Revision of the subfamily Macrocentrinae Foerster (Hymenoptera: Braconidae) from the Palaearctic region

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Six new species of the genus *Austrozele* Roman, one new genus (*Rectizele*; type species: *R. parki* spec. nov. from Korea), and eight species of the genus *Macrocentrus* Curtis are described and illustrated. Keys to the Holarctic genera and to the Palaearctic species are added. New combinations are: *Dolichozele gravitarsis* (Muesebeck, 1938); *Hymenochaonia delicata* (Cresson, 1872). The following new synonyms are proposed: *Paniscozele sumatrana* Enderlein, 1920, and *Palinzele oceanica* Brues, 1922, with *Austrozele longipes* (Holmgren, 1868); *Plectobracon testaceus* Brèthes, 1927, with *Dolichozele koebeli* Viereck, 1911; *Eubadizon dubius* Wesmael, 1835, *Macrocentrus affinis* Hedwig, 1961, and *M. affiniqades* Shenefelt, 1969, with *M. collaris* (Spinola, 1808); *Macrocentrus bicoloripes* van Achterberg, 1982, with *M. hungaricus* Marshall, 1893; *Helcon intricator* Ratzeburg, 1852, with *M. resinellae* (Linnaeus, 1758); *Macrocentrus cordanus* Papp, 1989, with *M. spilotus* van Achterbeg & Belokobylskij, 1987; *Paniscozele* Enderlein and *Laevis* Sharma, 1982, with *Austrozele* Roman, 1910; *Pachymerella* Enderlein, 1920, with *Hymenochaonia* Dalla Torre, 1898; *Neozele* Brues, 1926, and *Plectrobracon* Brèthes, 1927, with *Dolichozele* Viereck, 1911; *Pseudophylacter* Fahringer, 1929, with *Macrocentrus* Curtis, 1833.

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Contents

Introduction

The subfamily Macrocentrinae Foerster, 1862 (Braconidae), is currently being revised and this paper, dealing with the Palaearctic species, is the first part. Macrocentrinae occur worldwide and about 150 species are described; most species are gracile and long-legged. The majority of the species have long ovipositors, but nearly all species of the genera *Austrozele* Roman, 1910, and *Dolichozele* Viereck, 1911, and three new genera (to be described in a forthcoming paper on Palaeotropical Macrocentrinae) have ovipositors much shorter than the metasoma, and some species of the genus *Macrocentrus* Curtis, 1833, have ovipositors of intermediate length. The Macrocentrinae can be recognized by the small pegs on the front side of the trochantelli (in one Afrotropical genus absent on the hind trochantelli), the comparatively high insertion of the metasoma on the propodeum, and the convexity of the middle lobe of the mesoscutum (van Achterberg, 1990); the latter may be less distinct in males and is poorly developed in both sexes of some species of the genus *Macrocentrus*.

Species of Macrocentrinae are endoparasitic koinobionts of larvae of Lepidoptera (e.g. Noctuidae, Tortricidae, Pyralidae, Sesiidae, Tineidae, Oecophoridae, and Gelechiidae (van Achterberg & Belokobylskij, 1987; Shaw & Huddleston, 1991). Most of the smaller species (wing span less than 6 mm) are gregarious and presumably all develop by polyembryony, although sometimes only one specimen per host results. A few of these attack noctuids that feed on roots or inside stems (Shaw & Huddleston, 1991), having short legs and antennae. A larger number of species attack Pyralidae and Tortricidae feeding in shoots, spun or rolled leaves, or other concealed sites (including resinous galls and fungi on trees). The gregarious species usually spin their individual, elongate, brownish cocoons arranged within a communally-spun, outer envelope. In some cases the resulting mass is loosely ordered and more or less fusiform, but in at least one species the cocoons are accurately aligned in a honeycomb-like, closely packed array (Shaw & Huddleston, 1991). The solitary species of *Macrocentrus* attack various concealed microlepidopterous larvae, including Sesiidae, Oecophoridae, Gelechiidae and Tortricidae. The species of *Austrozele* are solitary parasites of (nocturnally exposed) noctuid larvae. Because these noctuid larvae are mainly nocturnal, these parasites also have a nocturnal activity pattern and possess an ophionoid facies (Gauld & Huddleston, 1976).

For the identification of the subfamily Macrocentrinae, see van Achterberg (1990), for its phylogeny, see Quicke & van Achterberg (1990), and for the terminology used in this paper, see van Achterberg (1988).

Keys and descriptions

Key to genera of the Holarctic Macrocentrinae

1. Laterope absent, exceptionally shallowly impressed in glymma, but not distinctly differentiated (fig. 11); first metasomal tergite flat or convex medio-basally (fig. 5) 2
- Laterope deep and large, distinctly differentiated from glymma (fig. 34); first tergite nearly always slightly concave medio-basally (figs 17, 40) 4

2. Vein SC+R1 of hind wing straight or nearly so, at most evenly curved (cf. fig. 59); fore femur short setose dorsally and much longer setose ventrally (figs 100, 101); first tergite without transverse striation (except the Neotropical subgenus *Pachymerella* Enderlein of the genus *Hymenochaonia* Dalla Torre); New World 3
- Vein SC+R1 of hind wing comparatively abruptly bent (figs 1, 7); first tergite with transverse striation (fig. 5); fore femur moderately long setose dorsally, somewhat shorter than ventrally (fig. 103); Old World ..... ***Aulacocentrum*** Brues
3. Fore femur wider basally than apically (fig. 101); ovipositor sheath of ♀ distinctly shorter than metasoma, less than 0.3 times fore wing; metapleural flange rather narrow and acute apically; tarsal lamella present; first metasomal tergite parallel-sided or nearly so; length of inner spur of hind tibia 0.6-0.8 times hind basitarsus, exceptionally 0.4 times (*D. gravitarsis* (Muesebeck, 1938) **comb. nov.**) which has widened tarsi) ..... ***Dolichozele*** Viereck
- Fore femur slender basally and about as wide as apically (fig. 100); ovipositor sheath of ♀ at least as long as metasoma, longer than 0.4 times fore wing; metapleural flange usually wide submedially and more or less truncate apically (fig. 83); if rather narrow then tarsal lamella absent or sides of first tergite diverging posteriorly (fig. 86); length of inner spur of hind tibia 0.4-0.6 times hind basitarsus (fig. 81) and tarsi normal ..... ***Hymenochaonia*** Dalla Torre
4. Vein R1 of hind wing distinctly widened (figs 86, 89); vein 3-M of fore wing more directed posteriad and shorter than twice vein 3-SR (fig. 86); vein SR of hind wing hardly or not curved basally (figs 86, 89) ..... ***Rectizele*** gen. nov.
- Vein R1 of hind wing slender (fig. 59); vein 3-M of fore wing normal, less directed posteriad and at least twice as long as vein 3-SR (fig. 12); vein SR of hind wing variable (figs 22, 35, 76, 110, 118, 207) 5

  Note. If vein SC+R1 of hind wing is abruptly bent and the first metasomal tergite is transversely striate, cf. some aberrant species of the genus *Aulacocentrum*.
5. Length of inner hind spur 0.5-0.8 times hind basitarsus (fig. 67); length of ovipositor sheath about equal to height of metasoma, about 0.1 times fore wing (fig. 73; only in two Afrotropical species distinctly longer, 0.2-0.4 times fore wing); vein SR of hind wing sinuate (figs 22, 62, 110); setae on fore femur longer on baso-ventral side than on dorsal side apico-ventrally (fig. 102) ..... ***Austrozele*** Roman
- Length of inner hind spur 0.3-0.5 times hind basitarsus (fig. 162); ovipositor sheath of Holarctic species distinctly longer than apical height of metasoma (figs 126, 159, 234), at least 0.4 times as long as fore wing; vein SR of hind wing at most slightly bent (figs 118, 161, 225); setae on fore femur more evenly in length on ventral side and comparatively shorter, if compared to dorsal setae (figs 105, 173, 205, 264) ..... ***Macrocentrus*** Curtis

Aulacocentrum Brues, 1922

Aulacocentrum Brues, 1922: 17; Shenefelt, 1969: 142. Type species (by original designation): *Aulacocentrum pedicellatum* Brues, 1922 [examined].

Diagnosis.— Antenna much longer than body, with 43-63 segments; palpi long (fig. 11); clypeus convex, ventrally straight to slightly concave; anterior tentorial pits medium-sized and rather deep; mandible strongly twisted, second tooth much

smaller than first tooth and acute; median carina of metanotum simple, not branched anteriorly (fig. 6); metapleural flange large and obtuse apically (fig. 11); vein 1-SR+M of fore wing straight, slightly curved (fig. 1) or with weak bend; vein 2A of fore wing present (fig. 1); angle between veins 1-SR+M and 1-M of fore wing about 90°; vein 1-M of fore wing straight or slightly curved; veins 1-CU1 and 1-1A of fore wing slender; vein 2-CU1 more or less slightly curved; subbasal cell of fore wing not or slightly widened apically, usually with elongate yellowish or brownish patch; vein cu-a of fore wing vertical, slender (at most basally somewhat widened), and at most slightly bent; vein CU1a of fore wing frequently with a faint brownish spot; first subdiscal cell of fore wing elongate (fig. 1) and partly glabrous; vein 3-M of fore wing normal, at least twice as long as vein 3-SR (fig. 1); marginal cell of hind wing narrow, subparallel-sided (figs 1, 7) or strongly widened apically; vein SR of hind wing strongly to moderately curved basally and partly sclerotized; vein 1r-m of hind wing straight and short to medium-sized; vein 2-SC+R of hind wing may be vertical (= transverse) and marginal cell elliptically widened basally; vein SC+R1 of hind wing abruptly bent towards anterior wing margin (fig. 7); vein r of hind wing absent, but present in one Afrotropical and one Papuan species; vein SR of hind wing strongly to moderately curved (figs 1, 7); vein R1 of hind wing slender; inner spur of hind tibia 0.4-0.5(0.6) times hind basitarsus; legs long; fore femur slender and curved, parallel-sided, setae much longer posteriorly than anteriorly (fig. 103); spur of fore tibia comparatively short, about 0.2 times fore basitarsus; tarsal claws with or without lamella (fig. 9); inner hind claw similar to outer hind claw; hind coxa frequently transversely striate; first metasomal tergite with transverse striation and slender, its length 3-6 times its apical width, nearly always parallel-sided; laterope of first tergite absent or shallow, not or weakly differentiated from glymma (fig. 11), exceptionally distinctly differentiated; first tergite convex or flat medio-basally; length of ovipositor sheath 1.1-1.6 times fore wing; apex of ovipositor normal, with notch subapically.

Distribution.— Afrotropical, East Palaearctic, Indo-Australian. Small genus.

Biology.— Solitary parasites of Pyralidae.

Note.— The group of *Macrocentrus gigas* Watanabe, 1937, also has vein 2-SC+R of hind wing strongly bent, but lacks the typical sculpture and shape of the first metasomal tergite. Therefore, I exclude this group from the genus *Aulacocentrum* and retain these species in the genus *Macrocentrus*. The resulting assemblage of species in the genus *Aulacocentrum* seems to form a monophyletic group; however, the aggregate of species in *Macrocentrus* with vein 2-SC+R bent seems to consist of a polyphyletic assemblage.

Aulacocentrum philippinense (Ashmead, 1904)
(figs 1-11, 103, 414, 414, 415)

Macrocentrus philippinensis Ashmead, 1904: 145; Watanabe, 1967: 5-6, fig. 2; Shenefelt, 1969: 168; Papp, 1982a: 108, 1985: 342.

Aulacocentrum philippinense; van Achterberg & Belokobylskij, 1987: 244; You & Zhou, 1990: 258-259.

Macrocentrus japonicus Watanabe, 1932: 133; Shenefelt, 1969: 168. Synonymized by Watanabe, 1939.

Material.— **Japan:** 2 ♀♀ (RMNH), "Japan, Kashidate, Hachijoh Isl., 300 km S Tokyo Met., 8.x.1980, A. Takasu"; 1 ♀ (USNM), "J. Nawa, Gifu, Japan. Host: *Glyphodes pyloalis* Wlk."; 1 ♂ (USNM), "Col. x.13.1938, Shindenbara, Fukuoka-ken, Japan", "reared from *Glyphodes pyloalis*, # 24705", "host larva

col. x.13.1938, par. adult em. vi.8.1939"; 2 ♀♀ (USNM), id., but em. viii.9.1932 or vi.5.1939. **China:** 1 ♂ (USNM), "Hangchow, China, vi.2.1932, J.T. Chu", "ex *Margaronia pyloalis* Walker". **Taiwan:** 1 ♀ (TMA), "Formosa, Sauter", "Fuhosho, 1909.x.". **India:** 3 ♂♂+1 ♀ (GC), "India, A.P., Warangal, A.R.S. coll."; 3 ♀♀+2 ♂♂ (AEI, RMNH), "Jeypore, Orissa, C.E., India, 1775'[= ft], x.1958, P.S. Nathan". **Philippines:** holotype of *A. philippinense*, ♀ (USNM), "Manila, P.I.", "W.A. Stanton collector", "♀, Type no. 8007, U.S.N.M.", "*Macrocentrus philippinensis* Ashm."; 2 ♀♀+9 ♂♂ (USNM, RMNH), "Los Banos, P.I., Baker"; 3 ♂♂+1 ♀ (USNM), "Dapitan, Mindanao, Baker"; 1 ♀ (USNM), "Mt. Makiling, Luzon, Baker"; 1 ♂ (USNM), "Surigan, Mindanao"; 1 ♂ (ZMC), "Philippines, Palawan, Mantalingajan, Pinigisan, 600 m, 7.ix.1961, Noona Dan Exp. 61-62" (aberrant because of whitish apical half of antenna). **Malaysia:** 2 ♀♀ (RMNH), "Malaysia-SE Sabah, nr Danum Valley Field C[entre], WO [trail], c 150 m, Mal. trap 11, 24.ii-18.iii.1987 (1 ♀, other ♀ 14-20.iii.1987), C.v.Achterberg, RMNH'87". **Indonesia:** 1 ♀ (ITZ), "L.J. Toxopeus, Buru, Station 1, 7.i.[19]22".

Holotype, ♀, length of body 7.4 mm, of fore wing 6.3 mm.

Head.— Antenna largely missing (in other females with about 45 segments, length of third segment 1.3 times fourth segment, length of third, fourth and penultimate segments 6.4, 4.8 and 3.3 times their width, respectively (figs)); length of maxillary palp 1.5 times height of head; length of eye in dorsal view 7.5 times temple (fig. 3); temples strongly receeding behind eyes (fig. 3); OOL:diameter of posterior ocellus: POL = 12:5:7; face densely and finely punctate medially, more remotely so laterally (fig. 2); clypeus remotely punctate and medio-ventrally straight; length of malar space equal to basal width of mandible.

Mesosoma.— Length of mesosoma 1.4 times its height; side of pronotum punctate anteriorly, narrowly crenulate medially and posteriorly, and remainder smooth (fig. 11); prepectal carina absent behind fore coxa, laterally complete; precoxal sulcus densely punctate; remainder of mesopleuron sparsely punctate; metapleuron rather coarsely punctate (fig. 11); metapleural flange wide, obtuse apically; surface of propodeum regularly and transversely rugose, and coarsely punctate, without median carina.

Wings.— Fore wing: first subdiscal cell largely glabrous laterally and setose medially; subbasal cell glabrous, except for a few setae dorsally and with faintly pigmented patch (fig. 1); 1-SR+M curved; r:3-SR:SR1 = 3:8:20; 1-CU1:2-CU1 = 11:16; r-m largely sclerotized; m-cu not widened; 2-SR:3-SR:r-m = 11:16:5. Hind wing: marginal cell subparallel-sided apically (fig. 1); 2-SC+R short, horizontal (= longitudinal); length of 1r-m 0.8 times 1-M.

Legs.— Tarsal claws with wide lobe ventrally (fig. 9); length of femur, tibia and basitarsus of hind leg 6.7, 16.2 and 11.6 times their width, respectively; length of inner spur of hind tibia 0.3 and 0.4 times hind basitarsus; length of fore basitarsus about 13 times its width; hind tibia slightly protruding at inner side, fringed; fore, middle and hind trochantelli with 5, 4, and 5 teeth, respectively.

Metasoma.— Length of first tergite 4.1 times its apical width, its surface transversely striate medially, obliquely striate laterally, and longitudinally latero-basally and remainder smooth (fig. 5); dorsal carinae of first tergite absent, except for an indistinct basal part; laterope rather deep (fig. 11); second tergite rather strongly sublongitudinally striate; third tergite largely smooth, basally superficially micro-striate (figs 5, 11); remainder of metasoma smooth and compressed; length of ovipositor sheath 1.24 times fore wing.

Colour.— Dark brown; palpi, tegulae, base of vein C+SC+R, parastigma, basal 0.4 of first tergite, basal third of middle and hind tibia, and hind tarsus basally, mainly

yellowish-white; scapus and pedicellus mainly, fore and middle legs, hind coxa, trochanter and trochantellus, basal 0.6 of third tergite, metapleuron mainly and anterior band of propodeum, and basal half of metasoma ventrally, yellowish; hind femur, basal 0.7 of hind tibia and hind tarsus partly, and hind spurs dark brown.

Variation.— Length of body 6.6-9.2 mm (-12.5 mm in specimen from Buru), of fore wing 5.7-9.0 mm; antennal segments of ♀ 43(1), 45(1), 46(2), 48(1), or 51(1: Buru), of ♂ 43(2), 44(2), 45(2), or 46(1); vein 2-SC+R of hind wing may be quadrate or longitudinal; length of first metasomal tergite 3.2-4.1(-5.0: male from Palawan); length of ovipositor sheath 1.10-1.59 times fore wing; male may have whole apical half of antenna whitish (Palawan specimen), but frequently without distinct pale band and only faintly yellowish or brownish (sub)medially; female has at least 12th-18th antennal segments white or ivory, but frequently the pale part starts at ninth segment and continues to 21st, the specimen from Buru has 12th-27th segments whitish; hind tarsus white, ivory or partly brown; basal half of palpi and vertex may be dark brown; hind coxa brownish or mainly dark brown.

Biology.— Solitary parasite of Pyralidae: *Diaphania pyloalis* (Walker), *Pyrausta (Botyodes) diniasalis* Walker, *P. (B.) asialis* (Guérin-Méneville), and *Palpita nigropunctalis* (Bremer) (Watanabe, 1967). The cocoon is sturdy, dark reddish-brown and the adult emerges through a cleanly cut opening.

Distribution.— China, India, Indonesia, Japan, Korea, Malaysia (Sabah), Philippines, Taiwan.

Note.— This species is characterized by the whitish colour of the basal half of the hind tibia and the pale ring of the antenna of the females, the largely smooth hind coxa (with at most some transverse striae), and the shape of the marginal cell of the hind wing (fig. 1) and of its clypeus (fig. 2).

Austrozele Roman, 1910

Austrozele Roman, 1910: 113; Shenefelt, 1969: 142. Type species (by original designation): *Perilitus longipes* Holmgren, 1868 [examined].

Palinzele Brues, 1922: 15; Shenefelt, 1969: 142. Type species (by original designation): *Palinzele oceanica* Brues, 1922 [examined; = *Austrozele longipes* (Holmgren, 1868) **syn. nov.**].

Paniscozele Enderlein, 1920: 144; Shenefelt, 1969: 144. **Syn. nov.** Type species (by original designation): *Paniscozele sumatrana* Enderlein, 1920 [examined; = *Austrozele longipes* (Holmgren, 1868) **syn. nov.**].

Laevis Sharma, 1982: 172. **Syn. nov.** Type species (by original designation): *Laevis spinosa* Sharma, 1982 [not available for study; may be *Austrozele longipes* (Holmgren, 1868)].

Diagnosis.— Antenna much longer than body, with 46-61 segments; apical segment with distinct spine; palpi long to very long (figs 65, 73); clypeus convex, ventrally straight to slightly concave; anterior tentorial pits medium-sized and rather deep; mandible strongly twisted, second tooth much smaller than first tooth and acute (fig. 25); median carina of metanotum simple, not or slightly branched anteriorly (figs 44, 57, 71), but exceptionally distinct (fig. 114); metapleural flange large and obtuse apically (figs 34, 61); vein 1-SR+M of fore wing straight, or slightly curved (figs 12, 49); vein 2A of fore wing present (fig. 35), obsolescent or absent (fig. 62); vein 1-M of fore wing straight or slightly curved; veins 1-CU1 and 1-1A of fore wing slender; subbasal cell of fore wing not (fig. 22) or moderately widened apically, with

small yellowish or brownish patch; vein cu-a of fore wing (sub)vertical, slender (at most basally somewhat widened); vein CU1a of fore wing frequently with a faint brownish spot; first subdiscal cell of fore wing robust (figs 22, 49) and largely setose; angle between veins 1-SR+M and 1-M about 90° (figs 35, 62); vein 3-M of fore wing normal, at least twice vein 3-SR (fig. 22); marginal cell of hind wing narrow, subparallel-sided (fig. 62) or distinctly widened apically; vein SR of hind wing curved basally and unsclerotized (fig. 22); vein 1r-m of hind wing straight and short to medium-sized (figs 12, 22, 62); vein 2-SC+R of hind wing horizontal (= longitudinal) or quadrate and marginal cell somewhat to moderately widened basally (figs 22, 35); vein SC+R1 of hind wing straight or slightly and evenly curved (fig. 45), exceptionally rather bent towards anterior wing margin; vein r of hind wing absent; vein R1 of hind wing slender; hind tibia only slightly bent inwards in dorsal view; inner spur of hind tibia 0.5-0.8 times (usually 0.7-0.8 times) hind basitarsus; fore leg slender; fore femur slender and curved, slightly widened submedially, its setae long posteriorly and medium-sized anteriorly (fig. 102); spur of fore tibia about 0.4 times fore basitarsus; tarsal claws with ventral lamella (figs 13, 30), but this sometimes obsolescent or absent; inner hind claw frequently different from outer hind claw (figs 69, 70); hind coxa without transverse striae; first metasomal tergite without transverse striation, its length 1.8-4.7 times its apical width, frequently parallel-sided; laterope of first tergite deep, distinctly differentiated from glymma (fig. 61); first tergite slightly concave medio-basally; length of ovipositor sheath 0.08-0.12 times (only in two Afrotropical species 0.2-0.4 times) fore wing; apex of ovipositor normal, with notch subapically (fig. 47).

Distribution.— Afrotropical, Holarctic, and Indo-Australian. Rather small genus.

Biology.— Solitary parasites of Noctuidae.

Key to Palaearctic species of the genus *Austrozele* Roman

1. Inner aspect of hind telotarsus of ♀ setose and convex, without glabrous area subapically (fig. 28); ventral margin of lamella of inner hind claw of ♀ straight (fig. 28); outer hind claw short yellowish or brownish pectinate basally (fig. 30); basal ring of hind tibia yellowish 2
- Inner aspect of hind telotarsus of ♀ with a glabrous and flat area subapically (figs 42, 53); ventral margin of lamella of inner hind claw of ♀ usually sinuate (figs 42, 70), if straight ventrally then outer hind claw setose basally (fig. 52); basal ring of hind tibia usually whitish or whitish-yellow 3
2. Hind femur and pterostigma of ♀ yellowish; mesosternum of both sexes pale yellowish-brown; length of malar space of ♀ 1.3-1.5 times basal width of mandible (fig. 21); West Palaearctic ..... ***A. longipalpis*** spec. nov.
- Hind femur and pterostigma of ♀ largely brown or blackish; mesosternum of both sexes dark brown or blackish; length of malar space of ♀ usually about equal to basal width of mandible (fig. 34), but exceptionally upto 1.4 times; East Palaearctic ..... ***A. adustus*** spec. nov.
3. Distance between posterior ocelli of ♀ 1.8-1.9 times diameter of posterior ocellus (fig. 64); fore claws only bristly setose (cf. fig. 69); mesoscutum of ♀ blackish medially and dark brown laterally; flagellum of ♀ only basally infuscate; pterostigma of ♀ partly dark brown; Japan ..... ***A. takasuae*** spec. nov.

- Distance between posterior ocelli of ♀ 1.0-1.3 times diameter of posterior ocellus (figs 38, 56); fore claws yellowish pectinate (cf. fig. 43); colour of mesoscutum and pterostigma of ♀ variable; flagellum of ♀ unicoloured light (yellowish-)brown basally 4

4. Vein 2-SR of fore wing about 1.9 times vein r (fig. 35); inner hind spur of hind tibia 0.7 times hind basitarsus; mesoscutal lobes dark brown medially; basal half of metasoma of ♀ infuscate dorsally; face sparsely punctulate; lamella of inner hind claw comparatively large and sinuate ventrally (fig. 42); Himalayan area ..... ***A. calvatus*** spec. nov.
- Vein 2-SR of fore wing 1.2-1.6 times vein r (fig. 49); inner hind spur of hind tibia 0.8-0.9 times hind basitarsus; mesoscutal lobes of ♀ and metasoma of ♀ variable, usually yellowish dorsally; face distinctly punctate medially; lamella of inner hind claw variable (fig. 53); Japan, Taiwan, Korea 5

5. Lamella of inner hind claw of ♀ sinuate ventrally (fig. 116), different from lamella of outer claw; length of mesosoma of ♀ about 1.1 times its height (fig. 117); Korea ..... ***A. koreanus*** spec. nov.
- Lamella of inner hind claw of ♀ straight ventrally (fig. 53), similar to lamella of outer claw (fig. 52); length of mesosoma of ♀ 1.3-1.4 times its height (fig. 61); Japan, Taiwan ..... ***A. nipponensis*** spec. nov.

Austrozele adustus spec. nov.
(figs 22-34)

Material.— Holotype, ♀ (AEI), "Kamikochi, Jap[an], vii.24, 1954, Townes Family". Paratypes: 2 ♀♀ + 2 ♂♂; 1 ♀ (RMNH), "Museum Leiden, Japan, Gaga Spa-zaô, Miyagi Pref., 31.vii.1981, A. Takasu"; 1 ♂ (AEI), "Mt. Norikura, Jap[an], vii.31, [19]54, 1500 m, Townes Family"; 1 ♀ (TMA), "Korea, Prov. Hyang-gang: Chann-Pay plateau, Sam-ziyan, 1700 m", "No. 282, 24.vii.1975, leg. J. Papp et A. Vojnits"; 1 ♂ (TMA), "Korea, Kum-gang san, Rükhaam, 10-12.vii.1977", "No. 365, Malaise trap, Dely & Draskovits".

Holotype, ♀, length of body 8.0 mm, of fore wing 7.9 mm.

Head.— Antennal segments 52, length of third segment 1.4 times fourth segment, length of third, fourth and penultimate segments 6.6, 4.8 and 2.0 times their width, respectively (fig. 32); length of maxillary palp 2.3 times height of head; length of eye in dorsal view 4.5 times temple (fig. 30); temples directly narrowed posteriorly (fig. 30); OOL:diameter of posterior ocellus:POL = 7:7:9; face finely and remotely punctate laterally, more densely so medio-ventrally (fig. 25); clypeus remotely punctate; length of malar space equal to basal width of mandible.

Mesosoma.— Length of mesosoma 1.4 times its height; propleuron coarsely and densely punctate; side of pronotum sparsely punctate (fig. 34); prepectal carina complete; precoxal sulcus rather densely punctate (fig. 34); remainder of mesopleuron more sparsely punctate; metapleuron remotely punctate and ventrally with few rugae; metapleural flange rather obtuse apically (fig. 34); metanotum with double median carina (fig. 27, but with one in other specimens); surface of propodeum coarsely and remotely rugose, with two median carina in a depression antero-medially (fig. 27).

Wings.— Fore wing: subbasal cell largely glabrous (except for about 35 setae in

apical third of cell), with brown patch (figs 22, 33); posterior half of M+CU1 straight (fig. 22); first subdiscal cell medially and first discal cell largely setose; r:3-SR:SR1 = 10:17:44; 1-CU1:2-CU1 = 1:16; r-m with large bulla (fig. 22); cu-a parallel with 3-CU1 (fig. 22); 2-SR:3-SR:r-m = 12:17:5; area basad of 2A sparsely setose; vein CU1a with dark patch. Hind wing: marginal cell subparallel-sided apically (fig. 22); 1r-m 0.5 times 1-M.

Legs.— Tarsal claws with small lamella (fig. 26), setose, and basally narrowly and yellowish pectinate (exept inner hind claw); lamella of inner hind claw straight ventrally, and inner side of telotarsus convex and completely setose (fig. 30); length of femur, tibia and basitarsus of hind leg 7.0, 12.6 and 8.0 times their width, respectively; length of spurs of hind tibia 0.6 and 0.8 times hind basitarsus; fore, middle and hind trochantelli with 5, 7, and 5 teeth, respectively.

Metasoma.— Length of first tergite 3.0 times its apical width (fig. 24), its surface remotely and rather coarsely rugose-punctate; dorsal carinae of first tergite obsolete basally (fig. 24); second tergite basally and medially aciculate, remainder of metasoma smooth and compressed apically; length of ovipositor sheath 0.09 times fore wing.

Colour.— Dark brown; tegulae, hind tarsus and palpi yellowish-white; face, ventral half of head, scapus and pedicellus ventrally, fore and middle legs, hind trochanters, basal ring of hind tibia and femur, and metasoma ventrally yellowish; antenna (except for the darker brown third-seventh segments) and pterostigma brown; vein 1-R1, apex of vein C+SC+R and most of parastigma of fore wing rather yellowish.

Biology.— Unknown.

Variation.— Length of fore wing 6.5-7.9 mm; antennal segments of ♀ 50(2) or 52(1), of ♂ 48(1); length of malar space of ♀ 1.0-1.4 times basal width of mandible (of ♂ from Korea 1.1 times, of ♂ from Japan up to 1.6 times); length of first metasomal tergite 3.0-3.2 times its apical width; length of ovipositor sheath 0.09-0.10 times fore wing; males have also the inner hind claw finely pectinate.

Note.— The main differences concern colour differences; obviously this species is the East Palaearctic sister-species of the West Palaearctic *A. longipalpis* spec. nov.

Austrozele calvatus spec. nov.
(figs 35-48)

Material.— Holotype, ♀ (CNC), "Nepal, Ktmd., Godavari, 6000 '[ft], viii.13-17.1967, mal. tr[ap], Can. Exp.".

Holotype, ♀, length of body 7.9 mm, of fore wing 7.6 mm.

Head.— Antennal segments 53, length of third segment 1.4 times fourth segment, length of third, fourth and penultimate segments 6.4, 4.6 and 2.7 times their width, respectively (figs 39, 41); length of maxillary palp 2.4 times height of head; length of eye in dorsal view 4.0 times temple (fig. 38); temples roundly narrowed posteriorly (fig. 38); OOL:diameter of posterior ocellus:POL = 7:7:9; face sparsely punctulate (fig. 37); clypeus remotely punctulate; length of malar space 1.2 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.2 times its height; propleuron rather densely punctate; side of pronotum medially and posteriorly crenulate, remainder punctulate (fig. 47); prepectal carina complete; precoxal sulcus rather densely and coarsely punctate (fig. 47); remainder of mesopleuron sparsely punctate; metapleuron punctate, but rugose ventrally (fig. 47); metapleural flange obtuse apically (fig. 47); metanotum with single median carina (fig. 44); surface of propodeum coarsely reticulate-rugose, without median carina antero-medially.

Wings.— Fore wing: subbasal cell largely glabrous (except for about 40 setae in apical third of cell), with weak yellowish patch (fig. 46); posterior half of M+CU1 straight (fig. 35); first subdiscal cell and first discal cell largely setose; r:3-SR:SR1 = 9:23:56; 1-CU1:2-CU1 = 2:29; bulla of r-m medium-sized (fig. 35); cu-a converging to 3-CU1 posteriorly (fig. 35); 2-SR:3-SR:r-m = 17:23:16; vein CU1a with dark patch. Hind wing: marginal cell slightly widened apically (fig. 35); 1r-m 0.45 times 1-M.

Legs.— Tarsal claws with distinct lamella (fig. 43), setose, and basally narrowly and yellowish pectinate (exept inner hind claw); lamella of inner hind claw sinuate ventrally, and inner side of hind telotarsus with flat glabrous patch (fig. 42); length of femur, tibia and basitarsus of hind leg 8.7, 14.7 and 11.0 times their width, respectively; length of spurs of hind tibia 0.6 and 0.7 times hind basitarsus; fore, middle and hind trochantelli with 3, 4, and 5 teeth, respectively.

Metasoma.— Length of first tergite 3.5 times its apical width (fig. 24), behind spiracles its surface superficially and longitudinally punctate-aciculate (fig. 40); dorsal carinae of first tergite absent; second tergite largely punctate-aciculate, third tergite somewhat punctulate, and remainder of metasoma smooth and compressed apically; length of ovipositor sheath 0.11 times fore wing.

Colour.— Brownish-yellow; apex of mandible, stemmaticum, vertex, middle of mesoscutal lobes, middle of pterostigma and most veins dark brown; metasoma infuscate dorsally; flagellum somewhat darker than the light brown scapus and pedicellus; hind tarsus and hind tibial spurs white; apical third of basal ring of hind tibia yellowish-white.

Biology.— Unknown.

Austrozele koreanus spec. nov.
(figs 106-117)

Material.— Holotype, ♀ (RMNH), "Korea: Gyeongbug-do, Cheongdo-gum, Unmum-myeon, Samgye-ri, 25-26.viii.1990, D.-S.Gu", "1575". Paratypes: 5 ♂♂; 1 ♂ (RMNH), "Korea: Gyeong Bug, Ullung Island, 28.vii.1981, J.S. Park", "1983""; 1 ♂ (Park Coll.), "Korea: Jeonnam-do, Namweon-gun, Namweon-myeon, Buum-ri, Baemsagol, 24-29.viii.1990, G.-H. Lee", "5851"; 3 ♂♂ (Park Coll., RMNH), "Korea: Gyongnam-do, Chinyu-shi (city), Kajwa-dong, 24-30.vi.1989 (2 ♂♂), 1-7.vii.1989 (1 ♂), Malaise trap", "5201", "5367", and "5109", respectively.

Holotype, ♀, length of body 7.4 mm, of fore wing 7.8 mm.

Head.— Antennal segments 50, length of third segment 1.4 times fourth segment, length of third, fourth and penultimate segments 6.4, 4.6 and 2.0 times their width, respectively (figs 106, 109); length of maxillary palp 2.4 times height of head; length of eye in dorsal view 6.0 times temple (fig. 113); temples directly narrowed posteriorly (fig. 113); OOL:diameter of posterior ocellus:POL = 6:5:7; face rather densely punc-

tate (interspaces usually about equal to diameter of punctures), above clypeus more densely and finely punctate (fig. 112); clypeus sparsely punctate; ventral margin of clypeus straight; length of malar space 1.2 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.1 times its height; propleuron moderately punctate; side of pronotum crenulate antero-medially, slightly crenulate posteriorly and remainder smooth (fig. 117); prepectal carina complete; precoxal sulcus rather densely punctate (fig. 117), interspaces about equal to diameter of punctures; remainder of mesopleuron more sparsely punctate; metapleuron densely and coarsely punctate and ventrally with few rugae; metapleural flange rather slender, obtuse apically (fig. 117); metanotum with divided median carina (fig. 114); surface of propodeum rugose, with coarse transverse rugae medially, anteriorly finely rugose, and with short median carina antero-medially (fig. 114).

Wings.— Fore wing: subbasal cell largely glabrous (except for about 25 setae in apical third of cell), and with indistinct yellowish patch (fig. 107); posterior half of M+CU1 straight (fig. 110); first subdiscal cell medially and first discal cell largely setose; r:3-SR:SR1 = 8:17:34; 1-CU1:2-CU1 = 1:19; r-m only dorsally sclerotized (fig. 110); cu-a parallel with 3-CU1 (fig. 110); 2-SR:3-SR:r-m = 12:17:6; basad of 2A largely glabrous; vein CU1a with weakly pigmented patch. Hind wing: with 4 hamuli; marginal cell subparallel-sided apically (fig. 110); 1r-m 0.5 times 1-M.

Legs.— Fore and middle tarsal claws with small lamella (fig. 108), setose, and basally yellowish pectinate, outer hind claw similar but not pectinate; lamella of inner hind claw sinuate ventrally, and inner side of telotarsus with glabrous patch and with sinuate bristle (fig. 116); length of femur, tibia and basitarsus of hind leg 7.3, 12.3 and 8.0 times their width, respectively; length of spurs of hind tibia 0.60 and 0.85 times hind basitarsus; fore, middle and hind trochantelli with 3, 4, and 5 teeth, respectively.

Metasoma.— Length of first tergite 2.8 times its apical width (fig. 111), its surface medially coarsely rugose, remainder irregularly longitudinally rugose and with some punctures; dorsal carinae of first tergite absent; second tergite (except posteriorly) finely aciculate and with some punctures; third tergite largely smooth except for some aciculation anteriorly; remainder of metasoma smooth and compressed apically; length of ovipositor sheath 0.10 times fore wing.

Colour.— Brownish-yellow; stemmaticum, ovipositor sheath and most veins (except along anterior margin of wings) dark brown; vertex infuscate; parastigma, pterostigma and vein 1-R1 of fore wing largely yellowish-brown, but parastigma infuscate posteriorly; hind tarsus (except telotarsus) ivory; base of hind tibia only slightly paler than remainder of tibia; wing membrane subhyaline; antenna yellowish-brown basally, but scapus and pedicellus paler than following segments.

Biology.— Unknown.

Variation.— Males: length of fore wing 6.0-7.5 mm, of body 7.5-9.7 mm; antennal segments of ♂ 49(1); length of mesosoma 1.2-1.3 times its height; length of first metasomal tergite 3.0-3.2 times its apical width, with median depression long, often nearly as long as tergite; POL 1.6 times and OOL 1.2 times diameter of posterior ocellus; colour variable, pterostigma at least largely dark brown (but vein 1-R1 yellowish), body yellowish as holotype or vertex, mesosoma dorsally, mesopleuron dorsally, hind coxa dorsally, metasoma dorsally, hind femur largely, hind tibia (except whitish basal band and its apical quarter), and complete pterostigma dark brown (intermedi-

ates are present); third antennal segment brown; wing membrane somewhat infuscate; median carina of propodeum present except in one paratype; length of maxillary palp 2.2-2.4 times height of head.

Note.— Very similar to *A. nipponensis* spec. nov., and probably only the females can be separated reliably by the shape of the hind telotarsus and the inner hind claw.

Austrozele longipalpis spec. nov.
(figs 12-21)

Austrozele spec.; Shaw & Huddleston, 1991: 75.

Material.— Holotype, ♀ (RMNH), "Holland, Asperen, 18.vii.1972, C.J. Zwakhals". Paratypes (15 ♀♀ + 14 ♂♂): 1 ♀ + 3 ♂♂, topotypic (RMNH, USNM, CNC), 15.vii.1972 (1♀ +1 ♂), 18.vii.1972 (1 ♂), and 21.vii,1972 (1 ♂); 3 ♀♀ (RMNH, BMNH, TMA), "Holland, Ede [Gld.], 27.vii.1970, C.J. Zwakhals" (2 ♀♀), and 3.viii.1970 (1 ♀); 1 ♀ + 1 ♂ (RMNH), "Wijster (Dr.), opposite Biol. Stat[ion], 12-19.viii.1977, C. v.Achterberg" (1 ♂) and 28.vii-5.viii.1978 (1 ♀); 1 ♀ (RMNH), "Netherlands, Nunspeet, 14.vii.1976, C.J. Zwakhals"; 2 ♀♀ (RMNH), "Netherlands, Gld., Tongeren, 22.vii.1986, C.J. Zwakhals" (1 ♀) and 4.viii.1986 (1 ♀); 1 ♀ (RMNH), "Netherlands, Ov., Hasselt, Stadsgaten, 25.vii.1986, C.J. Zwakhals"; 1 ♂ (RMNH), "Nederland, Gld., Elburg, 7.vii.1992, B.v.Aartsen"; 1 ♂ (RMNH), "Netherlands: L., St. Pietersberg, c 150 m, 6-13.vii.1988, Mal. tr[ap], B.v.Aartsen, RMNH'89"; 2 ♂♂ (NBM, RMNH), "Netherlands: N.B., Udenhout, "de Brand", 14-21.vii.1990, UTM FT 476225, Mal. trap., In. W.G. KNNV-Tilburg"; 1 ♂ (NBM), id. but 7-14.vii.1990; 2 ♂♂ (RMNH, NBM), id., but 21-28.vii.1990; 1 ♂ (RMNH), id., but 28.vi-4.vii.1990; 1 ♂ (ZSSM), "[Germany, Bayern], Augsburg, Sgögginger Wäldchen, 27.vi.[19]52, leg. A. Dahl"; 1 ♀ (ZSSM), "[Germany, ?Thüringen], Eisenberg"; 2 ♀♀ (ZSSSM, RMNH), "[Germany,], Bansin, Ostsee, 6.viii.1929, E. Bauer"; 1 ♂ (ZSSM), "[Germany], Ober-bayern, Badersee, 750 m, 7.vii.1953, E. Bauer"; 1 ♀ (BMNH), "[England], New Forest, Hants., larvae collected by Syms, ix.1962, cocoon given me by Lin, x.1962/2, pupae parasites of *fontis*", "From l[arva] of *B[omolocha] fontis* [auct.] taken by M. Syms in N. Forest, Hants., ix.1962", "?*Palinzele* or nr, det. J.A.J. Clarck, 1965", "*Palinzele* sp., Mo. 28/v/[19]70, R.D. Eady, det. 1970"; 2 ♀♀ (NMS). "[England], Pamber For[est], Hants., H: *Hypena crassalis* [on] *Vaccinium myrtillus*, HLC: 26.viii.[19]78, PLE: ix.[19]78, PIE: 3.vii.[19]79, M.R. Shaw & M.R. Britton" (1 ♀), and PIE: 8.vii.[19]79"(1 ♀); 1 ♀ (TMA), "Hungary, Szöce", "1986.vii.4, leg. Papp J.".

Holotype, ♀, length of body 7.3 mm, of fore wing 7.5 mm.

Head.— Antennal segments 51, length of third segment 1.3 times fourth segment, length of third, fourth and penultimate segments 6.2, 4.6 and 2.0 times their width, respectively (fig. 20); length of maxillary palp 2.0 times height of head; length of eye in dorsal view 3.7 times temple (fig. 19); temples directly narrowed posteriorly (fig. 19); OOL:diameter of posterior ocellus:POL = 8:7:12; face punctate laterally, largely smooth medially (fig. 14); clypeus punctate; ventral margin of clypeus thin, wide and slightly concave (fig. 14); length of malar space 1.3 times basal width of mandible; second tooth of mandible rather obtuse.

Mesosoma.— Length of mesosoma 1.3 times its height; propleuron coarsely and densely punctate; side of pronotum smooth, except for some crenulae (fig. 21); prepectal carina complete; precoxal sulcus densely and rather coarsely punctate anteriorly, rugose-punctate posteriorly (fig. 21); remainder of mesopleuron sparsely punctate; metapleuron remotely punctate (fig. 21); metapleural flange rather obtuse apically (fig. 21); surface of propodeum rugose-reticulate, but anteriorly smooth, with a short median carina in a depression antero-medially (fig. 17).

Wings.— Fore wing: subbasal cell largely glabrous (except for about 40 setae in apical third of cell), with small brown area (fig. 12); M+CU1 weakly curved (fig. 12);

first subdiscal cell medially and first discal cell largely setose; r:3-SR:SR1 = 11:21:53; 1-CU1:2-CU1 = 1:14; r-m with large bulla (fig. 12); cu-a converging to 3-CU1 posteriorly (fig. 12); 2-SR:3-SR:r-m = 16:21:7; basad of 2A sparsely setose; vein CU1a without brownish patch. Hind wing: marginal cell slightly widened apically (fig. 12); 1r-m 0.4 times 1-M.

Legs.— Tarsal claws with small lamella (fig. 13), setose, and basally narrowly and yellowish pectinate (except inner hind claw); lamella of inner hind claw straight ventrally, and inner side of telotarsus convex and completely setose (cf. fig. 30); length of femur, tibia and basitarsus of hind leg 7.8, 13.2 and 9.0 times their width, respectively; length of spurs of hind tibia 0.6 and 0.7 times hind basitarsus; fore, middle and hind trochantelli with 3, 5, and 3 teeth, respectively; hind femur punctate; hind tibia only pimply; fore tibial spur 0.5 times fore basitarsus.

Metasoma.— Length of first tergite 2.5 times its apical width (fig. 17), its surface superficially striate-rugose, but its basal quarter smooth; dorsal carinae of first tergite obsolete basally (fig. 17); second tergite and basal half of third tergite finely longitudinally striate, remainder of metasoma smooth and compressed; length of ovipositor sheath 0.11 times fore wing.

Colour.— Brownish-yellow; hind tarsus yellowish-white; vertex, apex of mandible and apices of most antennal segments blackish; apex of metasoma somewhat infuscate.

Biology.— Solitary parasite of Noctuidae-Hypeninae: *Hypena* (*Bomolocha*) *crassalis* (Fabricius, 1787) (= *B. fontis* auct.) on *Vaccinium myrtillus* Linnaeus. The cocoon is greyish-brown, rather tough.

Variation.— Length of fore wing 6.6-7.5 mm; antennal segments of ♀ 50(2) or 51(3), of ♂ 47(3), 48(1) or 49(3); length of maxillary palp 2.0-2.2 times height of head; length of malar space of ♀ 1.3-1.5 times basal width of mandible (of ♂ up to 1.8 times); dorsal half of subbasal cell of fore wing largely glabrous, at most with about 45 setae; length of first metasomal tergite 2.6-3.0 times its apical with; first and second tergites may be completely smooth or superficially aciculate; length of ovipositor sheath 0.11 times fore wing; females may have middle of hind tibia, mesosoma and metasoma dorsally, pterostigma, third-fifth antennal segments infuscate or dark brown; males have pterostigma dark brown, antenna (except scapus and pedicellus) infuscate, metasoma may be darker than of darkest female; dark males also have metasoma dorsally, hind coxa, mesosoma dorsally and laterally, hind femur (except its base and apex), middle of hind tibia more or less dark brown.

Austrozele nipponensis spec. nov.
(figs 49-61, 408-410, 412)

Material.— Holotype, ♀ (CNC), "Mt. Mitsumine, Saitama, Japan, 27.viii.1960, T. Hayasaka". Paratypes: 6 ♀♀ + 3 ♂♂; 3 ♀♀ + 6 ♂♂ (AEI, RMNH), "Wushi, Taiwan, 1150 m, v.3.[19]83, Henry Townes" (1 ♂ + 1 ♀), 10.v. (1 ♂), 15.v. (2 ♂♂), 22.v. (1 ♂), 29.v. (2 ♀♀ + 1 ♂); 1 ♀ (ELKU), "Mt. Sobosan (800-900 m), Oita Pref., 22.vii.1979, K. Maetô leg.", "Japan"; 1 ♀ (RMNH), "Honmura (500 m), Shôbara, Hiroshima Pref., 17.viii.1977, K. Maetô leg.", "Japan"; 1 ♀ (ELKU), "Daoisen-rindô, 1200 m, Kuju, Oita Pref., 18.vii.1978, K. Maetô leg.", "Japan".

Holotype, ♀, length of body 8.4 mm, of fore wing 8.3 mm.

Head.— Antenna largely missing, with 12 remaining segments, length of third segment 1.2 times fourth segment, length of third and fourth segments 5.0 and 3.9 times their width, respectively, penultimate segment of ♀ paratype from Japan 2.5 times its width; length of maxillary palp 2.4 times height of head; length of eye in dorsal view 4.8 times temple (fig. 56); temples directly narrowed posteriorly (fig. 56); OOL:diameter of posterior ocellus:POL = 6:6:7; face remotely punctate laterally, more densely medially than laterally (fig. 51); clypeus remotely punctate; length of malar space equal to basal width of mandible.

Mesosoma.— Length of mesosoma 1.3 times its height; propleuron rather densely punctate; side of pronotum medially and posteriorly crenulate, remainder remotely punctulate (fig. 61); prepectal carina complete; precoxal sulcus rather finely and remotely punctate, interspaces larger than diameter of punctures (fig. 61); remainder of mesopleuron sparsely punctate; metapleuron remotely punctate medially and punctate-rugose ventrally; metapleural flange obtuse apically (fig. 61); metanotum with single median carina, branched anteriorly (fig. 57); surface of propodeum irregularly reticulate-rugose, with a short obsolescent median carina in a wide anteromedial depression.

Wings.— Fore wing: subbasal cell largely glabrous (except for about 25 setae in apical third of cell, fig. 55), with weak brownish-yellow patch (fig. 49); posterior half of M+CU1 straight (fig. 49); first subdiscal cell and first discal cell largely setose; r:3-SR:SR1 = 9:19:39; 1-CU1:2-CU1 = 1:20; bulla of r-m medium-sized (fig. 49); cu-a subparallel with 3-CU1 (fig. 49); 2-SR:3-SR:r-m = 13:19:6; vein CU1a with faint yellowish patch. Hind wing: marginal cell slightly widened apically (fig. 49); 1r-m 0.6 times 1-M.

Legs.— Tarsal claws with medium-sized lamella (fig. 52), setose, in holotype pecten indistinct, but distinct in most paratypes (fig. 409), inner hind claw similar to outer hind claw (figs 52, 53); lamella of inner hind claw straight ventrally, and inner side of hind telotarsus with flat glabrous patch (fig. 53); length of femur, tibia and basitarsus of hind leg 7.9, 12.9 and 8.0 times their width, respectively; length of spurs of hind tibia 0.6 and 0.8 times hind basitarsus; fore, middle and hind trochantelli with 6, 7, and 4 teeth, respectively.

Metasoma.— Length of first tergite 3.0 times its apical width, behind spiracles its surface longitudinally (and posteriorly obliquely) striate (fig. 50); dorsal carinae of first tergite absent; second tergite aciculate (fig. 50); remainder of metasoma smooth and compressed apically; length of ovipositor sheath 0.09 times fore wing.

Colour.— Brownish-yellow; stemmatium black; flagellum largely brownish; middle part of pterostigma and ovipositor sheath dark brown; base of hind tibia, three apical segments of maxillary palp, middle tarsus and metasoma ventro-basally pale yellowish; hind tarsus, except telotarsus, (yellowish-)white; hind spurs and telotarsus yellowish; parastigma and pterostigma yellowish; wing membrane subhyaline.

Biology.— Unknown.

Variation.— Length of body 5.8-8.4 mm, of fore wing 5.6-8.3 mm; antennal segments of ♀ 49(1), 52(1) or 53(2), of ♂ 50(4) or 51(2); length of third antennal segment 1.2-1.4 times fourth segment; lengh of maxillary palp 2.2-2.4 times height of head; length of malar space 1.0-1.2 times basal width of mandible; OOL 1.0-1.5 times diameter of posterior ocellus; length of mesosoma of ♀ 1.3-1.4 times its height; apical third of subbasal cell of fore wing with 25-45 setae (figs 55, 408); length of hind femur 7.9-9.3 times its width; length of first tergite 2.5-3.5 times its apical width; basal half of

second tergite completely aciculate; length of ovipositor sheath 0.09-0.11 times fore wing; precoxal area sparsely or densely punctate and rugae may be absent, but frequently with some rugae posteriorly; pterostigma of ♀ completely yellowish or dark brown (usually intermediate in Japanese specimens, Taiwanese specimens usually have pterostigma completely yellowish); pterostigma of ♂ completely dark brown; wing membrane of ♂ slightly infuscate and basally rather yellowish; flagellum of ♂ dark brown; tibial spurs are yellowish or white; apex of first and base of second, apex of thid and entire fourth tergite of ♀ may be dark brown; first-seventh metasomal tergites of ♂ are partly or completely dark brown dorsally; one female paratype has apical half of metasoma and mesoscutal lobes dark brown.

Note.— Very closely related to *A. takasuae*, but *nipponensis* differs by the shape of the inner hind claw, colour of hind coxa (completely yellowish), and fore and middle claws pectinate basally.

Austrozele takasuae spec. nov.
(figs 62-74)

Material.— Holotype, ♀ (RMNH), "Japan, Koganezawa-rindo, Yamanashi Pref., 4.iv.1981, A. Takasu, RMNH'82". Paratype: 1 ♀ (ELKU), "Mt. Tachoibana, Fukuoka City, 23.vi.1979, K. Maetô leg.", "Japan".

Holotype, ♀, length of body 8.2 mm, of fore wing 7.6 mm.

Head.— Antennal segments 51, length of third segment 1.4 times fourth segment, length of third, fourth and penultimate segments 6.2, 4.6 and 2.8 times their width, respectively (figs 65, 72); length of maxillary palp 2.4 times height of head; length of eye in dorsal view 4.0 times temple (fig. 64); temples roundly narrowed posteriorly (fig. 64); OOL:diameter of posterior ocellus:POL = 11:7:13; face rather coarsely punctate laterally, finely and densely punctate medially (fig. 68); clypeus remotely punctate; length of malar space 1.3 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.3 times its height; propleuron strongly punctate (fig. 73); side of pronotum with few crenulae medially and densely punctate posteriorly, remainder sparsely punctate (fig. 73); prepectal carina complete, but weak latero-ventrally; precoxal sulcus coarsely punctate, interspaces wider than diameter of punctures (fig. 73); remainder of mesopleuron remotely punctate; metapleuron coarsely and densely punctate, with some ventral rugae (fig. 73); metapleural flange rather obtuse apically (fig. 73); metanotum with single median carina, which is branched anteriorly (fig. 71); surface of propodeum coarsely rugose-reticulate, sculpture reduced posteriorly and no distinct median carina antero-medially (but with a medial ruga (fig. 73)).

Wings.— Fore wing: subbasal cell largely glabrous (except for about 30 setae in apical third of cell), with weak yellowish patch (fig. 66); posterior half of M+CU1 straight (fig. 66); first subdiscal cell and first discal cell largely setose; r:3-SR:SR1 = 9:14:36; 1-CU1:2-CU1 = 1:20; r-m largely sclerotized (fig. 62); cu-a converging to 3-CU1 posteriorly (fig. 62); 2-SR:3-SR:r-m = 11:14:5; vein CU1a without distinct dark patch. Hind wing: marginal cell parallel-sided apically; 1r-m 0.6 times 1-M.

Legs.— Tarsal claws with narrow lamella (fig. 69), setose, and basally not pectinate (only bristly); lamella of inner hind claw disitnctly sinuate ventrally, and inner

side of hind telotarsus with flat, glabrous patch (fig. 70); length of femur, tibia and basitarsus of hind leg 7.8, 13.5 and 8.4 times their width, respectively; length of spurs of hind tibia 0.6 and 0.7 times hind basitarsus; fore, middle and hind trochantelli with 6, 7, and 4 teeth, respectively.

Metasoma.— Length of first tergite 3.0 times its apical width, behind spiracles its surface rather pimply punctate, more rugose posteriorly (fig. 63); dorsal carinae of first tergite absent; second tergite largely and third tergite medio-basally aciculate (fig. 63); remainder of metasoma smooth and compressed apically; length of ovipositor sheath 0.10 times fore wing.

Colour.— Pale brownish-yellow; vertex and stemmaticum, mesoscutum medially, blackish; remainder of mesoscutum, propodeum dorsally, pronotal side and mesopleuron partly, metapleuron posteriorly, hind coxa (except base), metasoma dorsally, and hind femur largely, (dark) brown; pterostigma basally and anteriorly yellowish, remainder largely dark brown; hind tarsus white; base of scapus dark brown, remainder and pedicellus yellowish; remainder of antenna largely brown, but somewhat infuscate basally; wing membrane slightly infuscate.

Biology.— Unknown.

Variation.— Length of body 8.2-8.7 mm, of fore wing 7.6-7.8 mm; length of ovipositor sheath 0.10-0.12 times fore wing; length of malar space 1.3-1.4 times basal width of mandible; length of first metasomal tergite 3.0-3.1 times its apical width; fore and middle claws of paratype weakly pectinate basally.

Dolichozele Viereck, 1911
(fig. 101)

Dolichozele Viereck, 1911: 182; Shenefelt, 1969: 143. Type species (by original designation): *Dolichozele koebelei* Viereck, 1911 [examined].

Neozele Brues, 1926: 275; Shenefelt, 1969: 174. **Syn. nov.** Type species (by original designation): *Neozele wheeleri* Brues, 1926 [examined].

Plectobracon Brèthes, 1927: 325; Shenefelt, 1970: 186. **Syn. nov.** Type species (designated by Shenefelt, 1970): *Plectobracon testaceus* Brèthes, 1927 [examined; = *Dolichozele koebelei* Viereck, 1911 **syn. nov.**].

Diagnosis.— Antenna much longer than body, with 44-58 segments; palpi long; clypeus convex, ventrally straight to rather concave; anterior tentorial pits medium-sized and rather deep; mandible strongly twisted, second tooth much smaller than first tooth and acute; median carina of metanotum simple, or distinctly branched anteriorly; metapleural flange large and usually acute apically; vein 1-SR+M of fore wing straight, slightly curved or with distinct bend; vein 2A of fore wing present; angle between veins 1-SR+M and 1-M of fore wing acute or rectangular; vein 1-M of fore wing straight or slightly curved; veins 1-CU1 and 1-1A of fore wing slender; subbasal cell of fore wing not or slightly widened apically, usually with elongate yellowish or brownish patch or sclerome; vein cu-a of fore wing vertical, slender (at most basally somewhat widened), and at most slightly bent; vein CU1a of fore wing without a faint brownish spot; first subdiscal cell of fore wing robust and glabrous or setose; vein M+CU1 of fore wing straight or curved, its apical half usually straight, exceptionally distinctly curved; vein 3-M of fore wing normal, usually about 3 times vein 3-SR (excptionally about twice); marginal cell of hind wing widened apically;

vein SR of hind wing curved basally and unsclerotized, exceptionally with a short sclerotized part; vein 1r-m of hind wing straight and short to medium-sized; vein 2-SC+R of hind wing horizontal (= longitudinal) and marginal cell slightly widened basally; vein SC+R1 of hind wing slightly curved or straight; vein r of hind wing absent; vein R1 of hind wing slender; hind tibia distinctly bent inwards in dorsal view; inner spur of hind tibia 0.6-0.8 (exceptionally 0.4) times hind basitarsus; legs long; fore femur wider basally than apically (fig. 101), more or less curved, with long setae posteriorly and comparatively short setae anteriorly (fig. 101); spur of fore tibia 0.2-0.4 times fore basitarsus; tarsal claws with lamella; inner hind claw similar to outer hind claw or basally concave; inner side of telotarsus of ♀ frequently partly glabrous and concave, and frequently with specialized bristle; hind coxa without transverse striae; first metasomal tergite (sub)longitudinally sculptured or smooth, its length 3.0-4.5 times its apical width, usually parallel-sided behind spiracles; laterope of first tergite absent or shallow, not or weakly differentiated from glymma; first tergite convex or flat medio-basally; length of ovipositor sheath 0.1-0.2 times fore wing; apex of ovipositor normal, with notch subapically.

Distribution.— This genus is restricted to the New World (mainly Neotropical, extending to southern Nearctic region). It is closely related to *Hymenochaonia*, but differs mainly in the shape of the fore femur (fig. 100) and the short ovipositor.

Biology.— Solitary parasites of Arctiidae.

Note.— Unknown from the Palaearctic region; added to this paper to have all Holarctic genera included in the key.

Hymenochaonia Dalla Torre, 1898
(figs 75-85, 413)

Chaonia Cresson, 1865: 59, nec Stephens, 1829. Type species (designated by Viereck, 1914): *Chaonia xanthostigma* Cresson, 1865 [examined].

Hymenochaonia Dalla Torre, 1898: 100 (new name for *Chaonia* Cresson); Shenefelt, 1970: 250. Type species: *Chaonia xanthostigma* Cresson, 1865 [examined].

Pachymerella Enderlein, 1920: 217; Shenefelt, 1969: 144. **Syn. nov.** Type species (by original designation): *Pachymerella maculicoxa* Enderlein, 1920 [examined].

Diagnosis.— Antenna much longer than body, with 48-67 segments; palpi long (fig. 83); clypeus convex, ventrally straight to slightly concave; anterior tentorial pits medium-sized and rather deep; mandible strongly twisted, second tooth much smaller than first tooth and acute; median carina of metanotum simple, not branched anteriorly; metapleural flange large and usually obtuse apically (fig. 83); vein 1-SR+M of fore wing straight, slightly curved or with weak or distinct bend (fig. 76); vein 2A of fore wing present; angle between veins 1-SR+M and 1-M of fore wing acute or rectangular; vein 1-M of fore wing straight or slightly curved; veins 1-CU1 and 1-1A of fore wing slender; subbasal cell of fore wing not or slightly widened apically, usually with elongate yellowish or brownish patch; vein cu-a of fore wing vertical, slender (at most basally somewhat widened), and exceptionally distinctly bent (subgenus *Pachymerella*); vein CU1a of fore wing without a faint brownish spot; first subdiscal cell of fore wing robust (fig. 76) and glabrous or setose; vein M+CU1 of fore wing straight or curved, its apical half straight; vein 3-M of fore wing normal, 2-

3 times vein 3-SR (fig. 76); marginal cell of hind wing subparallel-sided (fig. 76) or moderately widened apically; vein SR of hind wing weakly curved basally and largely or completely unsclerotized; vein 1r-m of hind wing straight and short to medium-sized; vein 2-SC+R of hind wing horizontal (= longitudinal), and marginal cell slightly or not widened basally; vein SC+R1 of hind wing weakly curved or straight (fig. 76); vein r of hind wing absent; vein R1 of hind wing slender; inner spur of hind tibia 0.4-0.6 times hind basitarsus; legs long; fore femur as wide basally as apically (fig. 100), more or less curved, with long setae posteriorly and comparatively short setae anteriorly; spur of fore tibia 0.2 -0.4 times fore basitarsus; tarsal claws with or without lamella (fig. 79); inner hind claw similar to outer hind claw; inner side of telotarsus of ♀ setose and convex; hind coxa largely smooth, exceptionally largely transversely striate (subgenus *Pachymerella*); first metasomal tergite with transverse (sub)longitudinal sculpture or smooth, its length 1.5-4.5 times its apical width, usually parallel-sided behind spiracles; laterope of first tergite absent or shallow, not or weakly differentiated from glymma (fig. 83); first tergite convex or flat medio-basally; length of ovipositor sheath 0.7-1.6 times fore wing; apex of ovipositor normal, with notch subapically.

Distribution.— This genus is restricted to the New World, but *H. delicata* (Cresson, 1872) **comb. nov.** has been introduced in Italy. It has not been recorded since its introduction, but in case it still occurs I have included the genus in this paper.

Biology.— Parasites of Tortricidae, Pyralidae and Noctuidae.

Macrocentrus Curtis, 1833
(figs 105, 118-407, 416-494)

Macrocentrus Curtis, 1833: 187; Shenefelt, 1969: 143-174; Haeselbarth, 1978: 25-32; Marsh, 1979: 186-190; Haeselbarth & van Achterberg, 1981: 157-160; van Achterberg & Haeselbarth, 1983: 38-52; Tobias, 1986: 250-263; van Achterberg & Belokobylskij, 1987: 244-261. Type species (by monotypy): *Macrocentrus bicolor* Curtis, 1833 [examined by Haeselbarth (1978)].

Amicroplus Foerster, 1862: 256; Shenefelt, 1969: 143. Type species (by original designation): "*Rogas collaris* Nees" [= *Bracon collaris* Spinola, 1808].

Amicroplites Dalla Torre, 1898: 79; Shenefelt, 1969: 143. Unjustified emendation.

Fhogra Cameron, 1901: 104; Shenefelt, 1969: 143. Type species (by monotypy): *Fhogra rubromaculata* Cameron, 1901 [examined].

Metapleurodon Enderlein, 1920: 213; Shenefelt, 1969: 143. Type species (by original designation): *Metapleuron ceylonicus* Enderlein, 1920 [examined].

Pseudophylacter Fahringer, 1929: 5-6; Shenefelt, 1970: 221. **Syn. nov.** Type species (by monotypy): *Phylacter* (*Pseudophylacter*) *bengtssoni* Fahringer, 1930 [examined].

Diagnosis.— Antenna often about as long as or somewhat longer than body (but sometimes distinctly shorter), with 24-61 segments, apical segment with distinct spine or without spine; palpi long to short; clypeus convex (exceptionally flattened), ventrally straight to rather concave; anterior tentorial pits medium-sized and rather deep; mandible variable, usually strongly twisted, second tooth variable, usually much smaller than first tooth and acute, but in some species about as long as first tooth and obtuse; middle lobe of mesoscutum in lateral view usually distinctly protruding over lateral lobes, but in several species (e.g. *M. pallipes*) hardly or not protruding; prepectal carina present but frequently interrupted behind fore coxae; median carina of metanotum simple, not branched anteriorly; metapleural flange vari-

able; vein 1-SR+M of fore wing straight, slightly curved, or distinctly bent; vein 2A of fore wing usually present; vein 1-M of fore wing straight, slightly curved, or with distinct bend; veins 1-CU1 and 1-1A of fore wing slender; vein 2-CU1 of fore wing straight or nearly so; subbasal cell of fore wing usually not or slightly widened apically, (but some Australian species have this cell distinctly widened distally), often with elongate yellowish or brownish patch; vein cu-a of fore wing vertical, usually slender (but may be widened basally or apically), and only exceptionally distinctly bent; vein r-m of fore wing sometimes absent (*Macrocentrus* is the only genus of the Macrocentrinae in which this condition occurs); vein CU1a of fore wing without a faint brownish spot; first subdiscal cell of fore wing elongate to robust and partly glabrous or setose; angle between veins 1-SR+M and 1-M about 90°; vein 3-M of fore wing normal, usually longer than twice vein 3-SR; marginal cell of hind wing narrow, subparallel-sided or somewhat widened apically; vein SR of hind wing at most weakly curved basally and unsclerotized; vein 1r-m of hind wing straight and short to medium-sized; vein 2-SC+R of hind wing horizontal (= longitudinal) and marginal cell slightly or not widened basally; vein SC+R1 of hind wing straight or evenly bent, exceptionally abruptly bent towards anterior wing margin; vein r of hind wing absent; vein R1 of hind wing slender; inner spur of hind tibia 0.3-0.5 times hind basitarsus; legs usually moderately long or short, fore femur variable, usually slender, parallel-sided, and curved, (but in some species robust, distinctly widened submedially and straight), posteriorly with moderately long setae, anteriorly with comparatively short setae; spur of fore tibia 0.2-0.6 times fore basitarsus; tarsal claws with or without lamella; inner hind claw similar to outer hind claw; hind coxa at most with a few transverse striae; first metasomal tergite largely smooth or longitudinally striate or rugulose, exceptionally (some Afrotropical species) with transverse striation, its length 1.5-3.4 times its apical width, usually widened posteriorly; laterope of first tergite deep, distinctly differentiated from glymma; first tergite more or less shallowly concave medio-basally; length of ovipositor sheath 0.2-2.7 times fore wing; apex of ovipositor variable, with notch subapically.

Distribution.— Cosmopolitan. Within the Macrocentrinae the dominant genus in the Holarctic region.

Biology.— Solitary or gregarious parasites of Tortricidae, Gelechiidae, Oecophoridae, Pyralidae, Sesiidae, Noctuidae and Lycaenidae. Polyembryony (usually resulting in gregarious broods) frequently occurs in this genus.

Key to Palaearctic species of the genus *Macrocentrus* Curtis

1. Tarsal claws with acute submedial lobe or with distinct angulate protuberance, which is comparatively close to apical tooth (figs 121, 136, 150, 168); malar space about as long as basal width of mandible or less (figs 119, 127, 167, 175, 199) 2
- Tarsal claws simple (figs 229, 240, 271, 332), or with an indistinct obtuse elevation (figs 255, 296, 353, 366), if with minute tooth then lobe far removed from apical tooth (fig. 310) and/or malar space longer than basal width of mandible (fig. 314) 11
2. Vein SC+R1 of hind wing distinctly curved (figs 122, 140); vein cu-a of fore wing straight or nearly so (figs 123, 132, 133); subbasal cell of fore wing with large

glabrous patch (fig. 123, 133); hind tarsus pale yellowish or ivory **and** apex of hind tibia yellowish; East Palaearctic 3

- Vein SC+R1 of hind wing straight or slightly curved (figs 146, 182), if rather curved then vein cu-a of fore wing curved basally **and** subbasal cell of fore wing largely setose (fig. 185); hind tarsus (dark) brown or brownish-yellow, **if** exceptionally ivory then apex of hind tibia infuscate 4

3. Body largely brownish-yellow; first metasomal tergite without medio-longitudinal groove, almost flat medio-basally (fig. 131), at most shallowly concave; medial furrow on side of pronotum smooth (fig. 127); side of scutellum largely smooth (fig. 120); first subdiscal cell of fore wing comparatively robust (fig. 118) ..... ***M. spilotus*** van Achterberg & Belokobylskij

- Body largely black; first tergite with (shallow) medio-longitudinal groove, distinctly concave medio-basally (fig. 138); medial furrow on side of pronotum carinate (fig. 143); side of scutellum carinate (fig. 137); first subdiscal cell of fore wing less robust (fig. 132) ..... ***M. alox*** van Achterberg & Belokobylskij

4. Temples virtually absent, eyes about reaching hind margin of head, length of eye 9-10 times temple in dorsal view (figs 177, 180); vein 1-CU1 of fore wing long, about as long as vein cu-a (figs 178, 185); vein cu-a of fore wing distinctly curved towards wing base (figs 178, 185); hind tibia and tarsus completely yellowish; subbasal cell of fore wing largely setose medio-apically (fig. 178); head black; West and East Palaearctic ..... ***M. thoracicus*** (Nees)

- Temple distinctly developed, eyes remain distant from hind margin of head, length of eye less than 9 times temple in dorsal view (figs 153, 172, 189, 190, 198, 203, 213, 223); vein 1-CU1 of fore wing medium-sized, distinctly shorter than vein cu-a (figs 152, 165, 186, 188, 195, 201, 224), vein cu-a of fore wing straight or nearly so (figs 152, 186, 195, 212), and apex of hind tibia infuscate; **if** vein 1-CU1 comparatively long (fig. 152) **and** apex of hind tibia yellowish, **then** subbasal cell of fore wing with glabrous patch (fig. 152) and/or head yellowish; colour of hind tarsus variable, often dark brown 5

5. Metasoma, head, pterostigma and hind tibia completely yellowish; propodeum finely transversely rugose (fig. 158), exceptionally rather coarsely so; ocelli comparatively large, POL about 1.5 times diameter of posterior ocellus (fig. 153); vein SR of hind wing distinctly sinuate (fig. 146); parasite of Pyralidae ..... ***M. flavus*** Snellen van Vollenhoven

- Metasoma, and usually head postero-dorsally, largely black; at least posterior margins of pterostigma infuscate or dark brown; apex of hind tibia variable, frequently dark brown; propodeum at least partly coarsely rugose (fig. 194); ocelli smaller, POL 1.7-3 times diameter of posterior ocellus or exceptionally less (figs 172, 189, 198, 213); vein SR of hind wing slightly or not sinuate (figs 161, 207) 6

6. Maxillary palp blackish or dark brown; subbasal cell of fore wing without trace of brownish or yellowish spot (figs 165, 195); penultimate antennal segment at most 1.5 times as long as wide (figs 174, 196); longitudinal aciculation of metasoma usually fading near middle of second tergite (fig. 169); third tergite almost or entirely smooth; apical part of upper valve of ovipositor behind notch comparatively robust (figs 171, 192) 7

- Maxillary palp largely pale yellowish or yellowish-brown, sometimes darkened basally, **if** largely dark brown then subbasal cell of fore wing with brownish pig-

mented spot (figs 186, 201) and penultimate antennal segment 1.7-2.4 times as long as wide (figs 206, 209, 220); aciculation of second tergite reaching third tergite, fading only near midlength of third tergite (except in *M. mellicornis*; fig. 214); apical part of upper valve of ovipositor behind notch rather slender (figs 204, 222, less in *M. mellicornis*, fig. 216) 8

7. Length of ovipositor sheath 1.8-2.2 times fore wing; fore femur distinctly curved, not or slightly widened medially (fig. 197); flagellum of antenna of ♀ blackish basally, exceptionally yellowish; subbasal cell of fore wing usually sparsely setose (fig. 195); vein cu-a of fore wing almost vertical, meeting vein 2-CU1 at about a right angle (fig. 195), exceptionally at an acute angle; trochanters and trochantelli usually yellowish; vein r inserted at basal 0.6-0.7 of pterostigma ..... ***M. nidulator*** (Nees)

- Length of ovipositor sheath 1.4-1.8 times fore wing, exceptionally 1.9 times; fore femur not or slightly curved and more or less widened medially in respect to its apical part (fig. 173); flagellum of ♀ yellowish basally, exceptionally blackish; anterio-apical part of subbasal cell of fore wing frequently evenly setose (fig. 165), or largely glabrous; vein cu-a of fore wing more or less inclivous, and sharply angled with vein 2-CU1 (fig. 165); trochanters and trochantelli frequently dark brown or blackish; vein r inserted at basal 0.7-0.8 of pterostigma (fig. 161) .... ***M. townesi*** van Achterberg & Haeselbarth

8. Basal half of hind tibia dark brown or blackish except for pale yellowish basal band, which distinctly contrasts with darker subbasal part of tibia; fore femur comparatively short and less slender (fig. 205); patch of subbasal cell of fore wing usually distinct (fig. 201); face frequently rather densely and distinctly punctate medially (fig. 199); hind tarsus dark brown; first metasomal tergite comparatively robust (fig. 200) ..... ***M. marginator*** (Nees)

- Basal half of hind tibia evenly yellowish-brown, if exceptionally largely dark brown then subbasal part weakly contrasting with pale basal band of tibia; fore femur comparatively long and more slender; patch of subbasal cell of fore wing obsolescent (figs 186, 188, 224); face sparsely and weakly punctate medially (fig. 219); colour of hind tarsus variable; first tergite comparatively slender (fig. 221) ... 9

9. Hind tarsus infuscate, darker than hind femur; mesoscutum black, dark brown or brown, exceptionally orange-brown; temples less receding, its length 2-5 times eye in dorsal view (figs 213, 223); propodeum black(ish); pterostigma largely (pale) brown; clypeus similarly coloured to face 10

- Hind tarsus (pale) yellowish-brown, similar to or paler than hind femur; mesoscutum of West Palaearctic specimens orange or yellowish-brown, blackish in East Palaearctic specimens; temples more receding behind eyes, its length 5-8 times eye in dorsal view (figs 189, 190); propodeum yellowish to dark brown, or blackish; pterostigma (partly) yellowish-brown medially; clypeus distinctly paler than face, except for many East Palaearctic specimens which have clypeus and face similarly coloured or clypeus only somewhat paler ..... ***M. bicolor*** Curtis

10. Antenna of ♀, except scapus, pedicellus and apex of antenna, largely yellowish; palpi (rather pale) brown; POL of ♀ about 1.8 times diameter of posterior ocellus (fig. 213); clypeus strongly convex (fig. 208); first metasomal tergite brownish, its length about twice its apical width (fig. 214); third metasomal tergite smooth; subbasal cell of fore wing evenly setose apically (figs 210, 212); length of penulti-

mate antennal segment of ♀ about 2.4 times its width (fig. 209); East Palaearctic ... . ***M. mellicornis*** van Achterberg & Belokobylskij

- Antenna of ♀ dark brown or black; if basally yellowish then palpi dark brown or blackish; POL of ♀ 2.3-2.4 times diameter of posterior ocellus (fig. 223); clypeus less convex (fig. 218); first tergite blackish, and its length more than twice its apical width (fig. 221); third tergite aciculate basally; setosity of subbasal cell of fore wing variable, usually less setose (fig. 224) and frequently with glabrous patch apically; length of penultimate antennal segment of ♀ at most 1.7 times as long as wide (fig. 220); Palaearctic ..... ***M. nitidus*** (Wesmael)

11. First tooth of mandible very short, about as long as second tooth (figs 269, 273, 276, 278); closed mandibles hardly meeting each other apically, and apices of mandibles hardly surpassing middle of clypeus (fig. 283); if ovipositor about as long as metasoma then its apex with distinct subapical notch (fig. 282) 12
- First tooth of mandible at least medium-sized, distinctly longer than second tooth (figs 231, 243, 289, 321, 334, 361, 422, 473, 494); closed mandibles distinctly crossing each other apically, and distinctly surpassing middle of clypeus (figs 233, 241, 246, 320, 464); if ovipositor about as long as metasoma then its apex without distinct subapical notch (fig. 263) 15

12. Length of malar space about twice basal width of mandible; vertex strongly protuberant; scapus and third antennal segment yellowish; antennal segments about 36 ..... ***M. mandibularis*** Watanabe
- Length of malar space equal to basal width of mandible or less; vertex moderately protuberant (fig. 283); scapus ivory, distinctly paler than third antennal segment; antennal segments 39-47 (unknown for *M. huggerti* and *brevicaudifer*) 13

13. Ovipositor sheath about as long as metasoma and 0.7-0.8 times fore wing; colour of scutellum similar to colour of mesoscutum, yellowish, dark brown or black; fore femur less curved and longer (fig. 275); length of mesosoma 1.6 times its height 14
- Ovipositor sheath much longer than metasoma and (1.2-)1.4-1.6 times fore wing; scutellum usually paler than mesoscutum and yellowish or brownish; fore femur more curved and shorter (fig. 277); length of mesosoma 1.4-1.5 times its height .... ***M. cingulum*** Brischke

14. Mesosoma completely blackish; apical tooth of mandible not surpassing second tooth in dorsal view (figs 269, 273); vein 1-M of hind wing about 2.5 times vein 1r-m (fig. 265); West Palaearctic ..... ***M. huggerti*** spec. nov.
- Mesosoma completely yellowish; apical tooth of mandible somewhat surpassing second tooth in dorsal view (fig. 278); vein 1-M of hind wing about 3.5 times vein 1r-m (fig. 281); East & South Palaearctic ..... ***M. brevicaudifer*** van Achterberg

15. Ovipositor sheath about as long as metasoma or shorter, about 0.8 times fore wing or less; ovipositor without a distinct subapical notch (fig. 263); second submarginal cell of fore wing comparatively small (figs 245, 248, 258) or vein r-m absent (fig. 225) **and** fore femur comparatively slender, long (fig. 264); (*M. collaris*-group) 16
- Ovipositor sheath usually as long as body or longer, longer than 0.8 times fore wing; ovipositor usually with a more or less developed subapical notch (fig. 406), or (if absent (figs 435, 449) then fore femur rather wide and short (figs 433, 439, 444; *M. infirmus*-group); second submarginal cell of fore wing variable (figs 352, 421, 425, 450) 19

16. Fourth segment of tarsi and telotarsi very slender (fig. 240); claws very large (fig. 240); metasoma almost completely smooth; prepectal carina largely absent; clypeus transverse (fig. 241); antennal segments about 27 ..... ***M. amphigenes*** Alexeev

- Fourth segment of tarsi and telotarsi normal, rather robust (figs 229, 244, 255); claws medium-sized (figs 244, 255); metasoma usually more or less finely aciculate (figs 254, 259); prepectal carina (almost) complete; clypeus variable, if strongly transverse (figs 233, 262) then number of antennal segments exceeding 29 ... 17

17. Clypeus comparatively flat (fig. 260) and transverse (fig. 262); second tooth of mandible shorter than half length of first tooth (fig. 261); third metasomal tergite smooth, at most with some faint rudimentary sculpture (fig. 259); hind trochantellus infuscate basally, but usually yellowish in Spanish specimens; mesosternal sulcus largely absent or obsolescent; maxillary palp about as long as height of head or shorter; hind femur slender (fig. 247); Palaearctic ..... ***M. collaris*** (Spinola)

- Clypeus convex (figs 239, 242, 253) and less transverse, distinctly removed from level of inner margin of eyes (figs 246, 249); second tooth of mandible about half as long as first tooth (figs 243, 250, 251); third tergite with at least some aciculation; hind trochantellus yellowish; mesosternal sulcus present, usually largely rather deep; length of maxillary palp 1.1-1.3 times height of head; hind femur variable 18

  Note. If length of first metasomal tergite about 3 times its apical width (fig. 280), first-third tergites (except apex of third tergite) rather strongly striate (fig. 280) and ovipositor sheath about as long as metasoma, cf. *M. brevicaudifer* van Achterberg.

18. Length of ovipositor sheath about 0.4 times fore wing and about 0.7 times length of metasoma; precoxal sulcus largely smooth, at most faintly rugose; scapus and pedicellus yellowish; vein 2-SR of fore wing comparatively short (fig. 245); vein cu-a of fore wing about as oblique as vein 3-CU1; hind femur more slender (fig. 247); West Palaearctic ..... ***M. equalis*** Lyle

- Length of ovipositor sheath about 0.8 times fore wing and about 1.3 times length of metasoma; precoxal sulcus densely rugose (fig. 252); scapus and pedicellus brown; vein 2-SR of fore wing longer (fig. 248); vein cu-a of fore wing distinctly more oblique than vein 3-CU1; hind femur less slender (fig. 256); East Palaearctic ..... ***M. oriens*** van Achterberg & Belokobylskij

19. First metasomal tergite rather swollen medially, robust, its sides weakly bowed convexly, its surface densely aciculate, its length about 1.5 times its apical width, and base of tergite slightly excavated (fig. 286); lateral lobes of mesoscutum distinctly convex posteriorly (fig. 284); mandible rather slightly twisted apically, and comparatively robust, its second tooth large, somewhat shorter than first tooth and both acute apically (fig. 289); subbasal cell of fore wing almost entirely setose; clypeus flattened (fig. 285); vein 1-SR-M of fore wing distinctly curved (fig. 288); Europe ..... ***M. crassus*** Eady & Clark

- First tergite without swollen appearance, its sides straight or nearly so, its surface less densely aciculate, often longer than 1.5 times its apical width, and base of tergite usually distinctly concave (figs 292, 308, 317, 329, 335, 428, 471); lateral lobes of mesoscutum (rather) flattened posteriorly; mandible strongly twisted apically and comparatively slender (figs 291, 434, 441, 455, 467, 473); subbasal cell

of fore wing variable; clypeus usually convex; vein 1-SR-M of fore wing straight or comparatively slightly curved (figs 346, 349, 352, 421, 425) 20

20. Hypopygium of ♀ deeply emarginate medio-posteriorly, strongly sclerotized (figs 294, 295) **and** length of fore wing about 7 mm; length of ovipositor sheath about 2.7 times fore wing; metasoma completely smooth (fig. 292) **and** subbasal cell of fore wing with glabrous patch subapically; wing membrane brownish; East Palaearctic ..... ***M. retusus*** van Achterberg & Belokobylskij
- Hypopygium of ♀ usually truncate medio-posteriorly (figs 386, 436) and at most moderately sclerotized, **if** deeply emarginate (figs 443, 452) then length of fore wing 3-4 mm; length of ovipositor sheath less than twice length of fore wing (unknown for *M. bengtssoni*); metasoma distinctly striate or aciculate basally (figs 428, 462), **if** largely smooth (fig. 400) then subbasal cell of fore wing largely setose subapically (fig. 404); wing membrane subhyaline 21

21. Head distinctly elongate in frontal view, length of malar space 1.3-1.6 times basal width of mandible (figs 300, 314); second tooth of mandible acute (fig. 316); hind tibia (except basally) dark brown; body largely black; face largely smooth laterally (figs 300, 314); East Palaearctic 22
- Head normal, transverse in frontal view, length of malar space less than 1.3 times basal width of mandible, **if** about 1.2 times (*M. pallipes*) then second tooth of mandible obtuse apically (fig. 465) and hind tibia largely yellowish; colour of body variable; sculpture of face variable 23

22. First subdiscal cell of fore wing normal (figs 309, 313); hind tarsus (except telotarsus) pale yellowish; posterior half of first tergite smooth or superficially sculptured medially (fig. 317) ..... ***M. pilosus*** Watanabe
- First subdiscal cell of fore wing robust (figs 298, 307); hind tarsus largely dark brown; posterior half of first tergite sculptured medially except apically (fig. 308) ..... ***M. bengtssoni*** (Fahringer)

23. Clypeus distinctly flattened and smooth (fig. 319); hind tibia with pale basal ring, constrasting with infuscate middle part of tibia; head comparatively transverse in frontal view (fig. 320); length of fore wing less than 5 mm; distal half of subbasal cell of fore wing largely setose (except near fold; fig. 322), length of eye of ♀ in dorsal view 2.6-4.2 times length of temple (fig. 318), **and** second tooth of mandible medium-sized and acute (fig. 321); ventral margin of clypeus straight (fig. 320); [antennal segments about 40] ..... ***M. resinellae*** (Linnaeus)

    Note. If antennal segments about 30, cf. the South Palaearctic *M. tessulatanae* Hedwig, 1959, reared from *Pseudococcyx tessulatana* (Staudinger, 1871), a Tortricid feeding on *Cupressus* spp.
- Clypeus convex (figs 333, 402, 429); hind tibia usually unicoloured yellowish, or basally dark brown and subbasally pale; length of fore wing 4-9 mm, **if** shorter than 5 mm or clypeus rather flat (fig. 386), then head less transverse in frontal view (fig. 379), distal half of subbasal cell of fore wing with a large glabrous area (fig. 354), second tooth of mandible small and obtuse (fig. 494), **or** length of eye in dorsal view about 5 times length of temple or more (fig. 485); ventral margin of clypeus variable 24

24. Distal half of fore wing with a large glabrous area (figs 326, 339, 348, 354); ventral margin of clypeus straight or nearly so (figs 327, 341); length of eye in dorsal view 2.4-6.5 times temple (figs 323, 330, 340, 342) 25
- Distal half of subbasal cell of fore wing largely (sparsely) setose (figs 368, 388,

404, 423, 482), except near fold; ventral margin of clypeus distinctly concave (figs 364, 379, 385, 395) or straight (figs 464, 487); length of eye in dorsal view 1.6-13 times temple (figs 398, 424, 458, 469) 29

25. Ocelli large, POL shorter than diameter of posterior ocellus (fig. 323); antennal segments 50-58 (males unknown); hind tibia dark brown medially; mesosoma black or dark brown; length of fore wing 6-9 mm; vein 2-SR+M of fore wing comparatively long (fig. 324); West Palaearctic ..... ***M. gibber*** Eady & Clark
- Ocelli medium-sized, POL longer than diameter of posterior ocellus (figs 330, 340, 342); antennal segments 41-50 (males known); hind tibia usually yellowish medially, except in *M. infuscatus*; mesosoma variable, usually largely reddish or yellowish in West Palaearctic specimens; length of fore wing 3.5-6.7 mm; vein 2-SR+M of fore wing variable (figs 331, 346, 349) 26
26. Apex of hind tibia yellowish; pterostigma largely dark brown; head below eyes strongly narrowed (fig. 330); second tergite smooth apically (fig. 329); propodeum comparatively narrow and long, its posterior half regularly transversely striate (fig. 329); middle lobe of mesoscutum slender and its medio-posterior depression slender (fig. 328); third antennal segment 1.4-1.7 times length of fourth segment (fig. 325); subbasal cell of fore wing with dark brown patch (fig. 326); face reddish; South Palaearctic ... ***M. rossemi*** Haeselbarth & van Achterberg
- Apex of hind tibia dark brown or infuscate; pterostigma largely light brown or yellowish; second tergite striate apically (fig. 343) or smooth (fig. 335); propodeum comparatively wide and shorter, its posterior half irregularly and coarsely rugose (fig. 344); middle lobe of mesoscutum rather robust and medio-posterior depression wide (fig. 344); third antennal segment 1.1-1.4 times length of fourth segment (figs 333, 345); subbasal cell of fore wing with at most a faint, light brown patch (fig. 348), but distinct in *M. infuscatus* (fig. 354); colour of face variable 27
27. Head black; vein cu-a of fore wing more postfurcal (figs 349, 354); temples comparatively narrow in lateral view; vein 1r-m of hind wing at least medium-sized (figs 349, 352); first metasomal tergite more or less widened apically (figs 343, 356) 28
- Head brownish-yellow; vein cu-a of fore wing less postfurcal (figs 331, 339); temples comparatively wide in lateral view (fig. 333); vein 1r-m of hind wing short (fig. 331); first tergite parallel-sided (fig. 335); Madeira ..... ***M. madeirensis*** spec. nov.
28. Hind tibia pale yellowish medially, only apical third dark brown or infuscate; vein 1-M of hind wing 0.8-1.6 times vein 1r-m (fig. 349); wings subhyaline and somewhat wider (fig. 349); temples somewhat shorter in dorsal view (figs 342, 363); face less densely punctate, interspaces less than diameter of punctures; subbasal cell of fore wing without distinct brown patch (fig. 348); tarsal claws simple (fig. 350); North, Central & East Palaearctic ..... ***M. kurnakovi*** Tobias
- Hind tibia dark brown medially, only basal ring pale yellowish; vein 1-M of hind wing 1.7-2.0 times vein 1r-m (fig. 352); wings infuscate and comparatively narrow (fig. 352); temples somewhat longer in dorsal view (fig. 357); face densely punctate, frequently interspaces equal to diameter of punctures; subbasal cell of fore wing with distinct brown patch (figs 352, 354); tarsal claws with minute lobe (fig. 353); Japan ..... ***M. infuscatus*** spec. nov.
29. Length of eye in dorsal view 6-13 times length of temple (figs 362, 370, 424); tem-

ples directly narrowed posteriorly (figs 362, 370, 424); vein 1-M of hind wing about twice as long as vein 1r-m 30

- Length of eye in dorsal view 1.4-6 times length of temple; temples subparallel-sided or gradually narrowed directly behind eyes (figs 375, 384, 427, 472, 490), but if directly narrowed (the introduced Nearctic *M. ancylivorus* (fig. 469), then vein 1-M of hind wing only slightly longer than vein 1r-m (fig. 468) 32

Note. If the maxillary palp is about twice as long as height of head, the ventral margin of the clypeus straight, the tarsal claws with a rather small lobe, and the palpi yellowish, cf. *M. nitidus*.

30. Length of body 5.5-7 mm; body largely black; pterostigma of ♀ largely dark brown; dorsal condylus of mandible above lower level of eyes (fig. 364); Japan .... ***M. rhyacioniae*** Watanabe

- Length of body 4-5 mm; body largely yellowish; pterostigma of ♀ at least partly pale brownish or yellowish, may be largely infuscate in males; dorsal condylus of mandible below lower level of eyes (fig. 369) 31

31. Length of ovipositor sheath about 0.9 times fore wing; antennal segments 44-45; vein 3-SR of fore wing about as long as vein 2-SR; POL about equal to OOL (fig. 370); first metasomal tergite somewhat longer than twice its apical width and without transverse sculpture medially; length of eye in dorsal view about 7 times temple (fig. 370); second tooth of mandible medium-sized (fig. 369); first tergite concave medio-basally; West Palaearctic ..... ***M. buolianae*** Eady & Clark

- Length of ovipositor sheath 1.5-1.6 times fore wing; antennal segments about 52; vein 3-SR of fore wing about 1.6 times vein 2-SR; POL about 0.7 times OOL (fig. 424); first tergite 2.6-3.0 times its apical width and medially transversely sculptured (fig. 420); length of eye in dorsal view 10-13 times temple (fig. 424); second tooth of mandible minute (fig. 422); first tergite flat medio-basally (fig. 420); East Palaearctic ..... ***M.*** spec. nov. He & Lou

32. Ventral margin of clypeus distinctly concave (figs 379, 385, 395); length of body 6.5-10 mm; length of ovipositor sheath 1.6-2.0 times length of fore wing; vein 1r-m of hind wing about as long as, or slightly shorter than vein 1-M (fig. 376, 392); pterostigma unicoloured, of ♀ (yellowish-)brown; clypeus less convex (figs 386, 402); mesoscutum reddish-brown; East & Central Palaearctic .... ***M. hungaricus*** Marshall

- Ventral margin of clypeus straight (figs 426, 437, 451) or nearly so (fig. 487); length of body 2.5-5 mm; length of ovipositor sheath 1.0-1.6 times fore wing; vein 1r-m of hind wing distinctly shorter than vein 1-M (figs 425, 450, 466, 493), except in *M. ancylivorus* (fig. 468); pterostigma of ♀ usually bicoloured, dark brown with pale yellowish base; clypeus more convex (figs 429, 454, 489); colour of mesoscutum variable 33

33. Length of eye in dorsal view 1.4-2.0 times length of temple (figs 427, 458); length of maxillary palp about equal to height of head (fig. 454), if distinctly longer (fig. 429) then length of ovipositor sheath about equal to length of fore wing; gregarious parasites of Noctuidae (*M. infirmus*-group) 34

- Length of eye in dorsal view 3-6 times length of temple (figs 469, 472, 485, 490); length of maxillary palp 1.2-1.8 times height of head; ovipositor sheath distinctly longer than fore wing; gregarious parasites, mainly of Tortricidae (*M. linearis*-group) 38

Note. If vein 1-CU1 of fore wing about as long as vein cu-a (fig. 185) widened and temples hardly developed, cf. small specimens of *M. thoracicus*.

34. First tergite robust, its length 1.3-1.7 times its apical width; maxillary and labial palpi with 5 and 3 segments, respectively ; third tergite smooth; body yellowish; second tooth of mandible comparatively wide and obtuse (cf. fig. 494]); South Palaearctic ..... ***M. turkestanicus*** (Telenga)
- First tergite comparatively slender, its length 1.9-2.5 times its apical width (figs 428, 462); maxillary and labial palpi with 6 and 4 segments, respectively ; third tergite usually striate basally (figs 428, 462); body at least partly dark brown or blackish; shape of second tooth of mandible variable (figs 434, 441, 448, 455) ... 35

35. Length of ovipositor sheath 1.5-1.6 times fore wing; inner hind tibial spur 0.5-0.6 times hind basitarsus (fig. 442); hind coxa more or less transversely striate dorso-apically; face distinctly and densely sculptured (fig. 437), medially rugulose, extending laterally to punctate; hypopygium of ♀ trunctate medio-posteriorly (fig. 438); ovipositor with minute subapical notch (fig. 440); West & Central Palaearctic ..... ***M. infirmus*** (Nees)
- Length of ovipositor sheath 1.0-1.2 times fore wing; inner hind tibial spur 0.3-0.45 times hind basitarsus (fig. 445); hind coxa usually smooth; face at most superficially sculptured or smooth (figs 426, 451); hypopygium of ♀ variable (figs 436, 443, 452); ovipositor without subapical notch (fig. 449) 36

36. Hypopygium of ♀ trunctate medio-posteriorly (fig. 436); length of ovipositor sheath about equal to equal to fore wing; fore femur slightly curved and more slender (fig. 433); length of maxillary palp about 1.4 times height of head (fig. 429); East Palaearctic ..... ***M. parki*** spec. nov.
- Hypopygium of ♀ deeply emarginate medio-posteriorly (fig. 443, 452); length of ovipositor sheath 1.2-1.3 times fore wing; fore femur straight or nearly so, and robust (fig. 444, 453); length of maxillary palp 0.8-0.9 times height of head (fig. 454) 37

37. Mesopleuron black; fore femur comparatively robust (fig. 444); face more transverse and strongly shiny, smooth, its medial height of face about 1.2 times height of clypeus (fig. 446); scapus dark brown; legs yellowish-brown; palpi infuscate; fifth segment of maxillary palp frequently shorter than sixth segment (fig. 447); West & Central Palaearctic ..... ***M. blandus*** Eady & Clark
- Mesopleuron yellow; fore femur less robust (fig. 453); face less transverse and less shiny, and finely sculptured above clypeus, its medial height of face about 1.5 times height of clypeus (fig. 451); scapus yellow; legs comparatively pale; palpi pale yellowish; fifth segment of maxillary palp about as long as sixth segment (fig. 454); East Palaearctic ..... ***M. blandoides*** spec. nov.

38. Head in frontal view comparatively long (fig. 464), length of malar space equal to basal width of mandible or longer; vein 1-M of hind wing 3.0-4.5 times vein 1r-m (figs 463, 466); vein 1-M of fore wing comparatively oblique and long (fig. 463); body largely black; Palaearctic ..... ***M. pallipes*** (Nees)
- Head in frontal view transverse (fig. 488), length of malar space usually less than basal width of mandible; vein 1-M of hind wing 1.1-2.5 times vein 1r-m (figs 470, 477, 480), but in linearis upto 3.4 times (fig. 493); vein 1-M fore wing less oblique and shorter (figs 479, 480); colour of body variable 39

39. Second tooth of mandible small and narrow (fig. 467); length of vein 1-M of hind wing 1.1-1.3 times vein 1r-m (fig. 468); head largely (except stemmaticum) brownish-yellow; second metasomal tergite finely aciculate anteriorly and medially, and smooth posteriorly; Nearctic, introduced in southern Palaearctic ..... ***M. ancylivorus*** Rohwer
- Second tooth of mandible medium-sized and wide (figs 473, 484, 494); temples in dorsal view convex (fig. 472, 485, 490); length of vein 1-M of hind wing 1.8-3.4 times vein 1r-m (figs 470, 480, 493); head often largely dark brown (except in *M. linearis*); usually whole second tergite striate (figs 483, 492) 40
40. Hind tibia largely dark brown, except for a pale yellowish subbasal ring; OOL about twice as long as diameter of posterior ocellus (fig. 472); vein SR1 of fore wing pale yellowish, similar to vein 1-R1; length of maxillary palp 1.3-1.4 times height of head; body largely blackish or dark brown; Japan ..... ***M. nigrigenius*** spec. nov.
- Whole hind tibia brownish-yellow, without pale subbasal ring; OOL 0.9-1.5 times as diameter of posterior ocellus (figs 485, 490); vein SR1 of fore wing darker or paler than vein 1-R1; length of maxillary palp about 1.2 times or 1.6-1.8 times height of head; body partly or completely yellowish 41
41. Length of maxillary palp about 1.2 times height of head; vein cu-a of fore wing far postfurcal (figs 480, 482); temples in dorsal view more convex (fig. 485); subbasal cell of fore wing sparsely setose apically (fig. 482); second metasomal tergite coarsely longitudinally striate (fig. 483); first tergite robust (fig. 483); antenna with about 40 segments; Japan (Ryukyu Islands) ..... ***M. watanabei*** spec. nov.
- Length of maxillary palp 1.6-1.8 times height of head; vein cu-a of fore wing less postfurcal (fig. 491); temples in dorsal view less convex (fig. 490); subbasal cell of fore wing evenly setose apically (fig. 491); second metasomal tergite finely or moderately strongly longitudinally striate (fig. 492); first tergite comparatively slender (fig. 492); antenna with 42-49 segments; Holarctic ..... ***M. linearis*** (Nees)

Macrocentrus alox van Achterberg & Belokobylskij, 1987 (figs 132-145)

Macrocentrus alox van Achterberg & Belokobylskij, 1987: 244-246, figs 15-28.

Material.— See van Achterberg & Belokobylskij (1987).

Biology.— Unknown.
Distribution.— Russia (Primoryan Territory).

Macrocentrus amphigenes Alexeev, 1971 (figs 237-241)

Macrocentrus amphigenes Alexeev, 1971: 412; Tobias, 1986: 253; van Achterberg & Belokobylskij, 1987: 254, figs 39-42.

Material.— Holotype, ♀ (ZMSP) from Turkmenia examined.

Biology.— Unknown.
Distribution.— Central Asia.

Macrocentrus ancylivorus Rohwer, 1923
(figs 467-469)

Macrocentrus ancylivora Rohwer, 1923: 168.
Macrocentrus ancylivorus; Shenefelt, 1969: 144-146; Marsh, 1979: 187; Tobias, 1986: 253.

Material.— 1 ♀ (CAS), "[U. S. A.], Berkeley, Cal., 6.iii.1946"; 1 ♀ (CAS), "San Francisco, Cal., 29.iii. 1926", "H.H. Keifer collector".

General appearance very similar to *M. linearis*, but has a normal, comparatively slender second tooth of mandible and is less sculptured (e.g. the apex of the second metasomal tergite is smooth).

Biology.— Recorded as parasite of a large number of species of Tortricidae and Gelechiidae (Shenefelt, 1969), among them the Oriental fruit moth: *Grapholita molesta* (Busck, 1916).

Distribution.— Nearctic, but recently introduced in Caucasia (Tobias, 1986), France, Italy and Yugoslavia (Papp, 1991) for biological control programs.

Macrocentrus bengtssoni (Fahringer, 1929)
(figs 298-308)

Phylacter bengtssoni Fahringer, 1929: 5-6; Shenefelt, 1970: 221.
Macrocentrus bengtssoni; van Achterberg, 1979b: 383-384; van Achterberg & Belokobylskij, 1987: 252.

Material.— Holotype, ♂ ((NRS) , "Kamschatka, Malaise", "1638", "Type", "*Pseudophylacter Bengtssoni* m., Type S." (in Fahringer's handwriting), "400, 77".

Biology.— Unknown.
Distribution.— Russia (Primoryan Territory).

Macrocentrus bicolor Curtis, 1833
(figs 186-190)

Macrocentrus bicolor Curtis, 1833: 188; Shenefelt, 1969: 173 (as synonym of *M. thoracicus*); Haeselbarth, 1978: 28-29 (re-instated); van Achterberg, 1982: 58; van Achterberg & Haeselbarth, 1983: 40; Tobias, 1986: 259; Papp, 1991: 12, 1993: 36; O'Connor et al., 1991: 452.
Rogas limbator Ratzeburg, 1848: 64.
Macrocentrus limbator; Shenefelt, 1969: 159; Haeselbarth, 1978: 28, figs 2, 3, 5, 6, 8; Haeselbarth, 1979: 194 (synonymized with *M. bicolor*); van Achterberg, 1982: 58; van Achterberg & Haeselbarth, 1983: 40.
Macrocentrus gracilipes Telenga, 1935: 271; Shenefelt, 1969: 173 (as synonym of *M. thoracicus*); Haeselbarth, 1978: 28, 1979: 194 (synonymized with *M. bicolor*); van Achterberg, 1982: 58; van Achterberg & Haeselbarth, 1983: 40.
Macrocentrus gibber; Papp, 1982a: 108.

Material.— 1 ♀ (RMNH), "Sverige, Hoör, (Skane), 25.viii.1973, C.J. Zwakhals"; 1 ♀ (ZIL), "3967, Suecia, Hall, Våxtrop, UTM 33V UC 8947, e.l. 18-30.iv.1979, Ingvar Svensson", ex "*Leucoptera lustratella* [Herrich-Schäffer, 1854]?";1 ♀ (RMNH), "[Poland], Stettin, Zeller"; 2 ♀♀ (RMNH), France, Ardeche, Chomirac, 1-7.viii.1977, K.J. Huisman"; 1 ♀ (RMNH), "[France], Orsay, eté 1946"; 1 ♀ (RMNH), id., but 1.ix.1947; 1 ♀ (RMNH), "[France], La Sicaudais, Loire inf., vi-vii.[19]48, J. Hamon"; 1 ♀ (RMNH), "France, col de Pymorem, alt. 1400 m, Arege, H. Teunissen"; 2 ♀♀ + 2 ♂♂ (RMNH), "Andorra, St. Julia, 23.vii.[19]82 (♀), P.J.L. Roche" (males collected between 30.vi-21.vii.1982); 1 ♀ (Valencia), "[Spain], Arties, 16.ix.[19]85"; 1 ♂ (RMNH), "Austria, Weiden am See, 14.viii.1979, Th. Peter"; 1 ♀ (RMNH), "Bulgaria, ex coll. Zaykov, RMNH Leiden 1991", "Rodopi, Shiroka Paljana, 21.vi.1976, leg. A. Zaykov"; 3 ♀♀ (RMNH), id., but Stavo Orjakovo, 12.vii.1987; 1 ♀ (RMNH), id., but Plovdiv, 12.viii.1984; 1 ♀ (RMNH), id., but Garvanov, 10.vii.1976; ; 1 ♂ (RMNH), id., but Chrabrino, 8.vii.1978; 1 ♂ (RMNH), id., but Ueritchleri, 18.vii.1982, J. Kolarev; 3 ♀♀ + 1 ♂ (RMNH), id., but Parvomay, 18-23.ix.1981;1 ♀ (RMNH), "Elias, Kerkyra, B. v. Aartsen, J.B. Wolschrijn", Dassia, 5 km z.o. v. Korakiana, 16-30.v.1971"; 124 ♀♀ + 11 ♂♂ (RMNH, ITZ) from The Netherlands (Arkel; Arnhem (ex *[Depressaria] chaerophylli* Zeller, 1839); Bergen op Zoom; Best; Brummen (Voorstonden); Eindhoven; Goeree (ex microlepidopteron in flowers of *Pastinaca*); Hasselt; Heerde; Kollum (Oudwoude); Kwade Hoek (Havenhoofd); Lexmond; Melissant; Middelaar (Mook, ex *Depressaria pastinacella* (Duponchel, 1838) in stem of *Heracleum sphondylium* Linnaeus); Montfort (L.); Muiderberg; Naardermeer; Nisse (Z., ex *Crataegus*-stem); Oegstgeest; Oostkapelle; Oostvoorne; Ouddorp; Oudkerk (Stania state); Overveen (ex larva on *Salix* spec.); Putten (Gld.); Rhenen (ex *Depressaria pastinacella* (Duponchel) in *Heracleum sphondylium* Linnaeus); Ried (Fr.); Rockanje (Stekelhoekduin); Rotterdam(Lombardijen); Spijk; St. Pietersberg (Heerderberg, Zonneberg, Cannerbos, Kasteel Neercanne); Texel (Oude Schild); Tongeren; Udenhout ("de Brand"); Vilt (L.); Vogelenzang (Gliphoeve); Warder (N.H.); Wijster; Zwammerdam); 1 ♀ (TAM), "Korea, Prov. South Pyongan, Pyongyan, Hotel garden, 4.viii.1971", "No. 138, leg. S. Horvatovich et J. Papp", "*Macrocentrus gibber* E. Cl., ♀, det. Papp, 1981"; 1 ♀ (Park Collection), "Korea: Jeju-do, Jeju Island, 12.viii.1981, J.-S. Park, RMNH'92"; 1 ♀ (RMNH), "Korea: Gyeongnam-do, Uju-gun, Sandbug-myeon, Icheon-ri, Mt. Gaji, 800 m, 20-21.vii.1987, J.-S. Park, RMNH'92"; 18 ♀♀ + 13 ♂♂ (RMNH), "Japan, Kusakai, Kawai V., Iwate, 3-4.viii.1981, A. Takasu, RMNH'82"; 1 ♀ (RMNH), "Museum Leiden, Japan, Gaga, Spa-Zaô, Miyagi Pref., 31.vii.1981, A. Takasu"; 3 ♀♀ (RMNH), "Japan, Baba Spa, Fukushima Pref., 7.viii.1981, A. Takasu, RMNH'82"; 1 ♀ (EIS), "[Japan], 28.vii.[19]65, Asahikayu, Hokkaido, S. Suzuki", "Host *Depressaria* sp. on flower of *Angelica ursina*", "*Macrocentrus thoracicus* (Nees). Det. C. Watanabe, 1966"; 1 ♀ (EIS), "Japan: Kyushu, Kagosima-si, 22.v.1963, K. Kusigemati", "Host *Deprresaria* [sic!] *culcitella*", "*Macrocentrus thoracicus* (Nees). Det. C. Watanabe, 1966"; 1 ♀ (EIS), [Japan], Mt. Hiraniwa, Honshu, 27.viii.1966, K. Kusig", "*Macrocentrus thoracicus* (Nees). Det. C. Watanabe, 1966"; 1 ♀ (EIS), "[Japan], Shimamatsu, Hokkaido, 12.vi.1967, K. Kusigemati", "*Macrocentrus marginator* (Nees). Det. C. Watanabe, 1967".

Notes.— The mesoscutum of European specimens is usually orange or yellowish-brown, but specimens with darkened mesoscutum occur; Japanese specimens have the entire mesosoma (including the mesoscutum) black or dark brown. Exceptionally, Japanese specimens have the pterostigma largely infuscated. The scapus of males is usually widened (cf. fig. 184) and frequently pale yellowish or ivory ventrally. One female from Japan has the subbasal cell more setose than normal.

Biology.— Recorded as solitary parasite of Tortricidae (*Archips rosana* (Linnaeus, 1758) (as *Tortrix laevigana* Denis & Schiffermüller, 1775; Ratzeburg, 1848), and *Agonopterix ferulae* Zeller, 1847 (Haeselbarth, 1978, who distinguished two varieties of *M. bicolor*)), Lyonetiidae (*Leucoptera lustratella* Herrich-Schäffer, 1854; see above), Gelechiidae (*Anacampsis populella* (Clerck, 1759); Haeselbarth, 1978) and Oecophoridae (several *Depressaria* spp.; see above).

Distribution.— Europe, Russia (including East Siberia and Far East Russia), Korea, Japan. Comes frequently to light.

Macrocentrus blandoides spec. nov.
(figs 450-462)

Material.— Holotype, ♀ (RMNH), "Korea: Gyeongnam-do, Changweon-shi (city), Yong-dong. Yongsu storing reservoir, 30.v.1987, J.-S. Park, RMNH'92", "4729". Paratypes: 11 ♀♀ + 3 ♂♂ (Park Coll., RMNH); 7 ♀♀, topotypic: 21.v.1987 (4 ♀♀), 1.viii.1989 (1 ♀), 31.viii.1988 (1 ♀), 7.x.1988 (1 ♀); 4 ♀♀ + 3 ♂♂, "Korea: Gyeongnam-do, Ulju-gun, Sangbug-myeon, Icheon-ri, Mt. Gaji, 800 m, J.-S. Park, RMNH'92": 6.v.1989 (1 ♀), 18.v.1989 (1 ♂), 21.v.1987 (1 ♀ + 1 ♂), 27.v.1987 (1 ♀ + 1 ♂), 24.viii.1988 (1 ♀).

Holotype, ♀, length of body 2.7 mm, of fore wing 2.6 mm.

Head.— Antennal segments 31, apical segments geniculate (fig. 461), length of third segment 1.3 times fourth segment, length of third, fourth and penultimate segments 4.0, 3.1, and 1.3 times their width, respectively, apical segment without spine; length of maxillary palp 0.9 times height of head (fig. 454); maxillary and labial palpi with 6 and 4 segments, respectively; labial palp very short, segments robust, third segment about as long as fourth segment (fig. 454); length of eye 1.4 times temple in dorsal view (fig. 458); temples parallel-sided behind eyes, roundly narrowed posteriorly (fig. 458); OOL:diameter of posterior ocellus:POL = 13:6:16; frons largely convex; face rather transverse (fig. 451), slightly convex, sparsely punctate; clypeus strongly convex, sparsely punctate; ventral margin of clypeus straight; length of malar space 0.8 times basal width of mandible; mandible medium-sized, distinctly twisted apically, its second tooth about as wide as first tooth, about half as long as first tooth, and its first tooth robust, acute (fig. 455).

Mesosoma.— Length of mesosoma 1.4 times its height; side of pronotum shiny and largely smooth, except for some fine rugulosity especially posteriorly; prepectal carina complete, distinct; precoxal sulcus largely smooth, with some microsculpture posteriorly; remainder of mesopleuron sparsely punctate; metapleuron dorsally largely smooth, medially finely rugulose, and rugose ventrally; metapleural flange medium-sized, broadly obtuse apically; mesoscutal lobes smooth, setose, but lateral lobes only setose near notauli and anteriorly; side of scutellum smooth, except for some large punctures; surface of propodeum distinctly rugose medially, except narrowly posteriorly, without median carina.

Wings.— Fore wing: subbasal cell evenly setose, and without patch (fig. 456); r:3-SR:SR1 = 5:7:37; 1-CU1:2-CU1 = 1:36; 1-CU1 widened, but very short (fig. 456); cu-a straight, slightly curved posteriorly, and subparallel with 3-CU1 (fig. 450); 2-SR:3-SR:r-m = 8:7:4; 2A largely absent and membrane basad of it sparsely setose. Hind wing: with 3 hamuli; SC+R1 evenly curved; marginal cell subparallel-sided apically; 1-M 1.4 times 1r-m.

Legs.— Hind coxa smooth; tarsal claws slender, with long apical tooth, without ventral lobe, setose (fig. 460); fore femur robust and straight (fig. 453); length of fore spur 0.4 times fore basitarsus; length of femur, tibia and basitarsus of hind leg 5.5, 8.1 and 7.0 times their width, respectively; length of spurs of hind tibia 0.30 and 0.40 times hind basitarsus; fore, middle and hind trochantelli with 3, 3, and 3 very minute teeth, respectively.

Metasoma.— Length of first tergite 2.6 times its apical width (fig. 462), its surface finely longitudinally striate, medio-basally rather concave; dorsal carinae of first tergite absent; second tergite moderately longitudinally striate, except narrowly posteriorly; anterior third of third tergite finely striate; remainder of metasoma smooth;

length of ovipositor sheath 1.19 times fore wing; apex of ovipositor very slender, without notch subapically (fig. 459); hypopygium deeply emarginate medio-posteriorly (fig. 452).

Colour.— Dark brown; palpi, tegulae (but humeral plate somewhat infuscate) pale yellowish; three basal antennal segments (but scapus infuscate dorsally) yellowish-brown, remainder of antenna brown (basally) or dark brown (apically); legs, mesosoma (except dark borwn propodeum), ventral half of metasoma, and hypopygium yellowish-brown; veins, parastigma and pterostigma (except its inconspicuous pale yellowish base) brown; wing membrane subhyaline.

Biology.— Unknown.

Variation.— Antennal segments of ♀ 31(2), 32(3) or 33(1), of ♂ 37(1) or 39(2); antenna of males much longer and segments much more slender than of females; length of fore wing 2.5-3.3 mm, and of body 2.7-3.5 mm; length of first metasomal tergite 1.9-2.6 times its apical width; length of ovipositor sheath 1.19-1.30 times fore wing; length of maxillary palp 0.8-0.9 times height of head; male has body completely dark brown or blackish, tegulae may be dark brown or partly yellowish; antenna and pterostigma of male completely dark brown; females frequently have scutellum, posterior part of mesoscutum, metanotum and metapleuron dark brown or infuscate; precoxal sulcus may be largely and densely rugulose, but usually as in holotype; hypopygium of male broadly emarginate medio-posteriorly (fig. 457).

Macrocentrus blandus Eady & Clark, 1964
(figs 443-449)

Macrocentrus blandus Eady & Clark, 1964: 118, figs; Watanabe, 1967: 7-8, figs 14, 25; Shenefelt, 1969: 147; Tobias, 1971[1975]: 104, 1976: 128, 1986: 250; Papp, 1980: 403, 1982a: 108, 1989: 81; O'Connor et al., 1991: 452; Koponen, 1992: 196.

Material.— 1 ♀ (RMNH), "N. England, Co. Durham, Upper Teesdale, Langdon Beck, c 600 m, 10.vi. 1984, C. v. Achterberg";1 ♂ (RMNH), "Sverige, Skane, Simlinge, 24.vi.1973, K. Straatman"; 1 ♀ + 3 ♂♂ (RMNH), "Andorra, St. Julia, 15.vi.[19]82 (♀; ♂♂ 30.vi.-21.vii.1974), P.J.L. Roche"; 5 ♀♀ (RMNH), "Andorra, Canillo, 1500 m, 4-23.vii.1979, J.B. Wolschrijn"; 1 ♀ (RMNH), "Andorra, Fontaneda, 1700 m, 23.vi.1981, P.H. v. Doesburg"; 1 ♀ (RMNH), "Schweiz, Tessin, Valle Maggia, Bignasco, 450 m, 23.vi.1978, C.J. Zwakhals"; 1 ♀ (RMNH), "[Austria], Fernpasse, vi.36. Dr. C. de Jong"; 3 ♀♀ (RMNH), "Bulgaria, ex coll. Zaykov, RMNH Leiden, 1991", m. Nektenica, 2.viii.1985, leg. Zaykov; 1 ♀ (RMNH), id., but Pamporovo, 22.ix.1977; 1 ♀ (RMNH), id., but Chrabrino, 25.vii.1978; 1 ♀ (RMNH), id., but Velingrad, 13.viii.1977, J. Kolarev; 1 ♀ (RMNH), id., but pi. Parvenez, 22.ix.1968, A. Germanov; 31 ♀♀ + 7 ♂♂ (RMNH) from The Netherlands (Arkel (ex *Hydroecia petasitis* Doubl.); Asperen; Baarle-Nassau; Gulpen; Hulshorst; Lienden; Nunspeet; Oostvoorne; Wijster).

Notes.— The length of the fifth segment of the maxillary palp (relative to the length of the second and sixth segments) is generally used for the identification of this species. However, this character is very variable and therefore unreliable for the identification of this species; e.g. the fifth segment is usually much shorter than the sixth segment, but can be about as long or even longer than the sixth segment in specimens from Bulgaria.

The Nearctic *M. innuitorum* Walley, 1936 is very similar (e.g. hypopygium of ♀ emarginate posteriorly and face largely smooth), but has a less transverse face (medial height of face about 1.6 times height of clypeus, about 1.2 times in *M. blandus*), the

fore femur is more slender, the sixth segment of the maxillary palp shorter than its fifth segment, the hind femur unicoloured yellowish and the length of the ovipositor sheath about equal to length of fore wing (about 1.2 times in *M. blandus*).

Biology.— Recorded as gregarious parasite of Noctuidae: *Hydroecia petasitis* Doubleday, 1847, *H. micacea* (Esper, 1789), and possibly *Dasypolia templi* (Thunberg, 1792) (Eady & Clark, 1964).

Distribution.— Europe, Kazakhstan, Russia. The specimens reported from North Korea, Mongolia and Japan (Watanabe, 1967; Papp, 1980, 1982a, 1989) probably belong to *M. blandoides* spec. nov.

Macrocentrus brevicaudifer van Achterberg, 1979
(figs 278-283)

Macrocentrus brevicaudis Abdinbekova, 1969: 86, not Szépligeti, 1902; Tobias, 1976: 129.
Macrocentrus brevicaudifer van Achterberg, 1979a: 175 (nomen novum); van Achterberg & Belokobylskij, 1987: 258, fig. 38.

Material.— Holotype, ♀ (ZMSP) examined; 1 ♀ (RMNH), "Korea: Gyeongbug-do, Gyeongsan-gun, Gyeongsan-eop, Dae-dong, 3.viii.1987, J.-S. Park, RMNH'92".

Biology.— Unknown.

Distribution.— Azerbaidzhan, Korea.

Macrocentrus buolianae Eady & Clark, 1964
(figs 367-371)

Macrocentrus buolianae Eady & Clark, 1964: 122, figs; Shenefelt, 1969: 147; Tobias 1971[1975]: 103, 1976: 129, 1986: 257; Papp, 1982a: 108.
Macrocentrus (Amicroplus) ancylivorus; Papp, 1991: 11 (misidentification).

Material.— Paratype, ♀ (BMNH), "[Germany], Schwetzingen, 18.ii.1956", "Paratype ♀ *Macrocentrus buolianae* n. sp., det. R.D. Eady & J.A.J. Clark, 1964"; 1 ♂ (TMA), "CH, Gersau, Sz, Oberholz, 550 m, 14.viii.1980 Lf, Dr. L. Rezbanyai", "*Macrocentrus ancylivorus* E. & Clark, 1964, det. Papp, J., 1989";

Notes.— General appearance very similar to *M. linearis*; antenna with 44-48 segments; length of ovipositor sheath about 0.9 times fore wing. For differences from *M.* spec. nov. reared from *Cnaphalocrocis medinalis* (Gueneé), see the note under that species. *M. buolianae* may be confused with the introduced Nearctic *M. ancylivorus*, but *ancylivorus* differs by the comparatively long vein 1r-m of hind wing, the more slender body, the longer ovipositor sheath (distinctly longer than body and about 1.3 times fore wing), the somewhat smaller ocelli, the hardly curved fore femur and the less postfurcal vein cu-a of fore wing. The specimen from Switzerland has the first tergite rather aberrantly shaped, its length 1.6 times its apical width (longer than twice its apical width in typical specimens).

Biology.— Recorded as a gregarious parasite of Tortricidae: *Rhyacionia buoliana* (Denis & Schiffermüller, 1775) (Eady & Clark, 1964), and *Archips oporana* (Linnaeus, 1758) (as *A. piceanus* (Linnaeus, 1758); Watanabe, 1967).

Distribution.— Germany, Switzerland, North Korea, Japan.

Macrocentrus cingulum Brischke, 1882
(figs 276, 277)

Macrocentrus cingulum Brischke, 1882: 108; Shenefelt, 1969: 149 (as supposed nomen nudum); van Achterberg & Haeselbarth, 1983: 51-52 (re-instated); Haeselbarth, 1985: 17; Vidal, 1993: 5.
Macrocentrus grandii Goidanich, 1937: 196, figs; Watanabe, 1967: 9-10; Shenefelt, 1969: 154-155; Tobias, 1971[1975]: 103, 104, 1976: 129, 1986: 257; Marsh, 1979: 188; Papp, 1982a: 108; Haeselbarth, 1983: 16; van Achterberg & Haeselbarth, 1983: 51-52 (synonymized with *M. cingulum*).
Macrocentrus gifuensis auct.

Material.— 23 ♀♀ + 21 ♂♂ (RMNH) from The Netherlands (Achtmaal; Asperen; Elzeterbosch (L.); Lelystad (Oostvaardersplassen); Liempde; Nunspeet; Putten (Gld.); Rijckholt (L.); Schaesberg (2 km N, Heihof; L.); Thorn (L.); Venlo; Waarder; Wageningen; Wijster; Winterswijk); 4 ♀♀ + 2 ♂♂ (RMNH) "Deutschland, Schwarzwald, Simonswald, 17.vi.1988, N.W. Elfferich"; 1 ♀ + 1 ♂ (RMNH) "Cardiff, U.K., coll. cat. 1.v.[19]81, em. 12.vi.1981, ex *Pleuroptya ruralis* (Hübner) (Pyr.), A. Davis"; 1 ♀ (RMNH) "[Bulgaria], 17.ix.1977, Rhodopi, Chrabrino, leg. A. Zaykov"; 1 ♂ (RMNH) "[Bulgaria], 8.ix.1977, Rhodopi, Markovo, leg. A. Zaykov"; 5 ♂♂ (RMNH), id., but Gornoslav, 4.vii.1985; 1 ♀ (RMNH), id., but Habrinio, 700 m, 6.vii.1985; 1 ♀ (RMNH), id., but G. Voden, 24.vii.1985; 2 ♀♀ + 2 ♂♂ (RMNH) "S. Korea, Cheong-Song, ex Tortricid on Vitaceae, em. 27.viii.1980, J. Paik"; 3 ♀♀ + 2 ♂♂ (RMNH) "S. Korea, Suweon, ex *Ostrinia furnacalis* (Guenée), em. 30.viii.1979, J.C. Paik"; 2 ♂♂ (RMNH) "S. Korea, Eumseong, Chungchongbug-Do, ex lepidopterous larvae on soyabean, em, 16.viii.1974, J.C. Paik"; 1 ♀ (RMNH) "Japan, Gaga Spa-zao, Miyagi Pref., 31.vii.1981, A. Takasu"; 1 ♀ (EIS), "[Japan], Sapporo, Hokkaido, 9.ix.1965, K. Kusig", "*Macrocentrus pallipes* (Nees). Det. C. Watanabe, 1967"; 2 ♀♀ + 1 ♂ (RMNH) "[China], Xiaoshan in Zhejiang, PRC, 21.vii.1964, Jin Dendi", "Host: *Ostrinia nubilalis* (Hübner), No. 64056.1".

Biology.— Recorded as a polyembryonic parasite of Pyralidae (e.g., it is an important parasite of the European corn borer, *Ostrinia nubilalis* (Hübner, 1796), and *Sitochroa verticalis* (Linnaeus, 1758)), and possibly of Lymantriidae: *Orgyia antiqua* (Linnaeus, 1758) (Brischke, 1882, but this host needs to be confirmed). Recorded also as parasite of pyralid larvae in nest of *Rhynchium oculatum* (Fabricius, 1781) (Vespidae; Goidanich, 1937), and of Noctuidae and Nymphalidae (Shenefelt, 1969).

The three specimens from China are rather aberrant because the length of the first metasomal tergite is 1.6-1.9 times its apical width (2.0-3.2 times in West Palaearctic specimens), the length of the maxillary palp is about 1.4 times height of head (1.5-1.7 times), and the length of the ovipositor sheath is 1.2-1.3 times fore wing (1.4-1.6 times).

Distribution.— Palaearctic (Europe, North Korea, Japan), and introduced in North America from France, Korea and Japan.

Macrocentrus spec. nov. He & Lou, 1993
(figs 419-424)

Macrocentrus spec. nov. He & Lou, MS.
Macrocentrus buolianae; Papp, 1982a: 108.

Material.— 1 ♀ + 1 ♂ (RMNH), paratypes of new species to be described by He & Lou (MS), with label-data largely in Chinese characters, 28.vii.1981, 820533 (♀) and viii.1979, 870417 (♂); 1 ♀ (TAM), "Korea: Prov. N Hwanghae, Sariwon, 28.ix.1978, leg. Dr. A. Vojnits et L. Zombori, No. 423", "*Macrocentrus buolianae* E. Cl., ♀, det. Papp, 1981".

Note.— Very similar to *M. thoracicus* (e.g. shape of temples, length of vein 1-CU1

of fore wing, colour of legs, setosity of subbasal cell of fore wing) but the new species has the first metasomal tergite more slender, flat basally, and with transverse sculpture medially (fig. 420); the tarsal claws with minute lobe (fig. 419); the head and metasoma yellowish; the prepectal carina complete behind fore coxa, the propodeum coarsely and remotely reticulate rugose, and vein 3-SR of fore wing comparatively long (fig. 421).

May be confused with *M. buolianae*, e.g. the tarsal claws, the mandibles, the colour of body and the (completely setose) subbasal cell of fore wing are similar. However, the new species has the length of eye in dorsal view 10-13 times temple (similar to length of eye of *M. thoracicus*, but about 7 times in *M. buolianae*), POL about 0.7 times OOL (about equal in *M. buolianae*), number of antennal segments about 52 (44-45 in *M. buolianae*), the pterostigma is at least basally yellowish (pale brown in *M. buolianae*), length of vein 3-SR about 1.6 times 2-SR (about equal in length in *M. buolianae*), length of first metasomal tergite about 3 times its apical width (somewhat shorter in *M. buolianae*) and length of ovipositor sheath about 1.6 times fore wing (about 0.9 times in *M. buolianae*).

Biology.— Solitary parasite of the rice leafroller or rice case worm, *Cnaphalocrocis medinalis* (Gueneé) (Tortricidae). The cocoon is slender spindle-shaped, and grey, situated within the stem of the hostplant.

Distribution.— China, Korea.

Macrocentrus collaris (Spinola, 1808)
(figs 225-236, 244, 257-264)

Bracon collaris Spinola, 1808: 140 [type lost; not listed by Casolari & Casolari Moreno, 1980].
Macrocentrus collaris; Shenefelt, 1969: 149-150; Papp, 1970: 64, 1971: 53, 1973: 8-9, 1980: 403, 1983: 320, 1984: 42, 1989: 82; Tobias, 1971[1975]: 103, 104, 1976: 128, 1986: 253; Haeselbarth, 1985: 17; van Achterberg & Belokobylskij, 1987: 255, figs 58-63; Koponen, 1992: 196-197.
Bracon ebeninus Nees, 1834: 67-68 [type lost].
Eubadizon dubius Wesmael, 1835: 118 [holotype examined]; Shenefelt, 1970: 234. **Syn. nov.**
Macrocentrus collaris var. *dubius*; Vidal, 1993: 6.
Macrocentrus picipes Haliday, 1835: 140 [holotype examined].
Macrocentrus affinis Hedwig, 1961: 95 (not *M. affinis* Muesebeck, 1932) [holotype examined]. **Syn. nov.**
Macrocentrus affiniqades Shenefelt, 1969: 144 [holotype examined]. **Syn. nov.**

Material.— Holotype of *M. affinis* and *M. affiniqades*, ♀ (ZIL), "Afghanistan, Qadès, (SE Qaléh Naou, 2.vii.1959, alt. 1320 m, leg. K. Lindberg", "A-685", "685e", "Holotypus *Macrocentrus affinis* Hedwig"; holotype of *M. dubius*, from Belgium, ♀ (KBIN), examined; 1 ♂ (RMNH), "England, Mitcheldean nr Monmouth, 9.viii. 1961, P. Staffeleu" ; 1 ♂ (RMNH), "Sweden, Vb., Umea, 2.viii.1981, L. Huggert"; 10 ♀♀ + 2 ♂♂ (RMNH), "W. Germany (Bay.-Dachau), Röhrmoos, 5.i.19986, in house, S. Blank"; 2 ♂♂ (RMNH), "W. Germany, Aachen, Seffent, ca 200 m, 19.vi.1981, C.v. Achterberg et al."; 1 ♀ + 1 ♂ (RMNH), "[Germany] Reinh[ard], Saxon."; 1 ♂ (RMNH), "[Czech Republic], Mähren, Weisskirchen"; 1 ♀ (RMNH), "[Poland], Brischke, Dantz[ig]"; 1 ♀ (RMNH), "Andorra, St. Julia, 16.ix.[19]82 (♀), P.J.L. Roche"; 3 ♀♀ (RMNH), "[France], Ardêche, Lavilledieu, 5-9.viii.1976, leg. H. Teunissen"; 1 ♀ (RMNH), "France, Ht Alpes, Eygliers, 1000 m, 26.vii.1987, A. Teunissen"; 3 ♀♀ + 1 ♂ (RMNH), "France, Drôme, M.J. Gijswijt", "Lachau, 8 km E. Séderon, 13.ix.1989"; 1 ♂ (RMNH), "[France], Ardêche, St. Rémèze, 8.viii.1976, leg. H. Teunissen"; 2 ♂♂ (RMNH), "France, Ardêche, Chomirac, 1-7.viii.1977, K.J. Huisman"; 1 ♀ (RMNH), "France, Avignon, ex *Sesamia* sp. (Noctuidae), RMNH'85)"; 1 ♀ + 1 ♂ (RMNH), "Excursie Frankrijk, Cestas [(Gironde), 2.vi.1955"; 1 ♂ (RMNH), "Frankrijk, St. Algrève, 1.viii.1952, H.C. Blöte"; 1 ♀ (RMNH), "France, Drôme, Séderon, Col de Macuègne, 29.ix.1987, M.J. Gijswijt"; 1 ♀ (RMNH), "France, Var, Fréjus, on *Cupressus*, 15.x.1987, M.J. Gijswijt"; 1 ♀ (RMNH),

"Corsica, 1050 m, 2 km W. v. Vizzavona, 11.viii.1956, R. Blöte"; 1 ♀ (RMNH), "Corsica, Tattone, bij Vizzavona, 700 m, 232.viii.1956, Blöte & Hesselbach"; 1 ♀ (RMNH), "Austria, N.O., Gastern, 19.vii.1982, C.J. Zwakhals"; 12 ♀♀ + 2 ♂♂ (RMNH), "Österreich, Fresach, Kärnten, 3-15.vi.1973, J.B. Wolschrijn"; 1 ♂ (RMNH), "Österreich, Tirol, Ötztal, Vent, Auf Stablein, 2200-2400 m, 29.vii.1967"; 1 ♀ (RMNH), "CSSR, Slovensko, Kolinany, 8 km NO v. Nitra, 20.vii.1968"; 1 ♀ (RMNH), id., but Pohranice, 6 km NE of Nitra, 23.vii.1968; 3 ♀♀ (BMNH), "Hungary, Baranya-megya, Nagyharsany, 6.vii.(1), 22.vii.(2) 1963"; 1 ♀ (BMNH), "Poland, Morskie Oko, 6.vii.1932, Tatra Mts, 4600 ft."; 20 ♀♀ + 13 ♂♂ (RMNH, ITZ) from The Netherlands (Axel (Z.); Bilthoven; Delft; Drunen; 's Gravenhage; Leiden (Knotterpolder); Melissant; Nunspeet; Putten (Krachtighuizen); Rottumeroog; St. Pietersberg (Zonneberg, Heerderberg, Cannerbos); Tegelen; Vilt (L.); Voorschoten; Weesp); 1 ♀ (Valencia), "[Spain], Garos, 19.ix.[19]85"; 7 ♀♀ + 3 ♂♂ (RMNH), "[Spain], E. Mallorca, Porto Christo, 17-24.iii.1980, Exc. Univ. Leiden"; 6 ♀♀ + 1 ♂ (RMNH), "[Spain], Torreveija (Alica.), 23.v.1984, leg. H. Teunissen"; 1 ♀ (RMNH), "East Spain, Altea, 10 km N of Benidorm, 13.iv.1982, Exc. Univ. Leiden"; 1 ♀ (RMNH), "East Spain, Albufera de Elche, 23.iv.1982, Exc. Univ. Leiden"; 10 ♀♀ + 1 ♂ (RMNH), "[Spain], E. Spain,(Alicante), Orihuela, 24.v.1984, A.P.J.A. Teunissen, RMNH-1984; 1 ♀ (RMNH) "East Spain, Exc. Univ. Leiden", "Benidorm, 24.iv.1982"; 1 ♀ (RMNH), "[Spain], Novelda (Alicante), 15.iv.1984, leg. H. Teunissen"; 1 ♀ (RMNH), "Espana, Valencia, Moraira, 16-30.v.1981, B. van Aartsen"; 5 ♀♀ + 2 ♂♂ (RMNH), "Spanje, Estepona, 3.x.1952, Bär, Blöte, de Jong & Osse"; 1 ♀ (RMNH), id., but Ecija, 18.ix.1952; 1 ♀ + 1 ♂ (RMNH), id., but 15 km NW of Tarifa, 27.ix.1952; 1 ♀ (RMNH), id., but 30 km ZW of Malaga, 4.x.1952; 3 ♀♀ (RMNH), id., but Velez Rubio, 10.x.1952; 1 ♀ (RMNH), "Esp., Alic., Altea, 22.vi.1978, leg. H. Teunissen"; 6 ♀♀ (RMNH), id., but 1-14.vi.1978; 15 ♀♀ (RMNH), "Spain, Huelva, 1 km N El Rompido, 13.v.1981, C. Gielis, at light"; 2 ♀♀ (RMNH), "Espana, Alicante, Denia, 15.v.1970"; 6 ♀♀ (RMNH), "E[spana], Rosas, 100 m, Paradise Villas, 2-9.x.1988, LF, Rezbanyai-Reser"; 1 ♀ (RMNH), "[Canary Islands], Tenerife, Sta. Ursula, 1.vii.1979, M. Báez"; 1 ♂ (RMNH), id, but 15.ix.1959, R. Arozarena; 1 ♀ (RMNH), "[Canary Islands], Fuerteventura, 10.iii.1984, leg. H. Teunissen"; 1 ♂ (RMNH), "[Canary Islands], Fuerteventura, La Asomada, 21.ii.[19]80, G. Ortega"; 4 ♀♀ + 1 ♂ (RMNH), "Portugal: Azores, 1992, P. Gloria & L. Oliveira, RMNH'92"; 2 ♀♀ + 1 ♂ (RMNH), "[Portugal], Madeira: Machico, ex fullgrown caterpillar of *Chrysodeixis chalcites* (Esp.), coll. iv.1982, em. v.1982, leg. Stüning; 1 ♀ (BMNH), "[Portugal], Madeira Is., Porto Santa, 21-27.ii.1963, E.W. Classey"; 2 ♀♀ + 1 ♂ (RMNH), "Portugal, Oeiras, 27-31.viii.1979 (1 ♀, 2 ♀♀ of 7-14.ix.1979, 1 ♂ of 30.viii-4.ix.1979), A. v. Harten"; 1 ♀ (RMNH), "Portugal, nr Costa da Caparica, 11-12.ix.1079, A .v.Harten'97"; 1 ♂ (RMNH), "Follaterres, Suisse, Martigny-Wallis, 21-25.viii.1975, leg. H. Teunissen"; 1 ♀ (RMNH), "Italia, Villnöss, Fune, oriv. Bolzano, 1100-1400 m, 13.v-30.v.1965, G. van Rossem"; 1 ♀ (RMNH), "[Italy], Gargnano, Lago di Garda, 13.x.1968, v. Ooststroom"; 1 ♀ + 1 ♂ (RMNH), "[Italy], Legnaro, 9.viii.1964"; 1 ♂ (RMNH), id., but 8.viii1964; 1 ♀ (RMNH), "Yu[goslavia], Kroatie, Jusici, 14.vii.1979, leg. H. Teunissen"; 1 ♀ (RMNH), "Jugoslavija, Srbija, Radavac, 8 km N v. Pec, 16.viii.1965"; 3 ♀♀ + 1 ♂ (RMNH), "[Bulgaria], Rodopi, 19.vi.1975 (1 ♂ 12.v.1976, 1 ♀ 23.vi.1976, 1 ♀ 19.viii.1975), Nikolovo, leg. A. Zaykov"; 1 ♀ (RMNH), id., but Belica, 8.viii.1985; 1 ♀ (RMNH), id., but Stanja Elnovo, 25.vi.1980; 2 ♂♂ (RMNH), id., but Semkovo, 6-8.viii.1985; 1 ♂ + 1 ♀ (RMNH), id., but Karamansi, 20-26.v.1976; 1 ♀ (RMNH), id., but Varna, 29.vii.1979. J. Kolarov; 1 ♂ (RMNH), id., but Banja Plovd, 4.v.1981; 1 ♂ (RMNH), id., but Plovdiv, 30.iv.1983; 1 ♂ (RMNH), id., but Parvomay, 23.ix.1981; 1 ♀ (RMNH), "[Bulgaria], Rodopi, Ptshelarovo, 26.vi.1976, leg. A. Zaykov"; 1 ♀ (RMNH), "[Bulgaria], Rodopi, Dolno Lucovo, 29.iv.1977, leg. A. Zaykov"; 3 ♀♀ (BMNH), "[Greece], Rhodes, nr Miramara, 24.iv.1962, W.H. Tams"; 1 ♀ (BMNH), "Greece, Kifisia, 8-25.vi.1974, L.A. Mound, Malaise trap"; 1 ♀ (RMNH), "Ellas, Thessalia, 10 km n. v. Litochoron, 19.ix.1962"; 4 ♀♀ (RMNH), "S. Greece, Lakonia, 5 km S of Monemvasia", "7.vii.1980 (1 ♀, 2 others 7.viii.1980, one 27.vii.1983), G. Christensen"; 2 ♂♂ (RMNH),"Turkey: Hakkari, Sat Dag, Varegös, SW Yäksekova, 1700 m, 4-8.viii.1983, W. Schacht, RMNH"; 1 ♂ (RMNH), "Turkey: (Van), Van, 1800 m, 13.vii.1987, leg. R. Hensen"; 16 ♀♀ + 41 ♂♂ (RMNH), "Yemen, Sana'a (749), Malaise trap, ii.1992, A. v. Harten, RMNH'92".

Notes.— Males are black or dark brown; females have at least part of the mesosoma orange-brown, but exceptionally largely dark brown females occur. Antennal segments of ♀ 30-34, of ♂ 36-39. Type of *M. affiniqades* differs from the European specimens in colour of the legs, the body is more extensively yellowish, and the pterostigma is completely yellowish. Length of ovipositor sheath 1.1 times length of metasoma. Vein r-m of fore wing may be absent ("var. *dubius* (Wesmael, 1835)" (e.g. part of the series from Madeira reared from *Chrysodeixis chalcites* (Esper, 1789) and a

female from Axel (Netherlands). The only other species of *Macrocentrus* with vein r-m absent is the closely related Nearctic *M. incompletus* Muesebeck, 1932; it differs from *M. collaris* by the shorter vein 1-M of hind wing (about equal to vein 1r-m; in *M. collaris* is vein 1-M is much longer than vein 1r-m) and it has the head less transverse in dorsal view.

Biology.— Reported to be a gregarious parasite of several species of Noctuidae (Shenefelt, 1969). Comes frequently to light.

Distribution.— Palaearctic, known south to Israel and Yemen, and east to North Korea and Mongolia.

Macrocentrus crassus Eady & Clark, 1964
(figs 284-289)

Macrocentrus crassus Eady & Clark, 1964: 116, figs; Shenefelt, 1969: 151; Tobias, 1986: 257.

Material.— 1 ♀ (BMNH), paratype, examined.

Biology.— Unknown.

Distribution.— Italy.

Macrocentrus equalis Lyle, 1914
(figs 242, 243, 245-247)

Macrocentrus equalis Lyle, 1914: 261, figs; Watanabe, 1967: 8; Shenefelt, 1969: 152; Tobias, 1971[1975]: 103, 1976: 428, 1986: 253; Papp & Reichart, 1973: 366, 367, 370; Papp, 1980: 403; van Achterberg & Belokobylskij, 1987: 255, figs 52-56; Koponen, 1992: 197.

Material.— 1 ♀ (BMNH), "[Germany], *M. collaris* Ns", "Ruthe Coll. 59.101", "*Macrocentrus equalis* Lyle, ♀, det. J.A.J. Clark, 1964"; 3 ♀♀ + 5 ♂♂ (RMNH), "[Netherlands, no loc.], uit de pop van *Noct. ditrapez.* [= ex pupa of *Xestia* (*X.*) *ditrapezium* Denis & Schiffermüller, 1775].

Note.— The length of the ovipositor sheath is about 0.4 times fore wing, the fore wing is about 3.5 mm, the second submarginal cell of fore wing is very short, and the fore tibial spur 0.3 times as long as fore basitarsus.

Biology.— Reported to be a gregarious parasite of Noctuidae: *Xestia triangulum* (Hufnagel, 1766) (Lyle, 1914), *X. ditrapezium* Denis & Schiffermüller, 1775 (see above), *Agrotis segetum* Denis & Schiffermüller, 1775 (Tobias, 1971[1975]), and *Orthotaenia undulana* (Denis & Schiffermüller, 1775) (Koponen, 1992).

Distribution.— U.K., Finland, Sweden, Germany, eastwards to Mongolia.

Macrocentrus flavus Snellen van Vollenhoven, 1878
(figs 146-160)

Macrocentrus flavus Snellen van Vollenhoven, 1878: 54, pl. 34, fig. 3, 3a-c; Shenefelt, 1969: 153; van Achterberg, 1982: 56-58, figs 1-15 (neotype designation); van Achterberg & Haeselbarth, 1983: 41.
Macrocentrus turanicus Telenga, 1950: 299; Tobias, 1971[1975]: 103, 1976: 130, 1986: 258 (synonymized with *M. flavus*); van Achterberg, 1982: 58; van Achterberg & Haeselbarth, 1983: 41.

Material.— Neotype, ♀ (RMNH), "Austria, Burgenl., Weiden am See, 14.viii.1979, Th. Peter"; 1 ♀ (RMNH), "[Netherlands], Exc. St. Pietersberg, Terrein Kasteel Neercanne, 21.viii.1950, op licht [= at light] 21.30-22.30 u"; 1 ♀ + 1 ♂ (RMNH), "France, Mont Ventoux, (Vaucluse), P. du Merle", "em. 29.vii.1980, ex larvae of *Acrobasis* sp. on *Quercus*, alt. 450 m."; 1 ♀ (RMNH), "France, (Var), 10 km S St. Tropez, Ramatuelle, 1.ix.1986, RMNH'86, M.J. Gijswijt"; 1 ♀ (TAM), "[Hungary], Mehádia, Ujhelyi, 1909"; 1 ♀ (TAM), "[Hungary], Hársbokorhegy Nagykovácsi", "1952, viii.16, leg. Bajári"; 2 ♀♀ (TAM), "[Italy], Sardinia, Mts Gannargentu, Belvi, 700 m, 25-30.vii.1975, at light, leg. Gozmány"; 1 ♀ (BMNH), "Crete, iii.1983, ex Lep. larva in stored chestnut, D. Campion, no. 5, CIEA 15094"; 2 ♀♀ (HC, RMNH), "BRD/Rheinl., Köln/Flittard, 10.viii.1983, R. Gierling leg."; 1 ♀ (RMNH), "Bulgaria, ex coll. Zaykov, RMNH Leiden, 1991", " Obzor, Burgasko, 19.viii.1981, leg. J. Kolarov"; 1 ♂ (HC), "Iran, Persepolis, Fars, 16.v.1978, 1570 m, K. Warncke".

Note.— The propodeum may be irregularly and coarsely sculptured; the second tergite is aciculate posteriorly, except medially.

Biology.— Recorded as solitary parasite of Pyralidae (Tobias, 1971[1975], van Achterberg, 1982).

Distribution.— Bulgaria, France, Hungary, Iran, Italy, Netherlands, Poland, Kazakhstan, Ukraine, Russia.

Macrocentrus gibber Eady & Clark, 1964
(figs 323, 324)

Macrocentrus gibber Eady & Clark, 1964: 114, figs; Shenefelt, 1969: 154; Tobias, 1971[1975]: 103, 1976: 128, 1986: 253; Haeselbarth, 1978: 30-32, fig. 10; van Achterberg & Belokobylskij, 1987: 252; Koponen, 1992: 197.

Material.— 1 ♀ (RMNH), "Suisse, Fiesch (VS), 22-27.ix.1980, leg. H. Teunissen"; 1 ♀ (RMNH), "Suisse, Vd., Glion, s. Montreux. leg. H. Teunissen"; 1 ♀ (RMNH), "Italia, No., Monte Zedo, 600 m, 19.viii.1982, leg. H. Teunissen"; 1 ♀ (RMNH), "[Germany], Baviaria mer., Steinebach am Wörthsee, viii.[19]49, leg. F. Daniel"; 2 ♀♀ (RMNH), "Austria, N.Ö., Mittelbach, 850 m, Erlaufsee, 15.vii.1982, Th. Peeters"; 1 ♀ (RMNH), "Öst., Mayrhofen, eind vii.1970, Dr. C. de Jong"; 1 ♀ (RMNH), "[Germany], Bavaria mer., Steinbach am Wörthsee, leg. F. Daniel"; 6 ♀♀ (RMNH), "[Germany], Bayern, FFB, Gernlinden, 1-6.viii.1979, Burmeister"; 1 ♀ (RMNH), "Suomi, V, Kaarina, 1992, R. Jussila leg."; 3 ♀♀ (RMNH), "Suomi, v., Aura, 637 26, 1992, R. Jussila leg."; 1 ♀ (RMNH), "Bulgaria, ex coll. Zaykov, RMNH Leiden, 1991", s. simovo, 21.viii.1968, P. Angelov".

Biology.— Unknown. Comes frequently to light.

Distribution.— Mainly in boreo-montainous habitats (Haeselbarth, 1978): Austria, Bulgaria, Germany, Finland, Sweden, Italy, Russia, Switzerland.

Macrocentrus huggerti spec. nov.
(figs 265-275)

Material.— Holotype, ♀ (RMNH), "Museum Leiden, Sweden, Ang., Älska, Petnäset, 21.vii.1981, L. Huggert".

Holotype, ♀, length of body 4.0 mm, of fore wing 3.3 mm.

Head.— Remaining antennal segments 27, length of third segment 1.4 times fourth segment, length of third, and fourth segments 8.7 and 6.3 times their width, respectively; length of maxillary palp 1.6 times height of head; length of eye in dorsal

view 3.6 times temple (fig. 268); temples gradually narrowed posteriorly (fig. 268); OOL:diameter of posterior ocellus:POL = 6:3:7; frons flat; face rather convex, mainly smooth, shiny, sparsely punctate; clypeus distinctly convex, sparsely punctate; ventral margin of clypeus straight; length of malar space 0.8 times basal width of mandible; mandible small, distinctly twisted apically, its second tooth wide, nearly as long as first tooth and its first tooth robust, acute and short (figs 269, 273).

Mesosoma.— Length of mesosoma 1.6 times its height; side of pronotum crenulate antero-medially, remainder smooth; prepectal carina complete, wide; middle mesoscutal lobe steep anteriorly; precoxal sulcus punctate only anteriorly, and crenulate posteriorly, interspaces wider than diameter of punctures; remainder of mesopleuron sparsely punctate; metapleuron rugose, but dorsally largely smooth; metapleural flange rather slender, nearly acute apically; mesoscutal lobes smooth, setose except medially; side of scutellum rugose posteriorly; surface of propodeum rugose, without median carina antero-medially.

Wings.— Fore wing: subbasal cell evenly and densely setose, without yellowish patch (fig. 274); r:3-SR:SR1 = 5:10:36; 1-CU1:2-CU1 = 1:31; 1-CU1 distinctly widened (fig. 274); cu-a straight, oblique and converging to 3-CU1 posteriorly (fig. 265); 2-SR:3-SR:r-m = 10:10:4; 2A absent, basal area sparsely setose. Hind wing: SC+R1 slightly curved; with 3 hamuli; marginal cell parallel-sided apically (fig. 265); 1-M 2.5 times 1r-m.

Legs.— Hind coxa very sparsely punctate, without striae; tarsal claws without ventral lamella, slender, setose (fig. 271); fore femur very slender and slightly curved (fig. 275); length of fore spur 0.3 times fore basitarsus; length of femur, tibia and basitarsus of hind leg 8.3, 16.4 and 11.3 times their width, respectively; length of spurs of hind tibia 0.30 and 0.40 times hind basitarsus; fore, middle and hind trochantelli with 2, 2, and 3 teeth, respectively.

Metasoma.— Length of first tergite 3.0 times its apical width (fig. 266), its surface coarsely and irregularly striate, medio-basally shallowly concave; dorsal carinae of first tergite short, in basal quarter; second tergite coarsely and obliquely striate; third tergite striate medially (except posteriorly); remainder of metasoma smooth; length of ovipositor sheath 0.77 times fore wing; apex of ovipositor slender, with distinct notch (fig. 270).

Colour.— Blackish or dark brown; palpi, scapus, pedicellus, tegulae, hind tibial spurs, base of hind tibia and parastigma pale yellowish; base of hind coxa infuscate; remainder of legs pale brownish-yellow; pronotum postero-dorsally, mesopleuron anteriorly and metasoma ventrally brown; veins (except yellowish 1-R1 of fore wing) and pterostigma (except its paler base) brown; wing membrane subhyaline.

Biology.— Unknown.

Notes.— Similar to the South Palaearctic *M. brevicaudifer*, but differs by the aberrantly shaped manddible, the smaller ocelli and the mainly dark body. *M. brevicaudifer* is mainly yellowish-brown, with the head and the base of the second metasomal tergite dark brown or blackish, and the base of the pterostigma yellowish.

It is a great pleasure to name this species after its collector, the well-known specialist of Proctotrupoidea, Dr L. Huggert (Dalby, Sweden).

Macrocentrus hungaricus Marshall, 1893
(figs 376-407)

Macrocentrus hungaricus Marshall, 1893: 231, pl. 7, fig. 2; Shenefelt, 1969: 155; Tobias, 1971[1975]: 103, 1976: 128, 1986: 253; Papp, 1973: 53, 1980: 404; van Achterberg, 1982: 60; van Achterberg & Belokobylskij, 1987: 248.

Macrocentrus macrocephalus Telenga, 1950: 297; Shenefelt, 1969: 162; Tobias, 1971[1975]: 102; van Achterberg, 1982: 60 (synonymized with *M. hungaricus*).

Macrocentrus tsunekii Watanabe, 1940: 32, fig.; Shenefelt, 1969: 173-174; van Achterberg, 1982: 60 (synonymized with *M. hungaricus*).

Macrocentrus mongolicus Papp, 1967: 192-194, figs 1-3; Shenefelt, 1969: 164; Papp, 1971: 53; Tobias, 1971[1975]: 102; van Achterberg, 1982: 60 (synonymized with *M. hungaricus*).

Macrocentrus bicoloripes van Achterberg, 1982: 58-60, figs 16-31; Tobias, 1986: 257. **Syn. nov.**

Material.— Holotype of *M. hungaricus* ♂ (TAM), "[Hungary], Hadház, 29.viii.[18]82", "*hungaricus*, Coll. Marshall", "Holotypus", "*Macrocentrus hungaricus* M., ♀ [sic!], det. Papp J., 1985", "Hym. Typ. No. 74493, Mus. Budapest"; holotype of *M. mongolicus* ♂ (TAM), "Mongolia, Uburchangaj aimak, Changaj Gebirge, 21 km O von somon Narijnteel, 2080 m, Exp. Dr. Z. Kaszab, 1964", "Nr. 213, 27.vi. 1964", Holotypus *Macrocentrus mongolicus* sp. n., ♂, Papp, J., 1967", "Hym. Typ. No. 301 Mus. Budapest"; holotype of *M. bicoloripes*, ♀ (RMNH), "Austria, Burgenl., Winden am See, 6.vi.1980, Th. Peter"; holotype of *M. tsunekii* (EIS) "K. Tuneki[sic!]/Mongolei, Apuka, vii.1939", "*Macrocentrus tsunekii* Watanabe, 1940, ♀, Type"; 1 ♂+1 ♀ (RMNH), "[?Hungary], Dunapentele, Szépligeti", "*Macrocentrus hungaricus* Marsh., det. Szépligeti"; 1 ♂ (RMNH), "Austria, N.Ö, Hainb. Berge, 11.vi.1982, Th. Peter"; 1 ♀ (BMNH), "Switzerland, Valais, Arolla, 7000 ft, 29.vi.1935, J.E. & & R.B. Benson, B.M. 1935-581"; 4 ♀♀ (RMNH), "Bulgaria, ex coll. Zaykov, RMNH Leiden 1991", "Bulgaria, Rila Mts.", "v. Iastreber, 23.vi.1982, leg. Zaykov".

Notes.— After examination of more material I am convinced that the variation of wing venation, of the colour of the body and legs, and of sculpture of the precoxal sulcus is much more extensive than expected when I described *M. bicoloripes*. The dark variety (with trochantelli, apices of femora and metasoma blackish or dark brown) and densely sculptured precoxal sulcus is represented by the holotype of *M. bicoloripes*, the other types belong to the less sculptured, pale nominate variety (with trochantelli, apices of femora and at least part of metasoma yellowish).

Precoxal sulcus usually rugose-punctate, but sometimes only sparsely punctate; vein r of fore wing 0.6-1.0 times vein 3-SR, and vein 2-SR 1.2-1.8 times vein 3-SR; length of first metasomal tergite 1.7-2.2 times its apical width; metasoma may be largely smooth or first, second and base of third tergites distinctly aciculate; length of maxillary palp 1.4-1.6 times height of head.

The East Palaearctic specimens have the scapus yellowish (♀-type of *M. tsunekii*) or black (♂-type of *M. mongolicus*); precoxal sulcus is sparsely sculptured; maxillary palp 1.0-1.2 times as long as height of head; vein r of fore wing about as long as vein 3-SR and vein 2-STR about 1.5 times vein 3-SR; length of first metasomal tergite 2.5-4 times its apical width; metasoma (except first tergite) frequently largely yellowish (but largely black in holotype male of *M. macrocephalus*); metasoma may be entirely smooth. Normally medium-sized (fore wing longer than 5.5 mm), but small specimens (length of fore wing about 4.5 mm) occur.

The NE Oriental *M. hunanensis* He & Lou, 1991, from SE China, of which the holotype has been examined, is very similar (e.g. length of eye in dorsal view 11 times temple, and vein 1-CU1 of fore wing long). However, it has the subbasal cell largely glabrous apically, and it differs in colour; the pronotum and the orbits of the eyes are pale yellowish or ivory.

Biology.— Unknown.

Distribution.— Austria, Bulgaria, China, Hungary, Mongolia, Russia (including Primoryan Territory), Switzerland.

Macrocentrus infirmus (Nees, 1834)
(figs 437-442)

Rogas infirmus Nees, 1834: 203.
Macrocentrus infirmus; Shenefelt, 1969: 156; Papp, 1971: 53, 1982a: 108, 1993: 36; Tobias, 1976: 128, 1986: 250; Koponen, 1992: 197.
Macrocentrus infimus [!]; Tobias, 1971[1975]: 103, 104.

Material.— 89 ♀♀ + 15 ♂♂ (RMNH) from The Netherlands (Ameland (Oerd); Assel; Ede (Gld.); Hulshorst; Nunspeet (very common); Tongeren; Waarder; Wijster; Zundert (N.B.)); 1 ♂ (RMNH), "Ireland, (Co. Dublin), Dublin, Phoenix Park, 28.ix.1986, RMNH'86, C. van Achterberg"; 5 ♀♀ + 1 ♂ (RMNH), "Dania, E. Jylland, Horsted, S of Vejle, 14-18.viii.1977, T. Munk, narrow grass-border between barley fields"; 1 ♀ (RMNH), "[England], Markeaton, Derbyshire, 28.viii.[19]77, P. Kirby"; 1 ♀ (RMNH), "S England, Co. Somerset, nr Crewkerne, 22.viii.1974, C. v.Achterberg"; 1 ♀ (RMNH), "France (Alpes Haut Pr.), Les Omergues (Sêderon), 8.ix.1986, M.J. Gijswijt, RMNH'86"; 1 ♀ + 3 ♂♂ (RMNH), "Museum Leiden, N. Italy, Prov. Como, C. van Achterberg", "Lanzo d'Intelvi, ca 1100 m, forest, 9-16.viii.1982"; 6 ♀♀ (RMNH), "Bulgaria, ex coll. Zaykov, RMNH Leiden, 1991", "Lilkovo, 17.ix.1977, leg. A. Zaykov"; 1 ♀ (RMNH), id., but 1.x.1978; 1 ♀ (RMNH), id., but Velinograd, 5.viii.1979; 1 ♀ (RMNH), id., but Pamporovo, 22.ix.1977; 1 ♀ (RMNH), id., but 3.viii.1978; 1 ♀ (RMNH), id., but Semkovo, 8.viii.1983; 2 ♀♀ (RMNH), id., but n. Varkovrak, 18.viii.1977; 1 ♀ (RMNH), id., but Samokov, 23.vii.1982; 1 ♀ (RMNH), id., but Stojkite, 23.ix.1977; 1 ♀ (RMNH), id., but Plotsknin, 5.vii.1977; 1 ♀ (RMNH), id., but Rojen, 3.viii.1978, J. Kolarov; 1 ♀ (RMNH), "Russie, Nizhniyaya Kuriya, 15 km W Perm, 1-3.viii.1967, W.J. Pulawski".

Biology.— Recorded as gregarious parasite of Noctuidae on grasses and low plants: *Apamea monoglypha* (Hufnagel, 1766) (Eady & Clark, 1964), and Tortricidae: *Blastesthia turionella* (Linnaeus, 1758) (Tobias, 1971[1975]).

Distribution.— Europe, Kazakhstan, Mongolia, Russia. The specimens reported from the East Palaearctic region (Primoryan Territory, China, North Korea) needs reexamination because they may belong to other members of the *M. infirmus*-group.

Macrocentrus infuscatus spec. nov.
(figs 352-359)

Material.— Holotype, ♀ (RMNH), "Japan, Kusakai, Kawai V., Iwate, 3-4.viii.1981, A. Takasu, RMNH'82". Paratype: 1 ♀ (RMNH), "Museunm Leiden, Japan, Yubune Spa, Shizuoka Pref., 7.vii.1981, A. Takasu".

Holotype, ♀, length of body 5.1 mm, of fore wing 4.0 mm.

Head.— Antennal segments 41, length of third segment 1.3 times fourth segment (fig. 359), length of third, fourth, and penultimate segments 6.7, 5.0, and 2.0 times their width, respectively; apical antennal segment with distinct spine; length of maxillary palp 2.0 times height of head; length of eye in dorsal view 5.8 times temple (fig. 357); temples gradually narrowed posteriorly (fig. 357); OOL:diameter of posterior ocellus:POL = 8:5:9; frons flat; face rather flat, densely punctate medially (interspaces about equal to diameter of punctures), laterally sparsely punctate; clypeus distinctly

convex, largely smooth, sparsely punctate; ventral margin of clypeus straight; length of malar space 0.8 times basal width of mandible; mandible medium-sized, distinctly twisted apically, its second tooth rather slender, acute, nearly half as long as first tooth and its first tooth robust, rather long, acute (fig. 355).

Mesosoma.— Length of mesosoma 1.4 times its height; side of pronotum coarsely crenulate medially, finely crenulate posteriorly, remainder sparsely punctate; prepectal carina absent behind fore coxa, laterally medium-sized; precoxal sulcus distinctly punctate, interspaces about equal to diameter of punctures; remainder of mesopleuron distinctly punctate; metapleuron coarsely rugose, but dorsally largely smooth; metapleural flange rather slender, nearly acute apically; mesoscutal lobes sparsely punctate, lobes largely setose; side of scutellum smooth, but punctate dorsally; surface of propodeum densely rugose, without median carina.

Wings.— Fore wing: wing comparatively narrow (fig. 352); subbasal cell glabrous apically, but dorsal third setose (fig. 354), and with distinct brownish patch (fig. 354); r:3-SR:SR1 = 17:24:87; 1-CU1:2-CU1 = 9:32; 1-CU1 hardly widened (fig. 354); cu-a straight anteriorly, curved posteriorly, and subparallel to 3-CU1 posteriorly (fig. 354); 2-SR:3-SR:r-m = 10:12:5; 2A present basally, and membrane basad of it sparsely setose. Hind wing: SC+R1 slightly curved; marginal cell parallel-sided apically; 1-M 2.0 times 1r-m (fig. 352).

Legs.— Hind coxa sparsely punctate, without striae; tarsal claws with minute ventral lamella, setose (fig. 353); fore femur slender and nearly straight (fig. 358); length of fore spur 0.3 times fore basitarsus; length of femur, tibia and basitarsus of hind leg 8.0, 13.6 and 10.2 times their width, respectively; length of spurs of hind tibia 0.35 and 0.45 times hind basitarsus; fore, middle and hind trochantelli with 3, 4, and 4 teeth, respectively.

Metasoma.— Length of first tergite 2.4 times its apical width (fig. 356), its surface coarsely longitudinally striate, medio-basally shallowly concave; dorsal carinae of first tergite distinct; second tergite coarsely and longitudinally striate; basal half of third tergite finely striate; remainder of metasoma largely smooth; length of ovipositor sheath 1.77 times fore wing; apex of ovipositor robust, with distinct notch.

Colour.— Blackish or dark brown; palpi, base of hind tibia, hind tarsus, and tegulae pale yellowish; remainder of hind tibia dark brown and distinctly contrasting with tarsus; remainder of legs (except slightly infuscate apex of hind femur) (pale) yellowish-brown; metasoma pale brown ventrally; antenna, complete pterostigma, parastigma and veins dark brown; wing membrane slightly infuscate.

Biology.— Unknown.

Variation.— Paratype has length of fore wing 5.2 mm, and of body 6.1 mm, length of ovipositor sheath 1.83 times fore wing, length of first metasomal tergite 2.5 times its apical width, vein 1-M of hind wing 1.6 times vein 1r-m, length of eye in dorsal view 5.0 times temple, and length of maxillary palp 2.1 times height of head.

Notes.— Very similar to *M. marginator* (e.g., the dark hind spurs, the infuscate, the rather narrow wings, the dark hind tibia, and the densely punctate face), but *marginator* has tarsal claws with a distinct lobe (cf. fig. 168), the ventral margin of the clypeus is distinctly concave, the hind tarsus is dark brown, vein cu-a of fore wing is less postfurcal and the fore femur is less slender.

M. infuscatus resembles *M. bicolor* by its pale hind tarsus, the comparatively far postfurcal vein cu-a of fore wing, and the slender fore femur. However, *M. bicolor* has

the tarsal claws with a distinct lobe, the wing membrane is subhyaline, the wings are somewhat wider, the ventral margin of the clypeus is more or less concave, the face is less sculptured, the hind tibia is yellowish medially, the hind spurs are ivory or yellowish, similar to hind tarsus.

Dark specimens of *M. nitidus* may resemble *M. infuscatus*, but *M. nitidus* has the hind tibial spurs brownish or yellowish, and paler than hind tarsus, the tarsal claws with a distinct lobe, the hind tarsus dark brown, the wing membrane subhyaline, the ventral margin of the clypeus concave and vein cu-a of fore wing less postfurcal.

Macrocentrus kurnakovi Tobias, 1976
(figs 341-351, 361, 363)

Macrocentrus kurnakovi Tobias, 1976: 129, 232, fig. 38-1; Haeselbarth, 1978: 29-30, figs 7, 9, 1983: 16; Haeselbarth & van Achterberg, 1981: 159-160, figs 7-12; Tobias, 1986: 257.

Material.— 15 ♀♀ + 2 ♂♂ (RMNH) from The Netherlands: (America (N.Br.), ex *Morophaga choragella* Denis & Schiffermüller); 't Harde; Hasselt; Heerde (G.); Nunspeet; Vlijmen; Warmond (from *Polyporus* spec.); Well (L., from dead *Betula*-stem); Wijster). 1 ♀ (RMNH), "[Germany], Gautzing 1875, 20.vii.[18]76 [rest illegible]"; 2 ♀♀ (Park Collection, RMNH), "Korea: Gyeongnam-do, Uju-gun, Sandbug-myeon, Icheon-ri, Mt. Gaji, 800 m, 20-21.vii.1987, J.-S. Park, RMNH'92"; 18 ♀♀ + 9 ♂♂ (RMNH, LIS, FFPRI), "Japan: Chiba Pref., Sanbu, ex *Morophagoides ussuriensis* (Caradja) (Tin.), coll. 2.iv.1991, em. 27.v.1991, E. Ishitani, RMNH'92"; 4 ♀♀ + 2 ♂♂ (RMNH), id., but coll. 30.iii.1991, em. 10-23.v.1991; 13 ♀♀ + 14 ♂♂ (RMNH), id., but coll. 2.iv.1991, em. 13.v-27.vi.1991; 12 ♀♀ + 7 ♂♂ (RMNH), id., but coll. 7.viii.1991, em. 2-24.ix.1991; 6 ♀♀ (RMNH), id., but coll. 6.vi.1991, em. 22.vii.1991; 39 ♀♀ + 22 ♂♂ (RMNH, LIS, FFPRI): "Japan: Ibaraki Pref., Kukizaki, ex *Morophagoides ussuriensis* (Caradja) (Tin.), coll. xi.1985, em. i.1986, E. Ohya, RMNH'92"; 1♂ (RMNH), "Museum Leiden, Japan, Gaga Spazaô, Miyagi Pref., 31.vii.1981, A. Takasu".

Note.— The mesosoma may be (nearly) completely black(ish), or completely orange or yellowish-brown (but anteriorly somewhat infuscate), the pterostigma yellowish and laterally somewhat infuscate, the hind tarsus ivory or pale yellowish; the hind tibia dark brown apically and remainder pale yellowish, vein C+SC+R of fore wing yellowish basally and dark brown apically. The Japanese series is somewhat aberrant, but intermediates are present among this large series. Distance between posterior ocellus and eye of female 1.0-1.2 times diameter of posterior ocellus (1.0-1.5 times in European females), length of eye 5.5-7.7 times temple (about 5 times), scapus ivory ventrally (dark brown in European females, but intermediates are present among the Japanese specimens), females are usually distinctly darker than females from Europe (especially the mesoscutum is blackish, but similar colouration is found among the specimens from The Netherlands), the sculpture of the third metasomal tergite is more extended than figured (but may also occur in European specimens), and males are similar to males from Europe.

Biology.— Solitary parasite of Tineidae in bracket fungi: *Morophaga choragella* (Denis & Schiffermüller, 1775 (= *M. boleti* (Fabricius, 1777)) (Haeselbarth & van Achterberg, 1981) and *Morophagoides ussuriensis* (Caradja), in shii-take mushrooms. The host is a destructive pest in cultures of this mushroom.

Distribution.— Austria, Czech Republic, Georgia (Abchazia), Germany, Hungary, Japan, Korea, Netherlands.

Macrocentrus linearis (Nees, 1812)
(figs 487-494)

Bracon linearis Nees, 1812: 13, fig.
Macrocentrus linearis; Watanabe, 1967: 10-11, figs 8, 11, 17, 21, 26, 1970b: 121; Shenefelt, 1969: 159-161; Tobias, 1971[1975]: 103, 104, 1976: 129, 1986: 257; Togashi, 1981: 51; Papp, 1983: 320, 1984: 42, 1987: 33; 1991: 12; Kotenko, 1989: 141, fig. 21; Koponen, 1992: 197.
Ichneumon abdominalis Fabricius, 1793: 183 (not *Ichneumon abdominalis* Geoffroy, 1785).
Macrocentrus abdominalis; Eady & Clark, 1964: 97 (synonymized with *M. linearis*).
Ichneumon abdominator Thunberg, 1822: 253.
Ichneumon fissura Thunberg, 1822: 261.
Rogas tenuis Ratzeburg, 1848: 64; Haeselbarth, 1979: 194 (synonymized with *M. linearis*).
Macrocentrus tenuis; Shenefelt, 1969: 179-180.
Macrocentrus iridescens French, 1880: 43; Watanabe, 1967: 11 (synonymized with *M. linearis*); Shenefelt, 1969: 158; Marsh, 1979: 188-189.
Macrocentrus amicroploides Viereck, 1912: 579; Watanabe, 1967: 11 (synonymized with *M. linearis*).
Macrocentrus gifuensis Ashmead, 1906: 191; Watanabe, 1967: 11 (synonymized with *M. linearis*), 1970b: 121; Shenefelt, 1969: 154.

Material.— 186 ♀♀ + 69 ♂♂ (RMNH, ITZ) from The Netherlands (Amsterdam; Andijk (ex *Pandemis heparana* (Denis & Schiffermüller, 1775)); Arkel; Bergen op Zoom; Blokker (ex *Ptycholoma lecheana* (Linnaeus, 1758) on apple); Best (N.B.); Broekhuizen (U., from cocoons on *Polygonatum*); Bunnik (ex *Ptycholoma lecheana* (Linnaeus, 1758), and *Pandemis heparana*); Diefdijk (G., ex *Pandemis heparana*); Drunen; Geldermalsen (ex *Archips podana* (Scopoli, 1763), and ex *Adoxophyes orana* (Fischer von Röslerstamm, 1834) on *Malus*); Hilversum; Hoge Veluwe (ex *Archips xylosteana* (Linnaeus, 1758), and ex *Tortrix viridana* Linnaeus, 1758); Kortenhoef; Leiden; Leidschendam; Lelystad (Oostvaardersplassen & Jagersbos); Melissant; Noordlaren (Gr.); Oegstgeest; Oostbroek (ex *Ptycholoma lecheana* on *Pyrus*); Oosthuizen (Gr.; ex *Pandemis heparana* (Denis & Schiffermüller, 1775)); Oostvoorne; Oostwold (Gr., ex *Archips podana* on *Malus*); Rijnsburg; Roosendaal (G.); Rotterdam (Lombardijen); Savelsbos (L.); Slenaken (L.); St. Pietersberg; Texel (ex *Pandemis heparana* (Denis & Schiffermüller, 1775); Udenhout; Ulvenhout (Ulvenhoutsebos); Waarder; Wageningen; Warmond; Wassenaar (in rotting *Hyacinthus*-leaves); Wijk (Gr., ex *Vanessa atalanta* (Linnaeus, 1758)); Wijster; Winterswijk; Woubrugge); 2 ♀♀ (RMNH), "[Germany], Wiesen/Spessart, e.l. vi.1960, leg. Haeselbarth/ aus Eichen-raupe"; 3 ♀♀ (RMNH), "[Germany], aus Eichenraupe, 11.vi.[19]69, Z. 144"; 1 ♀ (RMNH), "[Germany], Zengermoos, bei Ereding", "leg. 23.v.1977, Z.238, [on] *Prunus padus*"; 3 ♀♀ + 4 ♂♂ (RMNH), "France, Mont Ventoux (Vaucluse), P. du Merle", "greg. endopar. of larva of *Choristoneura hebenstreitella* (Müller, 1764) on *Quercus*, alt. 900 m, em. 6.vii.1979"; 2 ♀♀ (RMNH), id., but ex *Pandemis cerasana* (Hübner, 1786); 4 ♀♀ + 1 ♂ (RMNH), "France, Dépt. Vaucluse, M.J. Gijswijt", "Ventoux (Z), 22.vii.1978"; 1 ♂ (RMNH), "France, Mt. Ventoux, ex *Choristoneura sorbiana* (Hübner, 1799) [= *Choristoneura hebenstreitella*], P. du Merle"; 2 ♀♀ + 1 ♂ (RMNH), "France, Dépt. Vaucluse, M.J. Gijswijt", "Ventoux (Z), 22.vii.1978"; 1 ♀ + 1 ♂ (RMNH), "Spain: Huesca, Benasque, 1500 m, vii.1981, H.G.M. Teunissen, RMNH'82"; 2 ♀♀ (RMNH), "[Hungary], Budapest, 1928, Biró"; 2 ♀♀ (RMNH), "Hungaria, Nagykovácsi, Juliannamajor", "18.vi.1976, leg. Balás K.", "ex *Pandemis heparana* D. & Sch., 30.vi.1976 [on] *Malus domestica* Borkh."; 3 ♀♀ (RMNH), "Hungaria, Matrafüred", v.1977, leg. Szontagh", "ex *Tortrix viridana* L. [on] *Quercus petraea*, vi.1977"; 1 ♀ (RMNH), id., but Nagyhegyes, 15.vi.1979; 1 ♀ + 2 ♂♂ (RMNH), "Bulgaria, ex coll. Zaykov, RMNH, Leiden, 1991", "Velingrad, 5.viii.1979"; 2 ♀♀ (RMNH), id., but 18-20.viii.1977; 1 ♀ (RMNH), id., but 10.viii.1978; 1 ♀ (RMNH), id., but Galabovo, 30.vii.1978; 1 ♀ (RMNH), id., but Galabetic, 30.vii.1978; 1 ♂ (RMNH), id., but Sv. Marina, 13.vii.1976; 1 ♀ (RMNH), id., but Ptshelarovo, 4.vii.1976; 1 ♀ (RMNH), id., but Habrino, 700 m; 3 ♂♂ (RMNH), id., but Kostinbrod, 4.vi.1980; 1 ♀ (RMNH), id., but n. Bejanovshtilso, 8.vii.1978; 1 ♀ + 2 ♂♂ (RMNH), id., but n. R. partizani, 25.vi.1978; 1 ♂ (RMNH), id., but h. Teheran, 1.vii.1978; 1 ♀ (RMNH), id., but Orechez, 10.vii.1968, A. Germanov; 1 ♂ (RMNH), id., but Parvomay, 23.ix.1981, J. Kolarov; 2 ♂♂ (RMNH), "[Italy], Veneto, Legnago, 9.vi[19]58"; 1 ♀ (RMNH), "[Greece], Kreta, Amnissos, 23.iv.1972, D.C. Geijskes"; 1 ♀ (RMNH), "Japan, Kashidate, Hachijok Isl., Tokyo Met. (300 km S), 8.x.1980, A. Takasu"; 1 ♀ + 1 ♂ (RMNH), "S Korea, Suweon, ex Tortricid on pear, em. 9.viii.1974, J.C. Paik"; 1 ♀ (RMNH), "Korea, I.A.S., 41-105, 9.viii.1974, J.C. Paik", "ex Tortricid on pear".

Note.— This species is very variable in colour: it varies from completely yellowish-brown (common) to largely black with many intermediate stages of darkening, especially of the metasoma.

Biology.— Reported as a gregarious parasite of numerous species belonging to the Tortricidae. Also recorded as parasite of Gelechiidae, Coleophoridae, Thyatiridae, Lymantriidae, Geometridae and Yponomeutidae (Shenefelt, 1969). The record of a Nymphalid as host (see above) must be an error. The cocoons are dark brown, longitudinally arranged and united by a greyish silken cover.

Distribution.— Holarctic (including Japan, and transcontinental in North America), very common.

Macrocentrus madeirensis spec. nov.
(figs 331-340)

Material.— Holotype, ♀ (RMNH), "Museum Leiden, Madeira (Port[ugal], Pico Ariero, 1600 m", "from *Erica* spp., 9.x.1981, A. v. Harten, no. 9". Paratype: 1 ♂ (RMNH), topotypic, and same date.

Holotype, ♀, length of body 4.0 mm, of fore wing 3.9 mm.

Head.— Remaining antennal segments 19 (of male 44), length of third segment 1.2 times fourth segment, length of third, and fourth segments 7.0, and 6.0 times their width, respectively; length of maxillary palp 1.5 times height of head; maxillary and labial palpi with 6 and 4 segments, respectively; length of eye in dorsal view 2.7 times temple (fig. 340); temples gradually narrowed posteriorly (fig. 340); OOL:diameter of posterior ocellus:POL = 7:4:8; frons largely flat or slightly convex; face rather flat, except for a narrow convex triangle medially, and smooth; clypeus rather convex, smooth; ventral margin of clypeus straight; length of malar space 0.6 times basal width of mandible; mandible medium-sized, distinctly twisted apically, its second tooth acute, nearly half as long as first tooth, which is robust, long, acute (fig. 338).

Mesosoma.— Length of mesosoma 1.5 times its height; side of pronotum smooth, except for oblique crenulate groove medially, some rugae posteriorly; prepectal carina complete; precoxal sulcus distinctly punctate, interspaces wider than diameter of punctures and with some microsculpture; remainder of mesopleuron sparsely and finely punctate; metapleuron sparsely punctate medially and with some microsculpture and with some rugae ventrally; metapleural flange large and obtuse apically; mesoscutal lobes smooth, lobes largely glabrous; side of scutellum smooth; surface of propodeum finely, densely and transversely striate, without median carina.

Wings.— Fore wing: subbasal cell glabrous apically, and without distinctly pigmented patch (fig. 339); r:3-SR:SR1 = 6:11:34; 1-CU1:2-CU1 = 1:10; 1-CU1 widened and about 0.3 times as long as cu-a (fig. 339); cu-a straight anteriorly, slightly widened posteriorly, and parallel with 3-CU1 posteriorly (fig. 339); 2-SR:3-SR:r-m = 9:11:6; 2A unsclerotized basally, membrane basad of it sparsely setose. Hind wing: SC+R1 straight; marginal cell parallel-sided apically; 1-M 3.0 times 1r-m.

Legs.— Hind coxa superficially and finely striate, except basally; tarsal claws without ventral lobe or lamella, setose (fig. 332); fore femur slender and distinctly curved (fig. 336); length of fore spur 0.25 times fore basitarsus; length of femur, tibia and basitarsus of hind leg 6.5, 13.5 and 8.8 times their width, respectively; length of

spurs of hind tibia 0.35 and 0.40 times hind basitarsus; fore, middle and hind trochantelli with 4, 4, and 3 teeth, respectively.

Metasoma.— Length of first tergite 1.9 times its apical width (fig. 335), its surface aciculate, medio-basally rather concave; dorsal carinae of first tergite absent; second tergite obliquely aciculate except medio-anteriorly and posteriorly; basal half of third tergite largely smooth, except for some indistinct aciculation; remainder of metasoma largely smooth; length of ovipositor sheath 0.96 times fore wing; apex of ovipositor rather robust, with distinct notch subapically.

Colour.— Yellowish-brown; apices of fourth and following antennal segments and ovipositor sheath dark brown; apex of hind tibia, and hind tarsus slightly infuscate; pronotum largely, mesopleuron anteriorly and dorsally, metanotum, propodeum, metasoma dorsally, more or less dark brown; pterostigma and veins brown; wing membrane subhyaline.

Biology.— Unknown.

Variation.— Male paratype has length of fore wing 4.3 mm, and of body 4.4 mm; length of first metasomal tergite 2.2 times its apical width, its surface medially largely superfically V-shaped striate; scapus only slightly wider than of female; apical antennal segment with distinct spine; mesopleuron, mesosternum largely, hind tarsus, and stemmaticum dark brown.

Note.— Resembles *M. linearis*, but can be easily separated because of the normal shape of the second tooth of the mandible (fig. 338), the sculpture of the metasoma and the length of the ovipositor sheath.

Macrocentrus mandibularis Watanabe, 1967

Macrocentrus mandibularis Watanabe, 1967: 10-11, figs 6, 12, 13, 15, 23.

Biology.— Parasite of Tortricidae: *Archips fuscocupreanus* Walsingham (Watanabe, 1967).

Distribution.— Japan.

Macrocentrus marginator (Nees, 1812)
(figs 199-206)

Bracon marginator Nees, 1812: 14.

Macrocentrus marginator; Watanabe, 1967: 6, figs 4, 10, 18; Shenefelt, 1969: 162-163; Tobias, 1971[1975]: 103, 1976: 131, 1986: 263; Papp, 1980: 404, 1982a: 108, 1983: 320, 1987: 33; Haeselbarth, 1983: 17, 1985: 17, 1989: 20; van Achterberg & Haeselbarth, 1983: 42, 47-49, figs 26-31, 34-37; van Achterberg & Belokobylskij, 1987: 250, figs 77-79, 82-83, 92.

Rogas rugator Ratzeburg, 1848: 66; Haeselbarth, 1979: 194 (synonymized with *M. marginator*); van Achterberg & Haeselbarth, 1983: 42.

Macrocentrus rugator; Shenefelt, 1969: 170.

Material.— 175 ♀♀ + 7 ♂♂ (RMNH, ITZ) from The Netherlands (Ameland (Hollum); Asperen; Beneden Leeuwen (ex *Synanthedon tipuliformis* (Clerck, 1759) in *Ribes nigrum* Jansz.); Bergen aan Zee (Zuider-Achterveld); Bergen op Zoom; Berghem; Best; Blokker (ex *Synanthedon tipuliformis*); Bunde (Voulwames); Deventer; Drunen; Ede; Epe; Flevopolder (ex *Paranthrene tabaniformis* (Rottemburg, 1775)); 's Gravenhage; Griendsveen (Mariapeel); Hasselt; Heemstede; Heerde; Meijendel; Melissant;

Middelharnis; Neerijnen (Waardenburg); Nunspeet; Oostvoorne; Opheusden (ex *Synanthedon tipuliformis* in *Ribes nigrum* Jansz.); Oploo; Ouderkerk; Overveen; Putten (ex *Synanthedon culiciformis* (Linnaeus, 1858) in *Betula*); Putten (Gld.); Rockanje (Stekelhoekduin); Rouveen; Schaesberg (Heihof); L.; Schayk; Scheveningen (Westduin): Schiermonnikoog; St. Pietersberg; Tegelen; Terschelling; Tongeren; Udenhout (De Brand); Wassenaar (Zuydwijk); Wijster; Zwammerdam); 1 ♀ (RMNH), "[Poland], Datz[ig], Brischke"; 1 ♀ (RMNH), "[Germany], Bay., Pfeinach, 18.viii.[19]78, leg. U. und A. Walter"; 2 ♀♀ (RMNH), "Germ[any], Taschenb[erg]"; 2 ♀♀ (RMNH), "France, Ht. Alpes, Eygliers, 1000 m, 26.vii.1987, A. Teunissen"; 1 ♀ (RMNH), "France, Ht. Alpes, Col de Granon, 2250 m, 27.vii.1987, A. Teunissen"; 1 ♀ (RMNH), "[Italy], Veneto, Legnaro, 30.vii.1964"; 1 ♀ + 1 ♂ (RMNH), "Hungaria, Berneclbaráti, ix.1986, Szöcs", "ex *Synanthedon tipuliformis* Cl. [on] *Ribes rubrum* L."; 4 ♀♀ (RMNH), "(Rom[ania]), Tusnad-Bai, cioll. 9.vi.1992", "ex *Zeiraphera rufimitrana* [Herrich-Schäffer, 1859; Tortricidae]"; 1 ♀ (RMNH), "Bulgaria, ex coll. Zaykov, RMNH, Leiden, 1991", "Belastica, Rhodopi, 20.iv.1978, leg. J. Kolarev"; 1 ♀ (RMNH), id., but Chrabrino, 8.vii.1978, A. Zaykov; 1 ♂ (RMNH), id., but Belica, 8.viii.1985; 1 ♀ (RMNH), id., but St. planina, v. Stoletor, 7.vi.1982, leg. J. Kolarev; 1 ♀ (RMNH), "Museum Leiden, Japan, Gaga Spa-zaô, Niyagi Pref., 31.vii.1981, A. Takasu"; 1 ♀ (EIS), "[Russia], Saghalien, K. Tamanuki", "*Macrocentrus marginator* (Nees), ♀. Det. C. Watanabe, 1966"; 1 ♀ (EIS), "[Japan], Soranuma, Hokkaido, 17.vi.1967, M. Suwa", "*Macrocentrus marginator* (Nees), ♀. Det. C. Watanabe, 1967".

Note.— The hind coxa and hind femur of one female from Japan are largely infuscate or dark brown.

Biology.— Recorded as solitary parasite of species of Sesiidae. Also (less commonly) of Tortricidae and Lycaenidae (Shenefelt, 1969), but this needs confirmation.

Distribution.— Holarctic, including North Korea and Japan.

Macrocentrus mellicornis van Achterberg & Belokobylskij, 1987 (figs 207-217)

Macrocentrus mellicornis van Achterberg & Belokobylskij, 1987: 248-250, figs 64-74, 90.

Material.— Type series from Far East Russia and Korea (van Achterberg & Belokobylskij, 1987).

Biology.— Unknown.

Distribution.— Russia (Primoryan Territory), North Korea.

Macrocentrus nidulator (Nees, 1834) (figs 191-198)

Rogas nidulator Nees, 1834: 204.

Macrocentrus nidulator; Watanabe, 1967: 6-7, fig. 5; Shenefelt, 1969: 164; Tobias, 1971[1975]: 103, 1976: 131, 1986: 260; Papp, 1971: 53, 1973: 9, 1987: 33, 1993: 36; van Achterberg & Haeselbarth, 1983: 41, 45-47, figs 16, 17, 19-25, 46; O'Connor et al., 1991: 452; Koponen, 1992: 197.

Rogas longicaudis Herrich-Schäffer, 1838: no. 156; Shenefelt, 1975: 1236; van Achterberg & Haeselbarth, 1983: 41 (provisionally synonymized with *M. nidulator*).

Macrocentrus procerus Costa, 1884: 172; Shenefelt, 1969: 168; van Achterberg & Haeselbarth, 1983: 41 (synonymized with *M. nidulator*); Papp, 1992: 41.

Macrocentrus curticaudis Telenga, 1950: 298; Shenefelt, 1969: 151; Tobias, 1971[1975]: 103, 1986: 260 (lectotype designation); van Achterberg & Haeselbarth, 1983: 42 (synonymized with *M. nidulator*).

Material.— Lectotype of *M. procerus*, ♀ (Costa Collection, Portici) from Sardinia; 43 ♀♀ + 12 ♂♂ (RMNH, ITZ from The Netherlands (Amsterdam; Arcen (Hamert); Asperen; Bemelen; Bergen op Zoom; de Bilt; Bilthoven; Bleiswijk; Botshol; Bovenkerk (N.H.); Buitenhuizen; Cadier; Colmont

(Vrakelberg); den Dolder; Echt; Elsloo; Gulpen (L.); 't Harde; Heerde; Hilversum; Hoek ("Braakman"; Z.Vl.); Hontenisse (Z.Vl.); Leiden (Knotterpolder); Meijendel; Nunspeet; Oosterhout (N.B.); Oostkapelle; Oostvoorne; Opsterland; Putten (Gld.); Rijswijk (Gld.); Rouveen; Son (Oudmeer); St. Pietersberg; Udenhout ("de Brand"); Venlo; Vijlen; Wadenoyen; Wassenaar; Westervoort; Yerseke); 1 ♀ (RMNH), "[SE England], Dorking, 51°14'25"N, 0°21'40"W, 30.vii.1963, F.A. Bink"; 1 ♂ (RMNH), "Norge, Oppland, Lom-lia, 26.vi-20.vii.1978, G. van Rossem"; 1 ♂ (RMNH), "Denmark, N. Jutland, Lundtofte Camping nr Hjörring (Hjörring = 57°28'N-9°59'E), 31.vii.21971, Ph. Pronk (71.073)"; 1 ♂ (RMNH), "[Germany], D.D.R., Biesenthal, nr Eberswalde, 30.viii.1983, C. van Achterberg"; 1 ♀ (RMNH), "[Germany], Bayern, NM, Rappersdorf, Blank, 30.viii.[19]87"; 1 ♀ (RMNH), id, but Berching; 1 ♀ + 1 ♂ (RMNH), "Museum Leiden, France; dept. Aisne, Festieux, ca 8 km ESE Laon, in kalkgrasland, 14.viii.1983, leg. P. Thomas"; 1 ♀ (RMNH), "France, Aude, 5.vii.[19]88, Lespinassiere, Le Sahuc, 700 m, clairière en forêt, J. Hamon rec."; 1 ♀ (RMNH), "OÖ [= Oberösterrreich], Bad Leonfelden, Silberhartschlag, 48,560°N/14,291°Ö, 20.vii.[19]83, leg. A. u. W. Walter"; 1 ♂ (RMNH), "Oostenrijk, Niederthal, 1550 m, 30.vii.1951, L.D. Brongersma"; 1 ♀ (RMNH), "Spanje, Camino de Santiago, 7.viii.[19]83, E.A.M. Speijer"; 1 ♂ (RMNH), "Russie, Kamaï, 20 km SE Kungur, 14-15.viii.1967, W.J. Pulawski"; 2 ♂♂ (RMNH), "Bulgaria, ex coll. Zaykov, RMNH, Leiden, 1991", "Beklemeto, 10.viii.1986, leg. Zaykov"; 1 ♀ (RMNH), id., but St. plania Jamna, 10.viii.1968, leg. A. Germanov; 1 ♀ + 1 ♂ (EIS), "[Japan], Kyoto, Honshu, 28.ix.1965, H. Takada", "*Macrocentrus nidulator* (Nees). Det. C. Watanabe, 1967".

Note.— The metasoma may be largely smooth dorsally and strongly shiny.

Biology.— Reported as solitary parasite of Tortricidae and Gelechiidae in flowerheads (van Achterberg & Haeselbarth, 1983).

Distribution.— Europe, Russia (including South Siberia), Mongolia, Japan.

Macrocentrus nigrigenuis spec. nov.
(figs 470-476)

Macrocentrus resinellae p.p.; Watanabe, 1967: 9, figs 7, 24.

Material.— Holotype, ♀ (EIS), "[Japan], Sapporo, Hokkaido, v.1958, M. Inoue", "Host[:] *Archips piceanus* Linné", "*Macrocentrus resinellae* (Linné), ♀. Det. C. Watanabe, 1967". Paratypes: 9 ♀♀ + 3 ♂♂ (EIS, RMNH); 3 ♀♀, topotypic, and belonging to same batch; 6 ♀♀ + 3 ♂♂, "[Japan], Asahikawa, Hokkaido, 12-17.vii.1965, K. Kamijo", "8.vii.[19]65, No. 1" (or "9.vii.[19]65, No. 114", or "19.vi.[19]65, No. 117"), "Host[:] *Choristoneura coniferana* Issiki", "*Macrocentrus resinellae* (Linné), ♀. Det. C. Watanabe, 1967".

Holotype, ♀, length of body 3.8 mm, of fore wing 3.7 mm.

Head.— Antennal segments 47 (right) or 46 (left), length of third segment 1.4 times fourth segment, length of third, fourth and penultimate segments 6.3, 4.7, and 2.0 times their width, respectively; apical antennal segment with distinct spine; length of maxillary palp 1.4 times height of head; maxillary and labial palpi with 6 and 4 segments, respectively; length of eye in dorsal view 4.7 times temple (fig. 472); temples gradually narrowed posteriorly (fig. 472); OOL:diameter of posterior ocellus:POL = 8:4:8; frons flat; face slightly convex, largely smooth; clypeus distinctly convex, largely smooth; ventral margin of clypeus straight; length of malar space 0.7 times basal width of mandible; mandible medium-sized, distinctly twisted apically, its second tooth comparatively short and wider than first tooth, which is robust, much longer than second tooth, acute (fig. 473).

Mesosoma.— Length of mesosoma 1.4 times its height; no pronope; side of pronotum smooth, except for some rugulosity medially, posterior groove somewhat

sculptured; prepectal carina absent ventrally, distinct laterally; precoxal sulcus sparsely punctate, interspaces much wider than diameter of punctures; remainder of mesopleuron punctate; metapleuron distinctly punctate medially and rugose ventrally; metapleural flange small, obtuse apically; mesoscutal lobes smooth, lobes setose only near notauli, and medial lobe as convex as lateral lobes; side of scutellum smooth; surface of propodeum finely, and densely rugose, without median carina, except a weak ruga.

Wings.— Fore wing: marginal cell comparatively wide (fig. 470); subbasal cell evenly setose, and without distinctly pigmented patch, only somewhat darker posteriorly (fig. 475); r:3-SR:SR1 = 5:12:30; 1-CU1:2-CU1 = 1:11; 1-CU1 not or hardly widened (fig. 475); cu-a straight, somewhat curved posteriorly, and more oblique than 3-CU1 (fig. 475); 2-SR:3-SR:r-m = 7:12:4; 2A unsclerotized basally (only pigmented), and membrane basad of it sparsely setose. Hind wing: SC+R1 evenly curved; marginal cell parallel-sided apically; 1-M 1.8 times 1r-m (fig. 470).

Legs.— Hind coxa sparsely punctate, without striae; tarsal claws rather slender, without ventral lobe, spiny setose (fig. 474); fore femur slender and distinctly curved (fig. 476); length of fore spur 0.3 times fore basitarsus; length of femur, tibia and basitarsus of hind leg 7.7, 13.6 and 11.7 times their width, respectively; length of spurs of hind tibia 0.30 and 0.35 times hind basitarsus; fore, middle and hind trochantelli with 3, 4, and 4 minute teeth, respectively.

Metasoma.— Length of first tergite 2.0 times its apical width (fig. 471), its surface finely longitudinally striate, medio-basally distinctly concave; dorsal carinae of first tergite absent; second and third tergites (except apex of latter) finely longitudinally striate; remainder of metasoma smooth; length of ovipositor sheath 1.42 times fore wing; apex of ovipositor slender, with shallow notch subapically.

Colour.— Blackish; pedicellus, tegulae, legs (including spurs, but tarsi, and hind tibia (except for a pale subbasal band) dark brown) and hind trochantellus yellowish-brown; middle tibia (except subbasally) slightly infuscate; palpi (except pale yellowish fourth and fifth segments of maxillary palp), pterostigma and veins largely dark brown, but veins SR1 and 1-R1 of fore wing yellowish; pterostigma with small pale spot basally; wing membrane slightly infuscate.

Biology.— Reported as a gregarious parasite of Tortricidae: *Archips oporana* (Linnaeus, 1758) (as *A. piceanus* (Linnaeus, 1758) listed by Watanabe, 1967), and *Choristoneura coniferana* Issiki. Not examined but also listed by Watanabe (1967) are specimens reared from *Choristoneura diversana* (Hübner, 1817) and *Ariola* spec.; all hosts living on *Pinus sylvestris* Linnaeus.

Variation.— Antennal segments of ♀ 44(1), 45(2), 46(4), 47(3), 48(1), of ♂ 46(3); palpi may be yellowish basally; length of maxillary palp 1.3-1.4 times height of head; length of fore wing 3.2-4.0 mm, and of body 3.2-4.5 mm; length of first metasomal tergite 1.6-2.1 times its apical width; length of eye in dorsal view 3.0-5.0 times temple; vein 1-M of hind wing 1.8-2.5 times vein 1r-m; length of ovipositor sheath 1.36-1.55 times fore wing; apex of hind femur yellowish or dark brown; base of hind tibia usually dark brown, but may be pale yellowish.

Distribution.— Japan.

Macrocentrus nitidus (Wesmael, 1835) (figs 218-224, 417, 418)

Rogas nitidus Wesmael, 1835: 175.
Macrocentrus nitidus; Shenefelt, 1969: 165; Papp, 1973: 9, 1980: 404, 1991: 12; van Achterberg & Haeselbarth, 1983: 42, 50-51, figs 32, 33, 38-45; Tobias, 1986: 262; van Achterberg & Belokobylskij, 1987: 251, figs 75, 76, 85-89, 91; Koponen, 1992: 197-198.
Macrocentrus pilosus p.p.; Watanabe, 1967: 7.

Material.— 104 ♀♀ + 7 ♂♂ (RMNH, ITZ) from The Netherlands (Asperen; Baarle-Nassau; Bilthoven; Breukelen; Delft; Ede (Gld.); Hasselt; Kaatsheuvel (Plantloon); Melissant; Middelharnis; Muiderberg; Nunspeet; Oostkapelle; Oostvoorne; Ried (Fr.); Ritchem (Z.); Rockanje (Stekelhoekduin); Tongeren; Udenhout (de Brand); Waarder; Wassenaar (Zuydwijk); Westerschouwen; Wijster); 1 ♀ (RMNH), "Excursie Frankrijk, Auberviille, (Seine Inf.), 26.v.1955"; 4 ♀♀ (RMNH), "Suisse, Fiesch (VS), 22-27.ix.1980, 1100 m, leg. H. Teunissen"; 1 ♀ (RMNH), "Helvetia, Meyer-Dür"; 2 ♀♀ (RMNH), "Schweiz, Tessin, Valle Maggia, Bignasco, 21.vi.1978, C.J. Zwakhals"; 1 ♀ (RMNH), "[Italy], Udine, 13.viii.[19]85", "ex *Gypsonoma aceriana* [Duponchel, 1843; Tortr.] leg. Allegro"; 1 ♀ (RMNH), "Bulgaria, ex coll. Zaykov, RMNH, Leiden, 1991", "Velingrad, Rhodopi, 20.viii.1977, leg. A. Zaykov"; 1 ♀ (RMNH), id., but Kostrubrod,20.vii.1980; 1 ♀ (RMNH), id., but Vitocha, 30.vi.1982, leg. J. Kolarov; 3 ♀♀ (RMNH), id, but Dospat, 24.vi.1981; 4 ♀♀ (ITZ, RMNH), "Maroc, Ht. Atlas, Massif Toubkal, Arhbalou, 43 km S Marrakech (route S 513), 1000 m, 15-23.vii.1977, v. Oorschot, Houkes & Oosterbroek"; 1 ♀ (EIS), "No. 9, 14.vi.1966", "[Japan], Asahigawa, Hokkaido, 15.vii.1966, K. Kamijo", Host[:] ?*Epinotia*", "Paratype *Macrocentrus pilosus* Watanabe, ♀".

Notes.— The mesosoma may be largely (reddish or orange) brown, resembling *M. bicolor* in this respect. Small specimens (length of fore wing about 3 mm) occur, having rather robust antennal segments. However, this character is quite variable and intermediates have been found. The paratype of *M. pilosus* has the subbasal cell of fore wing completely setose (which occurs also rather frequently in West European specimens), the hind tibia largely dark brown (but not strongly contrasting with the comparatively pale basal band) and the clypeus rather convex.

Biology.— Reported as a solitary parasite of Tortricidae (Shenefelt, 1969; van Achterberg & Haeselbarth, 1983; Tobias, 1986).

Distribution.— Europe, North Africa, Central Asia, Mongolia, Japan.

Macrocentrus oriens van Achterberg & Belokobylskij, 1987 (figs 248-256)

Macrocentrus oriens van Achterberg & Belokobylskij, 1987: 253-255, figs 43-51.

Material.— Type series examined (van Achterberg & Belokobylskij, 1987).

Biology.— Unknown.

Distribution.— Russia (Far East: Magadan Territory).

Macrocentrus pallipes (Nees, 1812) (figs 463-466)

Bracon pallipes Nees, 1812: 14.
Macrocentrus pallipes; Watanabe, 1967: 12; Shenefelt, 1969: 166-167; Tobias, 1971[1975]: 103, 104, 1976: 129, 1986: 253; Papp & Reichart, 1973: 367, 370; Koponen, 1992: 198; Vidal, 1993: 6.
Macrocentrus pallidipes auct.; invalid emendation.

Material.— 2 ♀♀ (RMNH), "N England, Co. Durham, Upper Teesdale, Langdon Beck, c 600 m, 10.vi.1984, C. v.Achterberg"; 13 ♀♀ + 16 ♂♂ (RMNH) from The Netherlands (Lienden (ex *Spilonota ocellana* (Denis & Schiffermüller, 1775) and *Hedya nubiferana* (Haworth, 1811)); Schiermonnikoog (ex *Clepsis spectrana* (Treitschke, 1830)); Oostbroek (ex *Hedya nubiferana* (Haworth, 1811)); Wassenaar (Zuydwijk); Wijster); 3 ♀♀ + 3 ♂♂ (RMNH), "D [= Germany], Raindorf, Preetz, Schwontinewiesen, ex *Clepsis spectrana* [on *Glyceria maxima*], leg. 23.v.1990, em. 16.vi.1990, leg. Pusch"; 5 ♂♂ (RMNH), "D, Kiel, Malfsee, Eiderniederung, [em.] 17.vi.1990, leg. Pusch, [ex *Clepsis spectrana* on *Glyceria maxima*; cluster of cocoons in a rolled up leave)"; 2 ♀♀ + 2 ♂♂ (RMNH), "[Germany], Lütgenburg, Niedermühle, Niederunggeschlürft (Zucht), 21.vi.1989, leg. Pusch, [ex ?*Clepsis spectrana* on *Glyceria maxima*]"; 27 ♀♀ (RMNH) "W. Deutschland, (Ndr. Wf.), Gerolstein, 1.5 km SE: Heiligenstein. LA3465, 19.v.1986, S. Richter, E.J. van Nieukerken", "ex *Aphelia paleana* Hbn. on *Colchicum autumnale*, EvN 86030, em. 1986"; 2 ♂♂ (RMNH), "Austria, Slzbg, Filzmoos, 1150 m, 9-11.viii.1986"; 2 ♂♂ (RMNH), "Austria, Slzbg, Filzmoos, 1150 m, 9-11.viii.1986, C.J. Zwakhals"; 1 ♀ (BMNH), "Switzerland, Grindelwald, viii.1937, G. Nixon"; 2 ♀♀ (EIS), "[Japan], Asahigawa, Hokkaido, 24.vii.1966, S. Suzuki", "Host[:] Tortricid on *Cirsium boreale*", "*Macrocentrus pallipes* (Nees). Det. C. Watanabe, 1967".

Biology.— Recorded as gregarious parasite of various Tortricidae and Oecophoridae (Eady & Clark, 1964), on low plants. Cocoons dark brown, aggregated in an irregular cluster, and covered by a thin layer of greyish or brownish silk.

Distribution.— Europe, Japan.

Macrocentrus parki spec. nov.
(figs 425-436)

Material.— Holotype, ♀ (RMNH), "Korea: Gyeongnam-do, Ulju-gun, Sangbug-myeon, Icheon-ri, Mt. Gaji, 800 m, 6-13.vi.1989, J.-S. Park, RMNH'92", "3094". Paratype: 1 ♀ (Park Coll.), topotypic and same date.

Holotype, ♀, length of body 4.2 mm, of fore wing 3.8 mm.

Head.— Antennal segments 40, apical segments not geniculate (fig. 432), length of third segment 1.5 times fourth segment, length of third, fourth, and penultimate segments 6.3, 4.3, and 2.7 times their width, respectively, apical segment without spine; length of maxillary palp 1.4 times height of head (fig. 429); maxillary and labial palpi with 6 and 4 segments, respectively; labial palp moderately short, segments medium-sized, third segment somewhat shorter than fourth segment (fig. 429); length of eye 1.9 times temple in dorsal view (fig. 427); temples behind eyes parallel-sided, roundly narrowed posteriorly (fig. 427); OOL:diameter of posterior ocellus:POL = 8:3:9; frons largely convex; face normal (fig. 426), slightly convex, finely and sparsely punctate; clypeus strongly convex, sparsely punctate; ventral margin of clypeus straight; length of malar space 0.9 times basal width of mandible; mandible medium-sized, distinctly twisted apically, its second tooth about as wide as first tooth, about half as long as first tooth, and its first tooth robust, acute (fig. 434).

Mesosoma.— Length of mesosoma 1.3 times its height; side of pronotum with some crenulae antero-medially, and some rugae posteriorly, remainder smooth; prepectal carina complete, rather weak; precoxal sulcus anteriorly sparsely punctate, and remainder reticulate-rugose; remainder of mesopleuron sparsely punctate; metapleuron sparsely punctate dorsally, and rugose ventrally; metapleural flange narrow, lamella-like, broadly obtuse apically; mesoscutal lobes sparsely punctate, setose, but lateral lobes only setose near notauli and anteriorly, middle lobe (as in *M. blandoides*) short, and anteriorly truncate; side of scutellum smooth, except for some punctures;

surface of propodeum moderately rugose medially, irregularly anteriorly and transversely posteriorly, without median carina.

Wings.— Fore wing: subbasal cell evenly and densely setose, and without patch (fig. 430); r:3-SR:SR1 = 5:7:38; 1-CU1:2-CU1 = 1:45; 1-CU1 widened, but short (fig. 430); cu-a straight, and less oblique than 3-CU1 (fig. 425); 2-SR:3-SR:r-m = 10:7:4; 2A sclerotized basally and membrane basad of it moderately setose. Hind wing: with 3 hamuli; SC+R1 evenly curved; marginal cell parallel-sided apically; 1-M 2.2 times 1r-m (fig. 425).

Legs.— Hind coxa sparsely punctate; tarsal claws slender, with long apical tooth, without ventral lobe, setose (fig. 431); fore femur rather short and distinctly curved (fig. 433); length of fore spur 0.4 times fore basitarsus; length of femur, tibia and basitarsus of hind leg 5.9, 11.0 and 11.0 times their width, respectively; length of spurs of hind tibia 0.30 and 0.40 times hind basitarsus; fore, middle and hind trochantelli with 3, 4, and 3 minute teeth, respectively.

Metasoma.— Length of first tergite 2.2 times its apical width (fig. 428), its surface coarsely (sub)longitudinally striate, medio-basally distinctly concave; dorsal carinae of first tergite absent; second tergite coarsely longitudinally striate, except narrowly posteriorly; anterior two-fifths of third tergite finely striate; remainder of metasoma smooth; length of ovipositor sheath 1.02 times fore wing; apex of ovipositor very slender, without notch subapically (fig. 435); hypopygium broadly truncate medio-posteriorly (fig. 430).

Colour.— Blackish or dark brown; palpi, scapus and pedicellus, tegulae, legs, basal 0.6 of vein C+SC+R of fore wing and postero-dorsal corner of pronotal side pale brownish-yellow; remainder of antenna brown basally and dark brown apically; ventral half of metasoma and hypopygium yellowish-brown; remainder of veins and pterostigma (except basally and narrowly apically) dark brown; base and apex of pterostigma rather conspicuously, and parastigma largely, ivory; wing membrane subhyaline.

Biology.— Unknown.

Variation.— Length of first metasomal tergite 2.0-2.2 times its apical width; length of ovipositor sheath 0.95-1.02 times fore wing; postero-dorsal corner of pronotal sides may be dark brown.

Notes.— May be confused with *M. blandoides*, but *parki* is larger, has longer palpi, the scapus, pterostigma and parastigma are paler, the face is less transverse, the number of antennal segments is higher, the body of females is darker, and the hypopygium is not emarginate.

Closely related to *M. oriens*, but the latter has antenna with about 34 segments, scapus and pedicellus of ♀ brownish ventrally, fore femur more robust (cf. fig. 264) and mesoscutum reddish/orange-brown (blackish in *M. parki*).

Named after its collector, the hymenopterist Prof. Dr J.-S. Park (Kyongnam), who kindly supplied me with his intersting collection of Macrocentrinae from Korea.

Macrocentrus pilosus Watanabe, 1967
(figs 309-317)

Macrocentrus pilosus Watanabe, 1967: 7, figs 3, 19.

Material.— Holotype (EIS),"[Japan], Sapporo, Hokkaido, 22.ix.1965, K. Kusig", "Holotype, *Macrocentrus pilosus* Watanabe ♀". Paratypes: 2 ♀♀ (EIS), topotypic, 22.ix.1965 and 20.ix.1966, respectively.

Note.— One paratype (reared from *Epinotia* spec. on *Abies*) belongs to *M. nitidus*; it has the length of the malar space 1.2 times basal width of mandible, the hind tarsus dark brown (ivory in *M. pilosus*) and the clypeus rather convex.

Biology.— Unknown.

Distribution.— Japan.

Macrocentrus resinellae (Linnaeus, 1758)
(figs 318-322)

Ichneumon resinellae Linnaeus, 1758: 565.
Macrocentrus resinellae; Shenefelt, 1969: 169; Tobias, 1971[1975]: 103-105, 1976: 129, 1986: 257; Papp, 1982b: 62, 1991: 12; Koponen, 1992: 198.
Rogas flavipes Ratzeburg, 1844: 59; Haeselbarth, 1979: 193 (synonymized with *M. resinellae*).
Macrocentrus flavipes; Shenefelt, 1969: 153.
Rogas interstitialis Ratzeburg, 1844: 60; Haeselbarth, 1979: 194 (synonymized with *M. resinellae*).
Macrocentrus interstitialis; Shenefelt, 1969: 157.
Rogas obscurator Ratzeburg, 1848: 64; Haeselbarth, 1979: 194 (synonymized with *M. resinellae*).
Macrocentrus obscurator; Shenefelt, 1969: 166.
Helcon intricator Ratzeburg, 1852: 247. **Syn. nov.**
Macrocentrus intricator; Shenefelt, 1969: 157.
Macrocentrus punctifrons Thomson, 1895: 2211; Eady & Clark, 1964: 124 (synonymized with *M. resinellae*).
Macrocentrus sublaevis Thomson, 1895: 2212; Eady & Clark, 1964: 124 (synonymized with *M. resinellae*).

Material.— 41 ♀♀ + 30 ♂♂ (RMNH, EIS) from The Netherlands (Apeldoorn (Kootwijkerveen); Best; Crailo; Ede (Gld.; ex resin-galls on *Pinus*)); Heerde; Meijendel; Melissant; Muiderberg; Putten (Gld.; ex gall of *Retinia resinella* (Linnaeus, 1758)); Rotterdam (NS-driehoek; Lombardijen); Son (ex *Retinia resinella*); Wageningen (from resin-galls of *R. resinella*); Strabrechtse Heide (ex galls of *R. resinella* on *Pinus*)); 1 ♀ (RMNH), "Suomi, V Kaarina, 1992, R. Jussila leg."; 1 ♀ (RMNH), "Suomi, V Nauvo, Sandö,669-22, 10.vii.1992, R. Jussila leg."; 1 ♀ (RMNH), "France: 05, Pallon, ex *Barbara herrichiana* Obr. (Tortr.) in *Abies alba*-cones, A. Roques"; 1 ♀ (RMNH), "France: 05 Névache, ex host in *Picea abies*-cones, A. Roques, RMNH'85"; 7 ♀♀ + 2 ♂♂ (RMNH), "Andorra, St. Julia, vi. & vii.[19]82 (♀), P.J.L. Roche"; 1 ♀ (RMNH), "Spain: Teruel, Bronchales, 1500 m, 29.vii.1981, at light, H.G.M. Teunissen, RMNH'82"; 1 ♀ (RMNH), "Bulgaria, ex coll. Zaykov, RMNH Leiden, 1991", "Rhodopi, n. Bganovshtisa, 27.vii.1978, leg. A. Zaykov"; 1 ♀ (RMNH), id., but n. Varchovrach, 25.vii.1978; 1 ♀ (RMNH), "Museum Leiden, S Greece, Lakonia, Parnon Oros, 1700 m, 15.vii.1980, G. Christensen"; 1 ♀ (RMNH), "Ellas, Kerkyra, J.B. Wolschrijn", "Dassia, 5 km Z.O. v. Korakiana, 16-30.v.1971"; 1 ♀ (RMNH), "Spain, 1.viii.1986, 850 m, Campdevanol, 6 km NW of Ripoll, light, beekweide [= pasture near rivulet], R. Schouten".

Notes.— *Helcon intricator* Ratzeburg, 1852 is considered to be a synonym of *M. flavipes* (Ratzeburg, 1844) because it has been reared by Ratzeburg (1852) from the same host occurring on *Pinus* as *M. flavipes: Cydia pactolana* Zeller, 1840 (reported as *Tortrix dorsana* [auct. p.p, nec Fabricius, 1775]) and its (too) short description agrees with this interpretation. The holotype of *M. intricator* is lost (Haeselbarth, 1979). *M. flavipes* and *punctifrons* differ from the typical *M. resinellae* by the yellowish antennal base. I have seen a very similar species from Thailand (1 ♀ (RMNH), "Thailand, Chiangmai, 1981, ex *Dioryctria* sp. on *Pinus kesiya*, C. Hutacharern"), which differs by the more slender first tergite, the clypeus somewhat less flattened, and the length of eye in dorsal view 5-5.6 times temple. In general, the flattened clypeus (Eady & Clark, 1964) is an excellent character to separate this species from its congeners; very

exceptionally, e.g. in a specimen from Greece (RMNH), the clypeus is rather convex.

Biology.— Reported as a gregarious parasite of Tortricidae: *Retinia resinella* (Linnaeus, 1758) (first reported by Linnaeus (1758)), and *Cydia pactolana* Zeller, 1840 (reported as *Tortrix dorsana* [auct. p.p, nec Fabricius, 1775] by Ratzeburg, 1844, 1852), and Gelechiidae: *Exoteleia dodecella* (Linnaeus, 1758). The hosts live below resin-aggregations on conifers or generally, in shoots of conifers. The specimens reared from *Archips oporana* (Linnaeus, 1758) (as *A. piceanus* (Linnaeus, 1758) listed by Watanabe (1967, under *M. resinellae*) belong to *M. nigrigenuis* spec. nov. Those from *Dioryctria sylvestrella* (Ratzeburg, 1840) (= *D. splendidella* Herrich-Schäffer, 1848) also listed by Watanabe belong to *M. watanabei* spec. nov.

Distribution.— Europe, Russia (including Far East), Kazakhstan.

Macrocentrus retusus van Achterberg & Belokobylskij, 1987 (figs 290-297)

Macrocentrus retusus van Achterberg & Belokobylskij, 1987: 251-252, figs 29-31, 33-37.

Material.— Type series examined (van Achterberg & Belokobylskij, 1987).

Biology.— Unknown.

Distribution.— Russia (Primoryan Territory).

Macrocentrus rhyacioniae Watanabe, 1970 (figs 360, 362, 364-366)

Macrocentrus gibber; Watanabe, 1967: 8-9, fig. 20.
Macrocentrus rhyacioniae Watanabe, 1970a: 115-116; van Achterberg & Belokobylskij, 1987: 250.

Material.— 1 ♀ (BMNH), "Himakuma, Mie Honshu, 29.v.1962, M. Matsuura", "*Macrocentrus gibber* Eady & Clark, det. C. Watanabe", "*Macrocentrus* sp. n. nr. *gibber*, R.D. Eady, det. 1969".

Note.— Antenna with 46-50 segments (and 50-58 in the similar *M. gibber*); length of ovipositor sheath about 1.5 times fore wing.

Biology.— Reported as gregarious parasite of Tortricidae: *Rhyacionia duplana* (Hübner, 1813) and *Evetria cristata* Walsingham (Watanabe, 1970).

Distribution.— Japan.

Macrocentrus rossemi Haeselbarth & van Achterberg, 1981 (figs 118-131, 416)

Macrocentrus rossemi Haeselbarth & van Achterberg, 1981: 157-160, figs 1-6; Tobias, 1986: 257 (incorrectly listed for The Netherlands).
Material.— Holotype, ♀ (RMNH), "ex *Tortrix pronubana* [= *Cacoecimorpha pronubana* (Hübner, 1799)]", "Venhuizen, iv.1976, van Rossem"; 1 ♀ (Valencia), "[Spain], Sevilla (Expo), 10.vi.1991".

Biology.— Reported as a solitary parasite of Tortricidae: *Cacoecimorpha pronubana* (Hübner, 1799) (Haeselbarth & van Achterberg, 1981).

Distribution.— Mediterranean (Haeselbarth & van Achterberg, 1981): Spain.

Macrocentrus spilotus van Achterberg & Belokobylskij, 1987 (figs 118-131, 416)

Macrocentrus spilotus van Achterberg & Belokobylskij, 1987: 246-248, figs 1-14, 32.
Macrocentrus cordanus Papp, 1989: 86-89, figs 1-6, 16. **Syn. nov.**

Material.— Holotype of *M. spilotus* (ZMSP); holotype of *M. cordanus*, ♀ (TMA), "Korea, Prov. North Pyongan, Mt. Myohyang-san", "Hotel, 14.viii.1982, leg. Beron et Popov, No. 11", "Holotypus, ♀. *Macrocentrus cordanus* sp. n., Papp, 1988", "Hym. Typ. No. 7098, Mus. Budapest".

Notes.— The holotype of *M. cordanus* is very similar to *M. spilotus*, and differs mainly by the basally rugulose first tergite and the weakly curved vein 1-SR+M of fore wing. Antenna with 60 segments, length of ovipositor sheath 1.6 times fore wing, length of first tergite 2.8 times its apical width, and length of fore wing 7.9 mm.

In the NE Oriental region (SE China) *Macrocentrus maculistigmus* He & Lou, 1991 (figs 477-479) occurs, of which a paratype has been examined. It is similar to *M. spilotus* in colour (but mesoscutum completely and metasoma subposteriorly blackish), the shape of the first subdiscal cell of fore wing and the largely smooth sides of the scutellum. However, it has the first metasomal tergite distinctly concave basally and the medial furrow of the pronotum strongly crenulate.

Biology.— Unknown.

Distribution.— North Korea, Russia (Primoryan Territory).

Macrocentrus tessulatanae Hedwig, 1959

Macrocentrus tessulatanae Hedwig, 1959: 101; Shenefelt, 1969: 172.

It was not possible to find the type of this species, and the description is too elementary. Therefore, I am unable to include it in the key.

Biology.— Parasite of Tortricidae: *Pseudococcyx tessulatana* (Staudinger, 1871) on *Cupressus* spec. (Hedwig, 1959).

Distribution.— Turkey.

Macrocentrus thoracicus (Nees, 1812) (figs 177-185)

Bracon thoracicus Nees, 1812: 14.
Macrocentrus thoracicus; Watanabe, 1967: 4-5, figs 1, 9 (p.p.); Shenefelt, 1969: 172-173; Tobias, 1971 [1975]: 103, 1976: 131, 1986: 259; Papp, 1973: 9, 1982a: 108, 1982b: 62, 1987: 33, 1989: 82, 1991: 12; Haeselbarth, 1978: 26-27, figs 1, 4, 1989: 20; Villemant, 1980: 150-159; van Achterberg & Haeselbarth, 1983: 40, figs 47, 49; Koponen, 1992: 198.
Rogas longicornis Wesmael, 1835: 173; Haeselbarth, 1978: 27 (synonymized with *M. thoracicus*).
Macrocentrus longicornis; Haeselbarth, 1978: 27 (not *Macrocentrus longicornis* Provancher, 1880, = *M. longicornutus* Haeselbarth, 1978); van Achterberg & Haeselbarth, 1983: 40.

Material.— 68 ♀♀ + 18 ♂♂ (RMNH, ITZ) from The Netherlands (Amsterdam; Arkel (ex *Agonopteryx heracliana* (Linnaeus, 1758)); Assel; Asselt; Bergen op Zoom; Best; Crailo; Drunen; 's Graveland; 't Harde; Heerde; Horst (L.); Lexmond; Lienden (Schuilenburg, ex *Syndemis musculana* (Hübner, 1799) and ex *Spilonota ocellana* (Denis & Schiffermüller, 1775)); Meijendel (ex Tortricid on *Crataegus*); Melissant; Middelharnis; Muiderberg; Naardermeer; Nagele; Nijmegen; Nunspeet; Rockanje (Stekelhoek-

duin); Tongeren; Ulvenhout (N.B.); Wageningen; Wassenaar; Wijster); 1 ♀ (RMNH), "[France], St. Rémèze (Ardeche), 8.viii.1976, leg. H. Teunissen"; 1 ♂ (RMNH), "Spain: Huesca, Benasque, 1500 m, vii.1981, H.G.M. Teunissen, RMNH'82"; 2 ♀♀ + 1 ♂ (RMNH), "Bulgaria, ex coll. Zaykov, RMNH Leiden 1991", "Velingrad, Rhodopi, 5.viii.1979,leg. A. Zaykov"; 1 ♀ (RMNH), id., but Plovdiv, 25.vi.1982, leg. J. Kolarov; 1 ♀ (RMNH), "S Korea, ex *Grapholitha molesta* Busck, Cheonan, 7.vii.1980, J. Paik"; 1 ♀ + 3 ♂♂ (RMNH, Park Coll.), "Korea: Gyeong-do, Gyeongsan-gun, Gyeongsan-eop, Daedong, 18.v.1989 (1 ♀ + 1 ♂), 8.v.1989 (1 ♂) or 9.vi.1989 (1 ♂), J.-S. Park, RMNH'92 "; 1 ♀ (RMNH), "Japan, Kasakai, Kawai V., Iwate, 3-4.viii.1981, A. Takasu, RMNH'82"; 1 ♀ + 1 ♂ (RMNH), "Japan, Kogarezawa-rindo, Yamanashi Pref., 4.iv.1981, A. Takasu, RMNH'82; 1 ♀ (EIS), "[Japan], Bibai, Hokkaido, 6.vii.1964, K. Kamijo", "Host *Cymolomia hartigiana* Rtzbrg", "*Macrocentrus thoracicus* (Nees), ♀. Det. C. Watanabe, 1966".

Note.— The specimens from Japan have the mesosoma (except scutellum and metanotum medio-posteriorly) dark brown or blackish; also specimens from The Netherlands may have the mesosoma largely blackish dorsally. Males may have the scapus enlarged (figs 183, 184) compared to the scapus of the female, but the extend is rather variable. Small specimens occur rather frequently, resembling the species of the *M. linearis*-group.

Biology.— Reported as solitary parasite of Tortricidae, Gelechiidae, and Oecophoridae, mainly species occurring on trees and shrubs (Haeselbarth, 1978).

Distribution.— Europe, Russia (Far East, Siberia), Kazakhstan, Turkey, North Korea, South Korea, Japan.

Macrocentrus townesi van Achterberg & Haeselbarth, 1983 (figs 161-176)

Macrocentrus townesi van Achterberg & Haeselbarth, 1983: 41, 43-45, figs 1-15, 18, 23; van Achterberg & Belokobylskij, 1987: 250, figs 80-81, 84; Tobias, 1986: 260; O'Connor et al., 1991: 452.

Material.— Holotype, ♀ (RMNH) examined; 24 ♀♀ + 14 ♂♂ (RMNH, ITZ) from The Netherlands (Cadier; Colmont (Vrakelberg); Epen (L.); Heerde; Hilversum; Kerkrade; Maastricht; Nunspeet; Oostvoorne; Ouddorp; Putten (Gld.); St. Pietersberg; Tongeren; Venlo; Yerseke); 1 ♀ (RMNH), [Germany}, Bay., Lang alth., 17.viii.[19]78, leg. A u. W. Walter"; 1 ♀ (RMNH), "[Germany], D-Bay.-NM, Berching, 30.viii.[19]87, Blank"; 1 ♀ (RMNH), id, but Ottmaring; 1 ♂ (RMNH), "Reinh[ard], Saxon[y]"; 1 ♀ (RMNH), "Austria, Slzbg, Filzmoos, 1050 m, 10.viii.1986"; 1 ♂ (RMNH), "[Poland], Dantz[ig], Brischke"; 1 ♀ (RMNH), "[Germany], Berkf., Tischb[ein]"; 1 ♀ + 6 ♂♂ (RMNH), "Bulgaria, ex coll. Zaykov, RMNH Leiden 1991", "Rhodopi, h. Varchovrach, 25.vii.1978, leg. A. Zaykov"; 2 ♀♀ (RMNH), id., but v. Sneganka, 3.viii.1978; 1 ♂ (RMNH), id., but h. Zdraves, 30.vii.1978; 1 ♀ + 2 ♂♂ (RMNH), id., but h. Izgrev, 14.vii.1977; 1 ♀ (RMNH), id., but Beklemeto, 10.viii.[19]86; 1 ♂ (RMNH), id., but Pamporovo, 3.viii.1978; 1 ♂ (RMNH), id., but v. Brjanovshtisa, 29.v.1978; 1 ♀ (RMNH), id., but Martsiganitsa, 6.vii.1985; 1 ♀ + 1 ♂ (RMNH), id., but Semkovo, 6.viii.1985; 1 ♂ (RMNH), id., but Dospat, 1.v.1977; 1 ♂ (RMNH), id., but Borovez, 23.vii.19825; 1 ♂ (RMNH), id., but h. Zdraves, 30.vii.1978; 1 ♀ + 1 ♂ (RMNH), id., but St. planina, v. Stoletov, 7.vi.1982, J. Kolarov.

Biology.— Unknown.

Distribution.— Europe.

Macrocentrus turkestanicus (Telenga, 1950) (figs 372-375)

Amicroplus turkestanicus Telenga, 1950: 301.

Macrocentrus turkestanicus; Shenefelt, 1969: 174; Tobias, 1986: 253.
Macrocentrus turcestanicus; Tobias, 1971[1975]: 105.

Biology.— Reported as parasite of Noctuidae: *Sesamia cretica* Lederer, 1857 (Tobias, 1971 [1975]).

Distribution.— Central Asia.

Macrocentrus watanabei spec. nov.
(figs 480-486)

Macrocentrus resinellae p.p.; Watanabe, 1967: 9, figs 7, 24.

Material.— Holotype, ♀ (EIS), "[Japan], (Ryukyu), Ishigaki-jima, Banna, 1.ii.[19]65, K. Nogato", "Host[:] *Dioryctria splendidella* H.-S.", "*Macrocentrus resinellae* (Linné), ♀. Det. C. Watanabe, 1967". Paratypes: 2 ♀♀ + 2 ♂♂ (EIS, RMNH); topotypic, and belonging to same batch.

Holotype, ♀, length of body 4.4 mm, of fore wing 3.9 mm.

Head.— Remaining antennal segments 25, length of third segment 1.3 times fourth segment, length of third, and fourth segments 7.3, and 5.3 times their width, respectively; length of maxillary palp 1.2 times height of head; maxillary and labial palpi with 6 and 4 segments, respectively; length of eye in dorsal view 6.0 times temple (fig. 485); temples roundly narrowed posteriorly (fig. 485); OOL:diameter of posterior ocellus:POL = 6:6:7; frons flat; face slightly convex, sparsely and finely punctate; clypeus rather convex, sparsely punctate; ventral margin of clypeus straight; length of malar space 0.5 times basal width of mandible; mandible medium-sized, distinctly twisted apically, its second tooth about as wide as first tooth, about half as long as first tooth, which is robust and acute (fig. 484).

Mesosoma.— Length of mesosoma 1.4 times its height; no distinct pronope; side of pronotum smooth, but medially and posteriorly narrowly crenulate; prepectal carina absent ventrally, distinct laterally, except ventral part; precoxal sulcus rather densely rugulose-punctate, interspaces about equal to diameter of punctures; remainder of mesopleuron more sparsely punctate; metapleuron superficially punctate medially and rugose ventrally; metapleural flange wide, obtuse apically; mesoscutal lobes sparsely punctate (except medially), lateral lobes setose only near notauli, and medial lobe setose; side of scutellum smooth; surface of propodeum densely rugose medially, obliquely striate laterally, without median carina.

Wings.— Fore wing: subbasal cell largely and rather sparsely setose, and without patch (fig. 482); r:3-SR:SR1 = 5:10:34; 1-CU1:2-CU1 = 1:5; 1-CU1 slender, nearly as long as cu-a (fig. 482); cu-a straight, slightly curved posteriorly, and more oblique than 3-CU1 (fig. 480); 2-SR:3-SR:r-m = 9:10:4; 2A sclerotized basally (only pigmented), and membrane basad of it sparsely setose. Hind wing: with 3 hamuli; SC+R1 evenly curved; marginal cell parallel-sided apically; 1-M 2.0 times 1r-m (fig. 480).

Legs.— Hind coxa sparsely and finely punctate, without striae; tarsal claws slender, without ventral lobe, setose (fig. 481); fore femur slender and distinctly curved (fig. 486); length of fore spur 0.4 times fore basitarsus; length of femur, tibia and basitarsus of hind leg 6.8, 15.0 and 8.0 times their width, respectively; length of spurs of hind tibia 0.30 and 0.40 times hind basitarsus; fore, middle and hind trochantelli with 3, 7, and 4 minute teeth, respectively.

Metasoma.— Length of first tergite 1.8 times its apical width (fig. 483), its surface coarsely longitudinally striate, medio-basally rather concave; dorsal carinae of first tergite absent; second tergite and anterior half of third tergite coarsely longitudinally striate; posterior half and remainder of metasoma smooth; length of ovipositor sheath 1.56 times fore wing; apex of ovipositor slender, with distinct notch subapically.

Colour.— Dark brown or blackish; face, metanotum, and propodeum (rather dark) brown; scapus, palpi, legs, tegulae and remainder of mesosoma yellowish-brown; pterostigma dark brown, but basally (and to a lesser degree apically) inconspicuously pale; veins largely brown, but of apical third of fore wing pale brownish; vein SR1 somewhat paler than vein 1-R1; wing membrane subhyaline.

Biology.— Reported as a gregarious parasite of Pyralidae (*Dioryctria sylvestrella* (Ratzeburg, 1840) (= *D. splendidella* Herrich-Schäffer, 1848; Watanabe, 1967).

Variation.— Antennal segments 40 (2 ♀♀ + 2 ♂♂), length of fore wing 3.3-3.9 mm, and of body 4.1-4.4 mm; length of first metasomal tergite 1.6-1.8 times its apical width; length of eye in dorsal view 3.5-6.0 times temple; vein 1-M of hind wing 1.8-2.4 times vein 1r-m; length of ovipositor sheath 1.56-1.68 times fore wing.

Distribution.— Japan (Ryukyu Islands). Although this species belongs to the Oriental fauna, it is included in this paper because it has been confused with the Palaearctic *M. resinellae*.

Rectizele gen. nov.

Type species: *Rectizele parki* spec. nov.

Etymology.— From "rectus" (Latin for "straight") and the generic name *Leptozele* Cameron, 1910, because it is similar to *Leptozele* but it has vein SR of hind wing straight basally.

Diagnosis.— Antenna longer than body (figs 96, 98), with 50-52 segments; palpi rather long (fig. 98); clypeus convex, ventrally straight; anterior tentorial pits medium-sized and rather deep; mandible strongly twisted, second tooth much smaller than first tooth and acute; median carina of metanotum simple, not branched anteriorly (fig. 91); metapleural flange medium-sized and apically acute or narrowly obtuse (fig. 98); vein 1-SR+M of fore wing curved (fig. 86) or bent; vein 2A of fore wing present (fig. 86); angle between veins 1-SR+M and 1-M of fore wing acute (fig. 86); vein 1-M of fore wing straight; veins 1-CU1 and 1-1A of fore wing slender; subbasal cell of fore wing not or slightly widened apically, with small yellowish or brownish patch; vein cu-a of fore wing (sub)vertical (= transverse), slender; vein CU1a of fore wing with a faint brownish spot; first subdiscal cell of fore wing comparatively wide and long (fig. 86) and partly glabrous (fig. 94); vein 3-M of fore wing directed more posteriad, distinctly shorter than twice vein 3-SR (fig. 86); marginal cell of hind wing narrow basally, subparallel-sided and distinctly widened apically (fig. 86); vein SR of hind wing (nearly) straight basally and not sclerotized; vein 1r-m of hind wing straight and medium-sized; vein 2-SC+R of hind wing horizontal (= longitudinal); vein SC+R1 of hind wing straight (fig. 86); vein r of hind wing absent; vein SR of hind wing slightly sinuate (figs 86, 89); vein R1 of hind wing strongly widened (fig. 89); inner spur of hind tibia 0.5-0.6 times hind basitarsus; legs long;

fore femur slender, parallel-sided, and curved, posteriorly setae long and anteriorly medium-sized (fig.); spur of fore tibia comparatively short, about 0.2 times fore basitarsus; tarsal claws with ventral lamella (fig. 95); inner hind claw similar to outer hind claw; hind coxa without transverse striae; first metasomal tergite with or without transverse striation and slender, its length 3-5 times its (sub)apical width, largely parallel-sided (fig. 87); laterope of first tergite large and deep, distinctly differentiated from glymma (fig. 98); first tergite flat medio-basally; length of ovipositor sheath 1.3-1.4 times fore wing; apex of ovipositor normal, with notch subapically.

Distribution.— East Palaearctic, Indo-Australian. Small genus, additional species new to science will be described in a forthcoming part of this revision.

Biology.— Unknown.

Rectizele parki spec. nov.
(figs 86-99)

Material.— Holotype, ♀ (RMNH), "Seoul, Korea, 3.ix.1977, coll. S.M. Lee". Paratypes (3 ♀♀): 2 ♀♀ (Park Coll., RMNH), "Korea, Gyeongnam, Chinju-shi, Kajwa-dong, Malaise trap, 9-15.ix.1989. J.-S. Park"; 1 ♀ (Park Coll.), "Korea, Gyeongnam, Namhai-gun, Idong-myeon, Sinjen-ri, Keum Mt., 28-29.vii.1990, Yoon Ju-ik".

Holotype, ♀, length of body 7.6 mm, of fore wing 6.7 mm.

Head.— Antennal segments 50, length of third segment 1.3 times fourth segment, length of third, fourth and penultimate segments 5.6, 4.2 and 3.3 times their width, respectively (figs 96, 97); length of maxillary palp 1.7 times height of head; length of eye in dorsal view 6.3 times temple (fig. 92); temples directly narrowed posteriorly (fig. 92); OOL:diameter of posterior ocellus:POL = 10:11:14; stemmaticum with few punctures; face sparsely punctate laterally, densely punctate medially (fig. 88); clypeus punctate; length of malar space 0.9 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.4 times its height; side of pronotum medially and posteriorly crenulate, remainder smooth (fig. 98); prepectal carina complete; precoxal sulcus densely and rather coarsely punctate anteriorly, interspaces equal to diameter of punctures (fig. 98), more sparsely so posteriorly, remainder of mesopleuron more sparsely punctate; metapleuron coarsely and densely punctate (fig. 98); metapleural flange acute apically; surface of propodeum sparsely and irregularly transversely rugose, but anteriorly smooth, with an irregular median carina (fig. 91).

Wings.— Fore wing: first subdiscal cell medially and first discal cell largely setose (fig. 94); subbasal cell completely glabrous, with small brown patch (fig. 94); 1-SR+M curved; r:3-SR:SR1 = 9:19:37; 1-CU1:2-CU1 = 2:19; r-m largely unsclerotized (fig. 86); m-cu not widened; 2-SR:3-SR:r-m = 12:19:5; basad of 2A glabrous. Hind wing: marginal cell strongly widened apically (fig. 86); 1r-m 0.8 times 1-M.

Legs.— Length of femur, tibia and basitarsus of hind leg 7.7, 14.4 and 9.0 times their width, respectively; length of inner spur of hind tibia 0.45 and 0.55 times hind basitarsus; fore, middle and hind trochantelli with 3, 4, and 4 teeth, respectively.

Metasoma.— Length of first tergite 3.6 times its subapical width, 4.8 times its apical width, because it is narrowed apically (fig. 87), its surface finely and irregularly rugose, but its basal third smooth; dorsal carinae of first tergite absent; second tergite and basal half of third tergite finely striate, remainder of metasoma smooth and com-

pressed; length of ovipositor sheath 1.33 times fore wing.

Colour.— Dark brown; palpi, scapus ventrally and basally, tegulae, fore and middle legs, basal half of metasoma ventrally, pronotum dorso-posteriorly and base of first tergite pale yellowish; hind coxa infuscate; hind trochanter, trochantelli and basal fifth of hind tibia (pale) yellowish; hind tarsus and spurs, and apical half of ovipositor sheath white; remainder of hind leg and basal half of ovipositor sheath dark brown; 14th-22nd antennal segments ivory-white; remainder of antenna dark brown; pterostigma, parastigma and veins (except 1-R1) brown; 1-R1 yellowish; wing membrane subhyaline.

Variation.— Paratypes are very similar to holotype; body dark brown or black; length of body 7.6-9.2 mm, fore wing 6.7-7.5 mm; first subbasal cell of fore wing with 20-38 setae; length of vein 1r-m of hind wing 0.8-1.1 times vein 1-M; length of first tergite 3.2-3.8 times its apical width (if flat parts are included, if excluded then 3.6-4.8 times); length of ovipositor sheath 1.30-1.40 times fore wing.

Note.— I am pleased to name this species after Prof. Dr J.-S. Park (Gyeongnam), who brought the new species to my attention.

Excluded species

Ichneumon resinator Thunberg, 1822

Ichneumon resinator Thunberg, 1822: 275, 1824: 349 (synonymized with *I. resinellae* (Linnaeus, 1758). *Macrocentrus resinellae*; Shenefelt, 1969: 169.

According to Roman (1912: 276) and the late Mr M. Idar (in litt.) the type belongs to the Ichneumonidae: i.e. *Apechthis quadridentata* (Thomson, 1877) and is not related to *Macrocentrus resinellae* (Linnaeus, 1758).

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AEI = American Entomological Institute, Gainesville; BMNH = The Natural History Museum. London; CNC = Canadian National Collection of Insects, Ottawa; EIS = Entomological Institute, Sapporo; ELKU = Entomological Laboratory, Kyushu University, Fukuoka; FFPRI = Forestry and Forest Products Research Institute, Toyohira, Sapporo; LIS = Laboratory of Insect Systematics, National Institute of Agro-Environmental Sciences, Tsukuba, Ibaraki; NBM = Noordbrabants Natuurmuseum, Tilburg; NMS = National Museums of Scotland, Natural History, Edinburgh; RMNH = Nationaal Natuurhistorisch Museum, Leiden; TMA = Természettudományi Múzeum Allattára, Budapest; USNM = National Museum of Natural History, Washington; ZAU= Zhejiang Agricultural University, Hangzhou; ZIL = Zoological Institute, Lund; ZMSP = Zoological Museum, St. Petersburg; ZSSM = Zoologische Sammlung des Bayerischen Staates, München.

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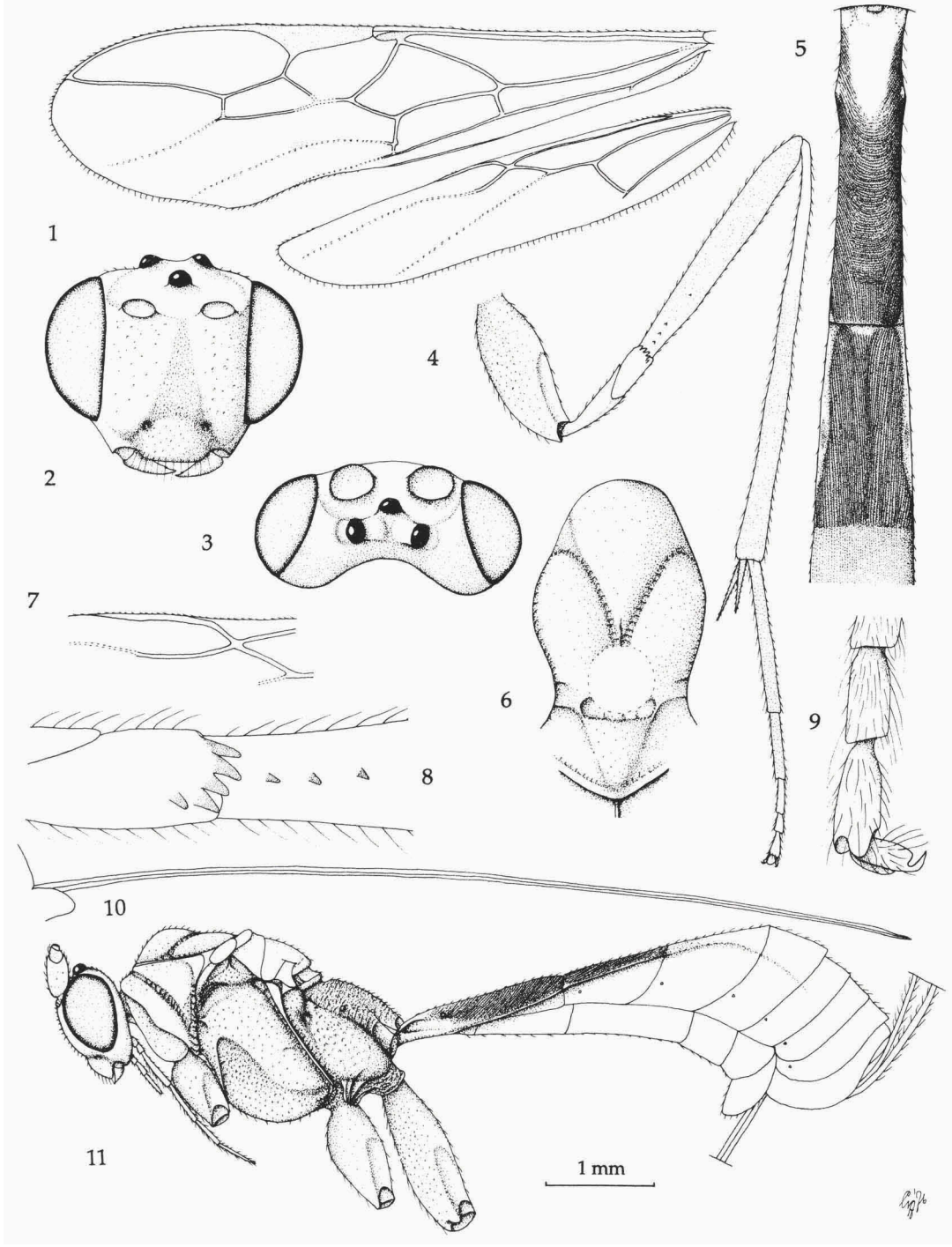
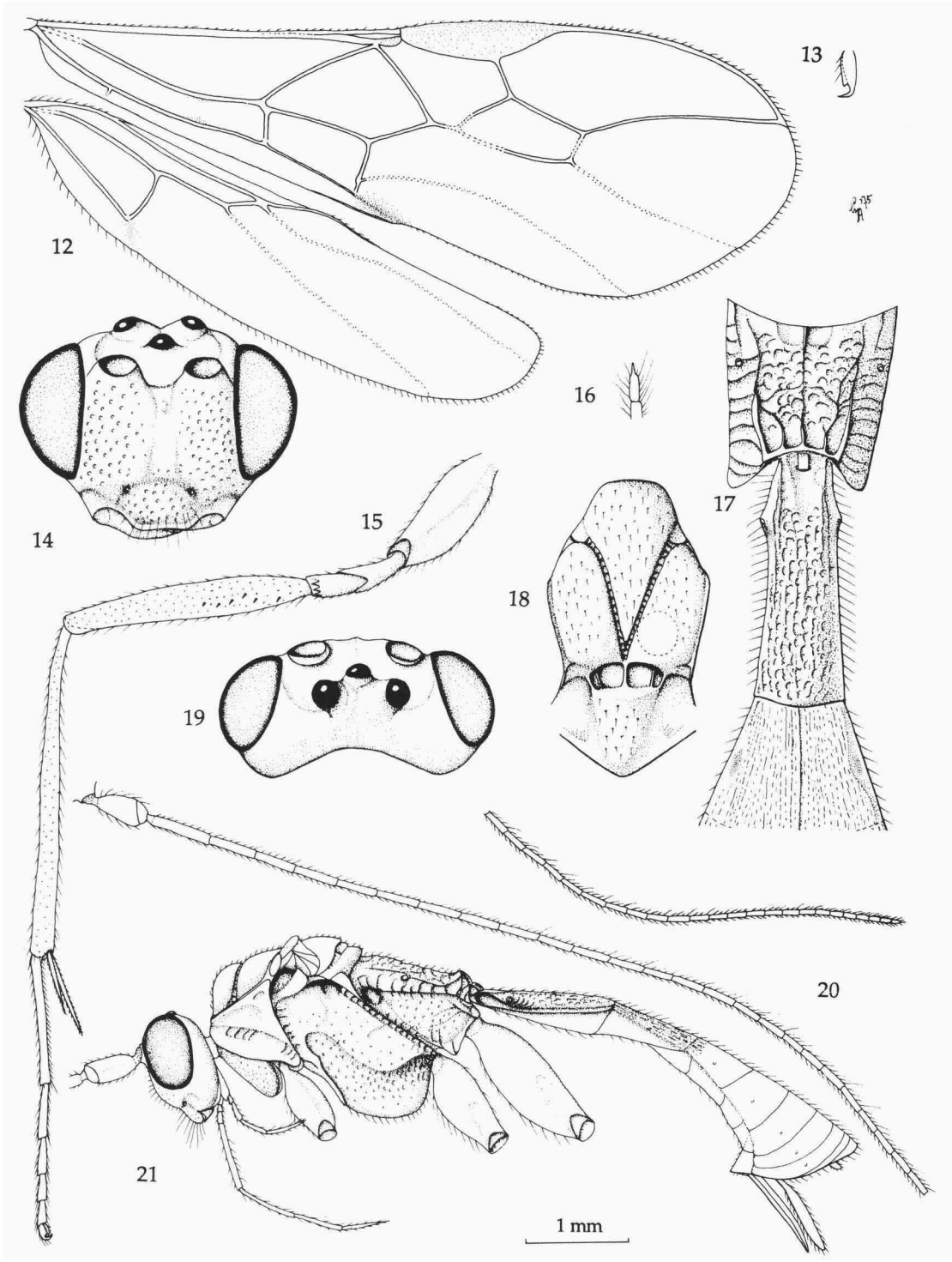
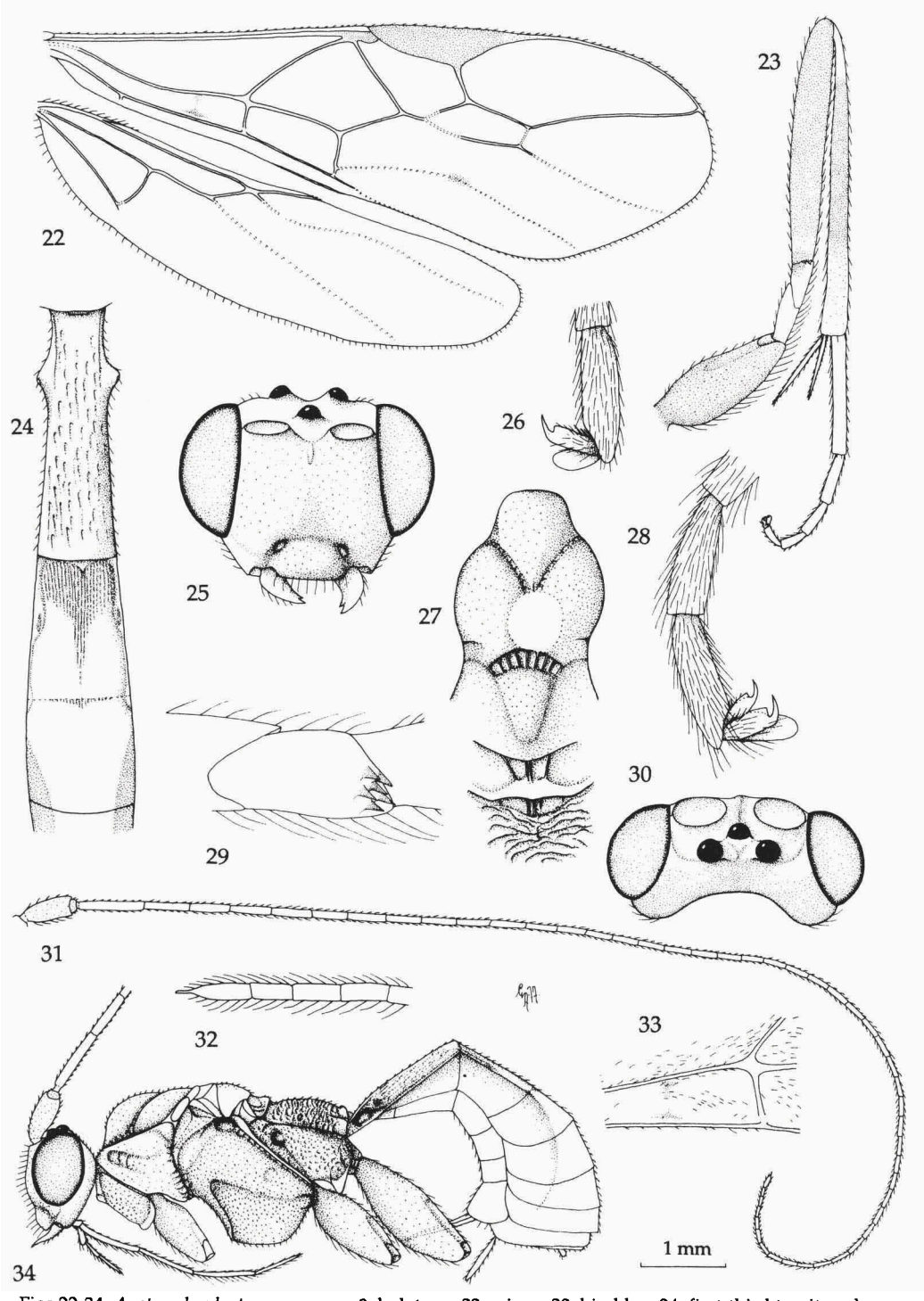


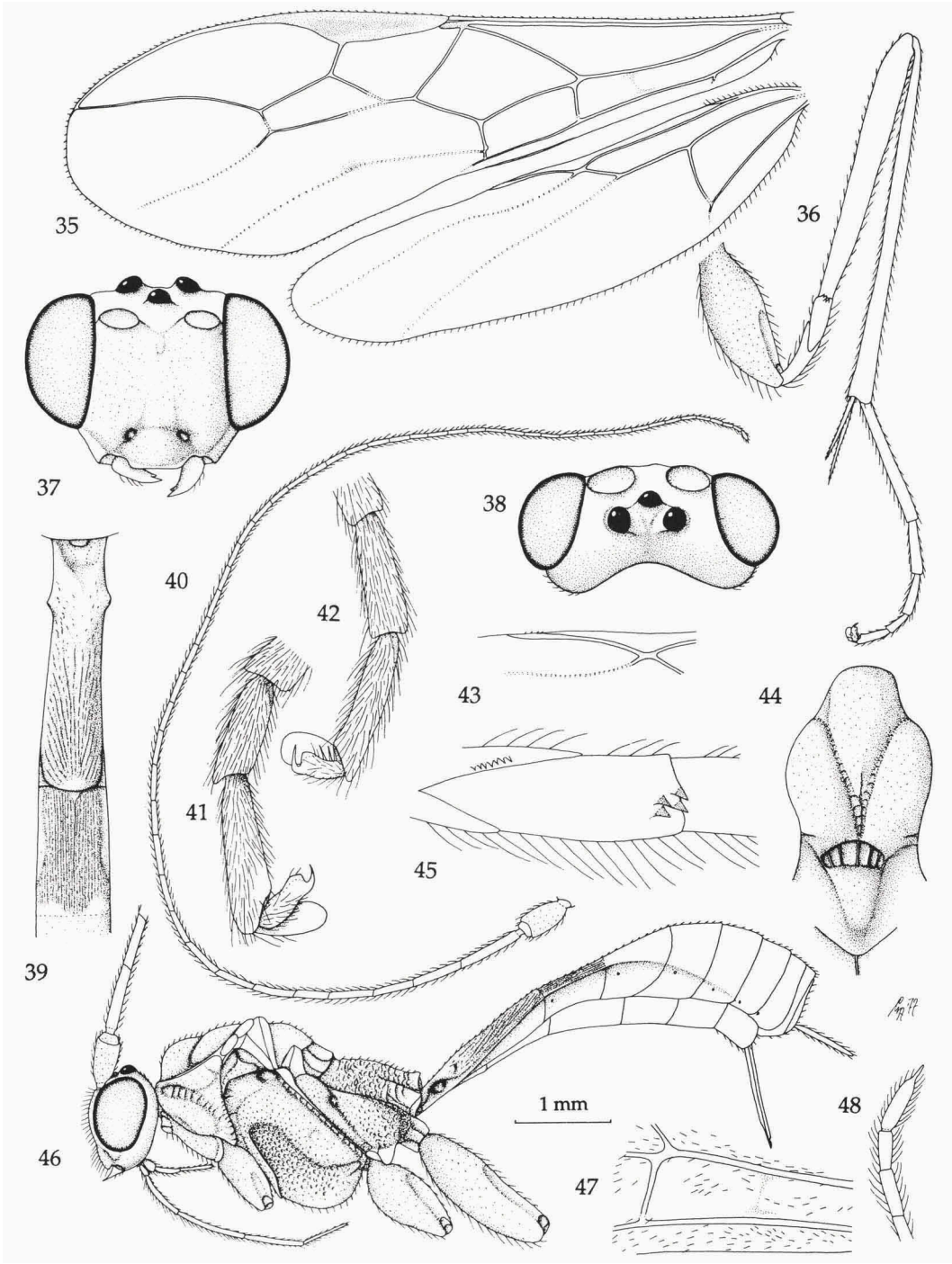
Figs 1-11, *Aulacocentrum philippinense* (Ashmead), ♀, holotype. 1, wings; 2, head, frontal aspect; 3, head, dorsal aspect; 4, hind leg; 5, first and second metasomal tergite, dorsal aspect; 6, mesonotum, dorsal aspect; 7, detail of vein SC+R1 of hind wing; 8, hind trochantellus; 9, outer hind claw; 10, ovipositor; 11, habitus, lateral aspect. 1, 4, 10, 11: 1 × scale-line; 2, 3, 5, 6: 2 ×; 7: 1.5 ×; 8, 9: 5 ×.



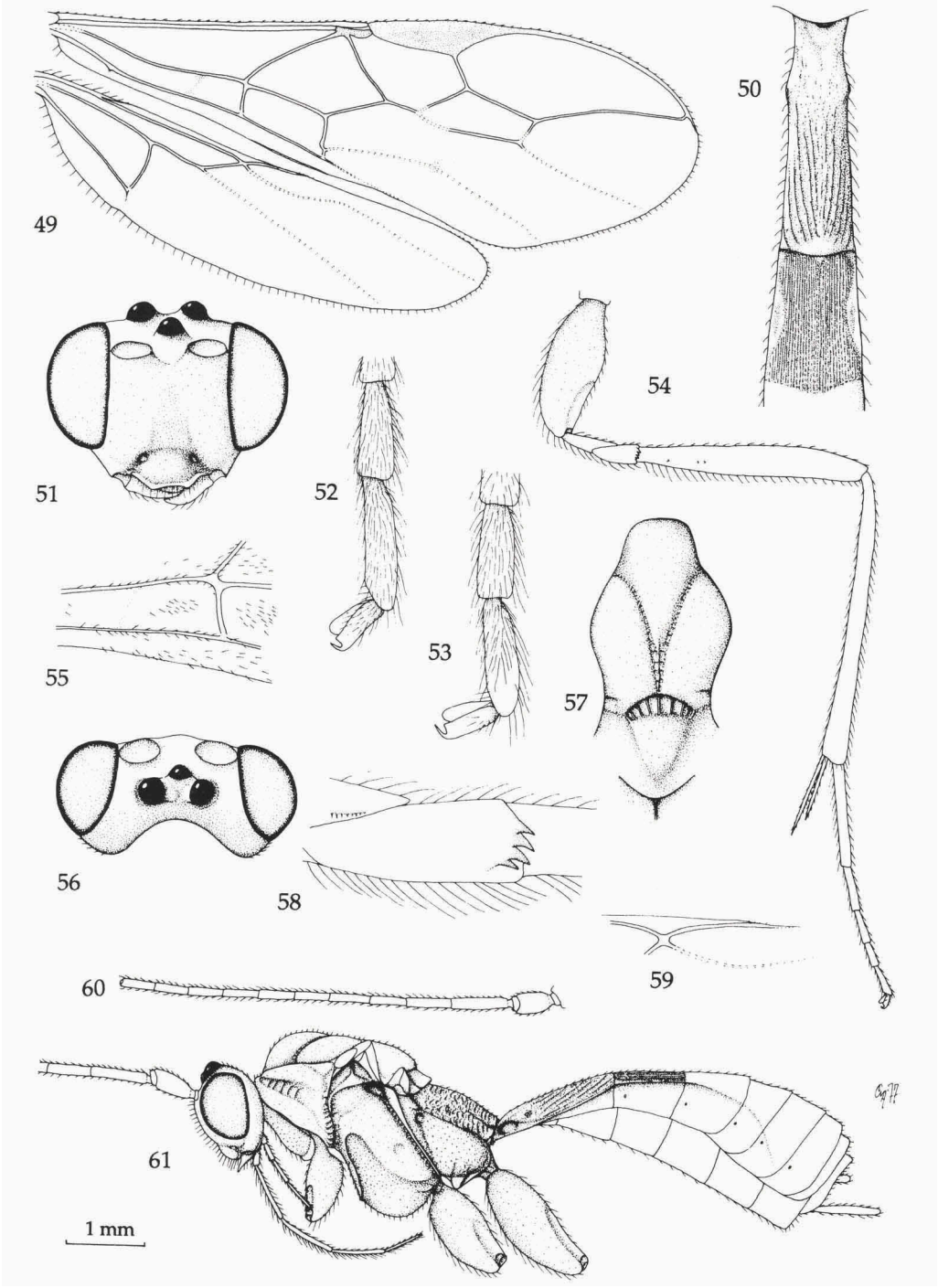
Figs 12-21, *Austrozele longipalpis* spec. nov., ♀, holotype. 12, wings; 13, middle claw; 14, head, frontal aspect; 15, hind leg; 16, apex of antenna; 17, propodeum; first and second tergites, dorsal aspect; 18, mesonotum, dorsal aspect; 19, head, dorsal aspect; 20, antenna; 21, habitus, lateral aspect. 12, 15, 20, 21: 1 × scale-line; 13, 16: 3 ×; 14, 17-19: 2 ×.



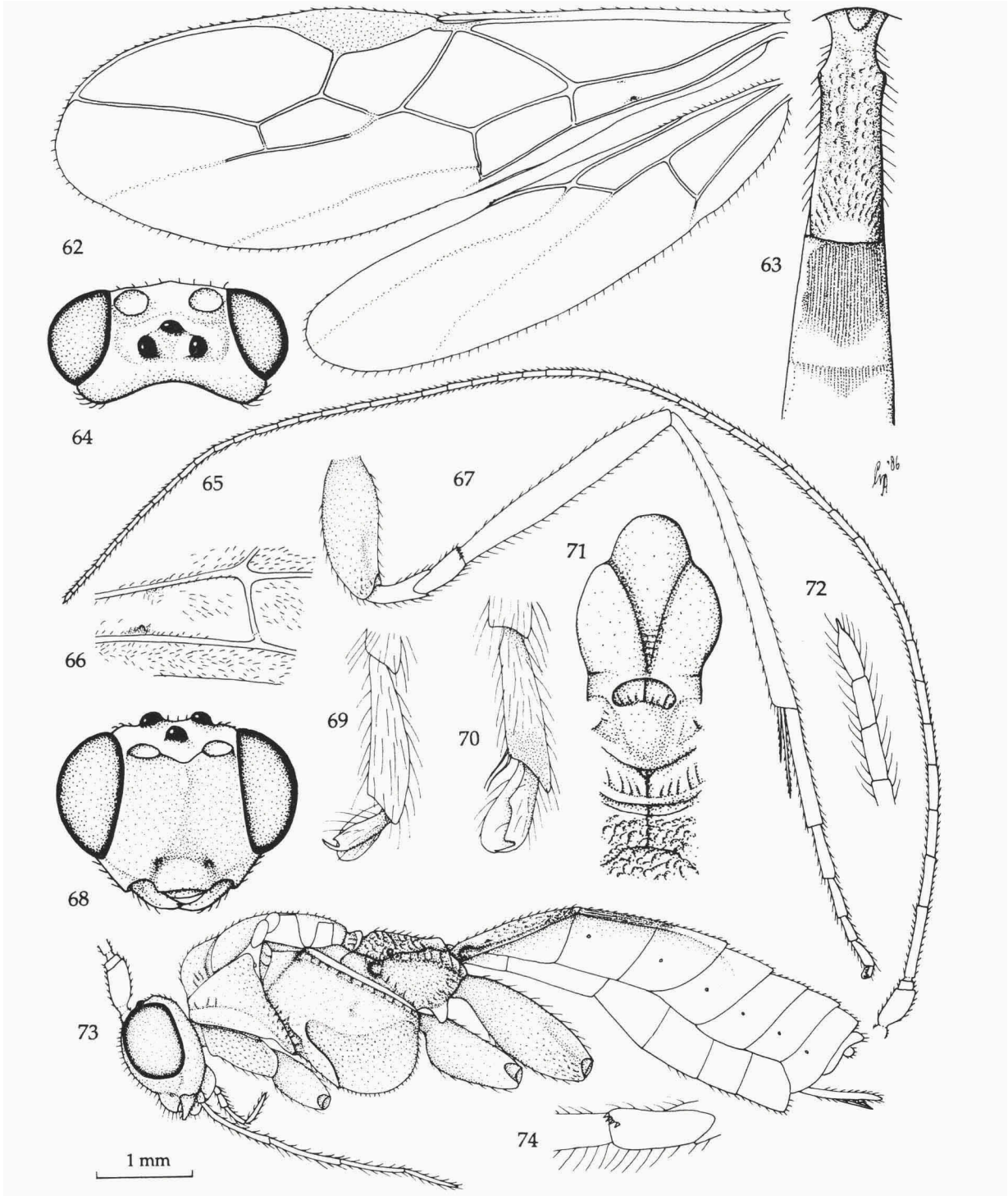
Figs 22-34, *Austrozele adustus* spec. nov., ♀, holotype. 22, wings; 23, hind leg; 24, first-third tergites, dorsal aspect; 25, head, frontal aspect; 26, outer hind claw; 27, mesosoma, dorsal aspect; 28, inner hind claw; 29, hind trochantellus; 30, head, dorsal aspect; 31, antenna; 32, apex of antenna; 33, apical half of first subbasal cell of fore wing; 34, habitus, lateral aspect. 22, 23, 31, 34: 1 × scale-line; 24, 25, 27, 30, 33: 2 ×; 26, 28, 29, 32, 33: 5 ×.



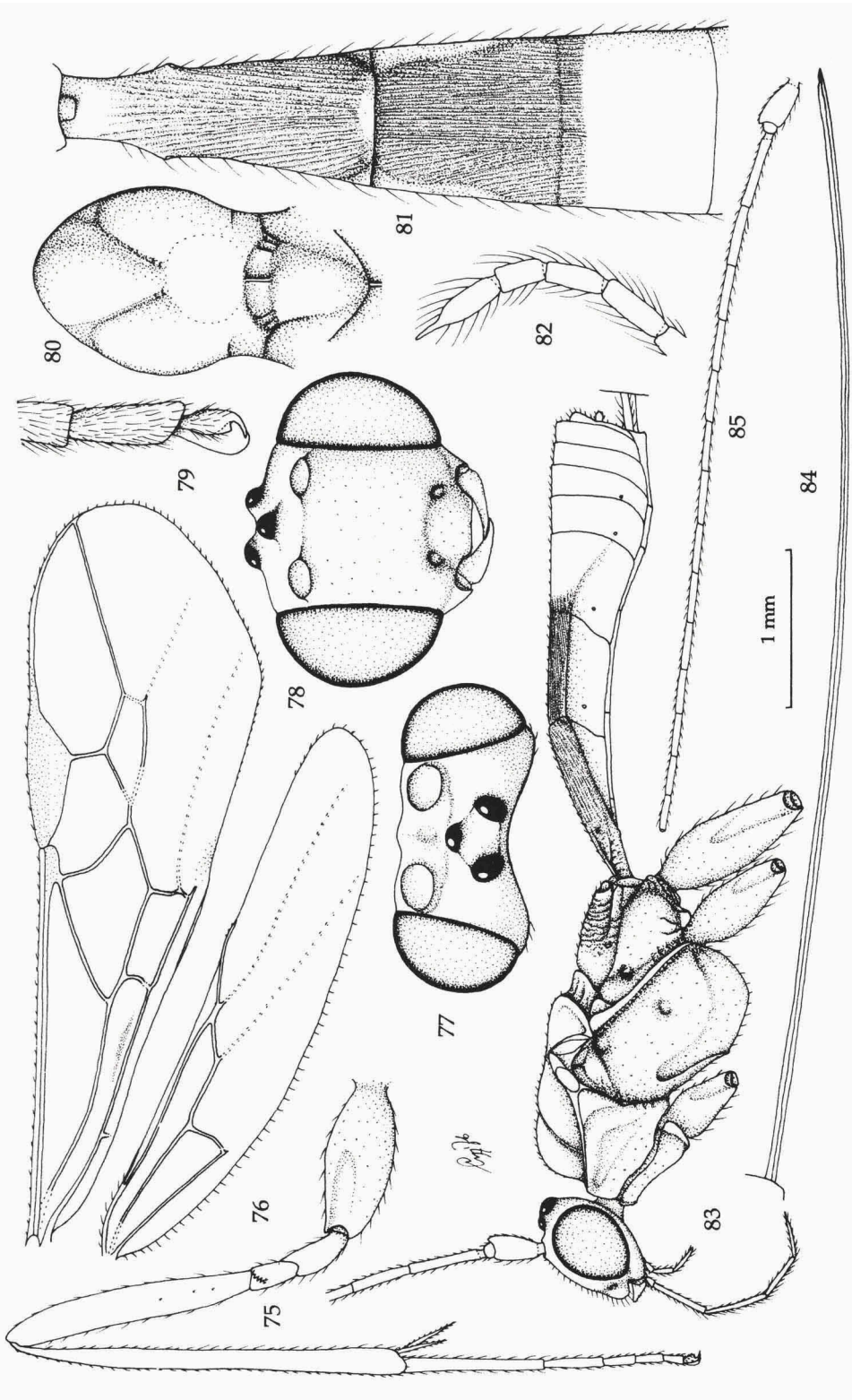
Figs 35-48, *Austrozele calvatus* spec. nov., ♀, holotype. 35, wings; 36, hind leg; 37, head, frontal aspect; 38, head, dorsal aspect; 39, first and second metasomal tergites, dorsal aspect; 40, antenna; 41, inner hind claw; 42, outer hind claw; 43, detail of vein SC+R1 of hind wing; 44, mesonotum, dorsal aspect; 45, hind trochantellus; 46, habitus, lateral aspect; 47, apical half of first subbasal cell of fore wing; 48, apex of antenna. 35, 36, 40, 46: 1 × scale-line; 37-39, 43, 44, 47: 2 ×; 39, 41, 42, 45, 48: 5 ×.



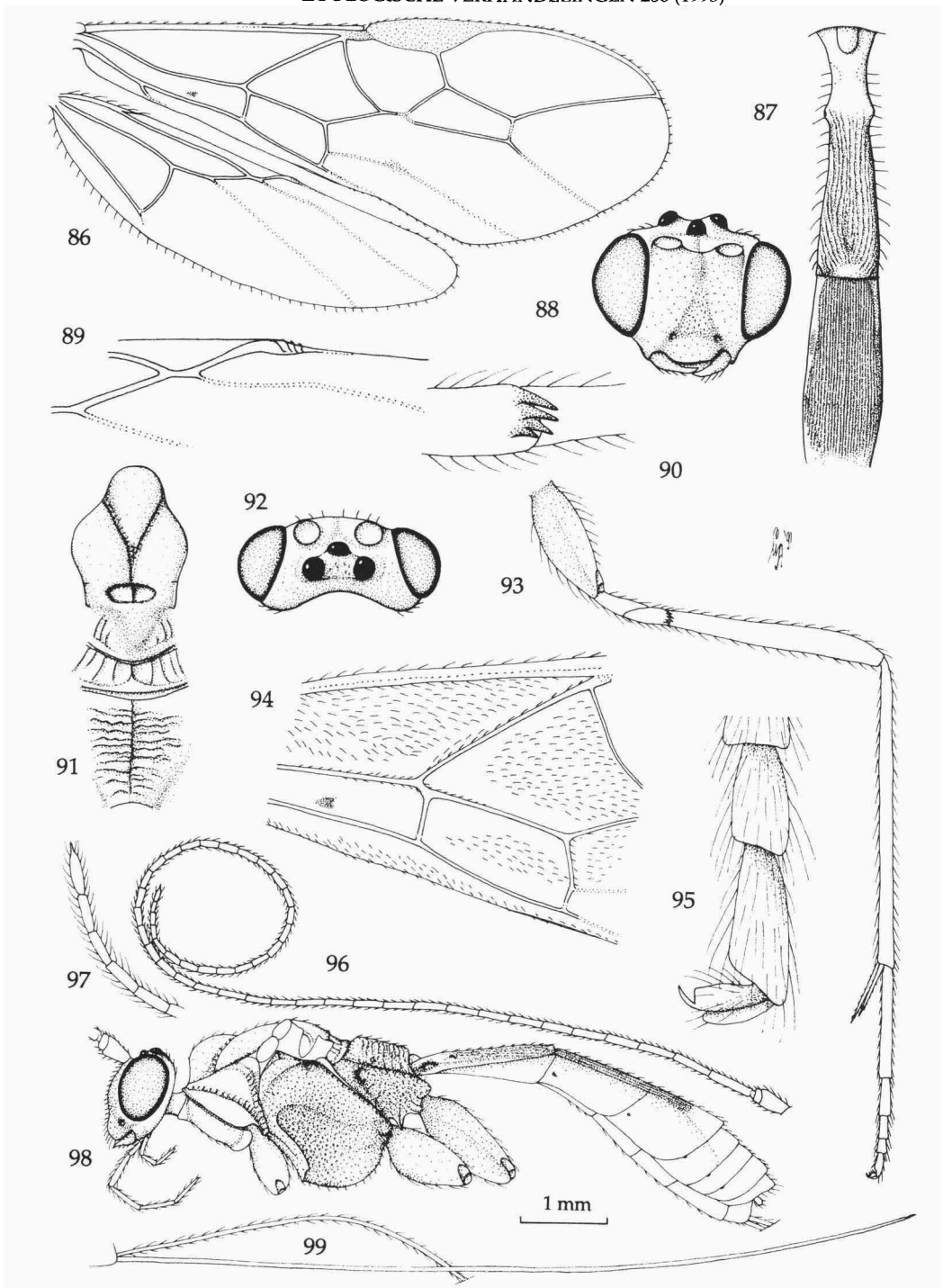
Figs 49-61, *Austrozele nipponensis* spec. nov., ♀, holotype. 49, wings; 50, first and second tergites, dorsal aspect; 51; head, frontal aspect; 52, outer hind claw; 53, inner hind claw; 54, hind leg; 55, apical half of first subbasal cell of fore wing; 56, head, dorsal aspect; 57, mesonotum, dorsal aspect; 58, hind trochantellus; 59, detail of vein SC+R1; 60, antenna; 61, habitus, lateral aspect. 49, 54, 60, 61: 1 × scale-line; 50, 51, 55-57, 59: 2 ×; 52, 53, 58: 5 ×.



Figs 62-74, *Austrozele takasuae* spec. nov., ♀, holotype. 62, wings; 63, first and second tergites, dorsal aspect; 64, head, dorsal aspect; 65, antenna; 66, apical half of first subbasal cell of fore wing; 67, hind leg; 68, head, frontal aspect; 69, outer hind claw; 70, inner hind claw; 71, mesosoma, dorsal aspect; 72, apex of antenna; 73, habitus, lateral aspect; 74, hind trochantellus. 62, 65, 67, 73: 1 × scale-line; 63, 64, 68, 71: 1.5 ×; 66, 74: 2 ×; 69, 70, 72: 5 ×.



Figs 75-85, *Hymenochaonia (H.) delicata* (Cresson), ♀, lectotype, but 82 of ♀, U.S.A., North Carolina. 75, hind leg; 76, wings; 77, head, dorsal aspect; 78, head, frontal aspect; 79, outer hind claw; 80, mesonotum, dorsal aspect; 81, first-third metasomal tergites, dorsal aspect; 82, apex of antenna; 83, habitus, lateral aspect.; 84, ovipositor; 85, antenna. 75, 76, 83-85: 1 × scale-line; 77, 78, 80, 81: 2 ×; 79: 5 ×; 82: 4.3 ×.



Figs 86-99, *Rectizele parki* gen. nov. & spec. nov., ♀, holotype. 86. wings; 87, first-third metasomal tergite, dorsal aspect; 88, head, frontal aspect; 89, detail of vein R1 of hind wing; 90, hind trochantellus; 91, mesosoma, dorsal aspect; 92, head, dorsal aspect; 93, hind leg; 94, detail of medial third of fore wing; 95, outer hind claw; 96, antenna; 97, apex of antenna; 98, habitus, lateral aspect; 99, ovipositor. 86, 93, 96, 98, 99: 1 × scale-line; 87, 88, 91, 92: 1.5 ×; 89: 2.8 ×; 90: 4 ×; 94: 2 ×; 95: 6.7 ×; 97: 2.9 ×.

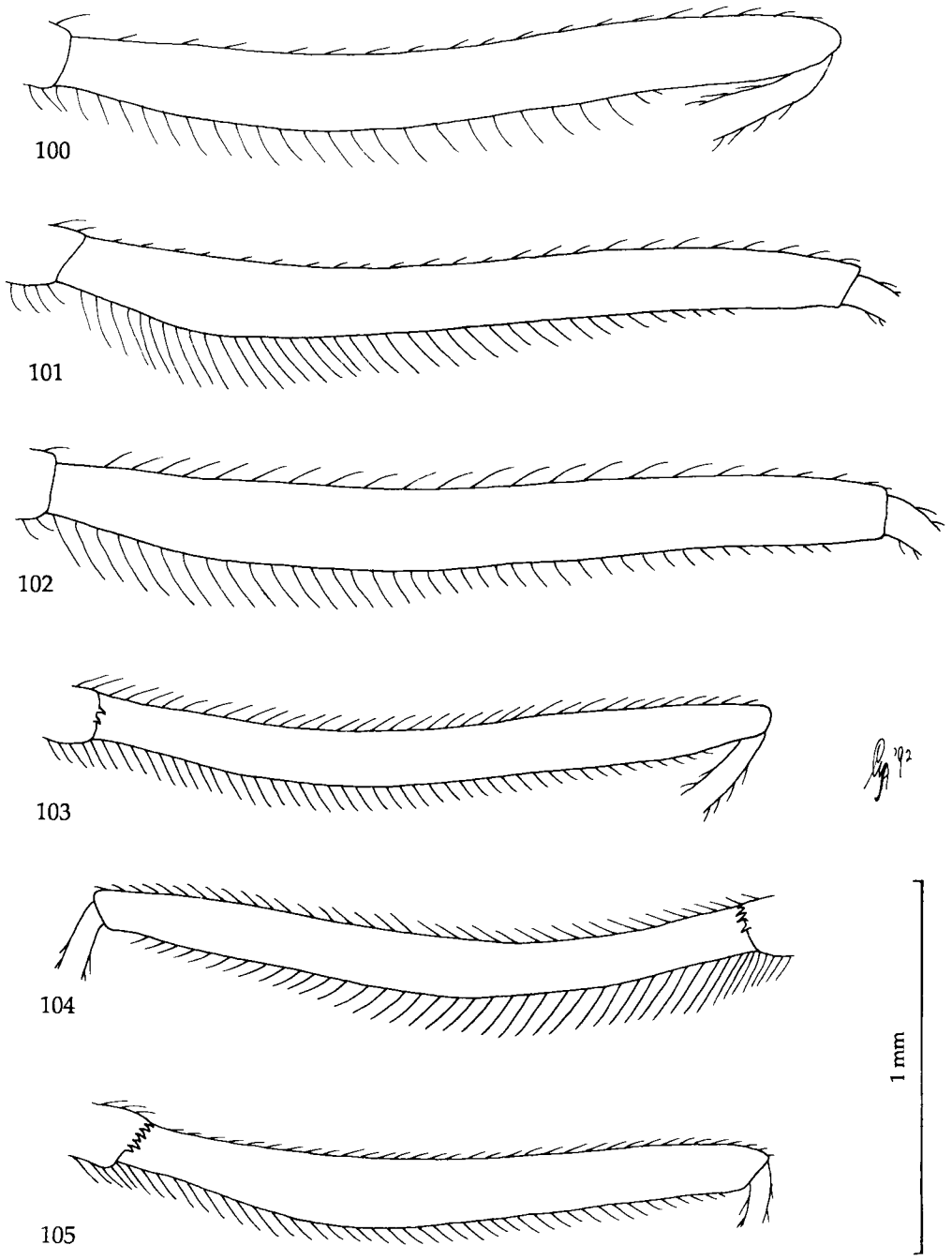
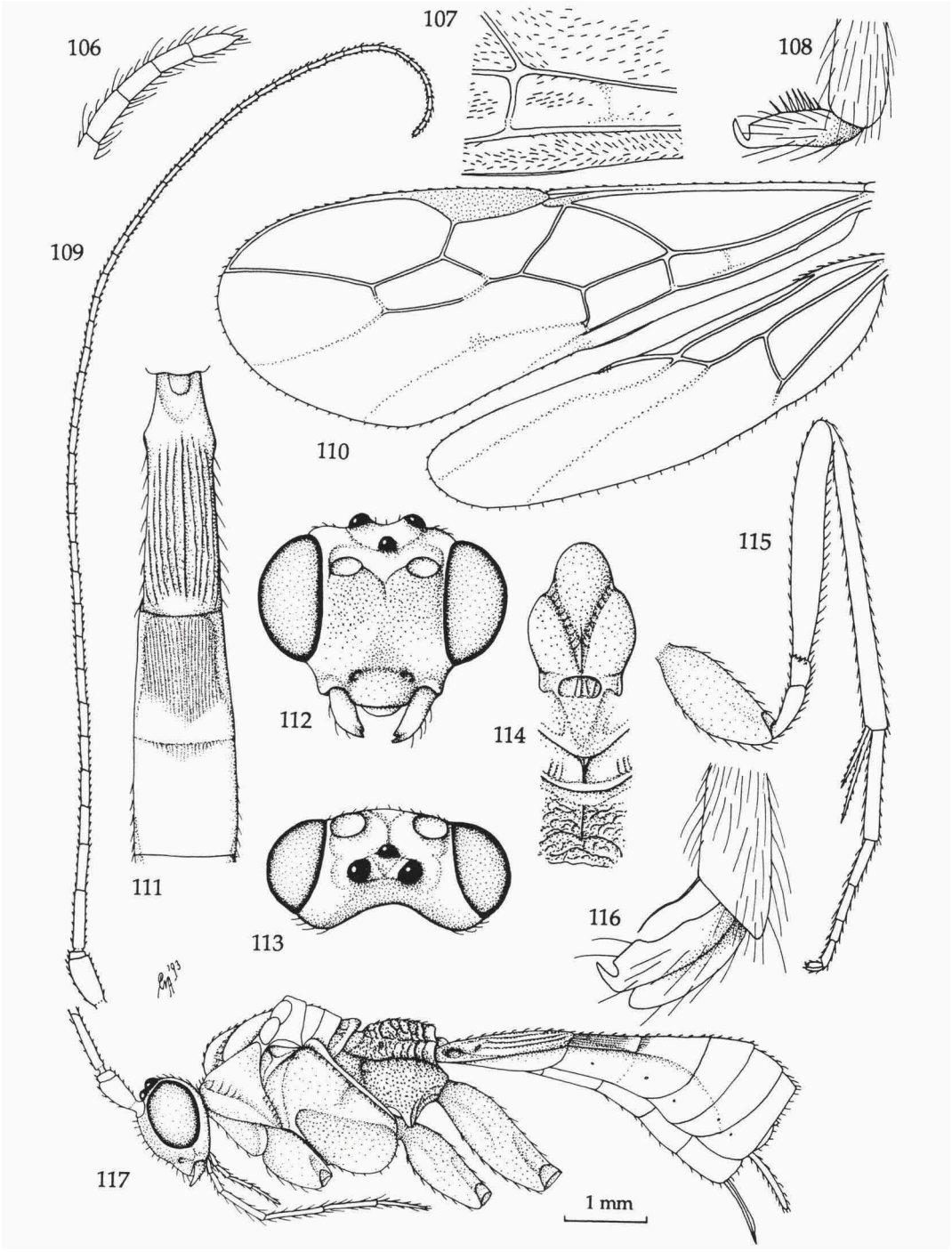
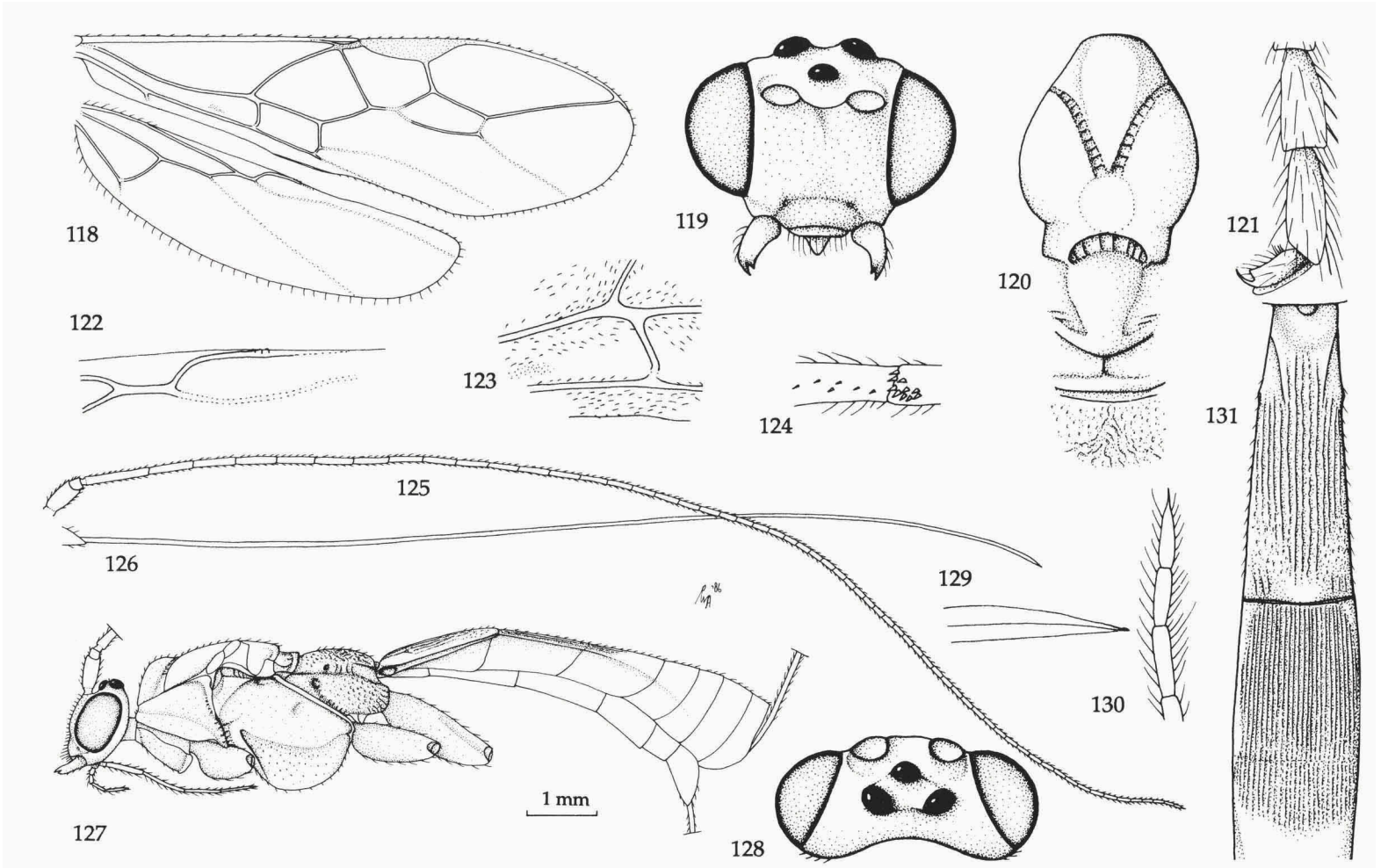


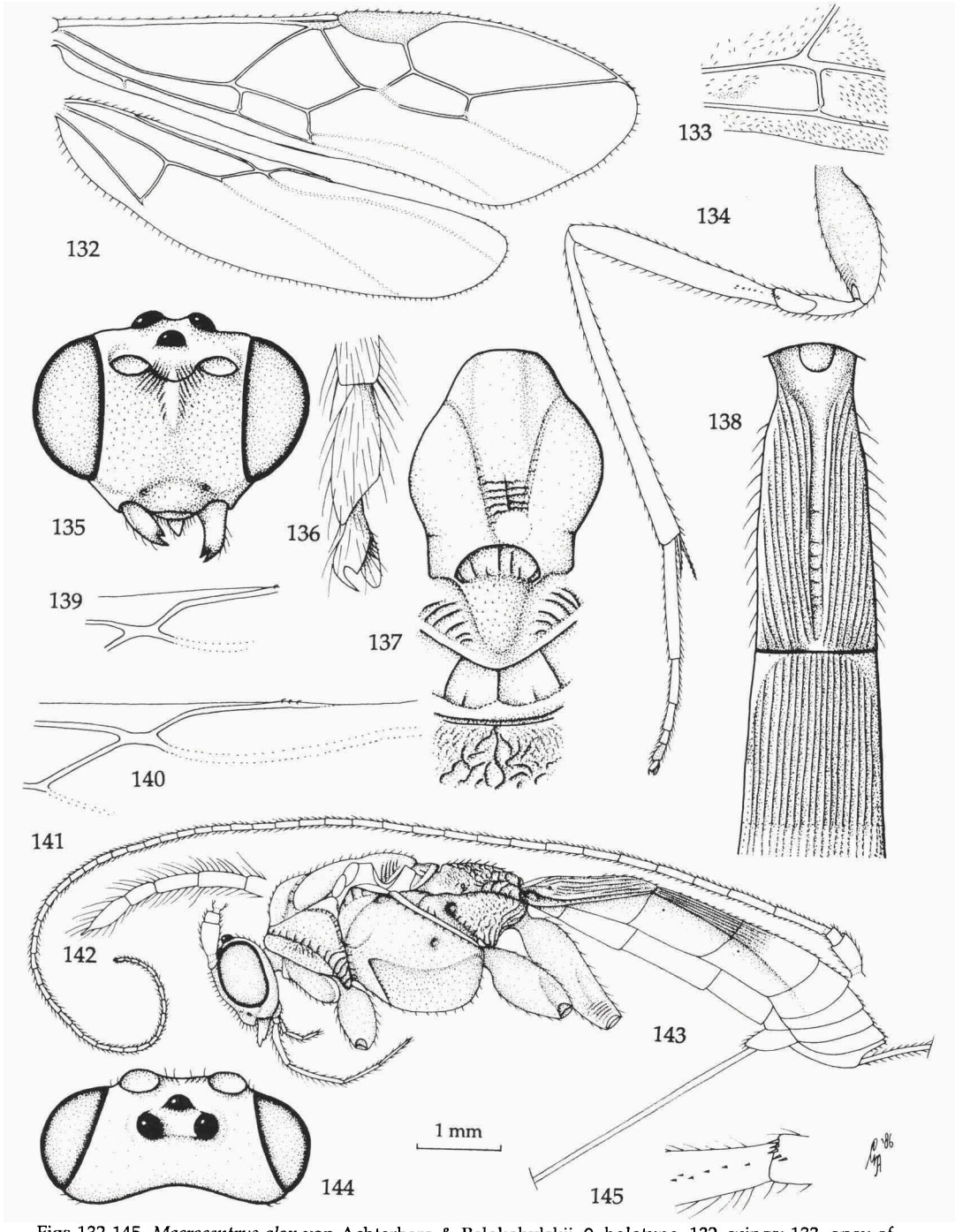
Fig. 100, *Hymenochaonia delicata* (Cresson), ♀, U.S.A., S.C., Greenville; fig. 101, *Dolichozele koebelei* Viereck, ♀, Peru, San Remon; fig. 102, *Austrozele soror* Mason, ♀, U.S.A., Virginia, Blandy; fig. 103, *Aulacocentrum philippinense* (Ashmead), ♀, Japan, Hachijoh Isl.; fig. 104, *Rectizele parki* gen. nov. & spec. nov., ♀, holotype; fig. 105, *Macrocentrus bicolor* Curtis, ♀, Netherlands, Oostkapelle. 100-105, fore femur, lateral aspect. 100: 1.5 × scale-line; 101-105: 1.0 ×.



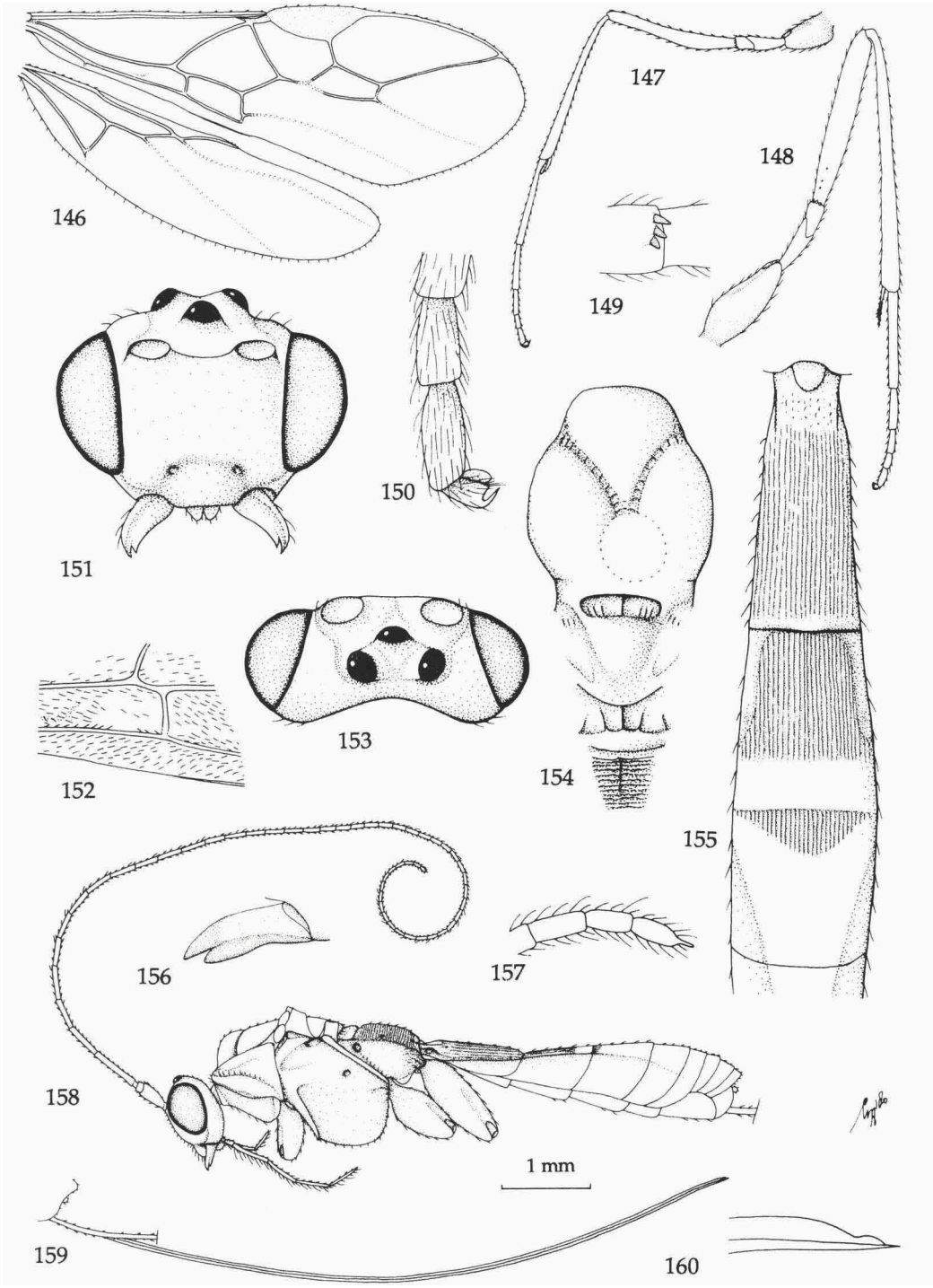
Figs 106-117, *Austrozele koreanus* spec. nov., ♀, holotype. 106, apex of antenna; 107, detail of apex of subbasal cell of fore wing; 108; inner fore claw; 109, antenna; 110, wings; 111, first-third metasomal tergites, dorsal aspect; 112, head, frontal aspect; 113, head, dorsal aspect; 114, mesosoma, dorsal aspect; 115, hind leg; 116, inner hind claw; 117, habitus, lateral aspect. 106: 5 × scale-line; 107, 111-113: 2.2 ×; 108, 116: 7.9 ×; 109, 110, 115, 117: 1 ×; 114: 2 ×.



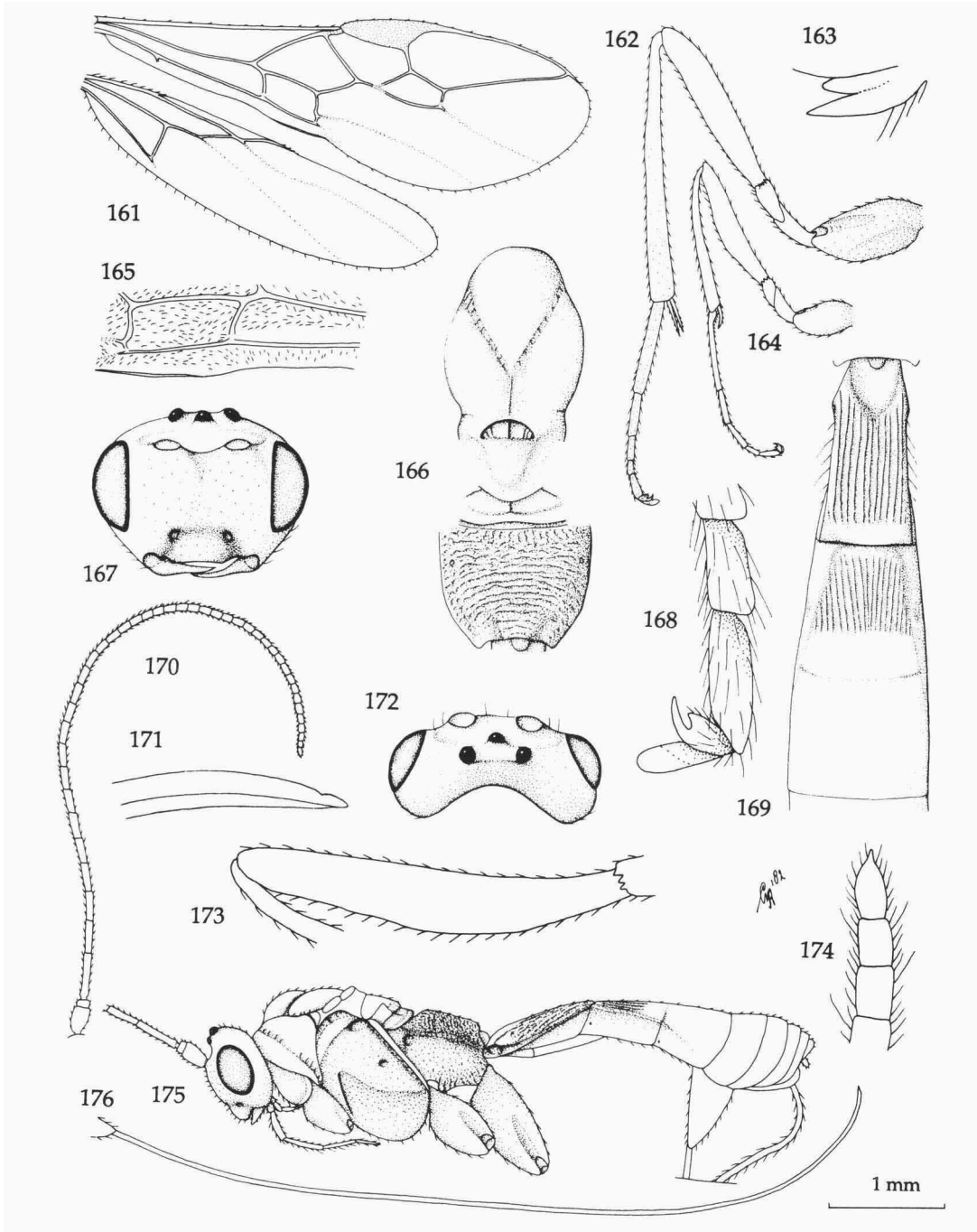
Figs 118-131, *Macrocentrus spilotus* van Achterberg & Belokobylskij, ♀, holotype. 118, wings; 119, head, frontal aspect; 120, mesosoma, dorsal aspect; 121, inner hind claw; 122, detail of vein SC+R1 of hind wing; 123, detail of apex of subbbasal cell of fore wing; 124, hind trochantellus; 125, antenna; 126, ovipositor; 127, habitus, lateral aspect; 128, head, dorsal aspect; 129, apex of ovipositor; 130, apex of antenna; 131, first-third metasomal tergites, dorsal aspect. 118, 125-127: 1 × scale-line; 119, 120, 128, 131: 2.1 ×; 121, 129, 130: 7 ×; 122-124: 2.8 ×.



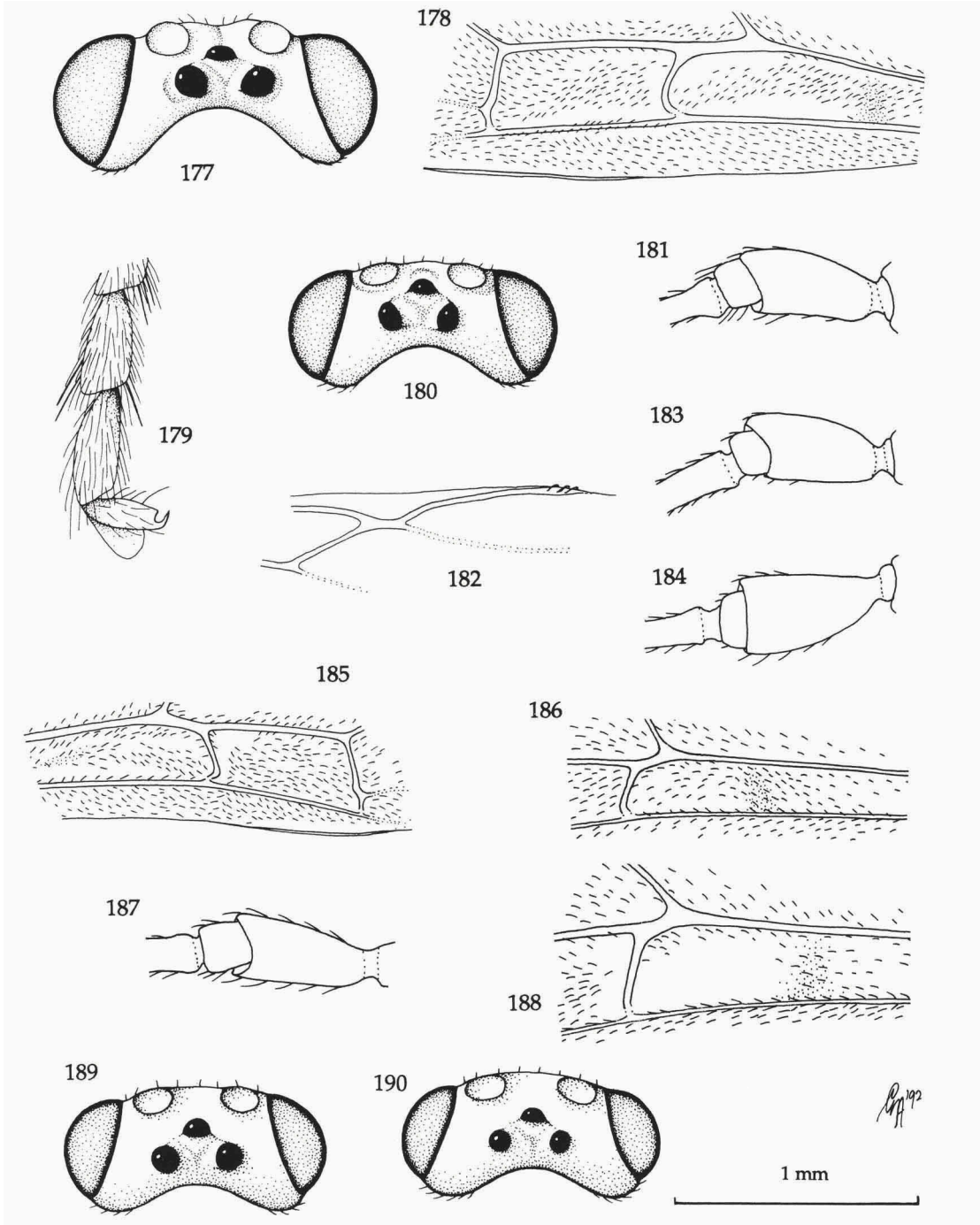
Figs 132-145, *Macrocentrus alox* van Achterberg & Belokobylskij, ♀, holotype. 132, wings; 133, apex of subbasal cell of fore wing; 134, hind leg; 135, head, frontal aspect; 136, outer hind claw; 137, mesosoma, dorsal aspect; 138, first and second metasomal tergites, dorsal aspect; 139, 140, detail of vein SC+R1 of left and right wing, respectively; 141, antenna; 142, apex of antenna; 143, habitus, lateral aspect; 144, head, dorsal aspect; 145, hind trochantellus. 132, 134, 141, 143: 1 × scale-line; 133: 2 ×; 135, 137, 138, 144: 2.1 ×; 136: 7 ×; 139, 140, 145: 2.8 ×; 142: 5 ×.



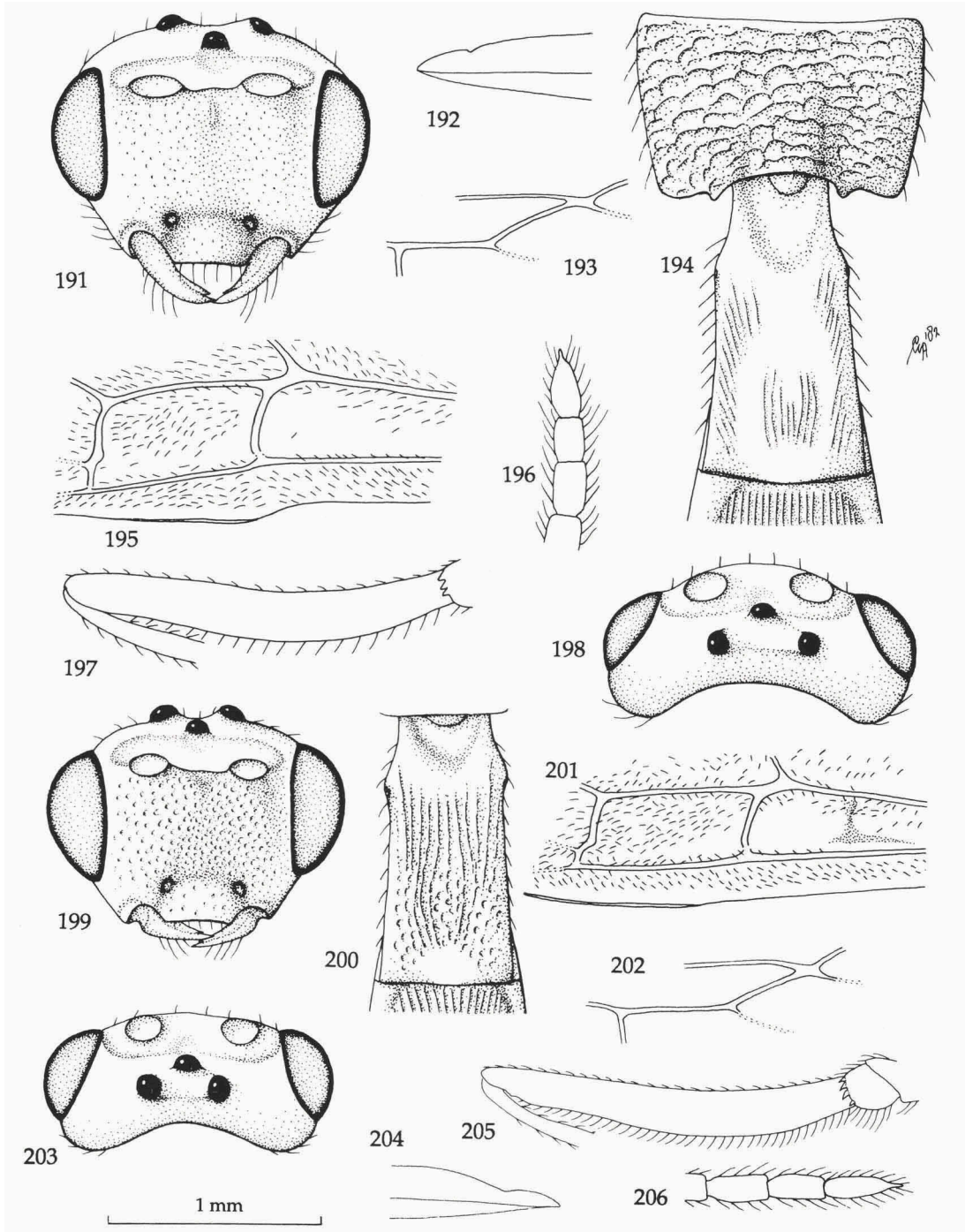
Figs 146-160, *Macrocentrus flavus* Snellen van Vollenhoven, ♀, neotype. 146, wings; 147, fore leg; 148, hind leg; 149, hind trochantellus; 150, inner hind claw; 151, head, frontal aspect; 152, detail of apex of subbasal cell of fore wing; 153, head, dorsal aspect; 154, mesosoma, dorsal aspect; 155, first-third metasomal tergites, dorsal aspect; 156, mandible, latero-ventral aspect; 157, apex of antenna; 158, habitus; lateral aspect; 159, ovipositor; 160, apex of ovipositor. 146-148, 158, 159: 1 × scale-line; 149, 156: 5 ×; 150, 157, 160: 7 ×; 151-155: 2.8 ×.



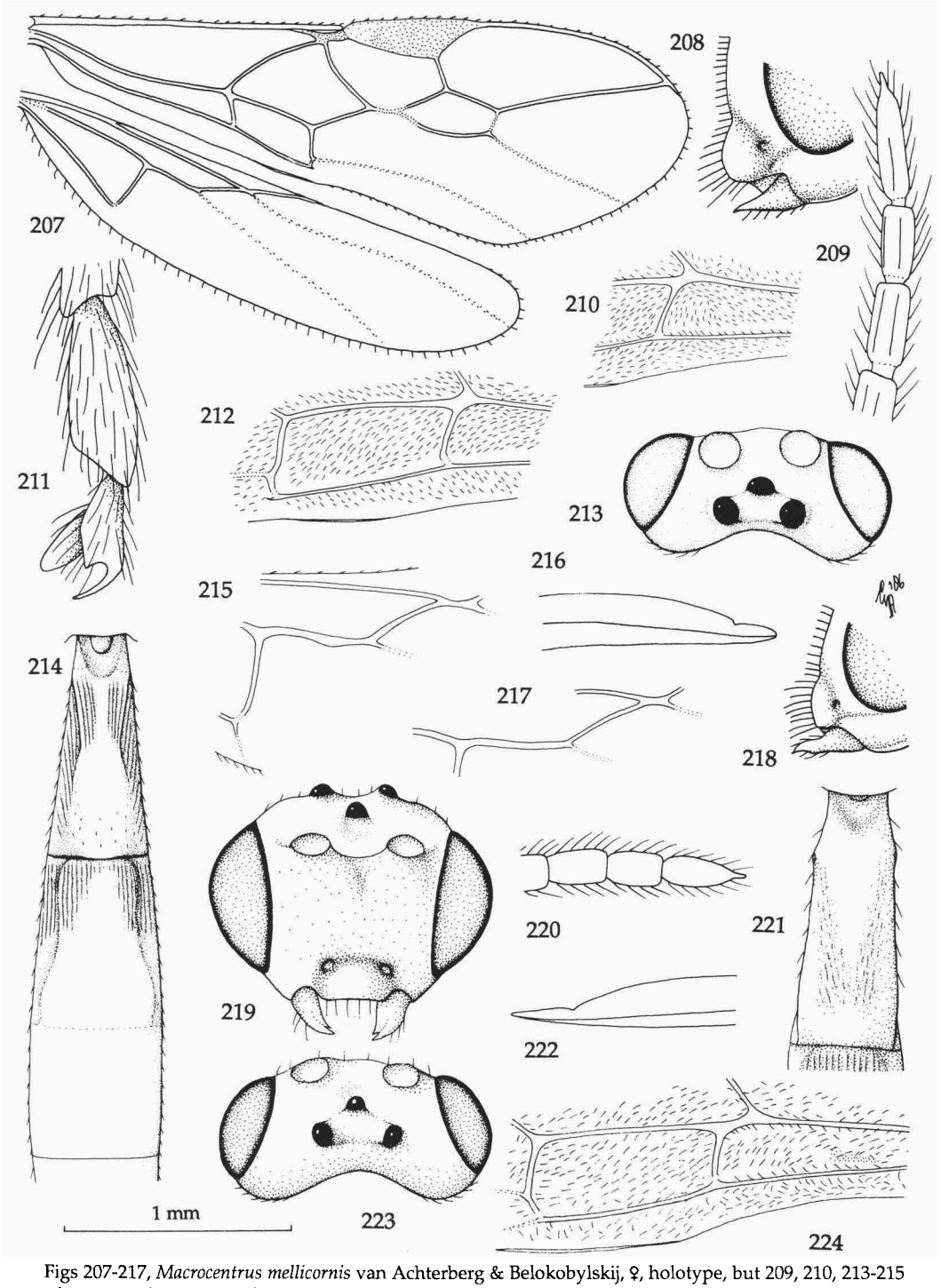
Figs 161-176, *Macrocentrus townesi* van Achterberg & Haeselbarth, ♀, holotype, but 173 of paratype, Netherlands, Epen. 161, wings; 162, hind leg; 163, mandible, dorsal aspect; 164, fore leg; 165, detail of first subdiscal and subbasal cells of fore wing; 166, mesosoma, dorsal aspect; 167, head, frontal aspect; 168, inner hind claw; 169, first-third metasomal tergites, dorsal aspect; 170, antenna; 171, apex of ovipositor; 172, head, dorsal aspect; 173, fore femur; 174, apex of antenna; 175, habitus, lateral aspect; 176, ovipositor. 161, 162, 164, 170, 176: 1 × scale-line; 163, 168, 171, 174: 7 ×; 165: 2 ×; 166, 167, 169, 172, 173,: 2.9 ×.



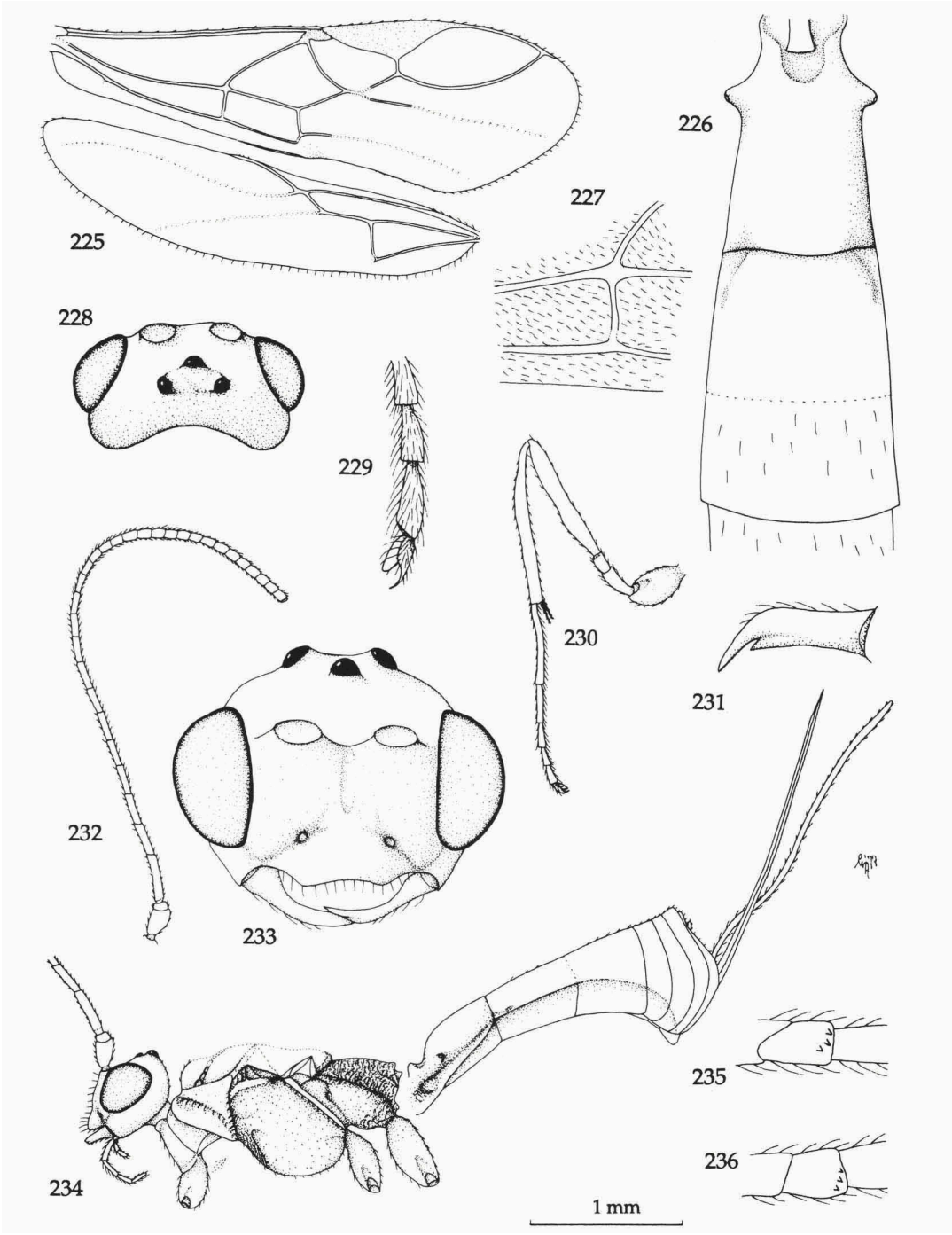
Figs 177-185, *Macrocentrus thoracicus* (Nees), ♀, Japan, Iwata, but 180, ♀, Netherlands, Meijendel; 181, ♀, Netherlands, Crailo; 183, ♂, Netherlands, Meijendel; 184, ♂, Japan, Iwata; and 185, ♀, Meijendel; figs 186-190, *M. bicolor* Curtis, ♀♀, Japan, Iwata, but 189, ♀, Netherlands, Arkel; and 190, ♀, Netherlands, Oostvoorne. 177, 180, 189, 190, head, dorsal aspect; 178, 185, 186, 188, detail of apical third of subbasal cell of fore wing; 179, inner hind claw; 181, 183, 184, 187, scapus, lateral aspect; 182, detail of vein SC+R1 of hind wing. 177, 178, 182: 1 × scale-line; 179: 3.3 ×; 180, 188-190: 0.9 ×; 181, 183-187: 1.4 ×.



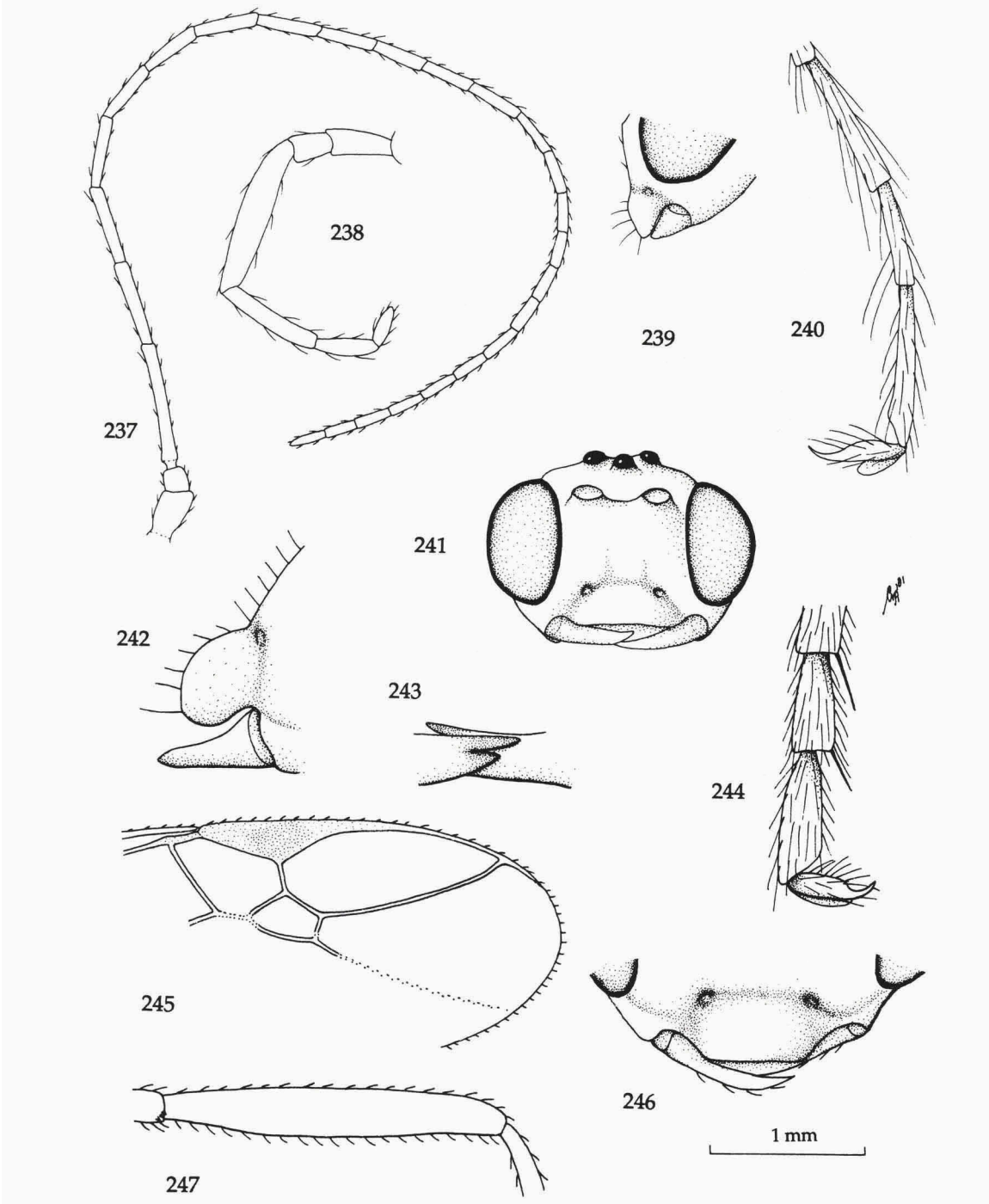
Figs 191-198, *Macrocentrus nidulator* (Nees), ♀, Germany, München; figs 199-206, *M. marginator* (Nees), ♀, Netherlands, Wijster. 191, 199, head, frontal aspect; 192, 204, apex of ovipositor; 193, 202, detail of vein 1-M and 1r-m of hind wing; 194, 200, first metasomal tergite, dorsal aspect; 195, 201, detail of apical third of subbasal cell of fore wing; 196, 206, apex of antenna; 197, 205, fore femur, anterior aspect; 198, 203, head, dorsal aspect. 191, 193-195, 197-203: 1 × scale-line; 192, 196: 2.5 ×; 204: 3.7 ×; 205: 0.8 ×; 206: 2.2 ×.



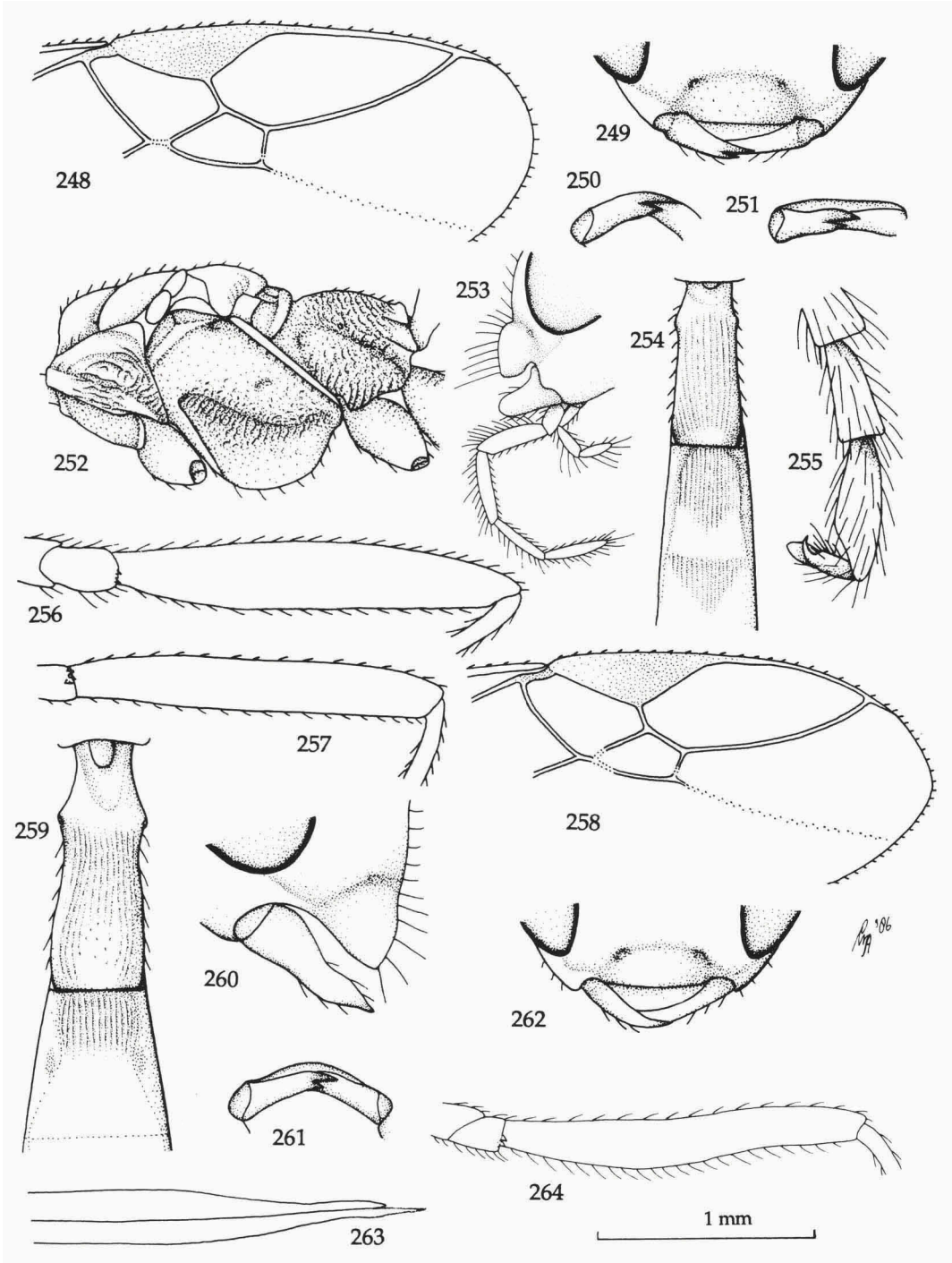
Figs 207-217, *Macrocentrus mellicornis* van Achterberg & Belokobylskij, ♀, holotype, but 209, 210, 213-215 of paratype from Korea; figs 218-224, *M. nitidus* (Wesmael), ♀, Netherlands, Wijster. 207, wings; 208, 218, clypeus, lateral aspect; 209, 220, apex of antenna; 210, 212, 224, detail of apex of subbasal and first subdiscal cell of fore wing; 211, outer hind claw; 213, 223, head, dorsal aspect; 214, first-third metasomal tergites, dorsal aspect; 215, 217, detail of veins 1r-m and 1-M of hind wing; 216, 222, apex of ovipositor; 219, head, frontal aspect; 221, first metasomal tergite, dorsal aspect. 207: 0.5 × scale-line; 208, 218, 219, 221, 223, 224: 1.4 ×; 209, 220, 222: 3.3 ×; 211, 216: 3.6 ×; 210, 213, 215: 0.9 ×; 212, 217: 1 ×; 214: 0.7 ×.



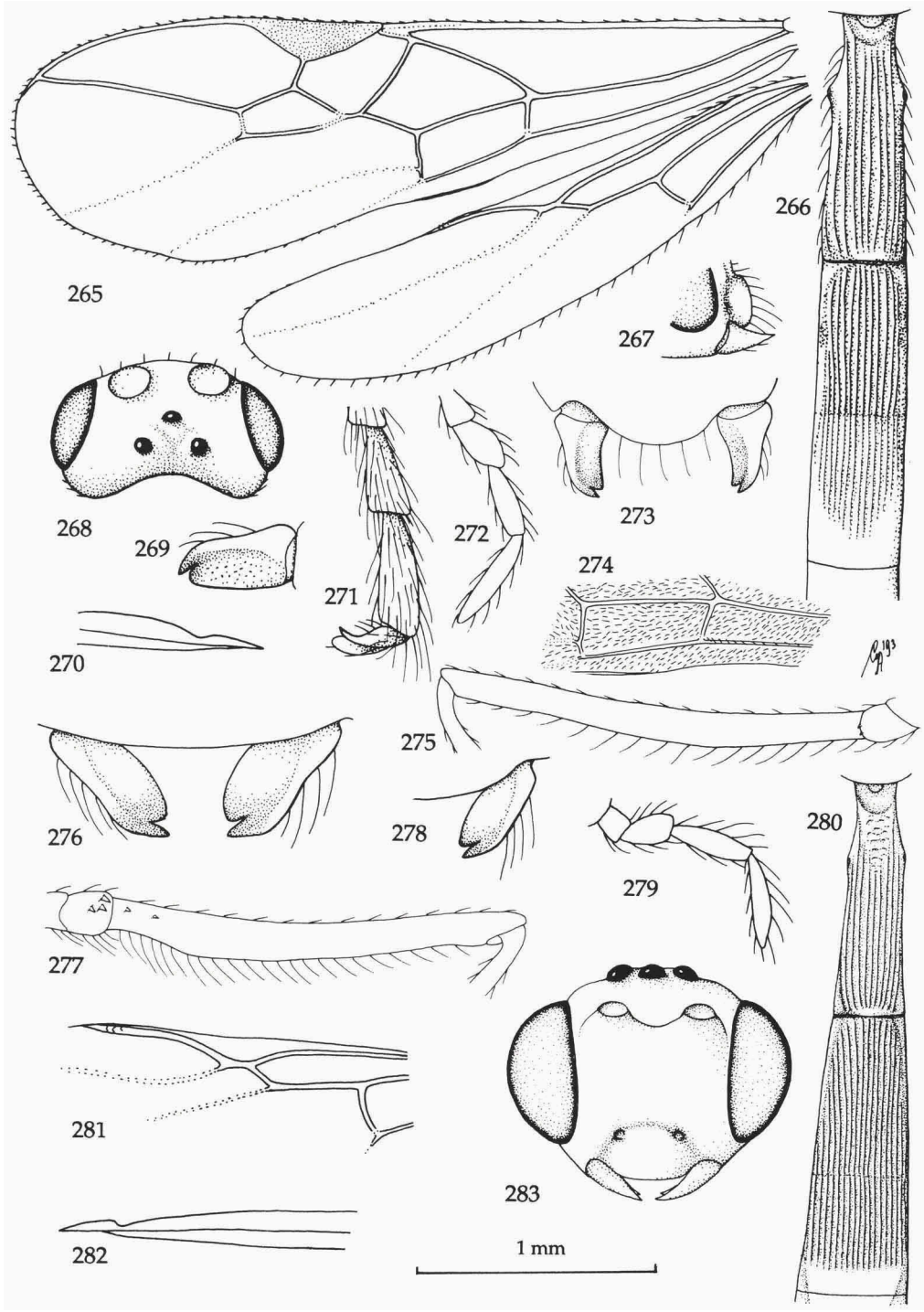
Figs 225-236, *Macrocentrus collaris* (Spinola), ♀, holotype of *M. dubius* (Wesmael). 225, wings; 226, first-third metasomal tergites, dorsal aspect; 227, detail of apex of subbasal cell of fore wing; 228, head, dorsal aspect; 229, outer middle claw; 230, middle leg; 231, mandible, lateral-ventral aspect; 232, antenna; 233, head, frontal aspect; 234, habitus, lateral aspect; 235, fore trochantellus; 236, middle trochantellus. 225, 230, 232, 234: 1 × scale-line; 226: 2 ×; 227, 233: 3 ×; 228: 2.1 ×; 229, 231, 235, 236: 4.2 ×.



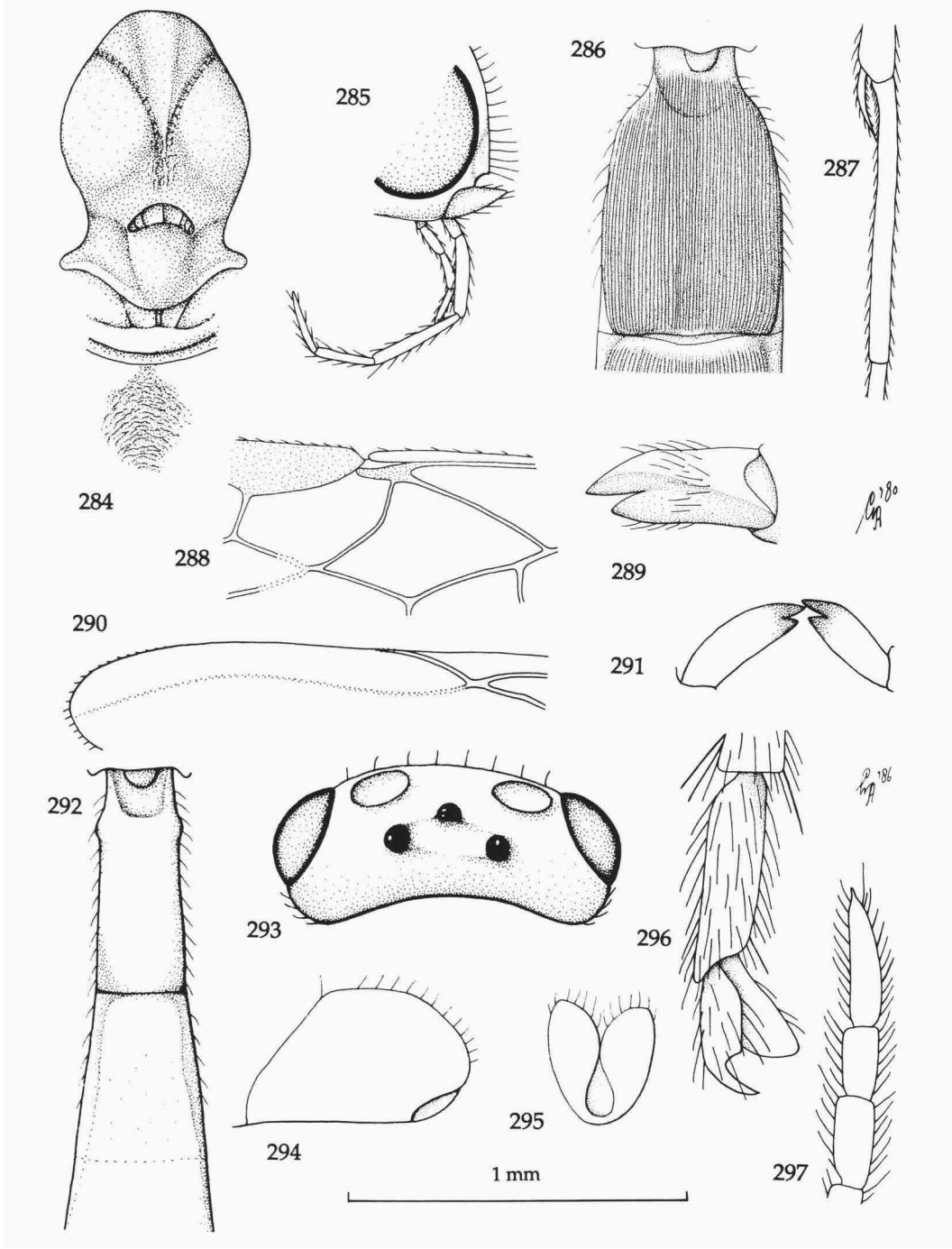
Figs 237-241, *Macrocentrus amphigenes* Alexeev, ♀, paratype; figs 242, 243, 245-247, *M. equalis* Lyle, ♀, Germany; fig. 244, *M. collaris* (Spinola), ♀, Italy, Gargnano. 237, antenna; 238, maxillary palp; 239, 242, clypeus, lateral aspect; 240, apical half of hind tarsus, outer aspect; 241, head, frontal aspect; 243, mandibles, ventral aspect; 244, outer hind claw; 245, apex of fore wing; 246, detail of clypeus, frontal aspect; 247, hind femur. 237, 239, 241, 247: 2 × scale-line; 238, 240, 244: 5 ×; 242, 243: 3.7 ×; 245: 1.3 ×; 246: 3.3 ×.



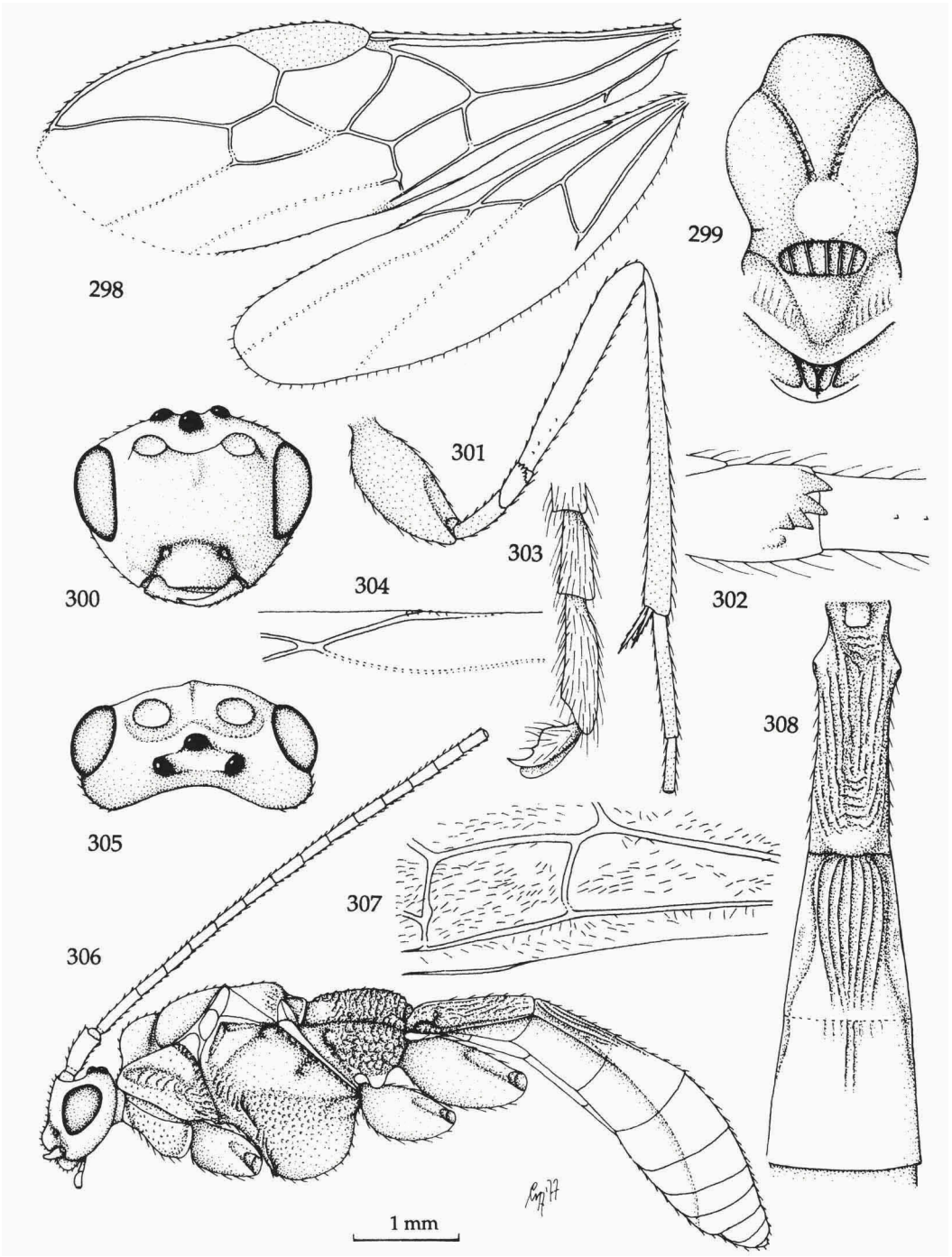
Figs 248-256, *Macrocentrus oriens* van Achterberg & Belokobylskij, ♀, holotype, but 251 of paratype; figs 257-264, *M. collaris* (Spinola), ♀, Italy, Gargnano, but 263, Spain, Denia, and 264, Netherlands, Tegelen. 248, 258, apex of fore wing; 249, 262, clypeus, frontal aspect; 250, 251, 261, mandibles, ventral aspect; 252, mesosoma, lateral aspect; 253, 260, clypeus, lateral aspect; 254, 259, first-third metasomal tergites, dorsal aspect; 255, inner hind claw; 256, 257, hind femur; 263, apex of ovipositor; 264, fore femur, anterior aspect. 248, 252, 254, 258: 1 × scale-line; 249-251, 256, 257, 259, 261, 262: 1.5 ×; 253, 260, 264: 1.8 ×; 255, 263: 3.8 ×.



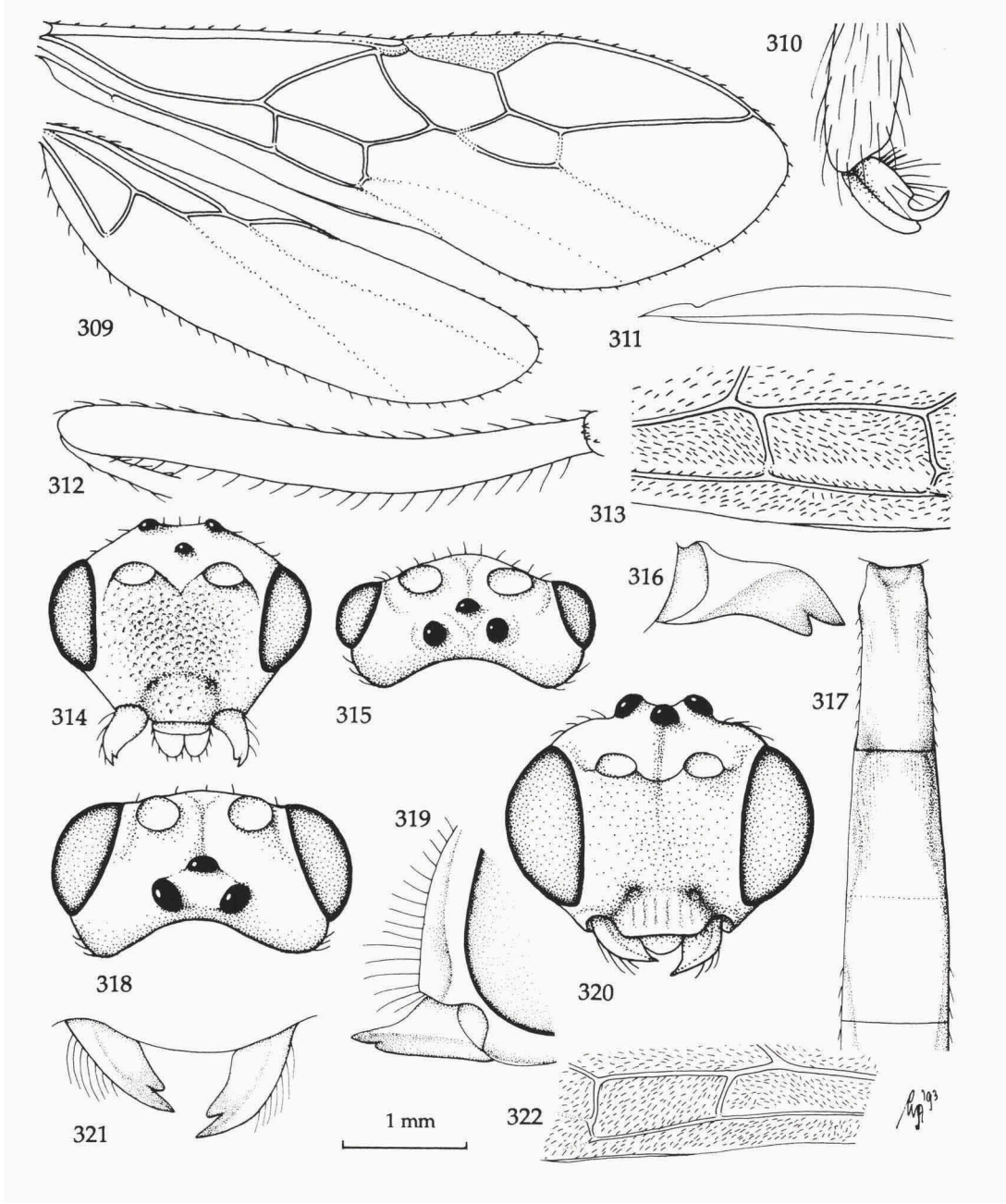
Figs 265-275, *Macrocentrus huggerti* spec. nov., ♀, holotype; figs 276, 277, *M. cingulum* Brischke, ♀, Bulgaria, Chrabrino, and U.K., Cardiff, respectively; figs 278-283, *M. brevicaudifer* van Achterberg, ♀, Korea, Dae-dong, but 280 and 283 of holotype. 265, wings; 266, 280, first-third metasomal tergites, dorsal aspect; 267, clypeus, lateral aspect; 268, head, dorsal aspect; 269, mandible, dorso-lateral aspect; 270, 282, apex of ovipositor; 271, outer hind claw; 272, 279, labial palp; 273, 276, 278, mandibles, dorsal aspect; 274; apex of subbasal cell and first subdiscal cell of fore wing; 275, 277, fore femur, anterior aspect; 281, veins 1r-m and 1-M of hind wing; 283 head, frontal aspect. 265: 1 × scale-line; 266-268, 281: 1.5 ×; 269-272, 276, 278, 279, 282: 3.5 ×; 273: 2.4 ×; 274: 1.1 ×; 275, 277: 1.6 ×; 280, 283: 1.4 ×.



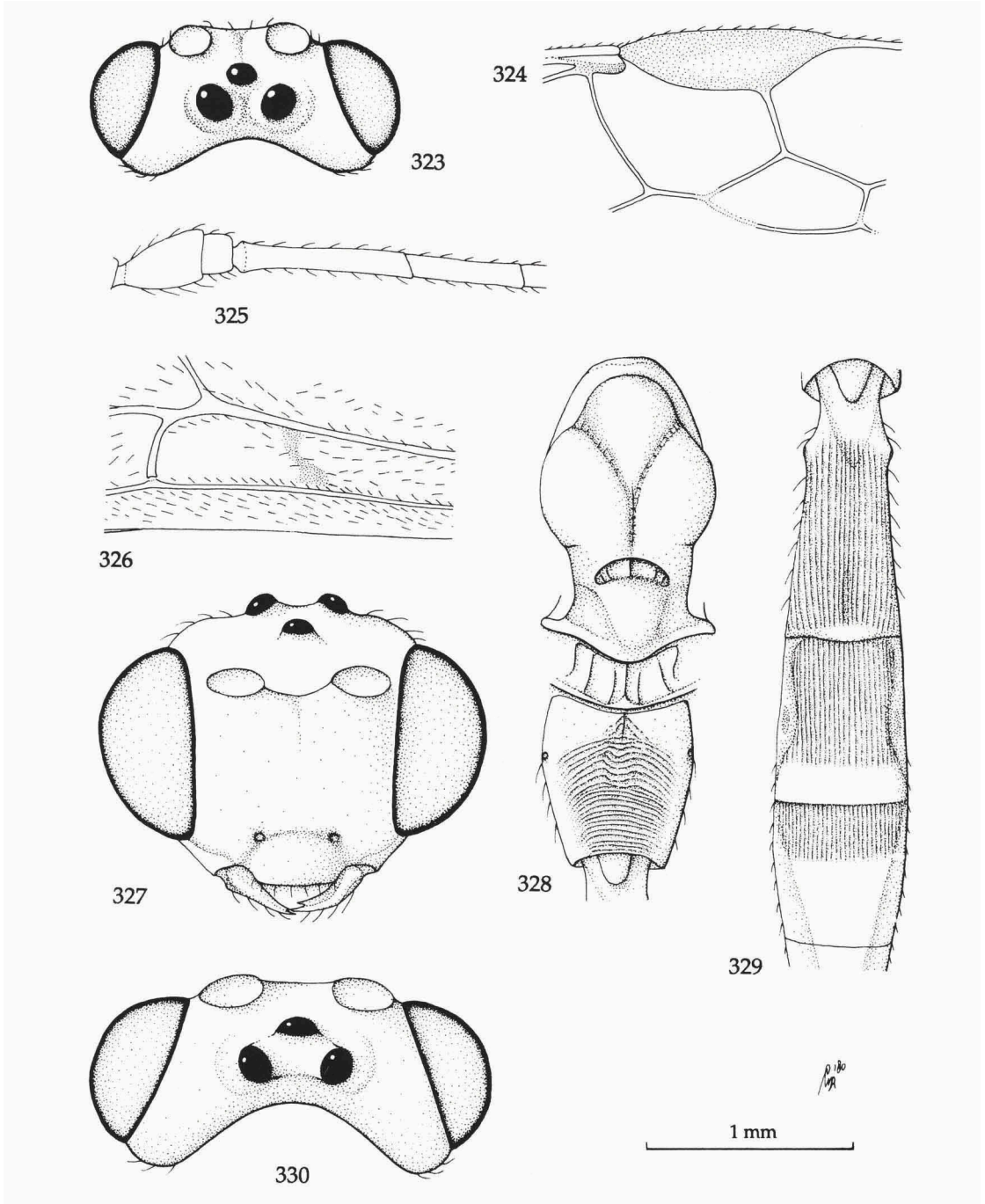
Figs 284-289, *Macrocentrus crassus* Eady & Clark, ♀, paratype; figs 290-297, *M. retusus* van Achterberg & Belokobylskij, ♀, holotype. 284, mesosoma, dorsal aspect; 285, palpi and clypeus, lateral aspect; 286, first metasomal tergite, dorsal aspect; 287, fore tibial spur; 288, detail of vein 1-SR+M of fore wing; 289, 291, mandible, ventral aspect; 290, marginal cell of hind wing; 292, first and second metasomal tergites, dorsal aspect; 293, head, dorsal aspect; 294, hypopygium, lateral aspect; 295, id., posterior aspect; 296, outer hind claw; 297, apex of antenna. 284, 286, 293: 0.7 × scale-line; 285, 288, 291, 294, 295: 1 ×; 287, 289: 1.4 ×; 290, 292: 0.5 ×; 296, 297: 3.6 ×.



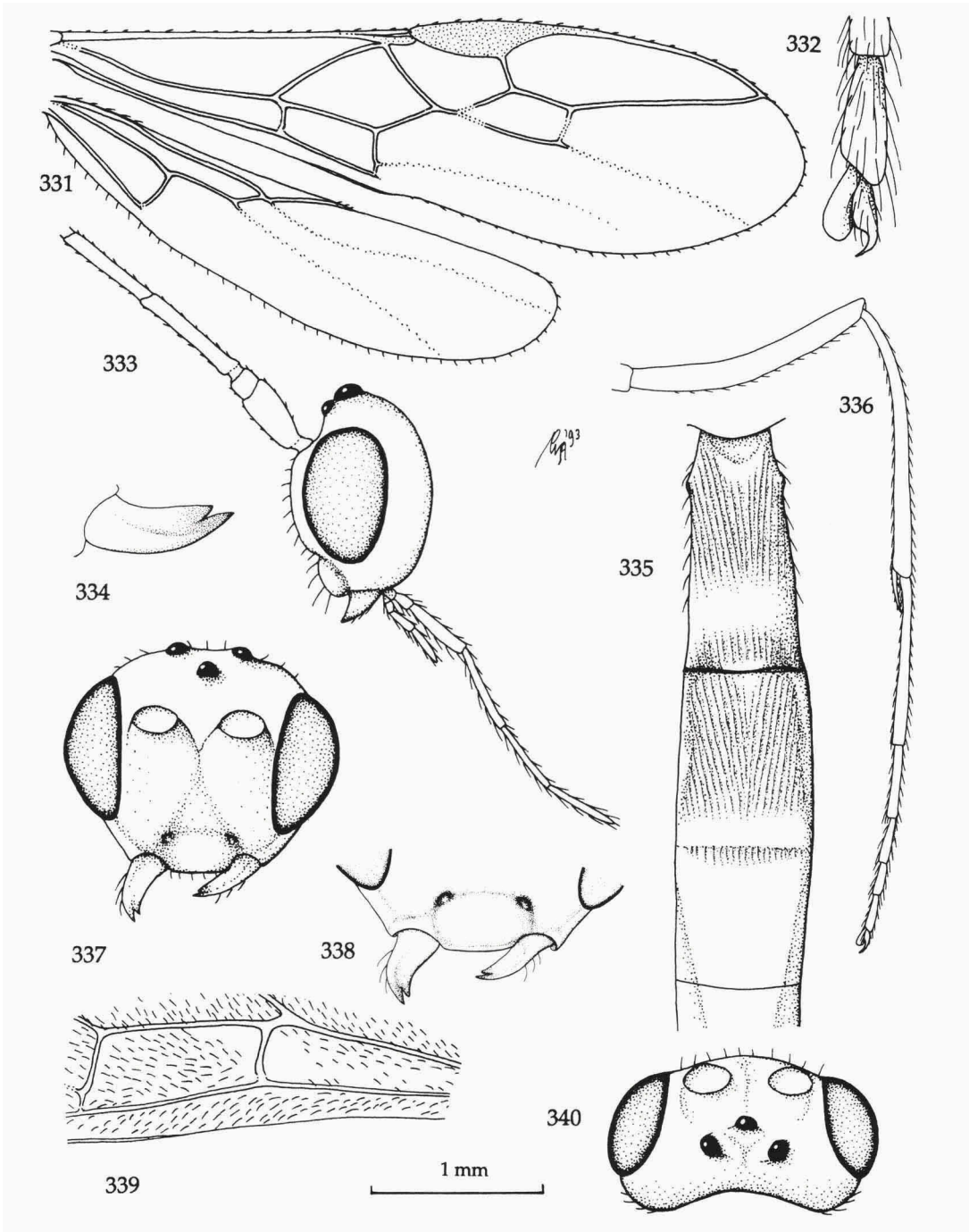
Figs 298-308, *Macrocentrus bengtssoni* (Fahringer), ♂, holotype. 298, wings; 299, meso- and metanotum, dorsal aspect; 300, head, frontal aspect; 301, hind leg; 302, hind trochantellus; 303, outer middle claw; 304, detail of vein SC+R1 of hind wing; 305, head, dorsal aspect; 306, habitus, lateral aspect; 307, apex of subbasal cell and first subdiscal cell of fore wing; 308, first-third metasomal tergites, dorsal aspect. 298, 301, 306: 1 × scale-line; 299, 300, 304, 305, 307, 308: 2 ×; 302, 303: 5 ×.



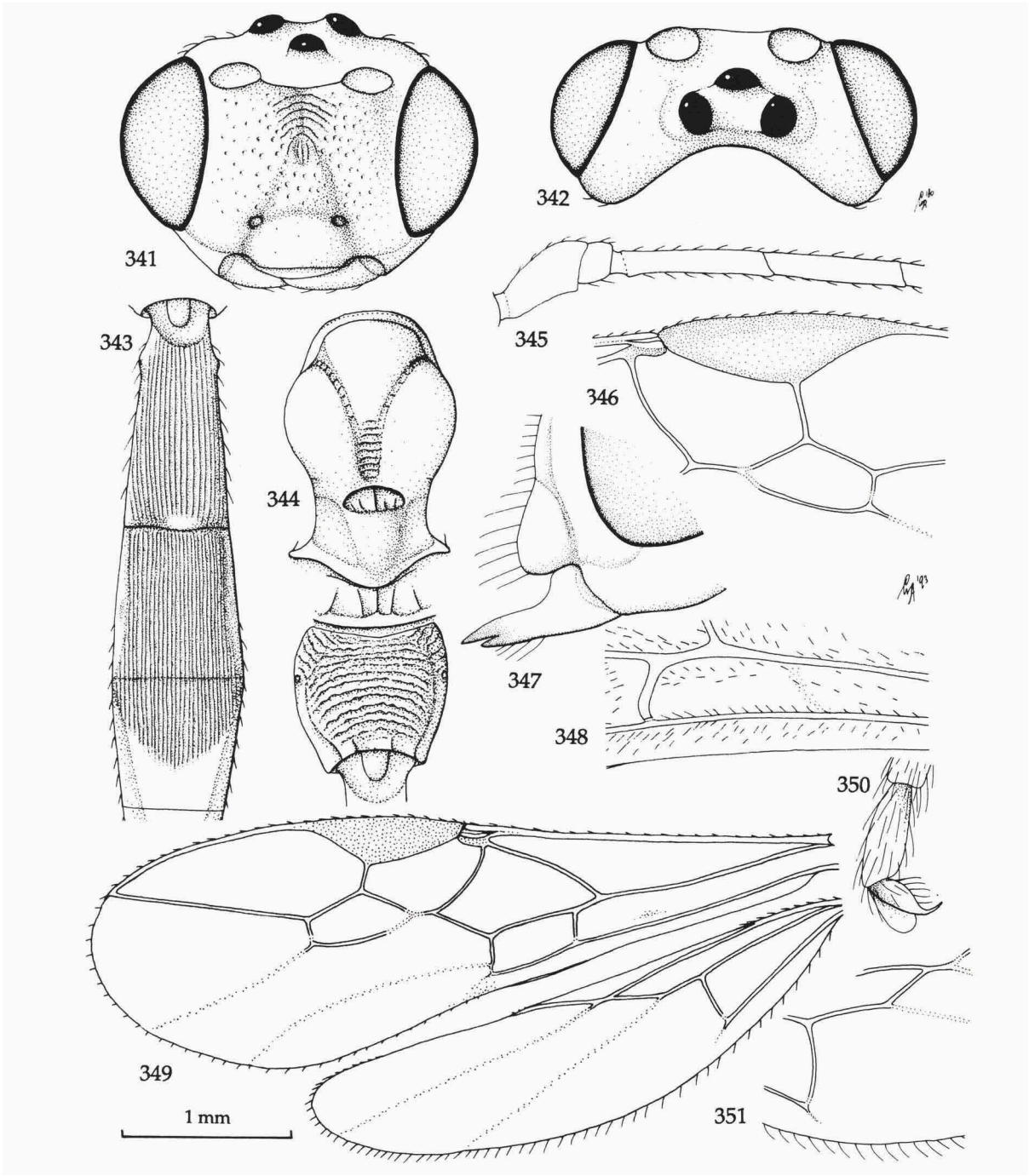
Figs 309-317, *Macrocentrus pilosus* Watanabe, ♀, holotype; figs 318-322, *M. resinellae* (Linnaeus), ♀, Netherlands, Rotterdam. 309, wings; 310, outer hind claw; 311, apex of ovipositor; 312, fore femur, frontal aspect; 313, 322, apex of subbasal cell and first subdiscal cell of fore wing; 314, 320, head, frontal aspect; 315, 318, head, dorsal aspect; 316, mandible, latero-dorsal aspect; 317, first-third metasomal tergites, dorsal aspect; 319, clypeus, lateral aspect; 321, mandibles, dorsal aspect. 309: 1 × scale-line; 310: 6.8 ×; 311, 319, 321: 4.8 ×; 312, 318, 320: 3 ×; 313-315: 2 ×; 316: 5.3 ×; 317: 1.4 ×; 322: 2.1 ×.



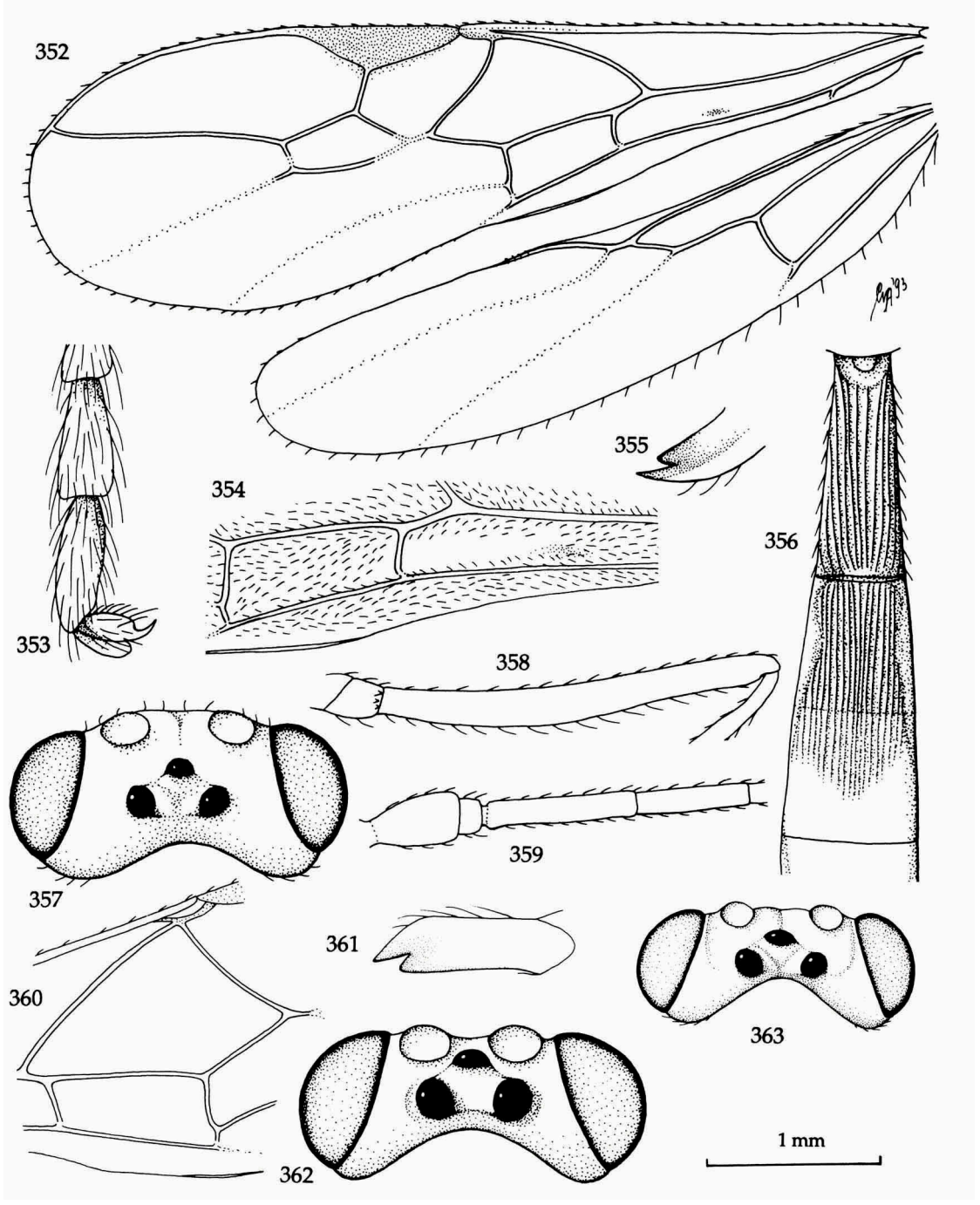
Figs 323, 324, *Macrocentrus gibber* Eady & Clark, ♀, Germany, Steinebach; figs 325-330, *M. rossemi* Haeselbarth & van Achterberg, ♀, holotype. 323, 330, head, dorsal aspect; 324, detail of 2-SR+M of fore wing; 325, basal segments of antenna; 326, apex of subbasal cell of fore wing; 327, head, frontal aspect; 328, mesosoma, dorsal aspect; 329, first-third metasomal tergites, dorsal aspect. 323, 324: 1.2 × scale-line; 325-327, 330: 1.4 ×; 328, 329: 1 ×.



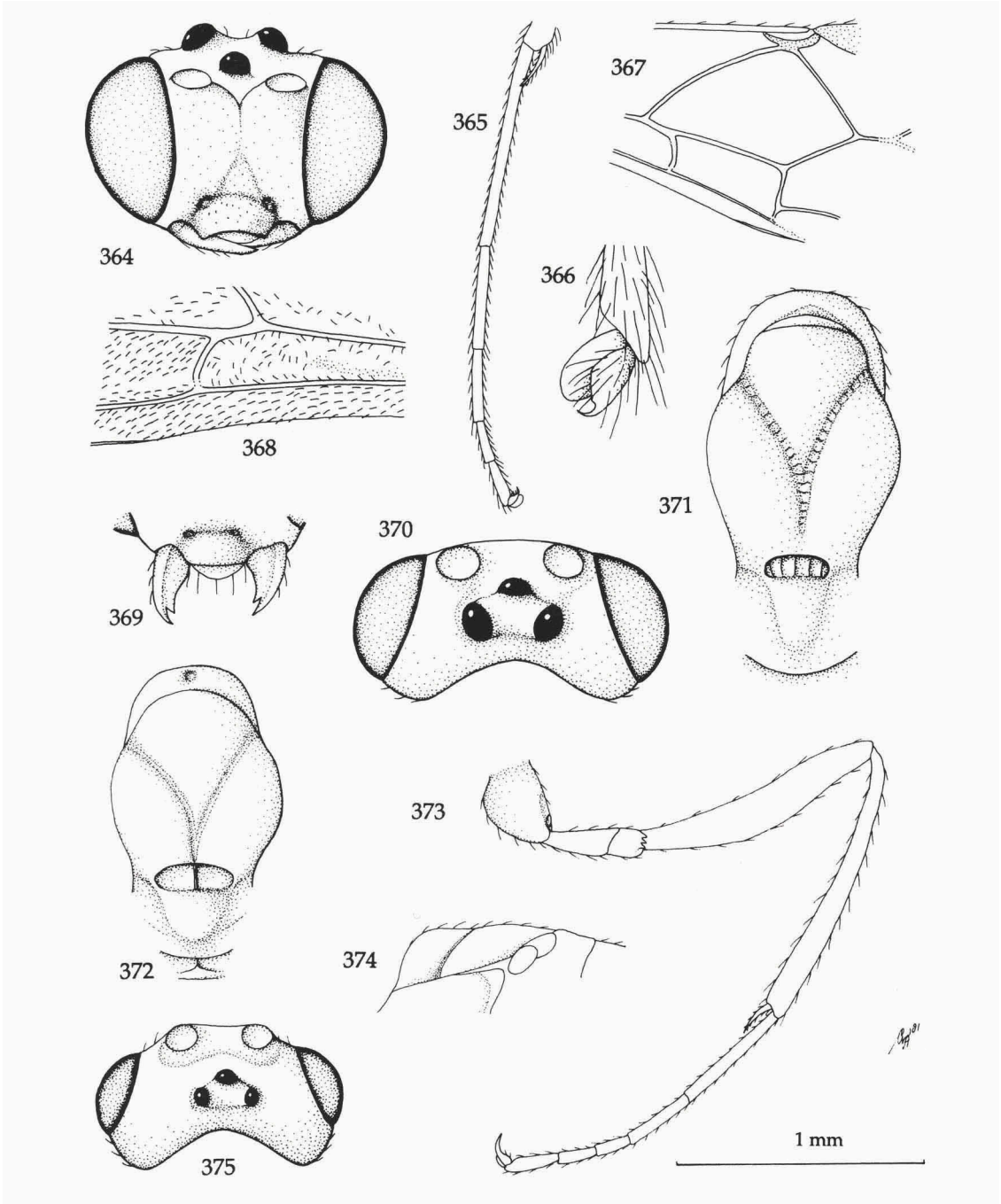
Figs 331-340, *Macrocentrus madeirensis* spec. nov., ♀, holotype. 331, wings; 332, outer hind claw; 333, head and palpi, lateral aspect; 334, mandible, ventral aspect; 335, first-third metasomal tergites, dorsal aspect; 336, fore leg, anterior aspect; 337, head, frontal aspect; 338, clypeus, frontal aspect; 339, apex of subbasal cell and first subdiscal cell of fore wing; 340, head, dorsal aspect. 331: 1 × scale-line; 332: 4.7 ×; 333, 335, 337, 339, 340: 2 ×; 334: 3.2 ×; 336: 1.4 ×; 338: 2.4 ×.



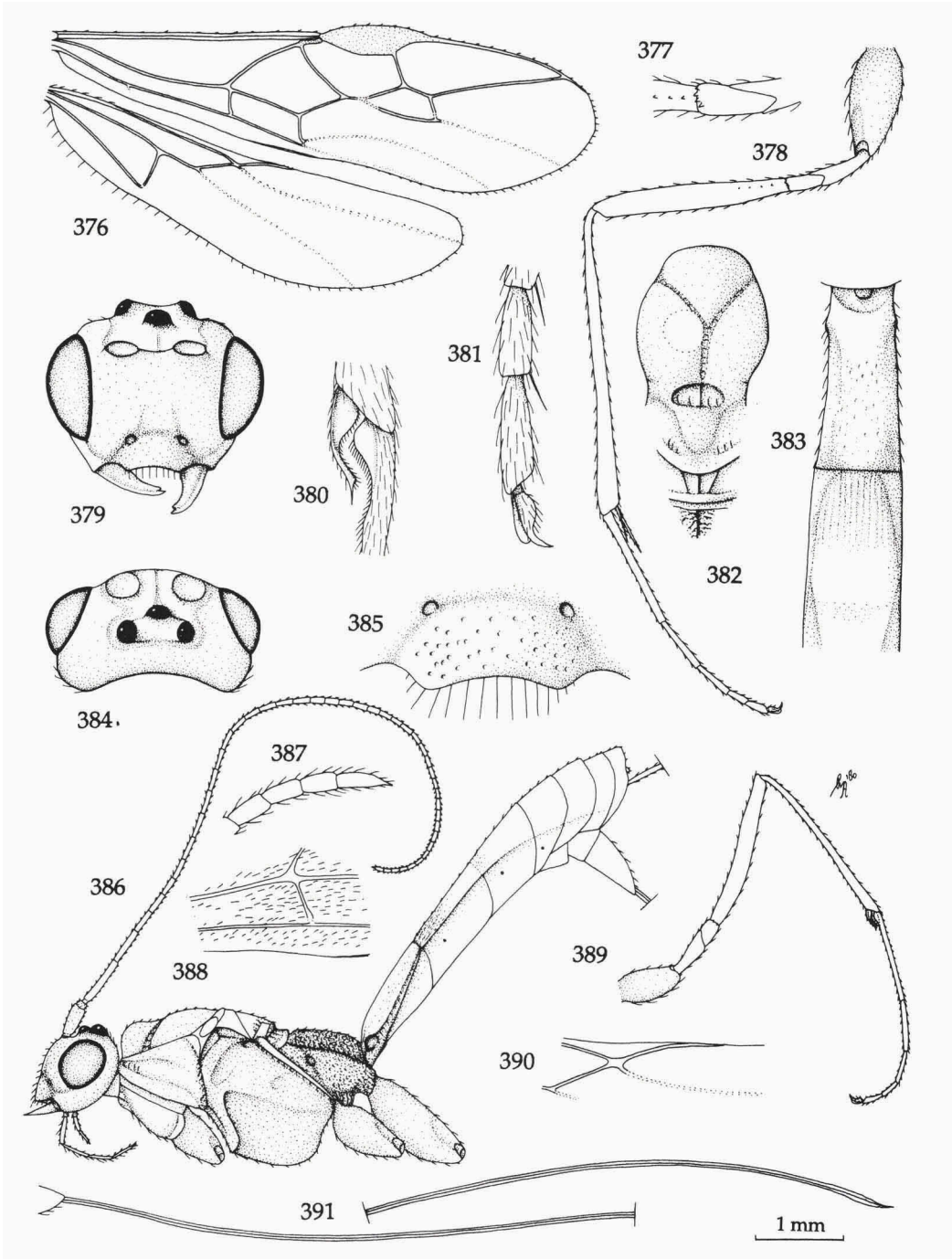
Figs 341-351, *Macrocentrus kurnakovi* Tobias, ♀, Netherlands, Well, but 346, 347, 351, Netherlands, Vlijmen, and 349, 350, Japan, Sanbu. 341, head, frontal aspect; 342, head, dorsal aspect; 343, first-third metasomal tergites, dorsal aspect; 344, mesosoma, dorsal aspect; 345, basal antennal segments; 346, detail of vein 2-SR+M of fore wing; 347, clypeus, lateral aspect; 348, apex of subbasal cell of fore wing; 349, wings; 350, outer hind claw; 3512, veins 1r-m and 1-M of hind wing. 341, 342, 345, 348: 1.8 × scale-line; 343, 344: 1.2 ×; 346, 351: 1.4 ×; 347, 350: 3.2 ×; 349: 1 ×.



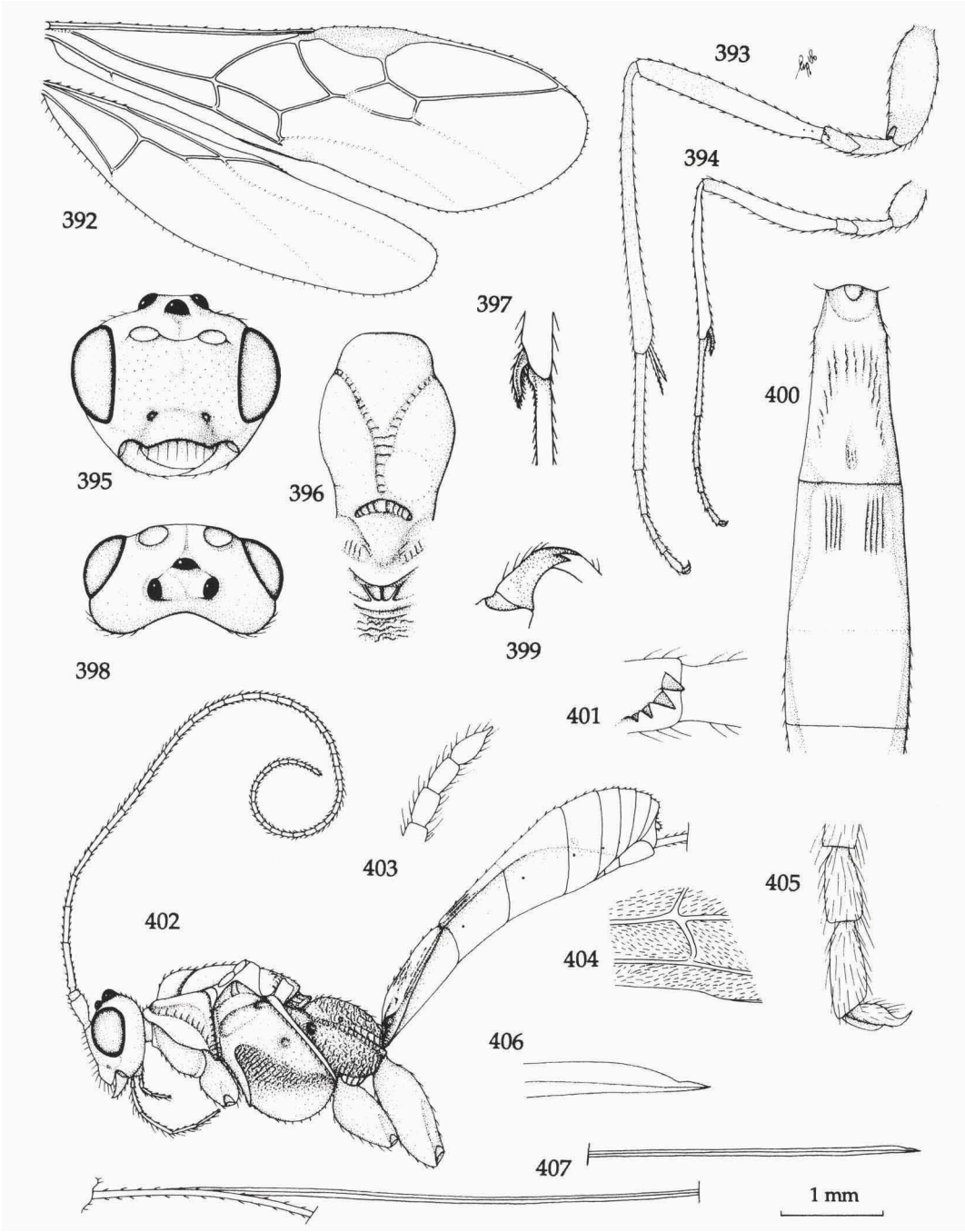
Figs 352-359, *Macrocentrus infuscatus* spec. nov., ♀, holotype; figs 360, 362, *M. rhyacioniae* Watanabe, ♀, Japan, Hirakura; figs 361, 363, *M. kurnakovi* Tobias, ♀, Japan, Sanbu. 352, wings; 353, inner hind claw; 354, apex of subbasal cell and first subdiscal cell of fore wing; 355, mandible, dorsal aspect; 356, first-third metasomal tergites, dorsal aspect; 357, 362, 363, head, dorsal aspect; 358, fore femur, anterior aspect; 359, basal segments of antenna; 360, discal cell of fore wing; 361, mandible, ventral aspect. 352, 356: 1 × scale-line; 353, 355: 4.5 ×; 354: 1.5 ×; 357, 358: 2 ×; 359: 2.5 ×; 360: 1.2 ×; 361: 3.3 ×; 362: 1.6 ×; 363: 1.3 ×.



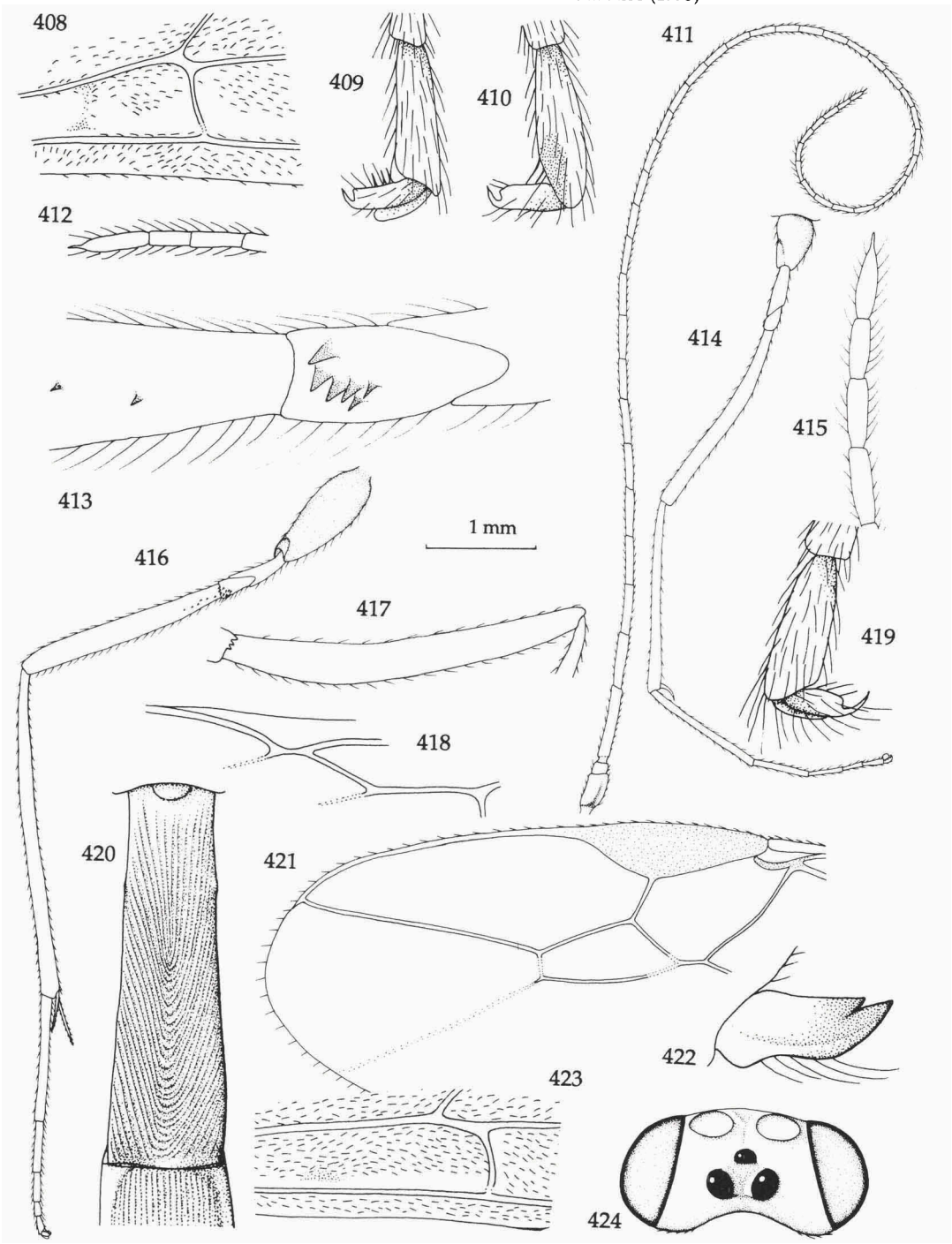
Figs 364-366, *Macrocentrus rhyacioniae* Watanabe, ♀, Japan, Hirakura; figs 367-371, *M. buolianae* Eady & Clark, ♀, paratype; figs 372-375, *M. turkestanicus* (Telenga), ♀, syntype. 364, head, frontal aspect; 365, fore tarsus; 366, outer hind claw; 367, discal cell of fore wing; 368, apex of subbasal cell and first subdiscal cell of fore wing; 369, detail of malar space and clypeus; 370, 375, head, dorsal aspect; 371, 372, mesonotum, dorsal aspect; 373, fore leg, lateral aspect; 374, mesoscutum, lateral aspect. 364: 1 × scale-line; 365: 0.8 ×; 366: 3.3 ×; 367: 0.9 ×; 368-371: 1.6 ×; 372-375: 1.3 ×.



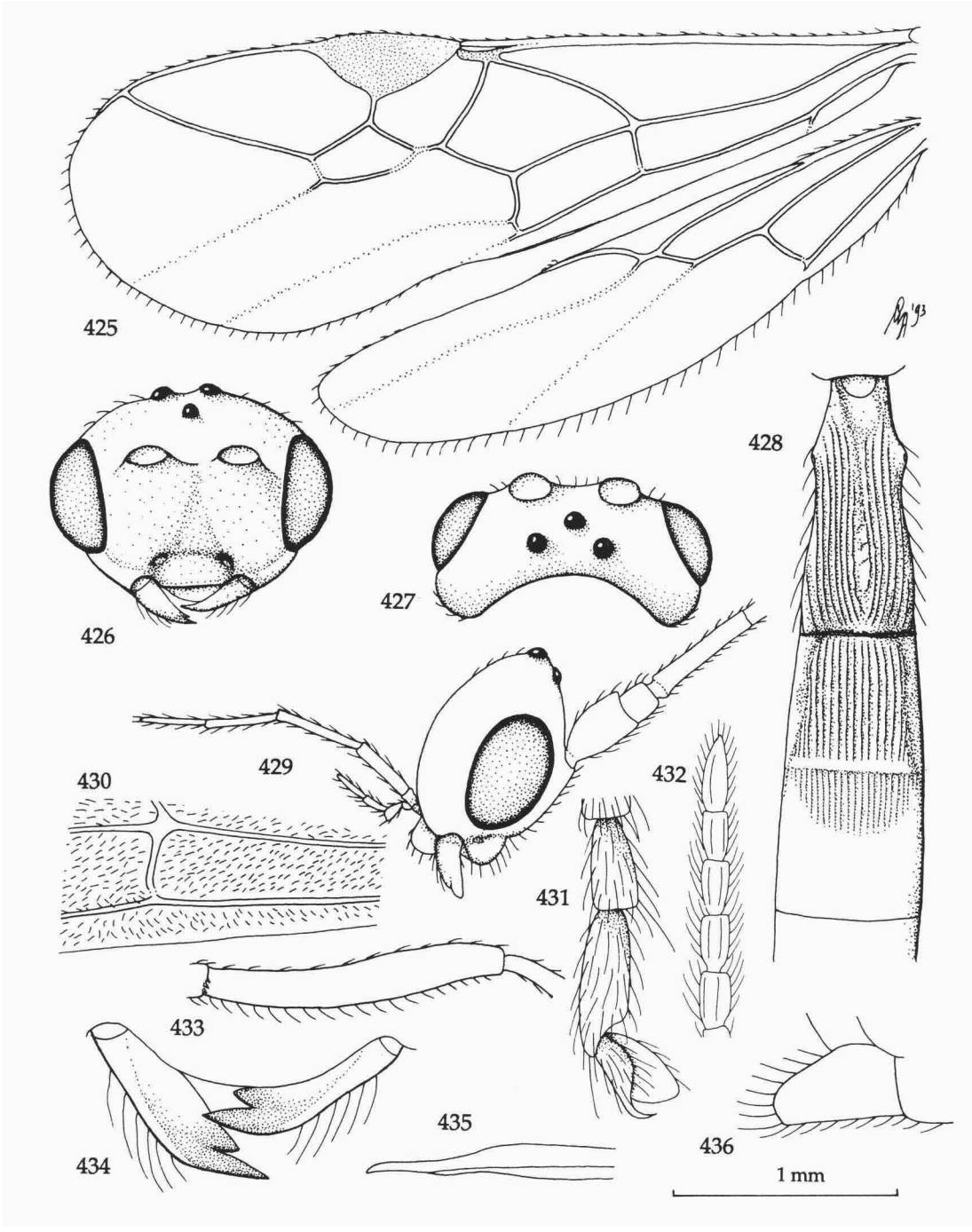
Figs 376-391, *Macrocentrus hungaricus* Marshall, ♀, holotype of *M. tsunekii* Watanabe. 376, wings; 377, hind trochantellus; 378, hind leg; 379, head, frontal aspect; 380, fore tibial spur; 381, inner hind claw; 382, mesosoma, dorsal aspect; 383, first and second metasomal tergites, dorsal aspect; 384, head, dorsal aspect; 385, clypeus, frontal aspect; 386, habitus, lateral aspect; 387, apex of antenna; 388, apex of subbasal cell of fore wing; 389, fore leg; 390, detail of SC+R1 of hind wing; 391, ovipositor. 376, 378, 386, 389, 391: 1 × scale-line; 377, 379, 382-384, 388, 390: 2 ×; 380, 381, 385, 387: 5 ×.



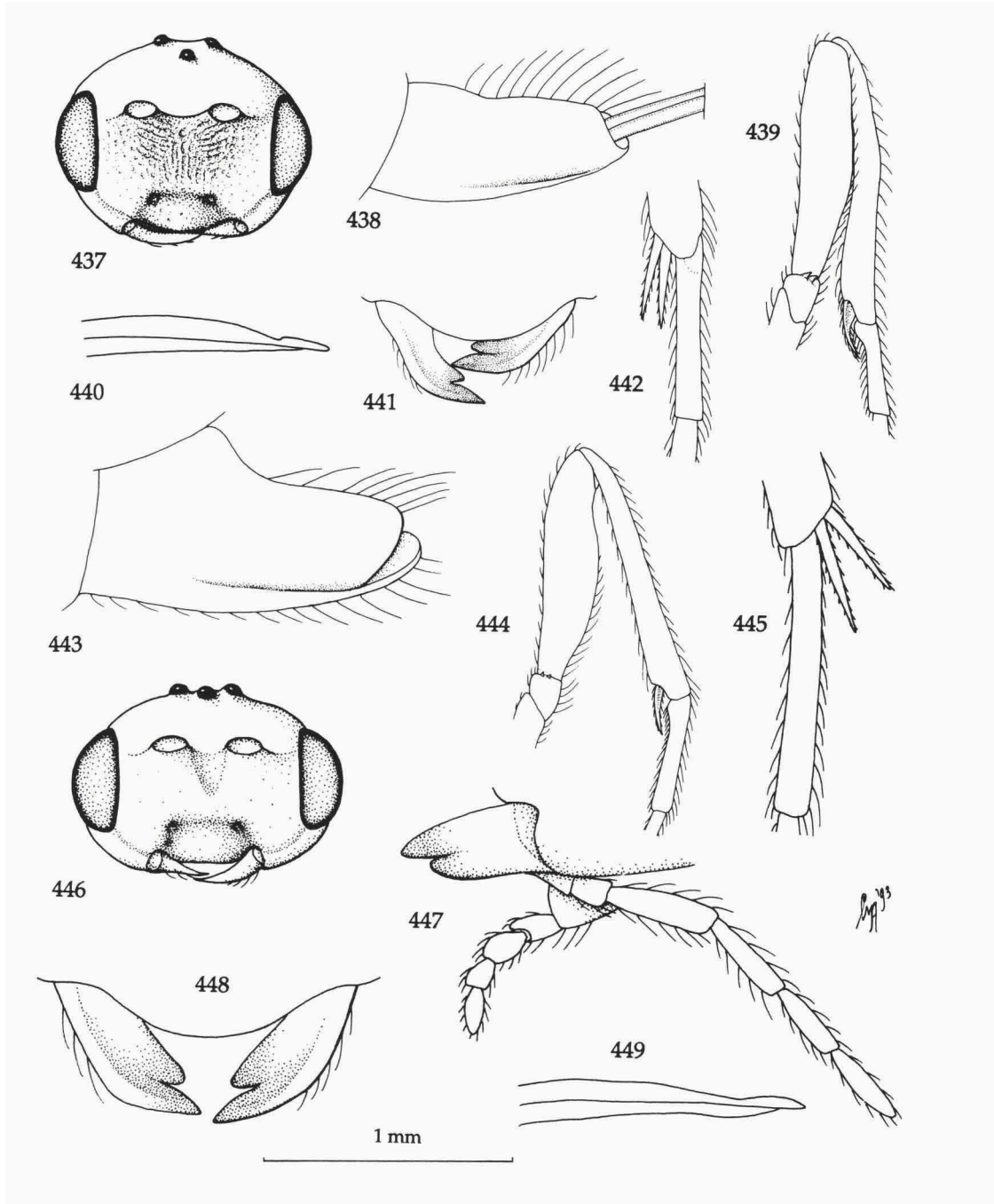
Figs 392-407, *Macrocentrus hungaricus* Marshall, ♀, holotype of *M. bicoloripes* van Achterberg. 392, wings; 393, hind leg; 394, fore leg; 395, head, frontal aspect; 396, mesosoma, dorsal aspect; 397, fore tibial spur; 398, head, dorsal aspect; 399, mandible, latero-ventral aspect; 400, first-third metasomal tergites, dorsal aspect; 401, hind trochantellus; 402, habitus, lateral aspect; 403, apex of antenna; 404, apex of subbasal cell of fore wing; 405, inner hind claw; 406, apex of ovipositor; 407, ovipositor. 392-394, 402, 407: 1 × scale-line; 395, 396, 398, 400, 404: 2 ×; 397, 399: 2.6 ×; 401, 403, 405, 406: 5 ×.



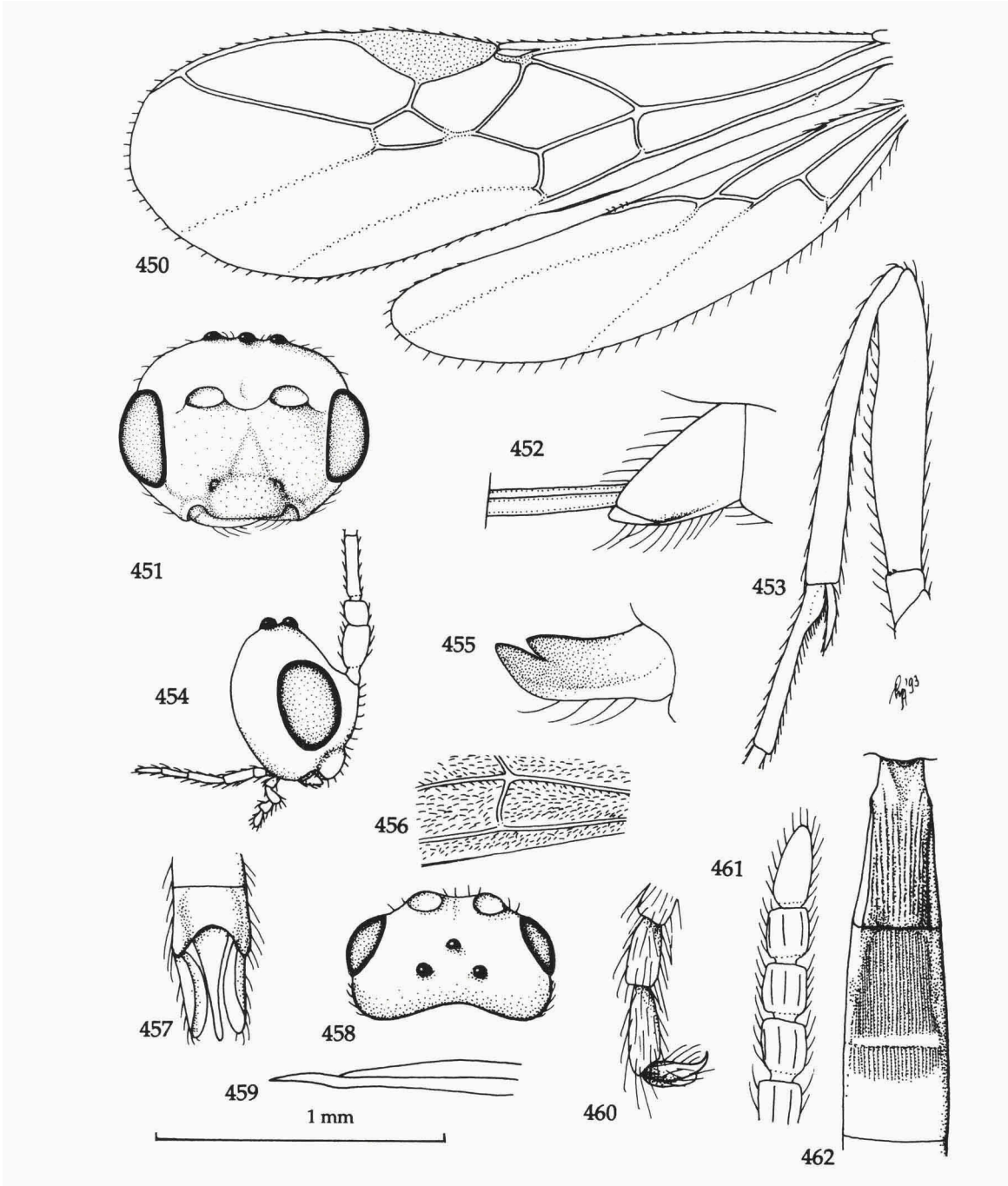
Figs 408-410, 412, *Austrozele nipponensis* spec. nov., ♀, paratype (Taiwan); figs 411, 414, 415, *Aulacocentrum philippinense* (Ashmead), ♀, Philippines, Mt Makiling; fig. 413, *Hymenochaonia delicata* (Cresson), ♀, lectotype; fig. 416, *Macrocentrus spilotus* van Achterberg & Belokobylskij, ♀, holotype; figs 417, 418, *M. nitidus* (Wesmael), ♀, Netherlands, Wijster; figs 419-424, *M.* spec. nov. He & Lou (MS), ♀, paratype. 408, 423, apex of subbasal cell of fore wing; 409, inner hind claw; 410, outer hind claw; 411, antenna; 412, 415, apex of antenna; 413, hind trochantellus; 414, fore leg; 416, hind leg; 417, fore femur, anterior aspect; 418, veins 1r-m and 1-M of fore wing; 419, inner fore claw; 420, first metasomal tergite, dorsal aspect; 421, apical part of fore wing; 422, mandible, dorsal aspect; 424, head, dorsal aspect. 409, 410, 412, 415: 4.3 × scale-line; 411, 414: 1 ×; 413: 6.9 ×; 416: 0.6 ×; 408, 417, 418, 420, 423: 3 ×; 419, 422: 7.1 ×; 421, 424: 2.1 ×.



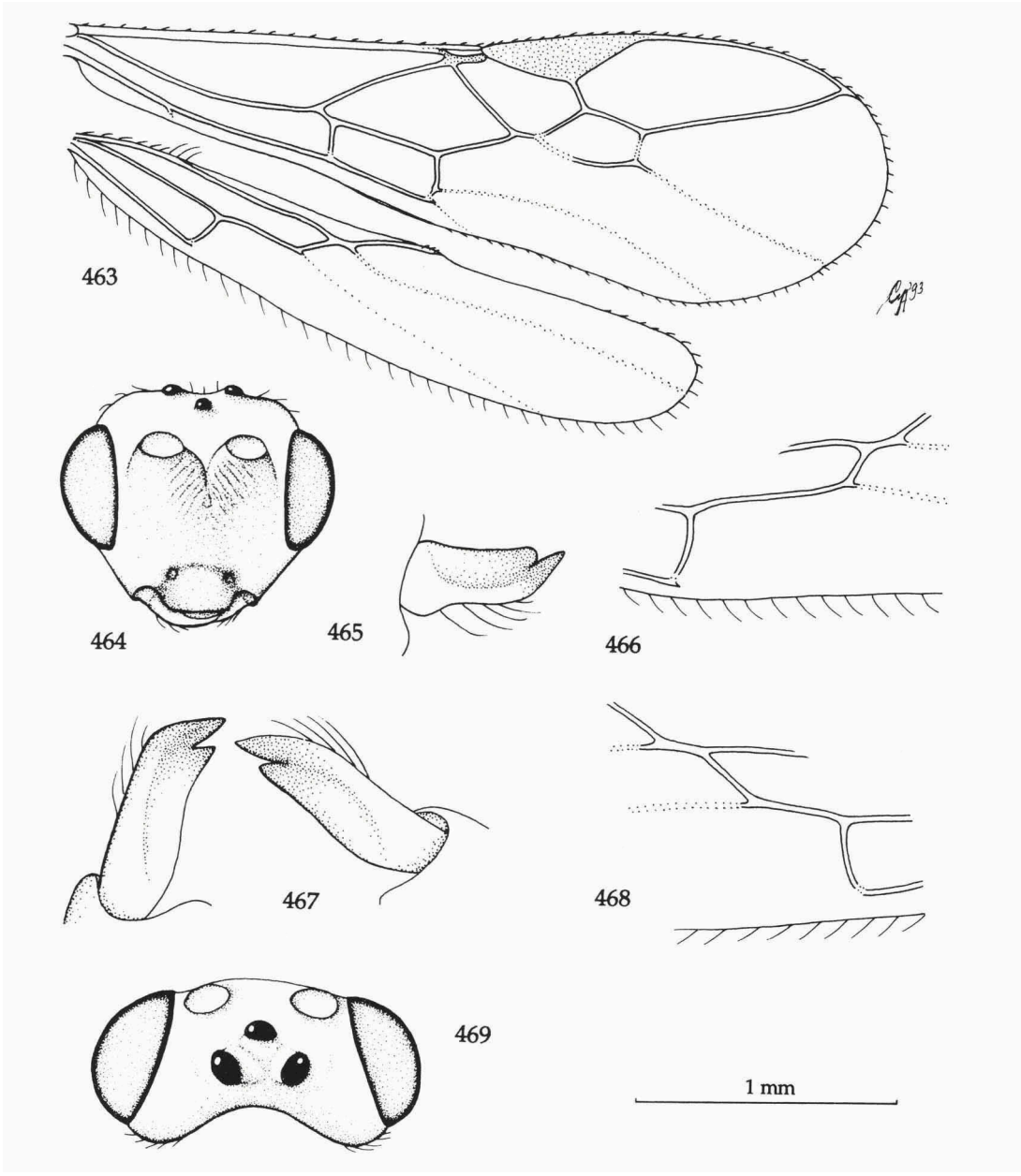
Figs 425-436, *Macrocentrus parki* spec. nov., ♀, holotype. 425, wings; 426, head, frontal aspect; 427, head, dorsal aspect; 428, first-third metasomal tergites, dorsal aspect; 429, head and palpi, lateral aspect; 430, apex of subbasal cell of fore wing; 431, inner hind claw; 432, apex of antenna; 433, fore femur, anterior aspect; 434, mandibles, dorsal aspect; 435, apex of ovipositor; 430, hypopygium, lateral aspect. 425: 1 × scale-line; 426-430, 436: 3 ×; 431, 434, 435, 436: 3.6 ×; 432: 2.5 ×; 433: 1.5 ×.



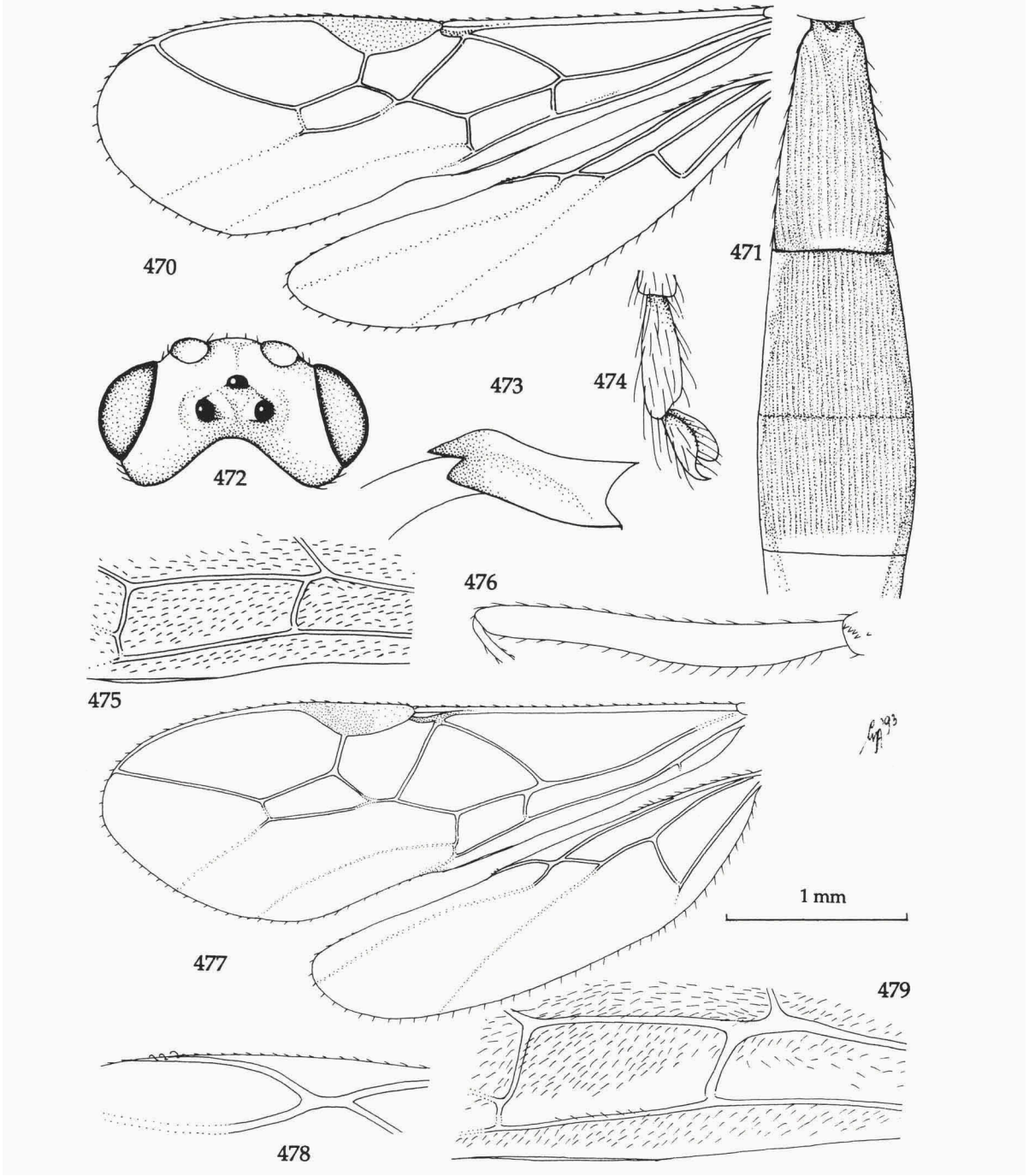
Figs 437-442, *Macrocentrus infirmus* (Nees), ♀, Netherlands, Nunspeet; figs 443-449, *M. blandus* Eady & Clark, ♀, Netherlands, Wijster, but 444, Netherlands, Asperen, and 447, 448, Netherlands, Oostvoorne. 437, 446, head, frontal aspect; 438, 443, hypopygium, ventro-lateral aspect; 439, 444, fore femur and tibia; 440, 449, apex of ovipositor; 441, 448, mandibles, dorsal aspect; 442, 445, hind tibial spurs; 447, palpi, lateral aspect. 437, 445, 446: 1.4 × scale-line; 438, 441, 443, 447: 2.3 ×; 439, 442, 444: 1.5 ×; 440, 448, 449: 3.3 ×.



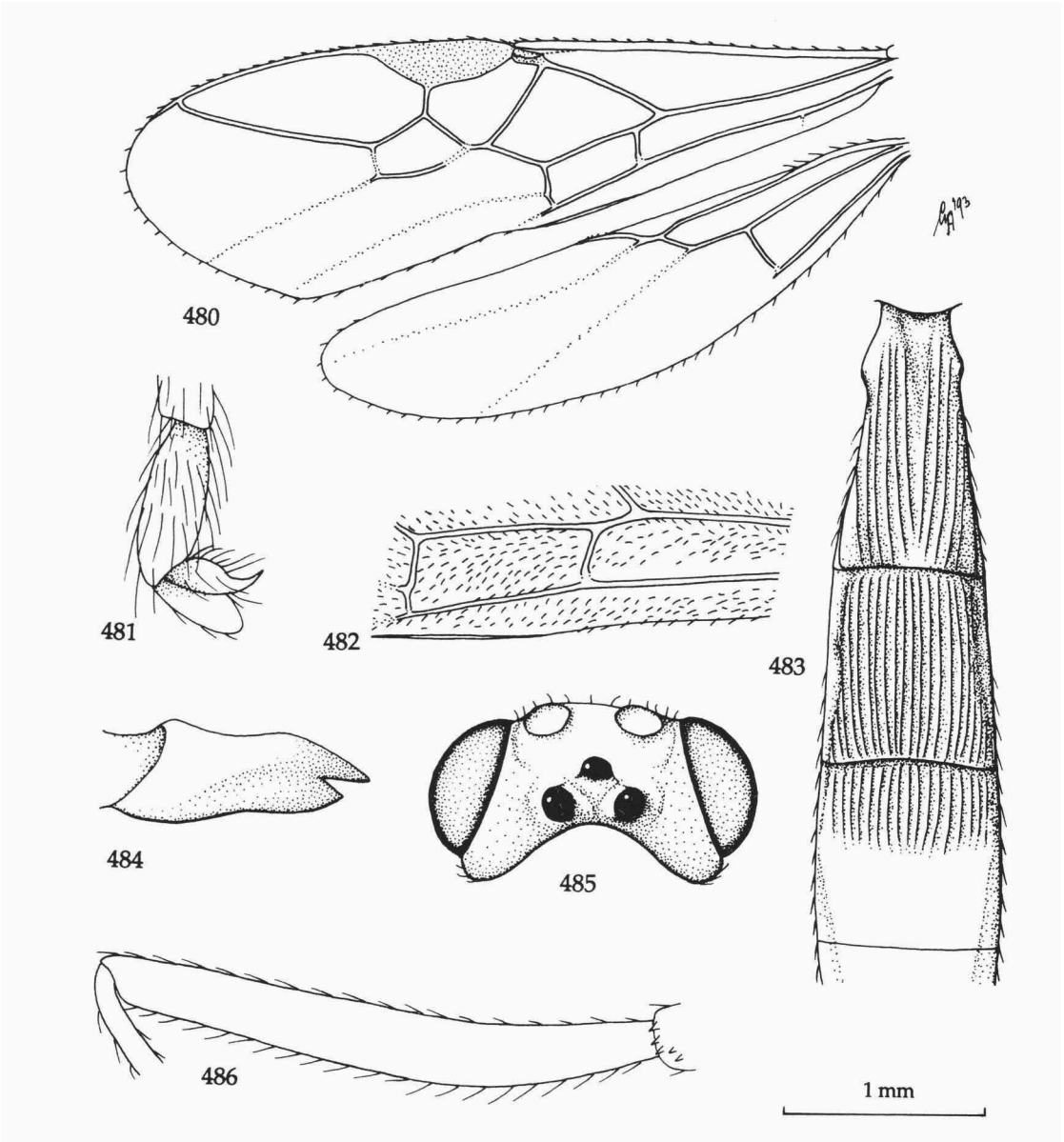
Figs 450-462, *Macrocentrus blandoides* spec. nov., ♀, holotype, but 455 of ♀ paratype (Yong-dong), and 457 of ♂ paratype (Mt Gaji). 450, wings; 451, head, frontal aspect; 452, hypopygium, ventro-lateral aspect; 453, fore femur and tibia; 454, head and palpi. lateral aspect; 455, mandible, dorsal aspect; 456, apex of subbasal cell of fore wing; 457, hypopygium, ventral aspect; 458, head, dorsal aspect; 459, apex of ovipositor; 460, inner hind claw; 461, apex of antenna; 4623, first-third metasomal tergites, dorsal aspect. 450: 1 × scale-line; 451: 1.3 ×; 452, 453: 1.8 ×; 454, 456-458, 462: 1.2 ×; 455, 459-461: 2.7 ×.



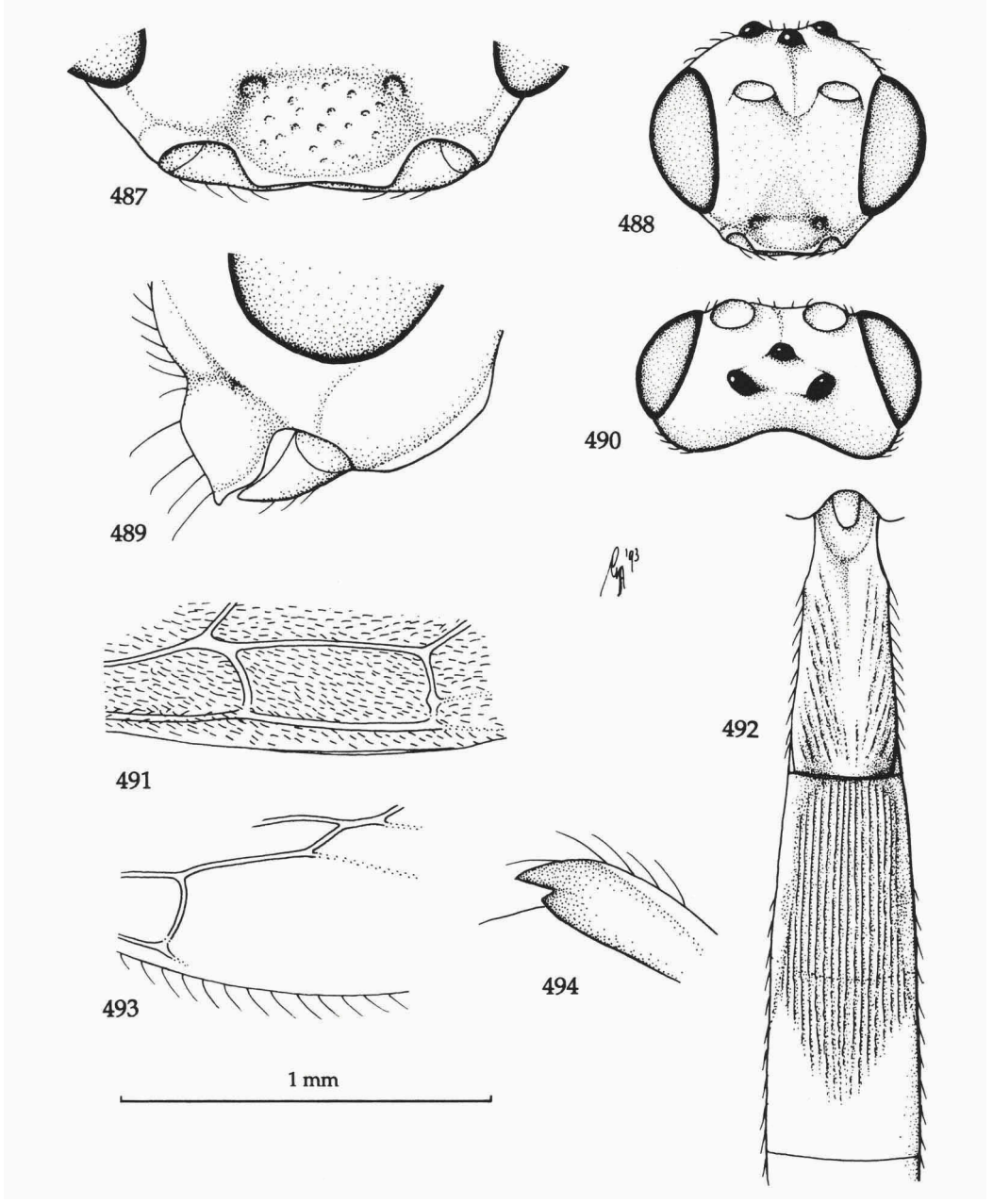
Figs 463-466, *Macrocentrus pallipes* (Nees), ♀, Germany, Gerolstein, but 465, 466, Netherlands, Wassenaar; figs 467-469, *Macrocentrus ancylivorus*Viereck, ♀, U.S.A., San Francisco. 463, wings; 464, head, frontal aspect; 465, mandible, dorsal aspect; 466, 468, veins 1r-m and 1-M of hind wing; 467, mandible, ventral aspect; 469, head, dorsal aspect. 463: 1 × scale-line; 464, 466, 468, 469: 1.5 ×; 465, 467: 3.3 ×.



Figs 470-476, *Macrocentrus nigrigenius* spec. nov., ♀, holotype; figs 477-479, *M. maculistigmus* He & Lou, ♂, paratype. 470, 477, wings; 471, first-third metasomal tergites, dorsal aspect; 472, head, dorsal aspect; 473, mandible, ventral aspect; 474, inner hind claw; 475, 479, apex of subbasal cell and first subdiscal cell of fore wing; 476, fore femur, anterior aspect; 478, detail of vein SC+R1 of hind wing. 470: 1 × scale-line; 471, 472, 475, 476: 2 ×; 473: 4.7 ×; 474: 4.3 ×; 477: 0.4 ×; 478, 479: 1.3 ×.



Figs 480-486, *Macrocentrus watanabei* spec. nov., ♀, holotype. 480, wings; 481, inner hind claw; 482, apex of subbasal cell and first subdiscal cell of fore wing; 483, first-third metasomal tergites, dorsal aspect; 484, mandible, ventral aspect; 485, head, dorsal aspect; 486, fore femur, anterior aspect. 480: 1 × scale-line; 481, 484: 4.7 ×; 482, 483, 485: 2 ×; 486: 3 ×.



Figs 487-494, *Macrocentrus linearis* (Nees), ♀, Netherlands, Ulvenhoutsebos, but 494, Netherlands, Slenaken. 487, detail of clypeus and malar space, frontal aspect; 488, head, frontal aspect; 489, detail of clypeus and malar space, lateral aspect; 490, head, dorsal aspect; 491, apex of subbasal cell and first subdiscal cell of fore wing; 492, first-third metasomal tergites, dorsal aspect; 493, veins 1r-m and 1-M of hind wing; 494, mandible, ventral aspect. 487, 489, 494: 2.3 × scale-line; 488, 490-493: 1 ×.