A revision of the genus *Microtypus* Ratzeburg (Hymenoptera: Braconidae)

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The genus *Microtypus* Ratzeburg, 1848 (Braconidae: Microtypinae) is revised, its species are keyed, and a new species, *M. petiolatus* van Achterberg spec. nov. is described. The type species is redescribed and fully illustrated. The genus *Similearinus* Glowacki & Karpiński, 1967 is a new junior synonym of *Microtypus*; *S. ilinskyi* Glowacki & Karpiński, 1967 is a new junior synonym of *Microtypus trigonus* (Nees, 1834), and *M. dioryctriae* Rohwer, 1920 of *M. wesmaelii* Ratzeburg, 1848. For both senior synonyms neotypes are designated. The Malagasian species that have been placed in *Microtypus* are excluded and transferred to the genus *Stantonia* Ashmead, 1904.

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Introduction

The genus *Microtypus* Ratzeburg, 1848 (Braconidae: Microtypinae) is a small genus of endoparasites of larvae belonging to Pyralidae, Gelechiidae and Tortricidae. Usually rarely collected except at light; only *M. desertorum* Shestakov (a species from semi-deserts) comes in large numbers ("swarms") to light. Specimens of other species of this genus are usually comparatively rare in collections. The variation both in colour and morphology is considerable and as a result the existing keys are not very reliable. Tobias (1971) even stated that "there are two or three species [of *Microtypus*] in the Palaearctic, probably representing only variants of one species" (translation, 1975: 107). The original reason for this paper was the recognition by the senior author of ecological differences between *Microtypus wesmaelii* Ratzeburg, 1848 and *M. trigonus* (Nees, 1834). By designating neotypes the interpretation of both species has been fixed, bringing to an end the confusing interpretations of *M. trigonus* that have persisted for more than 100 years. In addition the other species from the Palaeotropics known to belong to the subfamily are transferred to the genus *Stantonia* Ashmead, 1904 (Orgilinae).

The subfamily Microtypinae Szépligeti, 1908 is probably related to the Helconinae and Blacinae (figs 1, 3, 4, 6 in Quicke & van Achterberg, 1990), but in fig. 5 (l.c.) it is placed as the sister-group of the Homolobinae and Xiphozelinae. It has been included in the Homolobinae in the past (van Achterberg, 1979) because of structural similarities. The internal structures do not support this placement and therefore it has been given separate status, but still there is a lack of characters to place the Microtypinae satisfactorily. A placement close to the Blacinae seems to be wrong (considering its biology, and the adult morphology (the absence of the dorsope, the

position of the valvilli)) and at present we can only be sure about a place near the base of the Helconoid lineage. The larval taxonomy (morphology of the head sclerites) and biological evidence (endoparasitism in microlepidopterous larvae living in hidden places; delicate cocoons with equatorial stripe and irregular emergence opening) indicate the relationship of the Microtypinae to the Orgilinae (Čapek, 1970).

For the identification of the subfamily Microtypinae, see van Achterberg, 1990: 18; for the terminology used in this paper, see van Achterberg, 1988: 5-11. An asterisk indicates a new record for the country concerned; the junior author is responsible for the description of *M. petiolatus*.

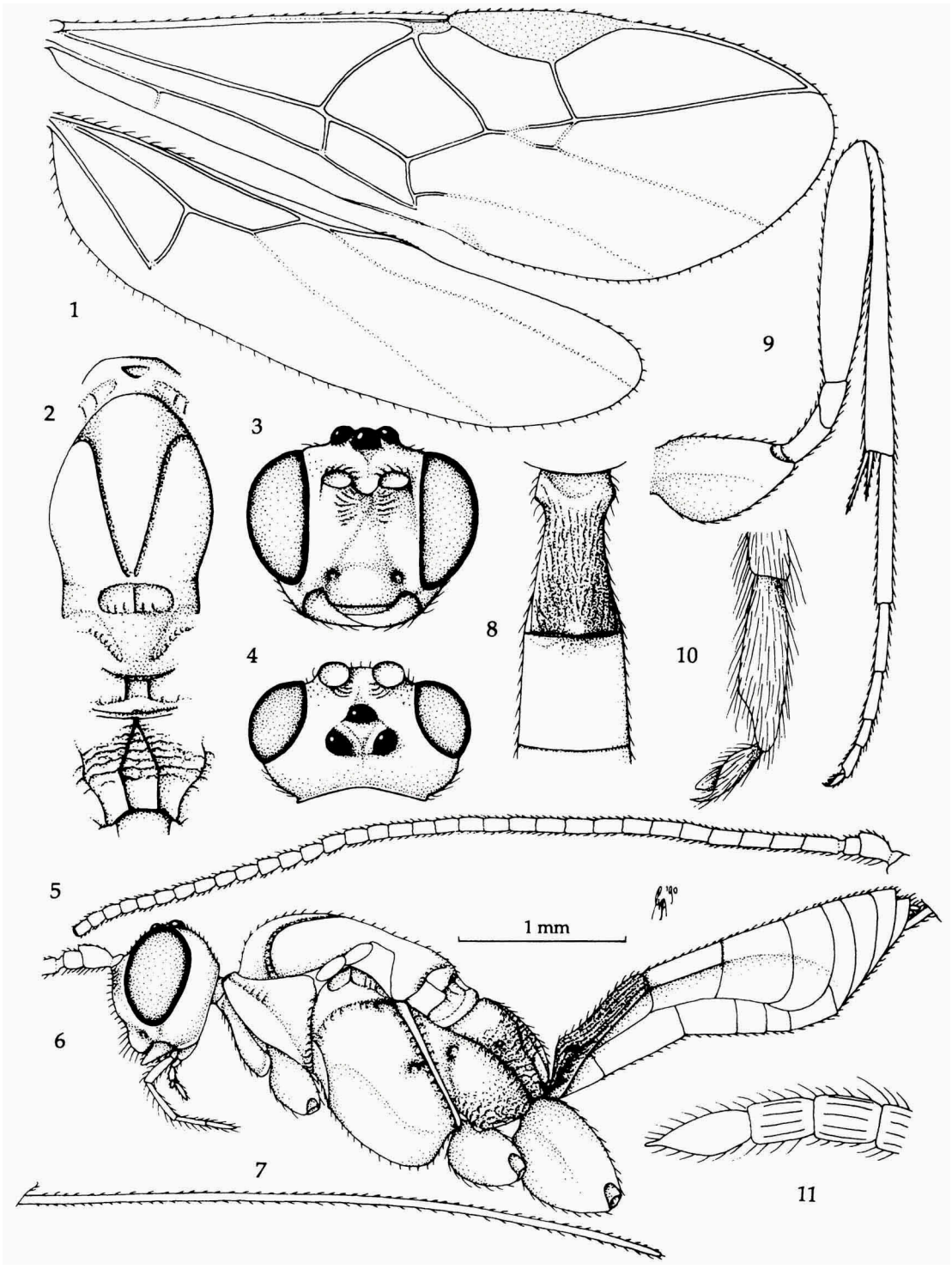
Descriptions

Microtypus Ratzeburg, 1848

Microtypus Ratzeburg, 1848: 47; Shenefelt, 1970: 264-266. Type species (by monotypy): *Microtypus wesmaelii* Ratzeburg, 1848 [neotype designated in this paper].

Similearinus Glowacki & Karpiński, 1967: 89, 95. **Syn. nov.** Type species (by monotypy): *Similearinus ilinskyi* Glowacki & Karpiński, 1967 [holotype lost?].

Diagnosis.— Antennal segments 34-49, scapus oval and short, truncate apically (fig. 5); antenna with spine apically (fig. 11); pedicellus medium-sized and cylindrical; maxillary and labial palpi with 6 and 4 segments, respectively, but third segment of labial palp minute (fig. 6); occipital carina complete, or medio-dorsally interrupted; hypostomal carina joining occipital carina about 1.5 times width of mandibular base above base of mandible (fig. 6); ocelli medium-sized to large (fig. 4); epistomal suture shallow dorsally (fig. 3); occipital flange medium-sized (fig. 6); length of malar space 0.2-0.6 times basal width of mandible; mandible distinctly twisted apically, slender, and with dorsal tooth longer than ventral tooth; pronotum straight anteriorly, dorsal pronope medium-sized and removed from anterior margin (fig. 2); antescutal depression absent, except for a shallow depression (fig. 6); epomia and lateral pronope absent (fig. 6); lateral carina of mesoscutum present; prepectal carina complete, reaching anterior margin of mesopleuron; precoxal sulcus smooth; metapleural flange comparatively small (fig. 6); notauli present (fig. 2); scutellum with narrow medio-posterior depression (fig. 2); metanotum without median carina (fig. 2); propodeum with a more or less developed sessile or shortly petiolate areola (figs 2, 15); propodeal spiracle small, round and situated in front of middle of propodeum; second submarginal cell of fore wing triangular, because vein 3-SR is absent; vein r of fore wing long (figs 1, 12); parastigma not separated from vein R and comparatively large (figs 1, 12, 27); vein SR1 straight and nearly in line with vein 2-SR (fig. 1); first subdiscal cell closed, with vein CU1b much shorter than vein 3-CU1 (fig. 1); vein m-cu of fore wing distinctly antefurcal and converging to vein 1-M posteriorly (figs 1, 12); vein cu-a of hind wing long (fig. 1); plical cell of hind wing medium-sized (fig. 1); marginal cell of hind wing (sub)parallel-sided (fig. 1); vein M+CU of hind wing much longer than vein 1-M (fig. 1); vein m-cu of hind wing absent; hind coxa enlarged and wide (fig. 6); tarsal claws slender, without lobe and only setose (fig. 10); fore spur about half as long as fore basitarsus; hind tarsus without ventral row of setae; no pegs on apex of hind tibia; first metasomal tergite constricted behind spiracles (figs 8, 15) and dorsal carinae absent; metasoma behind first tergite smooth or



Figs 1-11, *Microtypus wesmaelii* Ratzeburg, ♀, neotype, but 11 of ♀, Netherlands, Naardermeer. 1, wings; 2, mesosoma, dorsal aspect; 3, head, frontal aspect; 4, head, dorsal aspect; 5, antenna; 6, habitus, lateral aspect; 7, ovipositor sheath; 8, first and second metasomal tergites, dorsal aspect; 9, hind leg; 10, outer hind claw; 11, apex of antenna. 1, 5-7, 9: 1 × scale-line; 2-4, 8: 1.6 ×; 10, 11: 5 ×.

nearly so; second metasomal suture distinctly impressed but narrow; metasoma densely and shortly setose; ovipositor without teeth ventro-apically, with dorsal notch and with one apical valvillus per valve.

Distribution.— Small genus, restricted to the Holarctic region. Five extant species of which two have a Holarctic distribution and three are Palaearctic species.

Biology.— Endoparasites of larvae of Lepidoptera (Pyralidae, Tortricidae, Gelechiidae).

Notes.— In the literature several tropical species are listed under this genus but they belong to the subfamily Orgilinae. *Microtypus hammersteini* (Enderlein, 1908) (originally described in *Stantonia*, [examined]), *M. caudatus* Granger, 1949 and *M. seyrigi* Granger, 1949 (all from Malagasy) belong to the genus *Stantonia* and form new combinations. The position of *Microtypus fullawayi* Beardsley, 1961 from Hawaii is discussed in the paper on the genera of the Microtypinae by the junior author (van Achterberg, 1992). We consider the genus *Microtypus* to be restricted to the Holarctic region with the five extant species keyed below. In addition ten fossil species have been described from the Oligocene Baltic Amber; their types are lost (except of *M. grandis* Brues, 1939) and it will be best to include these species in *Microtypus* for the moment, despite several species deviating by the presence of a distinct vein 3-SR in the fore wing. *Microtypus* seems to be one of the very few extant genera of Braconidae with more fossil species known than recent species. This is probably an indication that the present species are survivors of an old large(r) group. The phylogenetic position of the Microtypinae indicates also that a basal placement in the Helconoid lineage may be justified (Quicke & van Achterberg, 1990). Otherwise the biology of *Microtypus* (parasites of microlepidopterous larvae on trees, and supposing that the fossil species had the same biology) may have made them liable to become fossilized into amber, and it may have biased the number of species fossilized.

Key to species of the genus *Microtypus* Ratzeburg

1. Ventral margin of clypeus situated at lower level of eyes (fig. 22); length of hind basitarsus 12-13 times its width (fig. 24); scapus and pedicellus completely yellowish and contrasting with dark brown third and following antennal segments; antennal segments 49(♀)-52(♂); length of fore wing 6.5-7 mm; first metasomal tergite robust (fig. 26); length of ovipositor sheath about 0.4 times fore wing; tarsal claws of ♀ slender basally and hardly curved apically (fig. 25), of ♂ as in fig. 21; anterior ocellus of ♀ large (fig. 22); (S Palaearctic) ..... ***M. algiricus*** Szépligeti
- Ventral margin of clypeus situated below lower level of eyes (figs 13, 18, 29; length of hind basitarsus 9-10 times its width (figs 20, 28); scapus and pedicellus not contrasting with dark brown third and following antennal segments, if rather contrasting then (part of) pedicellus and/or scapus dark brown; antennal segments 34-43; length of fore wing less than 6 mm; shape of first metasomal tergite (figs 8, 15, 17, 31) and length of ovipositor sheath variable; tarsal claws of ♀ wider basally and distinctly curved apically (figs 10, 21, 33); anterior ocellus of ♀ smaller (figs 4, 19, 29) 2
2. Length of malar space 0.2-0.3 times basal width of mandible (fig. 18); first metasomal tergite hardly constricted behind spiracles (fig. 17, but spiracles may be

more protruding then figured) and its length 1.5-1.6 times its apical width; pterostigma and frons (nearly) completely yellowish; area between posterior ocellus and eye about half as wide as posterior ocellus (fig. 19); antennal segments 39-42; length of ovipositor sheath 0.5-0.6 times fore wing; (S Palaearctic) ... . ***M. desertorum*** Shestakov

- Length of malar space 0.4-0.6 times basal width of mandible (figs 6, 29, 32, 34); first metasomal tergite distinctly narrowed behind spiracles (figs 8, 15, 31), and its length usually more than 1.6 times its apical width; pterostigma dark brown, pale brownish or brownish-yellow; middle part of frons often black(ish); antennal segments 34-43; length of ovipositor sheath 0.6-0.8 times fore wing 3

3. Length of ovipositor sheath 0.7-0.8 times fore wing, and about 1.5 times length of metasoma; occipital flange distinctly protruding in lateral view (fig. 34); length of fore wing (3.0-)4.0-5.5 mm; parasite of Pyralidae, exceptionally of Tortricidae; (Holarctic) ..... ***M. wesmaelii*** Ratzeburg

- Length of ovipositor sheath 0.4-0.6 times fore wing, and about as long as length of metasoma; occipital flange hardly or not protruding in lateral view (fig. 32); length of fore wing 3.5-4.5 mm; parasites of Gelechiidae and Tortricidae (unknown for *M. petiolatus*); (N. & C. Palaearctic) 4

4. Frons and pterostigma completely brownish-yellow; length of first tergite 1.3-1.6 times its apical width (fig. 31); second submarginal cell of fore wing distinctly petiolate (fig. 27); antennal segments 39-40; ocelli medium-sized (figs 29, 30) .... ***M. petiolatus*** spec. nov.

- Frons (largely) black; pterostigma dark brown; length of first tergite 1.7-1.8 times its apical width (fig. 15); second submarginal cell of fore wing usually sessile (fig. 12); antennal segments 34-36; ocelli slightly smaller ..... ***M. trigonus*** (Nees)

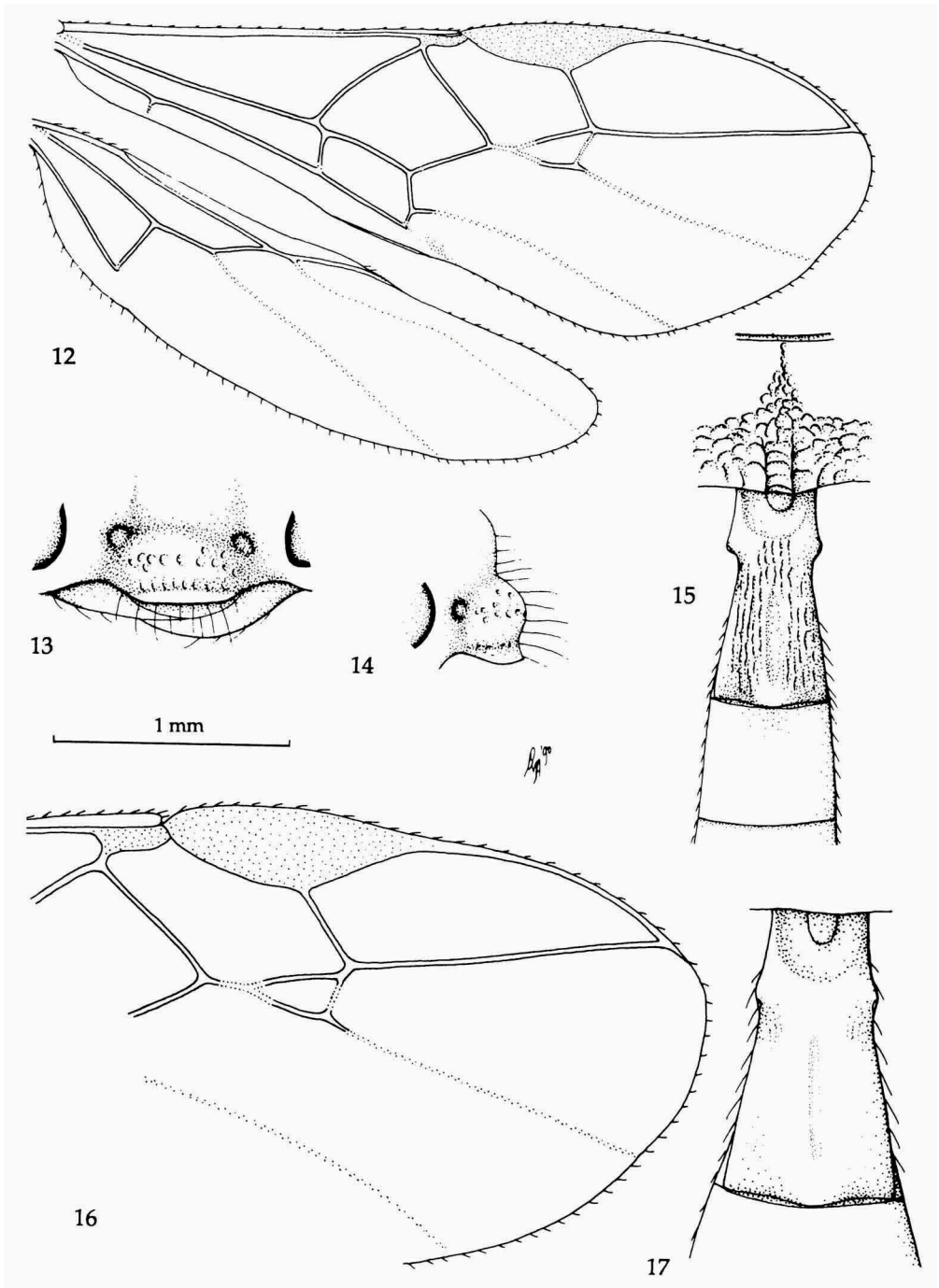
Microtypus algiricus Szépligeti, 1908
(figs 22-26)

Microtypus algiricus Szépligeti, 1908: 427.
Mimagathis algiricus; Shenefelt, 1970: 263 (lectotype designation).
Microtypus algiricus var. *Enderleini* Fahringer, 1937: 399 (type should be in Budapest, but not found).
Mimagathis algiricus var. *enderleini*; Shenefelt, 1970: 263.

Material.— Lectotype (erroneously labelled "Holotypus"), ♂ (TMA), " "Tatahonine, Algèrie", "Tatahonine", "Algier", "*Microtypus algiricus* " (in Szépligeti's handwriting), "Holotypus, ♂, *Microtypus algiricus* Szépl., det. Papp, 1967, 1967", "Hym. Typ. No. 458, Mus. Budapest"; 3 ♀♀ (CNC, RMNH), "O. Jordanien, Zerkatal b. Romana, 4.x.[19]66, J. Klapperich".

One of the most recognizable species because of the enlarged eyes (figs 22, 23), the large and more protruding anterior ocellus (fig. 22), the short malar space (fig. 22), and the slender legs and claws (figs 24, 25). As in other species of *Microtypus* the colour is very variable: it varies from completely yellowish to part of mesosoma and first tergite black. Length of first tergite about 1.6 times (including of lectotype) its apical width and rather constricted behind spiracles (fig. 26). The pterostigma is yellowish (♀) or faintly infuscate (♂). The host is unknown.

Distribution.— Algeria, *Jordan.



Figs 12-15, *Microtypus trigonus* (Nees), ♀, neotype; figs 16, 17, *M. desertorum* Shestakov, ♂ (16) and ♀ (17), Mongolia, Uburchangaj and Südgobi aimak, respectively. 12, wings; 13, clypeus, frontal aspect; 14, clypeus, lateral aspect; 15, propodeum, first and second metasomal tergites, dorsal aspect; 16, distal part of fore wing; 17, first metasomal tergite, dorsal aspect. 12: 1 × scale-line; 13, 14: 2.4 ×; 15: 1.6 ×; 16: 1.1 ×; 17, 1.3 ×.

Microtypus desertorum Shestakov, 1932
(figs 16-21)

Microtypus desertorum Shestakov, 1932: 262; Shenefelt, 1970: 264; Tobias, 1971: 232 (translation 1975: 107), 1976: 136 & 1986: 274 (lectotype designation).
Microtypus mongolicus Fahringer, 1937: 400; Papp, 1971: 53-54 & 1980: 411-412 (synonymy with *M. desertorum* after examination of the holotype).
Stantonia mongolicus; Shenefelt, 1970: 267.

Material.— 1 ♀ (RMNH), "Mongolia: Südgobi aimak, 7 km W von Somon Bulgan, 1350 m, Exp. Dr. Z. Kaszab, 1967", "Nr 885, 4.vii.1967"; 1 ♀ + 2 ♂♂ (RMNH), "Mongolia: Uburchangaj aimak, 130 km OSO von Somon Bajan, 1150 m, Exp. Dr. Z. Kaszab, 1967", "Nr 882, 3.vii.1967"; 2 ♀♀ + 1 ♂ (RMNH), "S. Algeria, Tamanrasset, 15.v.1952, F. Willemsen & W. v.Veen"; 1 ♀ (NRS), "Mongoliet", "China, Anders", "Type", "*Microtypus mongolicus* n.sp., ♀", "*Microtypus desertorum* Shest., ♀, det. Papp, 1976".

A variable species, but can be separated by the short malar space and large ocelli (figs 18, 19), combined with the moderately slender and bristly hind basitarsus (fig. 20), and the usually distinctly petiolate second submarginal cell of fore wing (fig. 16). The propodeum and first tergite are less sculptured than in pale *M. wesmaelii* (but exceptions occur, e.g. the holotype of *M. mongolicus* has propodeum (except anteriorly) and first tergite largely and distinctly sculptured). The yellowish colour of the body is usually also decisive, but partly blackish specimens occur. Similarly, Nearctic specimens of *M. wesmaelii* show the (normal) colour cline resulting in southern specimens having a completely yellowish body and in two out of three C. European species (nearly) completely yellowish specimens have been examined. Known from semi-desert areas in the S. Palaearctic region, is active at night and comes frequently to light. The host is unknown.

Variation.— Antennal segments of examined specimens: ♀ 39(1) or 41(1), of ♂ 40(1) or 42(1); length of fore wing 4.1-5.7 mm; length of malar space 0.2-0.3 times basal width of mandible; vein 1-SR of fore wing slender and medium-sized or very short and wide; length of ovipositor sheath 0.45-0.56 times fore wing; length of first tergite 1.5-1.6 times its apical width, its surface usually smooth and comparatively flat; laterope deep, but sometimes rather shallow. The specimens from S. Algeria and the holotype of *M. mongolicus* are comparatively small (length of fore wing 4.1-4.7 mm) and the N. African specimens have the second submarginal cell of fore wing distinctly petiolate.

Distribution.— *Algeria, Kazakhstan, Mongolia, Russia.

Microtypus petiolatus van Achterberg spec. nov.
(figs 27-33)

Microtypus trigonus; Tobias, 1971: 232 (translation, 1975: 107), 1976: 136 & 1986: 274.

Material.— Holotype, ♀ (RMNH), "Bulgaria, ex coll. Zaykov, RMNH Leiden 1991", "2.viii.1968, Plovdivsko Lenovo, leg. A. Germanov". Paratypes: 2 ♂♂ (RMNH), "Bulgaria, ex coll. Zaykov, RMNH Leiden 1991", "28.viii.1977, Rhodopi, Belashtisa, leg. A. Zaykov" and "23.vi.1978, Rhodopi, Markovo, leg. A. Zaykov", "*Microtypus trigonus* Nees, Tobias det. 1978".

Holotype, ♀, length of body 4.8 mm, of fore wing 4.5 mm.

Head.— Antennal segments 39, long setose, length of third segment 1.4 times fourth segment, length of third, fourth and penultimate segments 2.6, 1.9 and 1.5 times their width, respectively; length of maxillary palp equal to height of head; occipital carina nearly complete, medio-dorsally interrupted; length of eye in dorsal view 1.9 times temple (fig. 30); temples roundly narrowed posteriorly (fig. 30); OOL:diameter of ocellus:POL = 4:5:8; frons largely smooth, but anteriorly with some rugae and only laterally with some punctulation and setose (figs 29, 30); vertex setose, rather flat and with indistinct punctulation; face rather flat and with some rugae and punctures dorsally (fig. 29); clypeus moderately convex and sparsely punctate (fig 29); ventral margin of clypeus thin, straight and below level of lower level of eyes (fig. 29); occipital flange comparatively narrow and not protruding in lateral view (fig. 32); length of malar space 0.4 times basal width of mandible; malar suture absent except for a shallow depression (fig. 29).

Mesosoma.— Length of mesosoma 1.3 times its height; side of pronotum smooth, except for crenulae medially and with rugae and punctures posteriorly, mesosternal suture narrow and finely crenulate; epicnemial area smooth; precoxal sulcus absent (except for a shallow depression), remainder of mesopleuron smooth and setose; metapleuron punctulate medially and rugose ventrally; metapleural flange narrow; notauli complete and finely crenulate; mesoscutal lobes smooth and densely setose; scutellar sulcus wide, rather shallow anteriorly and with one carina and some rugosity; scutellum convex, largely smooth, and with some punctulation; surface of propodeum antero-laterally and posteriorly smooth (except for the carinae), medio-anteriorly and medially rugose and without areola or median carina, only with part of carinae posteriorly present.

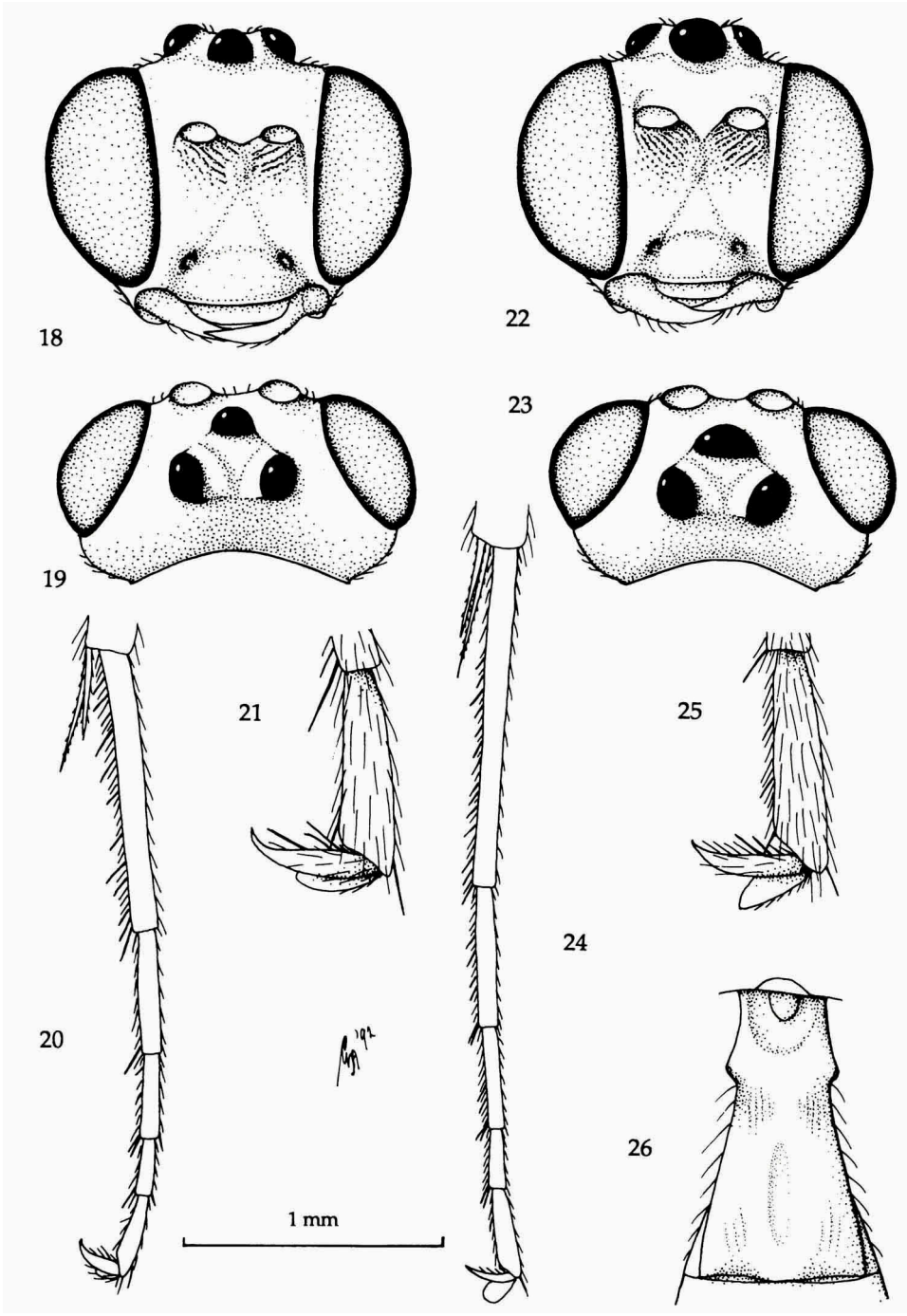
Wings.— Fore wing: 1-SR normal and short (fig. 27); r:3-SR+SR1:2-SR (including petiolus):r-m = 18:56:17:5; 1-SR+M slightly sinuate; r long and oblique, longer than width of pterostigma (fig. 27); cu-a interstitial, vertical and long; 3-CU1 oblique; subbasal cell normally setose; second submarginal cell distinctly petiolate (fig. 27). Hind wing: cu-a somewhat vertical; marginal cell slightly widened apically, nearly parallel-sided.

Legs.— Hind coxa superficially punctulate; tarsal claws slender, with apex curved (fig. 33)); length of femur, tibia and basitarsus of hind leg 5.4, 10.9 and 10 times their width, respectively; length of hind tibial spurs 0.40 and 0.45 times hind basitarsus; hind basitarsus normally setose (fig. 28).

Metasoma.— Length of first tergite 1.3 times its apical width, distinctly narrowed behind spiracles, its surface densely rugose (fig. 31), medially rather flattened and concave basally, its dorsal carinae absent; laterope shallow and large; second tergite smooth except for obsolescent microsculpture; second suture distinct and narrow; third tergite smooth; second tergite with sharp lateral crease; length of ovipositor sheath 0.59 times fore wing; hypopygium medium-sized.

Colour.— Yellowish-brown; antenna (but scapus, pedicellus and annellus partly yellowish), telotarsi and ovipositor dark brown; remainder of tarsi and apical half of metasoma infuscated; tegulae and palpi pale yellowish; veins brown; pterostigma brownish-yellow; wing membrane hyaline.

Variation.— Paratypes (2 ♂ ♂), antennal segments 40(1); length of fore wing 4.8-4.9 mm, of body 5.0-5.1 mm; length of first tergite 1.5-1.6 times its apical width, its surface may be sparsely sculptured; face more extensively sculptured than holotype;



Figs 18-21, *Microtypus desertorum* Shestakov, ♀, Mongolia, Südgobi aimak; figs 22-26, *M. algiricus* Szépligeti, ♀, Jordan, Zerka Valley. 18, 22, Head, frontal aspect; 19, 23, head, dorsal aspect; 20, 24, hind tarsus; 21, 25, outer and inner hind tarsal claw, respectively; 26, first metasomal tergite, dorsal aspect. 18-20: 1.2 × scale-line; 21: 3 ×; 22-24, 26: 1 ×; 25: 2.5 ×.

colour as holotype but antenna completely, stemmaticum, occiput partly, (part of) propleuron, prepectus, most of mesopleuron, metapleuron, propodeum, part of hind coxa, metasoma except second tergite black(ish), but apical half of metasoma may be only infuscated; pterostigma yellowish.

Microtypus trigonus (Nees, 1834)
(figs 12-15)

Eubadizon trigonus Nees, 1834: 236.
Microtypus trigonus; Shenefelt, 1970: 265-266 (p.p.).
Similearinus il'inskyi Glowacki & Karpiński, 1967: 89, 95, 103-104, fig. 3. **Syn. nov.**

Material.— Neotype, ♀ (neotype here designated, deposited in the Moravské Museum at Brno), "[Czecho-Slovakia], Hodruša, vi.1956, lgt M. Čapek/ z jedle [= swept from *Abies alba* L.]; 1 ♂ (CC), "[Austria], Kolbnitz, 23.vi.[19]53, ex *Teleia saltuum* [E. Jahn], "271"; 1 ♀ (CC), "Czecho-Slovakia, Vrch Dobroč, v.1956, ex *Teleia saltuum* (J. Patočka)"; 1 ♂ (RMNH), "Austria, Tirol, Aschbach, 1400 m, 20.viii.1975, C.J. Zwakhals"; 1 ♀ (CNC), "Parke Reserve, Kam. Co., Que., 950' [ft], 24.viii.[19]57, W.R.M. Mason"; 1 ♀ (CNC), "Alberton, P.E.I., 9.viii.1963, W.R.M. Mason".

Neotype, ♀, length of fore wing 3.5 mm, of body 3.9 mm.

Head.— Antennal segments 34, length of third segment 1.3 times fourth segment, length of third and fourth segments 2.3 and 2.0 times their width, respectively; penultimate segment of antenna 1.4 times its width; length of maxillary palp 1.2 times height of head; occipital carina complete; length of eye in dorsal view 1.5 times temple; temples roundly narrowed posteriorly; OOL:diameter of ocellus:POL = 10:9:11; frons smooth and setose, only laterally with some punctures; face with some short rugae below antennal sockets; clypeus convex and punctulate (figs 13, 14); ventral margin of clypeus thin and straight; length of malar space 0.6 times basal width of mandible; malar suture indistinct (figs 13, 14).

Mesosoma.— Length of mesosoma 1.5 times its height; side of pronotum smooth, except for crenulate medio-anterior groove and crenulate posteriorly; mesosternal suture indistinct; epicnemial area smooth; precoxal sulcus absent, remainder of mesopleuron smooth and setose; metapleural flange minute; notauli complete and finely crenulate; mesoscutal lobes smooth and densely setose; scutellar sulcus wide with one median carina and some rugosity; scutellum smooth; propodeum smooth anteriorly, with a short median carina and posteriorly with a rugulose areola.

Wings.— Fore wing (fig. 12): 1-SR very short; r:3-SR+SR1:2-SR:r-m = 11:46:14:6; 1-SR+M almost straight; r longer than width of pterostigma and nearly straight; cu-a postfurcal and inclivous; 3-CU1 straight; 1-CU1:2-CU1 = 1:4; subbasal cell evenly setose. Hind wing: cu-a straight; marginal cell narrowed medially and slightly widened apically.

Legs.— Hind coxa smooth; tarsal claws slender; length of femur, tibia and basitarsus of hind leg 5.1, 10.9 and 10.1 times their width, respectively; length of hind tibial spurs both 0.4 times hind basitarsus (but inner spur slightly longer).

Metasoma.— Length of first tergite 1.7 times its apical width (fig. 15), its surface longitudinally rugose, with slightly raised flattened area between two weak, parallel median carinae and basally concave; laterope deep and large; second tergite setose for some microsculpture basally and with sharp lateral crease; second suture shal-

low; third tergite somewhat longer than second tergite, setose and smooth; length of ovipositor sheath 0.45 times fore wing.

Colour.— Black; palpi, tegulae, legs (but hind coxa, apex of hind tibia and most of middle and hind tarsi infuscated) yellowish; basal part of antenna, ocelli, orbits laterally, ovipositor sheaths, pterostigma and veins dark brown; wing membrane subhyaline.

Variation.— Antennal segments of ♀ 34(2), 35(1) or 37(1), and of ♂ 36(1); length of fore wing 3.5-4.9 mm; length of body 3.9-4.9 mm; length of ovipositor sheath 0.45-0.47 times fore wing; length of first metasomal tergite 1.7-1.9 times its apical width; coloration rather uniform, pronotum in some specimens dorso-posteriorly dark brown; the specimen from Tirol has the hind coxa nearly completely black and the middle coxa dark brown; sculpture of first tergite rather weak (neotype) to strong. The Palaearctic specimens have the second submarginal cell of fore wing sessile, which is in the Nearctic specimens (sub)petiolate.

Hosts.— Gelechiidae: *Adrasteia saltuum* (Zeller). Further *Chionodes tragicella* (Heyden) (Gelechiidae; Schütze & Roman, 1931), and *Laspeyresia ibeeliana* Karp. (Tortricidae; Karpinski, 1967), all known hosts feed on *Larix*.

Distribution.— (Only specimens examined and countries of the type localities are listed, because at least some of the specimens listed in the literature under *M. trigonus* are really *M. petiolatus* and *M. wesmaelii*); Palaearctic: *Austria, Czecho-Slovakia, Germany, Poland; Nearctic: *Canada.

Note.— The original description by Nees is confusing; the short diagnosis is in conflict with the full description (the length of the ovipositor, the colour). We take the full description as the basis for our interpretation of this species. According to Nees (1834) *M. trigonus* should have a distinct areola on the propodeum (weak in the neotype), but in both other specimens known to us the areola is more or less present and intermediately developed compared to *M. wesmaelii*. Also the colour of the hind leg is paler, because according to the original description (not the diagnosis!) the femur should also be infuscated.

The holotype ♀ from Sickershausen (near Göttingen) was lost in the 1880's because the collection was discarded during clearing out of the former study of Nees at Bonn. The information about the fate of the Nees collection was obtained by the late Dr J.G. Betrem when he visited Bonn in 1936 to find types of Braconidae and Scoliidae. His informant was a German biologist who was in Bonn at the time the former room of Nees was cleared and managed to save some boxes from destruction. However, no Braconidae were involved and even the other remnants were lost when Bonn was bombed at the end of the second World War.

Microtypus wesmaelii Ratzeburg, 1848
(figs 1-11, 34)

Microtypus wesmaelii Ratzeburg, 1848: 47; Shenefelt, 1970: 266.
Microtypus wesmaeli; Tobias, 1976: 136.
Microtypus dioryctriae Rohwer, 1920: 227; Shenefelt, 1970: 264; Marsh, 1979: 276. **Syn. nov.**
Microtypus trigonus; Papp, 1971: 54 & 1980: 412 (reported from Mongolia).

Material.— Neotype here designated, ♀ (RMNH), "[Czecho-Slovakia], Tematin, 12.v.1964, ed. M. Čapek/ ex *Acrobasis tumidana*". Additional specimens from the Palaearctic region: **Netherlands**

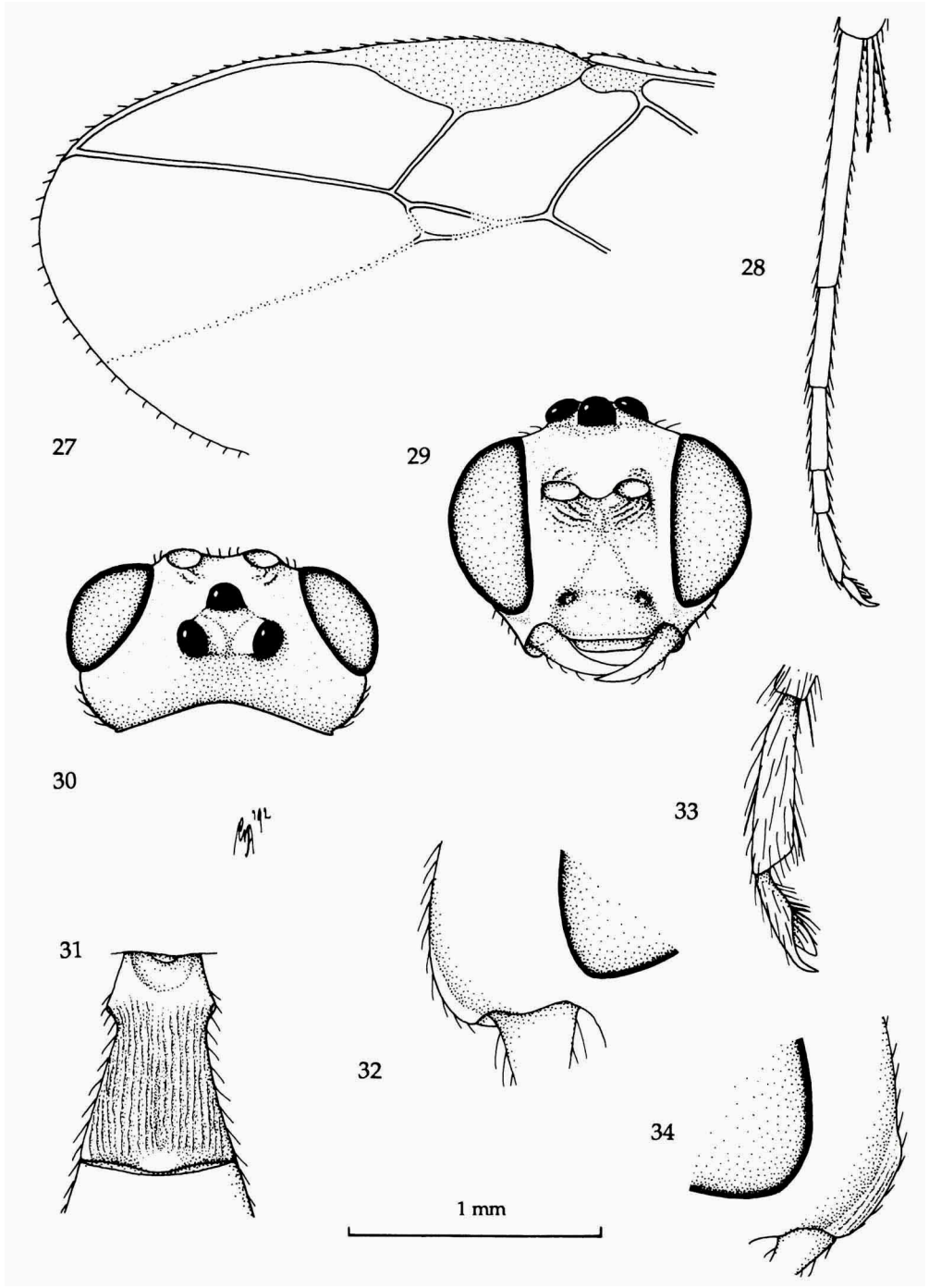
(RMNH, USNM, CC), Crailo (N.H.), Heerde (Gld.), Kootwijk (Gld.; ex *Acrobasis consociella* (Hübner) on *Quercus*), Muiderberg (N.H.), Naardermeer (N.H.); Nunspeet (Gld.); St. Anthonius (N.B.), Tegelen (L., de Holtmühle), Wijster (Dr.); **Bulgaria** (RMNH, CC), Boyno, Tarnovo (ex Tortricid larva?); **Czecho-Slovakia** (CC, RMNH), B. Štiavnica, Gbelce, Kováčova (ex *Acrobasis consociella* (Hübner), Pata (ex *Acrobasis sodalella* Zeller), Stúrovo (ex *Acrobasis tumidana* (Denis & Schiffermüller), Vinica (id.). From the Nearctic region: **U.S.A.** (USNM, RMNH, CNC): **Alaska**, Richard. Hwy mile 212, Big Delta **Arizona**, Globe; **California**, Patricks Creek (paratypes of *M. dioryctriae*, ex *Dioryctria xanthaenobares* Dyar (= *D. auranticella*) on *Pinus attenuata* Lemm.), Lancaster (6 mi SW Los Angeles, one ♀ ex *Loxostege* spec.; **Connecticut**, Canaan; **Idaho**, Homedale (2238 feet), 5 mi W Paul (reared from sage), 2 mi N Melba, Hollister, Hubb's Butte; **Iowa**, Country 3 (large yellowish specimen); **Maine**, Kendiskeag (ex *Acrobasis betulella* Hulst); **Massachusetts**, Sterling (ex *Acrobasis sylviella* Ely, one from *Comptonia peregrina* or Sweet fern), Hopkinton, N. Andover (ex *Acrobasis comptoniella* Hulst); **Michigan**, Midland Co., Emmett Co., Ann Arbor; **Minnesota**, Ramsey Co., St. Paul, Crookston, Canal Grant (ex *Eucordylea atrupictella* Dietz on fir); **New Brunswick**, Kouchibouguac N. P.; **New Hampshire**, Durham (ex lepidopterous host on Sweet fern); **New York**, Ithaca, Orient, Long Island; **North Dakota**, Grand Forks; **South Dakota**, Brookings; **Texas**, Presidio, Big Bend Park (body completely yellowish); **Utah**, Farmington, Logan (id.); **Virginia**, Blackburn; **Washington**, Takima, Paha; **?**, Windsor (ex *Laspeyresia molesta* Busck); **Canada**: **Nova Scotia**, Little River, Victoria (ex *Dioryctria reniculella* Grt. on white spruce); **Ontario**, Geraldton (ex *Acrobasis betulella*), Cedar Lake Field Station (ex *Tetralopha* spec.), Gogama (ex *Tetralopha asperatella*), Latchford (ex *Zelleria haimbachi*); **Quebec**, Hull.

Neotype, ♀, length of body 4.9 mm, of fore wing 4.7 mm.

Head.— Antennal segments 40 (as recorded before transport to Leiden, remaining segments 34), length of third segment 1.3 times fourth segment, length of third and fourth segments 2.6 and 2.0 times their width, respectively (fig. 5); penultimate segment of ♀ from Naardermeer 1.6 times its width (fig. 11); length of maxillary palp 1.1 times height of head; occipital carina complete; length of eye in dorsal view 1.9 times temple (fig. 4); temples roundly narrowed posteriorly (fig. 4); OOL:diameter of ocellus:POL = 9:9:10; frons largely smooth, but anteriorly rugose and only laterally with some punctures and setose (fig. 4); vertex setose, rather flat and smooth; face rather flat and with some rugae dorsally (fig. 3); clypeus moderately convex (fig. 6) and smooth (but in other specimens may be more convex and punctulate); ventral margin of clypeus thin and straight; occipital flange distinctly protruding in lateral view (fig. 34); length of malar space 0.6 times basal width of mandible; malar suture absent except for an obsolescent depression (fig. 3).

Mesosoma.— Length of mesosoma 1.6 times its height; side of pronotum smooth, except for crenulae medio-anteriorly and posteriorly (fig. 6); mesosternal suture narrow and finely crenulate; epicnemial area largely smooth and with few crenulae; precoxal sulcus absent (except for a shallow depression, fig. 6), remainder of mesopleuron smooth and setose; metapleuron smooth medially and rugose ventrally; metapleural flange minute (fig. 6); notauli complete and finely crenulate (fig. 2); mesoscutal lobes smooth and densely setose; scutellar sulcus wide, rather shallow and with one carina and some rugosity (fig. 2); scutellum smooth, except for some punctulation; surface of propodeum antero-laterally and posteriorly smooth (except for the carinae), medio-anteriorly and medially rugose and with elongate areola, without median carina (fig. 2).

Wings.— Fore wing: 1-SR wide and short (fig. 1); r:3-SR+SR1:2-SR:r-m = 12:45:11:5; 1-SR+M slightly sinuate; r long and oblique, longer than width of pterostigma (fig. 1); cu-a postfurcal, vertical and long; 3-CU1 oblique (fig. 1); 1-CU1:2-CU1 = 1:8; subbasal cell normally setose; second submarginal cell subsessile. Hind wing: cu-a somewhat inclivous (fig. 1); marginal cell slightly widened apically, nearly parallel-sided (fig. 1).



Figs 27-33, *Microtypus petiolatus* spec. nov., ♀, holotype; fig. 34, *M. wesmaelii* Ratzeburg, ♀, Netherlands, Kootwijk. 27, distal part of fore wing; 28, hind tarsus; 29, head, frontal aspect; 30, head, dorsal aspect; 31, first metasomal tergite, dorsal aspect; 32, 34, detail of occipital flange, lateral aspect; 33, inner hind claw. 27: 0.8 × scale-line; 28-31: 1 ×; 32, 34: 1.8 ×; 33: 2.5 ×.

Legs.— Hind coxa largely smooth; tarsal claws slender (fig. 10); length of femur, tibia and basitarsus of hind leg 5.3, 10.3 and 9.5 times their width, respectively; length of hind tibial spurs 0.40 and 0.45 times hind basitarsus.

Metasoma.— Length of first tergite 1.8 times its apical width, its surface densely rugose (fig. 8), medially rather flattened and concave basally, its dorsal carinae absent; laterope deep and large (fig. 6); second tergite smooth except for some microsculpture basally (fig. 8); second suture shallow; third tergite smooth; second tergite with sharp lateral crease; length of ovipositor sheath 0.81 times fore wing; hypopygium medium-sized (fig. 6).

Colour.— Black; palpi, tegulae, legs (but apex of hind tibia, and most of hind and middle tarsi infuscated) pale yellowish; clypeus, face laterally (with its remainder dark brown), orbits laterally (dorsally about as wide as ocellus), mesoscutum (but laterally infuscated), pronotum anteriorly, and dorso-posteriorly, propleuron posteriorly yellowish-brown; basal 0.6 of metasoma ventrally, ovipositor sheath largely, second and base of third tergite, pterostigma and veins dark brown; wing membrane subhyaline.

Variation.— Palaearctic specimens: antennal segments of ♀ 40(5), 41(9) and 42(11), of ♂ 39(3), 40(3) and 43(1); length of fore wing 4.0-5.2 mm; length of ovipositor sheath 0.76-0.83 times fore wing; length of first metasomal tergite 1.8-2.0 times its apical width; the colour is very variable, the typical variety has the face, orbits, pro- and mesothorax dorsally (more or less), second and part of third tergite yellowish or brown and is common in C. Europe. The specimens from The Netherlands are usually much darker (except the specimens reared from *Acrobasis consociella*), the body is black, except for the clypeus ventrally, and the orbits are brownish and the metasoma is dark brown basally. The colour of the legs are as of the typical variety, but intermediates in colour occur frequently, and the face may be largely punctate-rugose. The clypeus is normally smooth and moderately convex, but some specimens have the clypeus more convex and punctate; the propodeal areola is strongly to moderately developed. The vein cu-a of the fore wing may be slightly antefurcal and inclivous; the marginal cell of the hind wing may be distinctly parallel-sided apically.

Nearctic specimens: antennal segments of ♀ 34(1), 36(2), 38(5), 39(5), 40(4), 41(1), 42(2) and 43(1), of ♂ 35(1) and 37(3); length of fore wing 3.0-5.5 mm; length of ovipositor sheath 0.65 times fore wing or longer; colour and venation are highly variable. The colouration seems to be clinal: completely yellowish specimens occur in the southern (semi-desert) areas and in the northern areas the specimens are usually completely black. However, no morphological differences could be linked with this colour variation and intermediately coloured specimens have been examined. Therefore, we consider all specimens to belong to one (variable) species. The clypeus may be smooth to (sparsely) punctate; the vein cu-a of the fore wing is interstitial to postfurcal; often the mesoscutum and/or second and third metasomal tergites are yellowish or the mesosoma (except propodeum) is yellowish; the pterostigma is more or less yellowish basally. The hind femur may be slender to rather robust.

Distribution.— Palaearctic: *Bulgaria, Czecho-Slovakia, Germany, Italy, Mongolia, Netherlands, Russia, Tadzhikistan, Yugoslavia. Nearctic: U.S.A., *Canada.

Biology.— Hosts in the Palaearctic region are Pyralidae on *Quercus*: *Acrobasis tumidana* (Denis & Schiffermüller) (4 ♀♀), *A. consociella* (Hübner) (4 ♀♀ + 2 ♂♂), and *A. sodalella* Zeller (1 ♀). Seems to have two generations per year in W. Europe; adults

have been collected in June (May in S. Europe) and the first half of July, and again from 12 September to (early) October. Hosts in the Nearctic region are Pyralidae (even on coniferous trees and ferns): *Dioryctria auranticella* (Grote), *Acrobasis betulella* Hulst, *A. sylviella* Ely, *Tetralopha asperatella* (Clemens), and *A. comptoniella* Hulst. In addition it has been reared from the Gelechiid *Eucordylea atrupictella* Dietz, the Yponomeutid *Zelleria haimbachi* Busck, and (in laboratory?) the Tortricid *Laspeyresia molesta* Busck. In the Nearctic region at least two generations seem to be present.

In the Nearctic region this species seems to have a wider spectrum of hosts than in the Palaearctic region, including hosts on coniferous trees. This may be because the Palaearctic *M. trigonus*, which is parasitizing the hosts on coniferous trees (but only *Larix*!), may be absent in the main part of the Nearctic region. Also, in the Nearctic region small specimens occur with less antennal segments than is usual in the Palaearctic region.

Notes.— The record of *M. trigonus* (Nees) from The Netherlands by Shenefelt (1970) could not be proven. The specimen from The Netherlands probably is a dark specimen of *M. wesmaelii* Ratzeburg. The type series of *M. wesmaelii* is considered to have been lost during the transportation of the collection by train in the second World War. No material was found among the remnants of the Ratzeburg collection (Königsmann, 1964).

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The following abbreviations are used: CC = Čapek Collection, Brno; CNC = Canadian National Collection of Insects, Ottawa; NRS = Naturhistoriska Riksmuseet, Stockholm; RMNH = Nationaal Natuurhistorisch Museum, Leiden; TMA = Természettudományi Múzeum Allattára, Budapest.

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