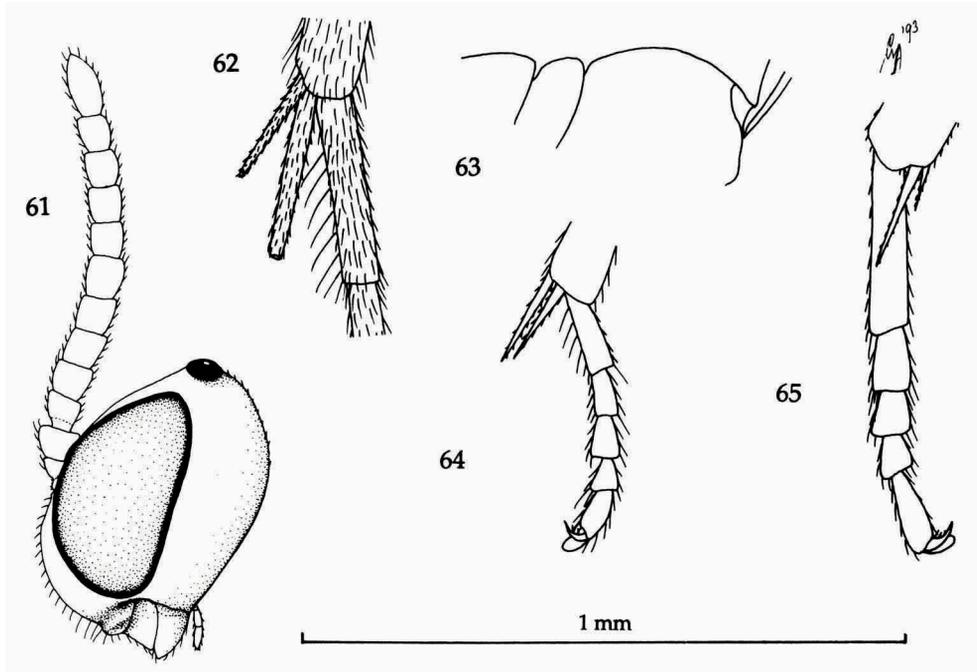
1. Scapus longer than pedicellus, somewhat longer than wide (fig. 145-17 in Tobias, 1986); third antennal segment somewhat longer than fourth segment (fig. 145-17, l.c.); fore tarsus shorter than middle tarsus; face, frons and vertex transversely striate; hypopygium of ♀ protruding apically; face black; Kazakhstan *K. marikovskii* (Tobias)
- Scapus shorter than pedicellus, wider than long (figs 11, 61); third antennal segment distinctly shorter than fourth segment (figs 11, 13, 61); fore tarsus about 1.3 times as long as middle tarsus; face, frons and vertex granulate; hypopygium of ♀ (sub)truncate apically (fig. 13); face pale yellowish 2
2. Dorsal face of propodeum about as long as metanotum (fig. 13); ; outer spur of hind tibia of ♀ enlarged and apically obtuse (figs 2, 3); temples narrow, about 0.4 times width of eye in lateral view (fig. 13); basitarsus of middle leg 2-3 times as long as second tarsal segment (fig. 65); Mediterranean *K. platamonense* (Huddleston)
- Dorsal face of propodeum distinctly longer than metanotum, normal, similar to posterior face (fig. 63); outer spur of hind tibia of ♀ acute, inner spur enlarged and apically truncate (fig. 62); temples enlarged, about 0.7 times as wide as eye in lateral view (fig. 61); basitarsus of middle leg about 1.5 times as long as second tarsal segment (fig. 65); Mongolia *K. cubiceps* (Huddleston)

Kollasmosoma cubiceps (Huddleston, 1976) comb. nov. (figs 61-64)

Elasmosoma cubiceps Huddleston, 1976: 219-220, figs 10-12.

Material.— Paratype, ♀ (BMNH), "Mongolia: Mittelgobi aimak, Choot bulag, sw. Chuld und Delgerchangaj, 1480 m, exp. Dr. Z. Kaszab, 1967", "Nr. 782, 10.vi.1967", "Paratypus *Elasmosoma cubiceps* sp. n., Huddleston, 1975".

Only known from the type series (two females) from Mongolia (1480 m altitude). The biology is unknown.



Figs 61-64, *Kollasmosoma cubiceps* (Huddleston), ♀, paratype; 65, *K. platamonense* (Huddleston), ♀, holotype. 61, head, lateral aspect; 62, spurs of hind tibia; 63, metanotum and propodeum, lateral profile; 64, 65, middle tarsus and tibial spurs. 61: scale-line (= 1 ×); 62-65: 1.4 ×.

***Kollasmosoma marikovskii* (Tobias, 1986) comb. nov.**

Elasmosoma marikovskii Tobias, 1986: 248. figs 145-16, 17.

Only known from the female holotype from Alma-Ata (Kazakhstan), and reared from *Formica pratensis* (Retzius, 1783). Obviously the least derived species of the genus because the face is black, both spurs of hind tibia of ♀ are acute apically, and the four basal antennal segments of ♀ are normal for the subfamily, lacking the aberrant features of both other species of the genus.

***Kollasmosoma platamonense* (Huddleston, 1976) comb. nov.**
(figs 1-13, 65)

Elasmosoma platamonense Huddleston, 1976: 223-224, figs 9, 13; Tobias, 1986: 248.

Material.— Holotype, ♀ (BMNH), "Holotype", "Greece, Platamon, viii.1974, R.D. Harkness", "Holotype *Elasmosoma platamonense* n. sp., det. Huddleston, 1975". Figured specimen, ♀ (Israel National Collection of Insects and Arthropods, c/o George Wise Faculty of Life Sciences, Tel Aviv University, Tel Aviv), "Israel, Eilat, 3.ix.1976, A. Freidberg"; 7 ♀♀ (RMNH, Argaman Collection), "Israel, Mikhmoret, Q. Argaman, 7.vii.1980 (1 ♀), 17.vii.1980 (1 ♀), 1.viii.1980 (1 ♀), 8.viii.1980 (1 ♀), 11.viii.1980 (1 ♀), 21.viii.1980 (1 ♀), or 27.viii.1980 (1 ♀)"; 1 ♂ (RMNH), "Espana, Toledo, M.J. Gijswijt", "20 km NE Talavera along C 503, 5.vi.1987".

Figured specimen from Eilat, ♀, length of body 2.6 mm, of fore wing 1.8 mm.

Head.— Length of third segment of antenna 0.8 times fourth segment, scapus widened apically and shorter than pedicellus (fig. 11), length of third, fourth and penultimate segments 0.8, 1.3 and 1.1 times their width, respectively (figs 10, 11, 13); length of maxillar palp 0.2 times height of head; length of eye 1.9 times temple in dorsal view (fig. 8); temples directly narrowed behind eyes, in lateral view about 0.4 times as wide as eye (fig. 13); OOL: diameter of ocellus:POL = 1:2:9; face, frons and vertex granulate; length of malar space 0.2 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.1 times its height; mesosternal sulcus smooth, narrow and rather deep; metanotum without median carina, not protruding dorsally; propodeum finely granulate, rather dull, its median carina and areola absent, slightly depressed antero-medially, and its spiracle far in front of middle of propodeum, medium-sized, round.

Wings.— Fore wing: parastigma large (fig. 1); 1A largely unsclerotized; basal half of wing sparsely setose, less than distal half of wing. Hind wing: wing membrane setose basally.

Legs.— Hind coxa largely granulate; all tarsal claws slender, setose, simple (fig. 3); fore tarsus 1.3 times as long as middle tarsus; basitarsus of middle leg 3 times second tarsal segment (fig. 65; according to original description 2-3 times); length of femur, tibia and basitarsus of hind leg 3.5, 5.2 and 6 times their width, respectively; length of fore tibial spur 0.7 times fore basitarsus (fig. 5); length of spurs of hind tibia 1.0 and 0.6 times hind basitarsus; outer spur of hind tibia (of ♀, not of ♂) enlarged and apically truncate (fig. 3).

Metasoma.— Length of first tergite 0.7 times its apical width, its surface shiny, granulate, without dorso-lateral and dorsal carinae, basally concave, medially slightly concave and its spiracles not protruding, distinctly behind middle of tergite (fig. 13); second tergite superficially granulate; second metasomal suture shallow and smooth; third and fourth tergites superficially coriaceous; remainder of metasoma largely smooth and compressed; setae of metasoma spread, short, tergites densely setose; second tergite with sharp lateral crease; length of ovipositor sheath 0.03 times fore wing.

Colour.— Black or dark brown; face, clypeus, labrum, malar space, scapus anteriorly, palpi, legs and tegula (but humeral plate brown) pale yellowish; hind and middle coxae dark brown antero-dorsally; veins unpigmented except vein C+SC+R, parastigma and pterostigma, which are pale yellowish; borders of pterostigma largely infuscate; wing membrane hyaline; antenna (rather dark) brown.

Variation.— Length of body 2.4-2.6 mm, of fore wing 1.6-1.8 mm, all females have 12 antennal segments; length of ovipositor sheath 0.03-0.04 times fore wing; pterostigma may be completely infuscate, as apical half of hind tarsus, frequently apical half of pterostigma is dark brown; scapus may be pale yellowish ventrally or completely dark brown; pedicellus may be pale yellowish ventrally; veins SC+R and R1 of fore wing may be largely unsclerotized.

Distribution.— Egypt, Greece, Israel, Spain.

Note.— The male from Spain has missing the head, the antennae and most of its legs. The tegulae, the hind trochanter and the hind coxa are dark brown and the hind femur is infuscate. According to Huddleston (1976) the males have the antenna 14-15 segments and somewhat expanded centrally. The outer hind tibial spur is shorter

than the hind basitarsus, and apically, the face and clypeus are black. According to the original description the specimens from Israel differs from the type series by the lack of a subdivision of the apical antennal segment (the females of the type series have the "last two segments not distinctly divided"), the propodeum lacks the strong reticulate-rugose sculpture medially, and the hypopygium is truncate apically, not broadly and shallowly emarginate. These differences seem to be of infraspecific value, therefore I include the specimens in *K. platamonense*.

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References

- Achterberg, C. van, 1988. Revision of the subfamily Blacinae Foerster (Hymenoptera, Braconidae).— Zool. Verh. Leiden 249: 1-324, figs 1-1250.
- Achterberg, C. van, 1990. Illustrated key to the subfamilies of the Holarctic Braconidae (Hymenoptera: Ichneumonoidea).— Zool. Med. Leiden 64: 1-20, figs 1-26.
- Huddleston, T., 1976. A revision of *Elasmosoma* Ruthe (Hymenoptera, Braconidae) with two new species from Mongolia.— Annls hist.-nat. Mus. natn. hung. 68: 215-225, figs 1-15.
- Marsh, P.M., 1979. Braconidae: 144-295. In: Krombein, K.V., P.D. Hurd, D.R. Smith & B.D. Burks. Catalog of Hymenoptera in America north of Mexico (3 vols): 1-2735.— Washington.
- Schmiedeknecht, O., 1914. Die Schlupfwespen (Ichneumonidae) Mitteleuropas, insbesondere Deutschlands: 113-256, pls 1-3. In: Schröder, C. Die Insekten Mitteleuropas, insbesondere Deutschlands 2. Hymenopteren 2: i-viii + 1-256.— Stuttgart.
- Shaw, M.R. & T. Huddleston, 1991. Classification and biology of braconid wasps (Hymenoptera: Braconidae).— Handbk Ident. Br. Ins. 7(11): 1-126, figs 1-126.
- Shenefelt, R.D., 1969. Braconidae, 1.— Hym. Cat. (nov. ed.) 4: 1-176.
- Tobias, V.I., 1971. Obzor naezdnikov-brakonid (Hymenoptera) fauny SSSR.— Trudy vses. ent. Obsch. 54: 156-268, figs 1-112. Translation (1975): A review of the Braconidae (Hymenoptera) of the USSR: 1-164, figs 1-112.— New Delhi.
- Tobias, V.I., 1986. Euphorinae: p. 181-250. In: Medvedev, G.S. (ed.). Opredelitel nasekomych Evropeiskoi tchasti SSSR 3, Perepontchatokrylye 4.— Opr. Faune SSSR 145: 1-501, figs 1-263.

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