Illustrated key to the subfamilies of the Holarctic Braconidae (Hymenoptera: Ichneumonoidea)

C. van Achterberg

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An illustrated key to the subfamilies of the family Braconidae (Hymenoptera: Ichneumonoidea) from the Holarctic region is given.

C. van Achterberg, Nationaal Natuurhistorisch Museum (Rijksmuseum van Natuurlijke Historie), Postbus 9517, 2300 RA Leiden, The Netherlands.

Introduction

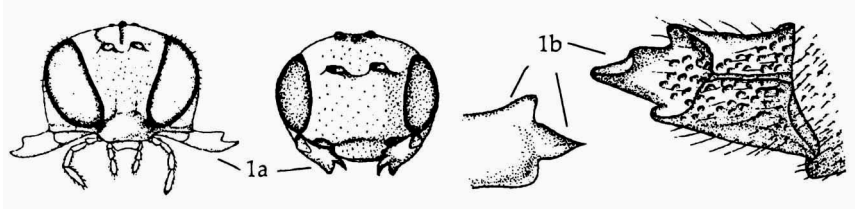
Since the publication of the last complete key to the subfamilies of the Braconidae (Hymenoptera: Ichneumonoidea) in 1976 by van Achterberg several papers on the phylogeny of the Braconidae have been published or are in preparation (e.g., Edson & Vinson, 1979; van Achterberg, 1984 & 1988; Maetô, 1987; Quicke & van Achterberg, in prep.). The need for an updated key to the subfamilies of the Braconidae from the Holarctic region is obvious. Therefore I decided to extend a key prepared for the course on parasitic Hymenoptera in Sheffield given on 3-8 September 1989. Specimens problematical to identify to subfamily with this key can be sent to the author for confirmation.

For the morphological terms used in this paper, see van Achterberg, 1988: 5-11.

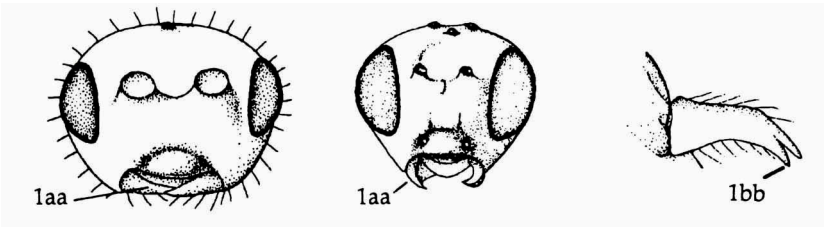
Key to subfamilies of Braconidae from the Holarctic region

1. Mandibles straight or curved outwards, their tips not touching when closed (fig. 1a), and with 3 or 4 (exceptional 2 teeth or lobes; fig. 1b: "exodont braconids")... ..... **Alysiinae**

Very large cosmopolitan subfamily of endoparasites of cyclorrhaphous Diptera. Very frequently collected.

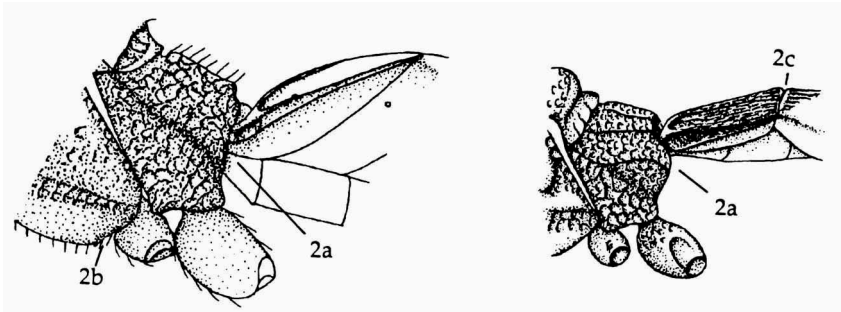


- Mandibles curved inwards, their tips touching when closed (fig. 1aa), and with 1 or 2 teeth (fig. 1bb) 2

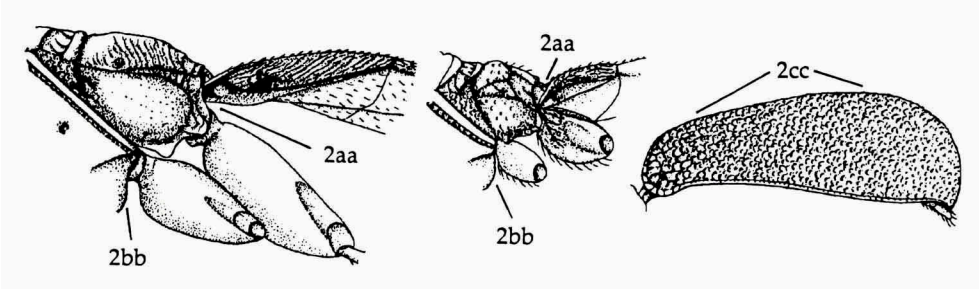


2. First metasomal tergite inserted far above hind coxae (fig. 2a); postpectal carina usually present (fig. 2b); first metasomal tergite movably joined to second tergite (fig. 2c) ..... **Cenocoeliinae**

Small cosmopolitan subfamily of endoparasites of larvae of Coleoptera living in wood. Rarely collected.

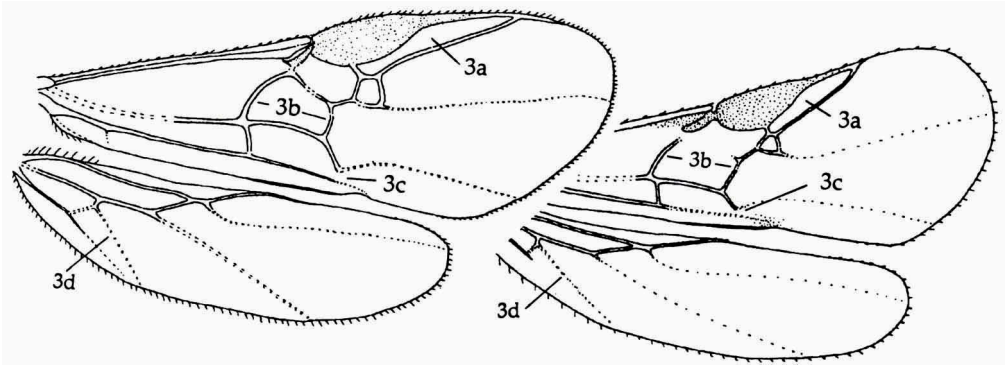


- First metasomal tergite inserted medio-posteriorly or ventrally at propodeum, distinctly below dorsal level of propodeum and close to hind coxae (fig. 2aa); postpectal carina absent (fig. 2bb), except in the Cheloninae, which have the first and second tergites immovably joined (fig. 2cc) 3

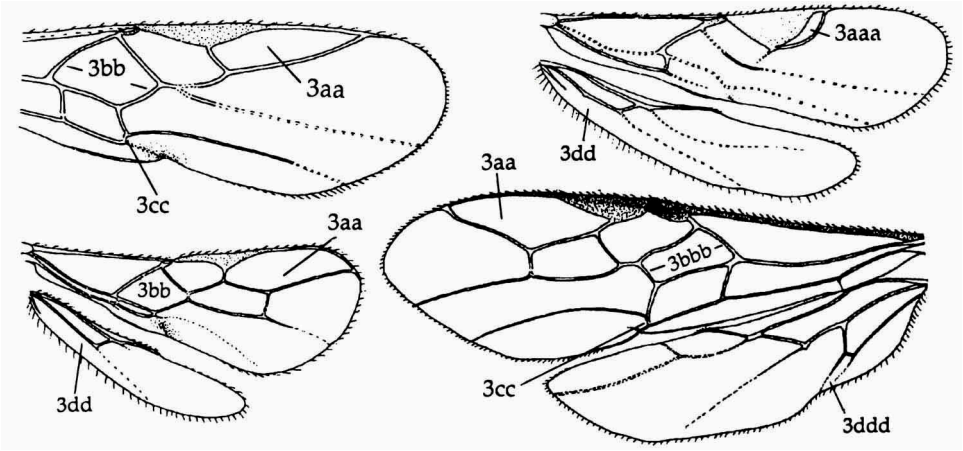


3. Marginal cell of fore wing extremely narrow and rather long (fig. 3a); vein m-cu of fore wing more or less diverging posteriorly, from direction of anterior half of vein 1-M (fig. 3b); vein CU1b of fore wing (fig. 3c) absent; trace of vein 2-CU of hind wing nearly always present (fig. 3d) ..... **Agathidinae**

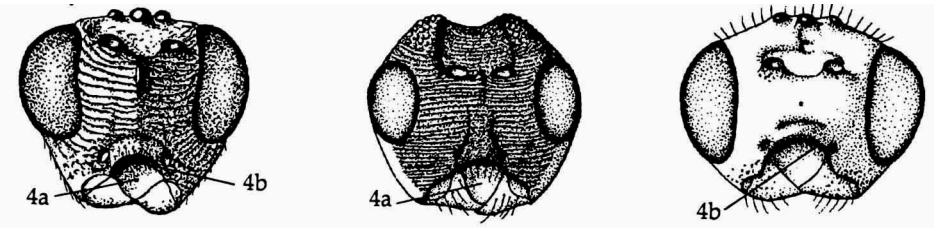
Large cosmopolitan subfamily of endoparasites of larvae of Lepidoptera. Rather frequently collected.



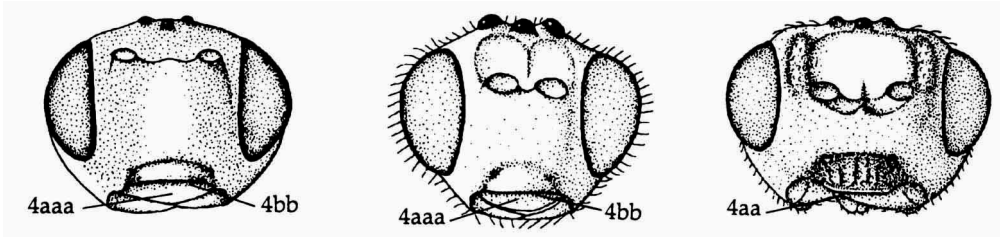
- Marginal cell of fore wing wider (fig. 3aa); if exceptionally narrow then comparatively short (fig. 3aaa); vein m-cu of fore wing (if present) converging posteriorly or parallel to vein 1-M (fig. 3bb), if diverging posteriorly (fig. 3bbb), then vein CU1b of fore wing (fig. 3cc) present; vein 2-CU of hind wing nearly always absent (fig. 3dd), except in the Sigalphinae (fig. 3ddd). 4



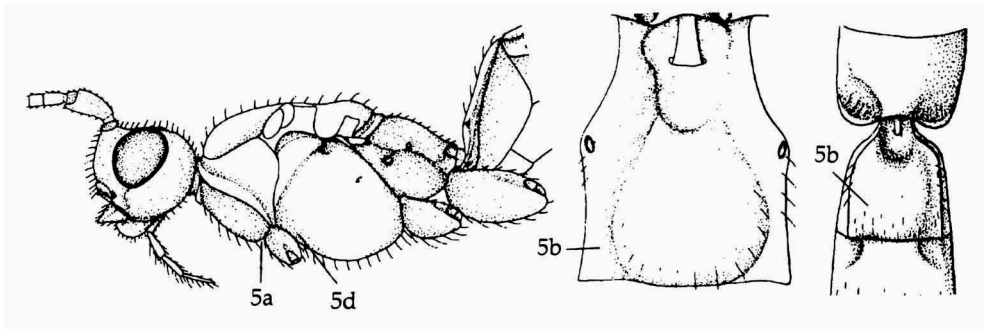
4. Hypoclypeal depression deep and wide, and middle of apparent ventral margin of clypeus distinctly above upper level of mandibular bases (fig. 4a); bottom of hypoclypeal depression consists of the concave labrum and usually a depressed part of clypeus (fig. 4b: "cyclostome braconids"); fore tarsal segments nearly always slender.....5



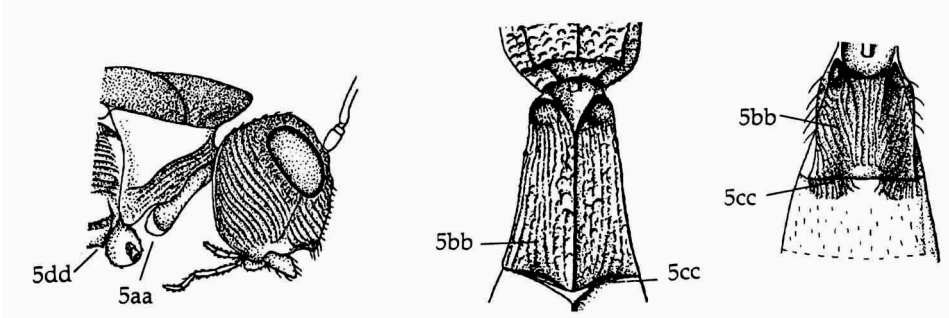
- Hypoclypeal depression usually absent (fig. 4aa); if present then shallow, narrower, and medio-ventral margin of clypeus close to upper level of mandibular bases (fig. 4aaa); labrum flat and ventral part of clypeus not part of a hypoclypeal depression, if present (fig. 4bb); fore tarsal segments may be shortened.....9



5. Posterior flange of propleuron absent (fig. 5a): first metasomal tergite with lateral parts flattened (fig. 5b), or tergite immovably connected to second tergite; prepectal carina absent laterally (fig. 5d) 6

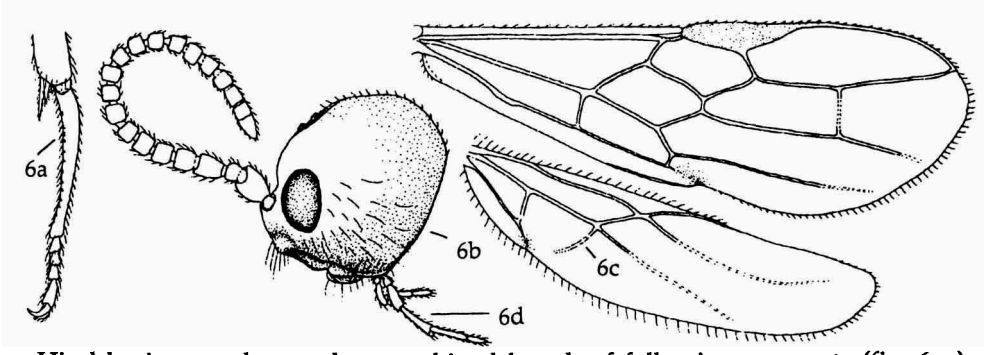


- Posterior flange of propleuron present (fig. 5aa); first metasomal tergite with convex lateral parts (fig. 5bb) and movably connected to second tergite (fig. 5cc); prepectal carina present laterally (fig. 5dd), but absent in the Rogadinae-Exothecini) 8

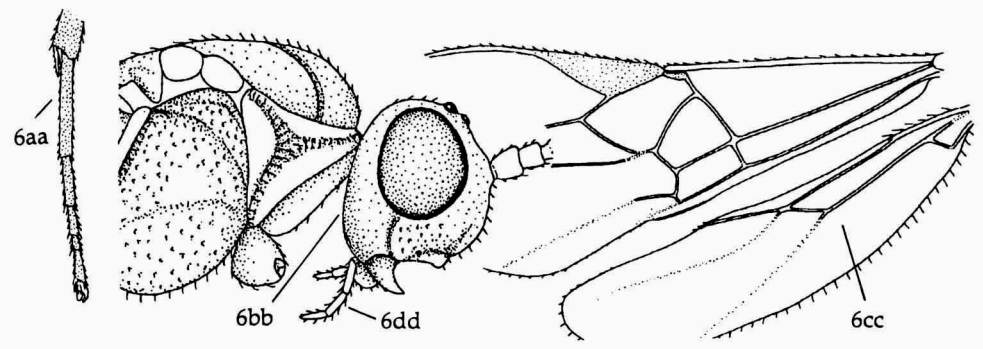


6. Hind basitarsus about twice as long as combined length of following segments of tarsus (fig. 6a); occipital carina present (fig. 6b); hind wing with vein m-cu distinct and rather curved inwards (fig.6c); maxillary palp with 6 segments (fig. 6d) ..... **Histeromerinae**

Small Holarctic and Australian subfamily of ectoparasites of larval Coleoptera in wood. Rarely collected.

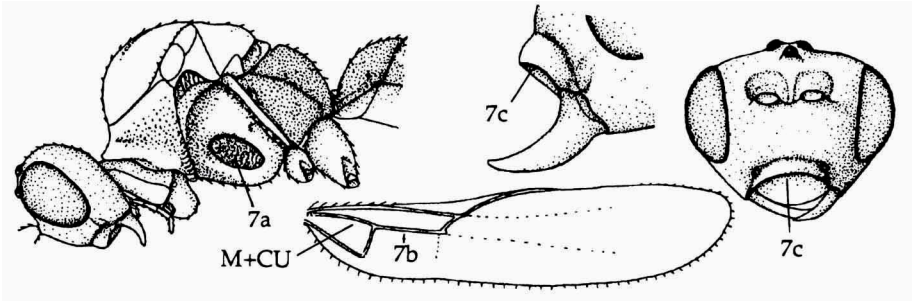


- Hind basitarsus shorter than combined length of following segments (fig. 6aa); occipital carina completely absent (fig. 6bb); hind wing without vein m-cu (fig. 6cc) or obsolescent and straight; maxillary palp with 5 segments (fig. 6dd).....7



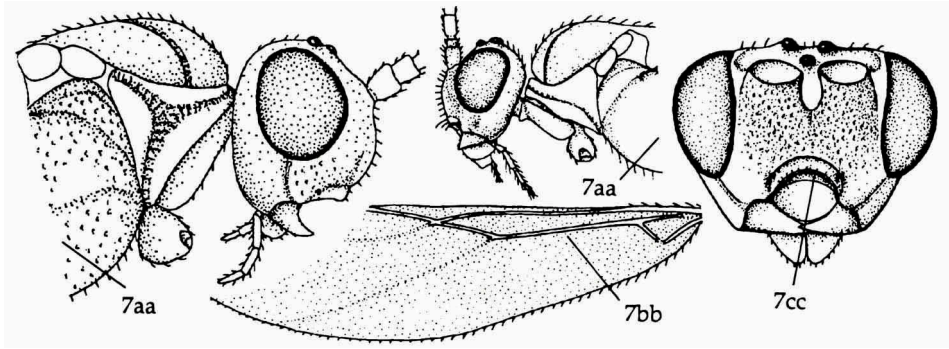
7. Mesopleuron with wide elliptical depression (fig. 7a); length of vein 1-M of hind wing subequal to vein M+CU and not widened basally (fig. 7b); ventral part of clypeus not depressed and not part of hypoclypeal depression (fig. 7c) ....**Telengaiinae**

Small subfamily from Central Asia, ofwhich the biology is unknown. Exceptionally collected.



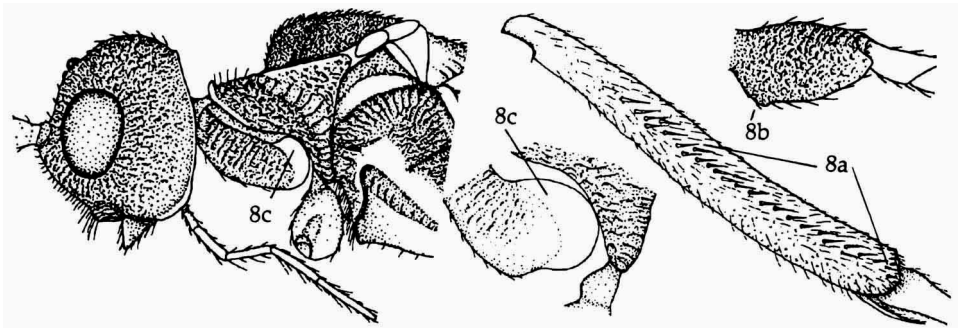
- Mesopleuron without wide depression, usually completely flat (fig. 7aa); length of vein 1-M of hind wing at least 1.5 times vein M+CU and more or less widened basally (fig. 7bb); ventral part of clypeus depressed, forming dorsal part of hypoclypeal depression (fig. 7cc).....**Braconinae**

Very large cosmopolitan subfamily of ectoparasites of larval Coleoptera, Diptera, Lepidoptera and phytophagous Hymenoptera. Exceptionally endoparasitism occurs. Very frequently collected.



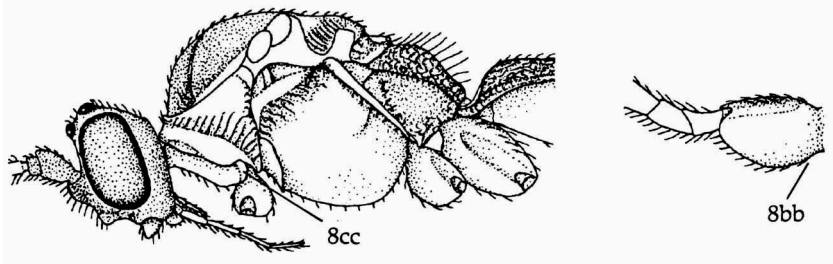
8. Fore tibia with row of (usually) stout pegs or spines, which are at most as long as about 6 times their width (fig. 8a), or hind coxa angulate antero-ventrally, frequently with a ventral tubercle (fig. 8b); posterior flange of propleuron largely dorsally situated (fig. 8c) ..... **Doryctinae**

Large cosmopolitan subfamily of ectoparasites of larval Coleoptera (exceptionally of Embioptera). In most habitats rather rarely collected.

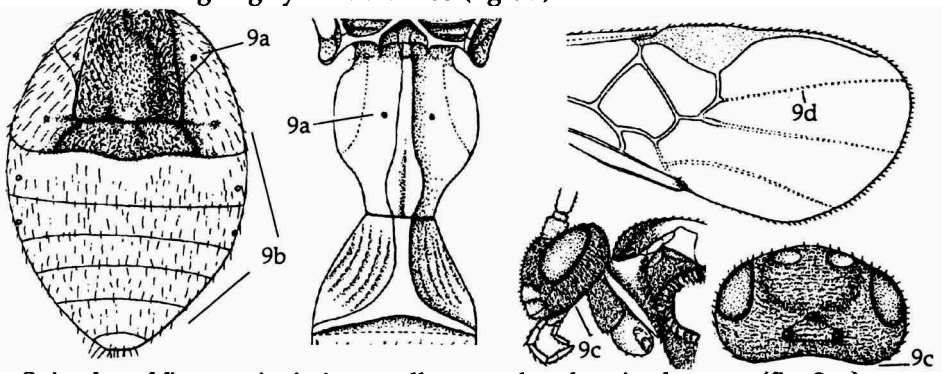


- Fore tibia without row of pegs or spines, but frequently bristly and length of bristles at least about 8 times their width; hind coxa not angulate and without tubercle antero-ventrally (fig. 8bb); posterior flange of propleuron situated posteriorly (fig. 8cc) or obsolescent ..... **Rogadinae**

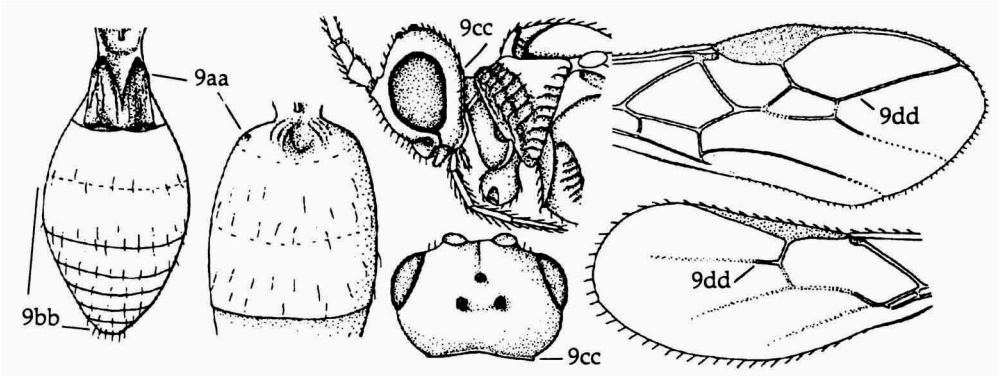
Large cosmopolitan subfamily, which probably has to be split into three subfamilies. The Rogadinae *sensu stricto* with inner margin of eyes more or less emarginate and usually extensively sculptured metasoma are endoparasites of larval Lepidoptera. Mummification of the host caterpillar is frequent. The two other groups are ectoparasites of larval Coleoptera, Lepidoptera and Hymenoptera. The Exothecinae lack the prepectal carina or have the second metasomal tergite largely weakly sclerotized; some Opiinae are morphologically extremely similar, but have the part of the pronotum anterior to the mesoscutum subvertical. The Rhyssalinae form the remainder of the Rogadinae. The Rogadinae *sensu lato* are frequently collected.



9. Spiracles of first metasomal tergite in its weakly sclerotized epipleuron (=laterotergite) (fig. 9a); metasoma short (fig. 9b); occipital carina absent (fig. 9c); vein SR1 of fore wing largely unsclerotized (fig. 9d) 10

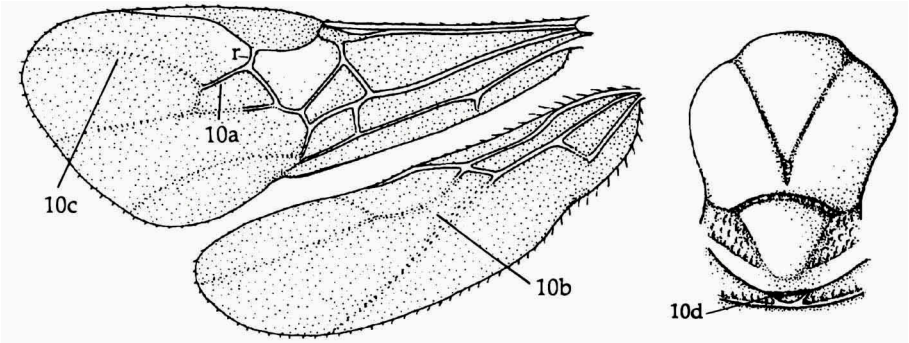


- Spiracles of first tergite in its usually strongly sclerotized notum (fig. 9aa); metasoma more elongate (fig. 9bb), if similarly short then occipital carina present (fig. 9cc); vein SR1 nearly always at least basally sclerotized (fig. 9dd) 12

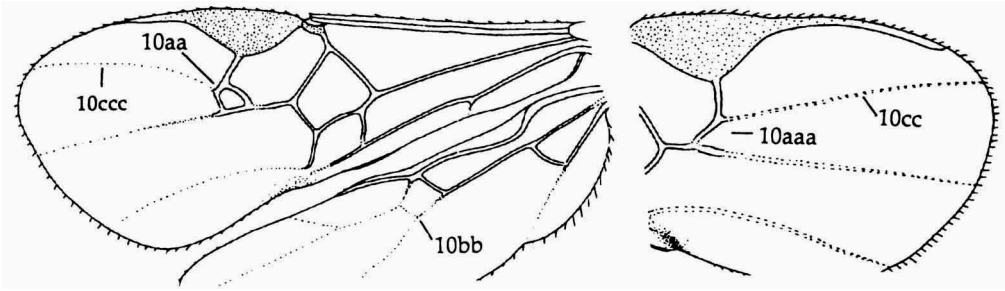


10. Vein 3-SR of fore wing much longer than vein r and sclerotized (fig. 10a); antenna with 20-51 segments, number not fixed; maxillary palp with 6 segments; vein 2r-m of hind wing absent (fig. 10b); vein SR1 strongly curved or angularly bent towards anterior wing margin (fig. 10c); posterior scutellar depression more or less developed (fig. 10d) ..... **Cardiochilinae**

Small cosmopolitan subfamily of endoparasites of larval Lepidoptera. In semi-arid (sub)tropical areas rather frequently collected.

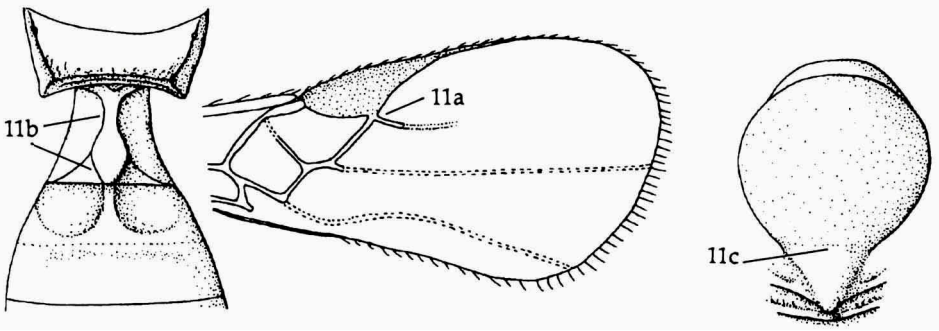


- Vein 3-SR of fore wing shorter than vein r (fig. 10aa) or vein r-m absent (fig. 10aaa) ; number of antennal segments fixed to 14 or 18; maxillary palp with 5 segments; vein 2r-m of hind wing usually present (fig. 10bb); vein SR1 nearly always straight or slightly curved towards anterior wing margin (fig. 10cc), but occassionally more or less curved (fig. 10ccc); posterior scutellar depression absent 11



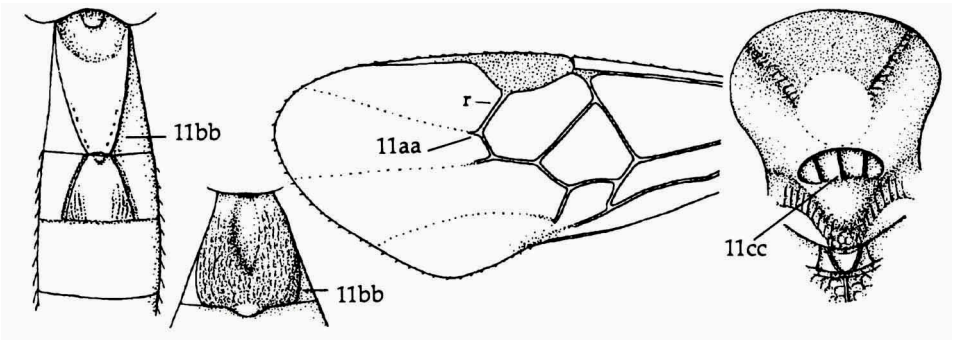
11. Antennae with 14 segments; vein 2-SR of fore wing connected with pterostigma or nearly so (fig. 11a); notum of first metasomal tergite strongly narrowed towards apex and medially (fig. 11b); scutellar sulcus absent (fig. 11c) ..... **Miracinae**

Small cosmopolitan subfamily of endoparasites of larval Lepidoptera. Rather rarely collected.



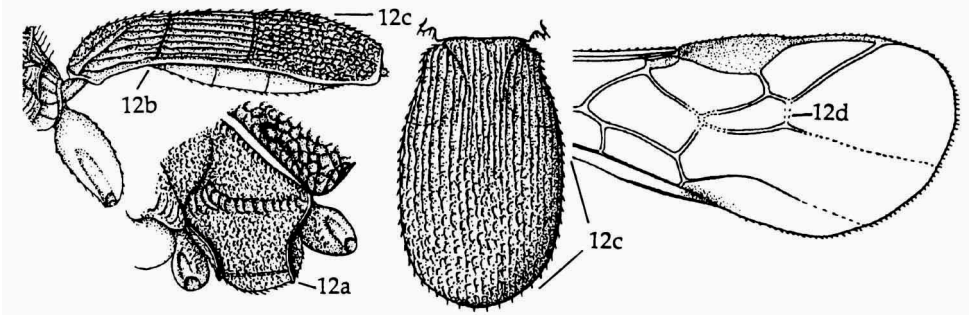
- Antennae with 18 segments; vein 2-SR of fore wing connected to vein r (fig. 11aa); shape of notum of first tergite different, even if strongly narrowed posteriorly (fig. 11bb); scutellar sulcus more or less developed (fig. 11cc) ..... **Microgastrinae**

Very large cosmopolitan subfamily of endoparasites of larval Lepidoptera. This group is very common, especially in late spring and early summer.

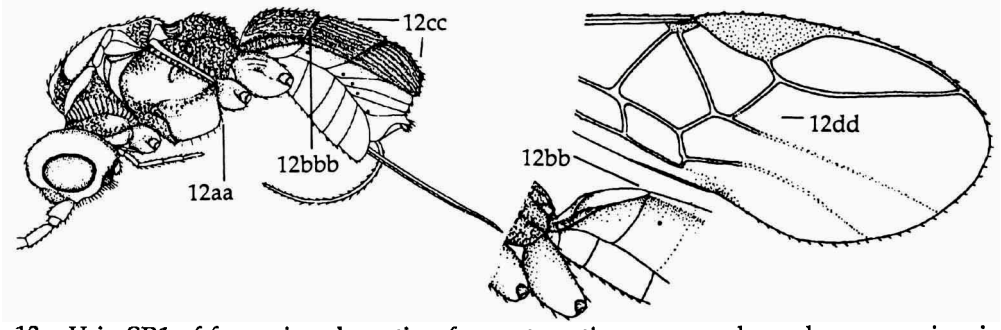


12. Postpectal carina strong and complete (fig. 12a); first-third metasomal tergites immovably joined (fig. 12b) and forming a rigid carapace (fig. 12c); vein r-m of fore wing present (fig. 12d) ..... **Cheloninae**

Rather large cosmopolitan subfamily of endoparasites of larval Lepidoptera. Very frequently collected.

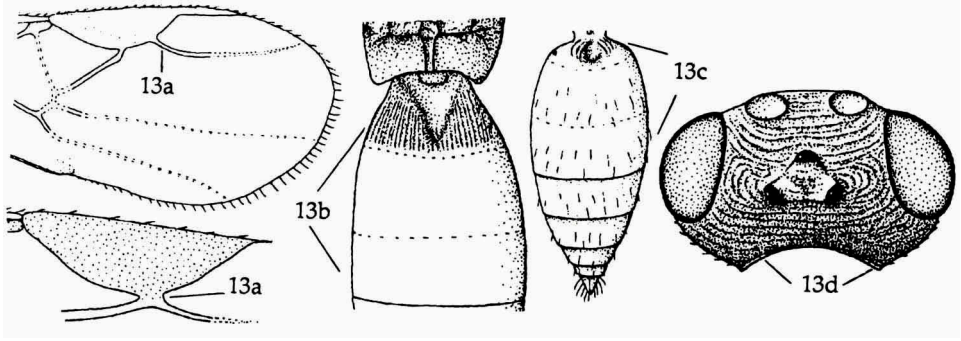


- Postpectal carina absent, at most with a short ventral part present (fig. 12aa); first metasomal tergite usually movably joined to second tergite (fig. 12bb), and if immovably joined (fig. 12bbb) then vein r-m of fore wing absent (fig. 12dd; in Holarctic genera), and shape of carapace dissimilar (fig. 12cc) 13

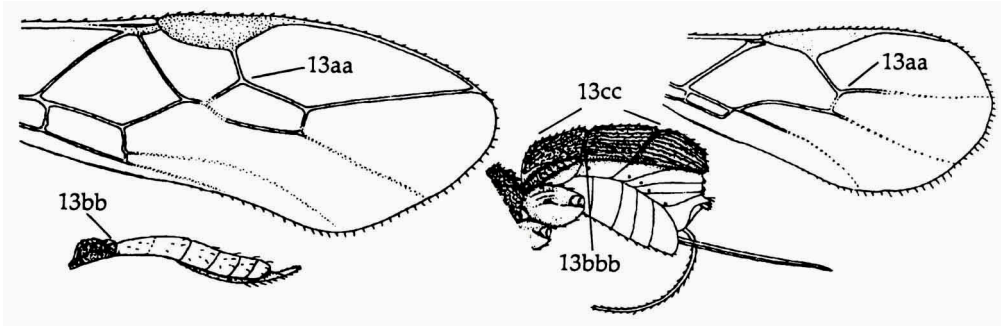


13. Vein SR1 of fore wing departing from pterostigma or nearly so, because vein r is (nearly) absent (fig. 13a); first three basal metasomal segments immovably joined (fig. 13b) and forming a flat shield that covers about two-thirds of metasoma (fig. 13c); occipital carina complete (fig. 13d); antennal segments 20..... **Adeliinae**

Small cosmopolitan subfamily of endoparasites of larval Lepidoptera. Rarely collected.

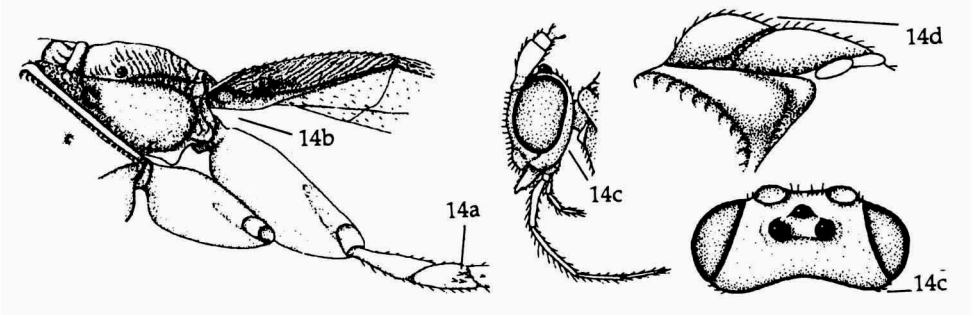


- Vein SR1 of fore wing departing from vein r and vein r of fore wing distinct (fig. 13aa); first tergite usually movably joined to second tergite (fig. 13bb), if immovably joined (fig. 13bbb) then forming a convex shield, covering almost whole metasoma (fig. 13cc); occipital carina and antennal segments variable 14

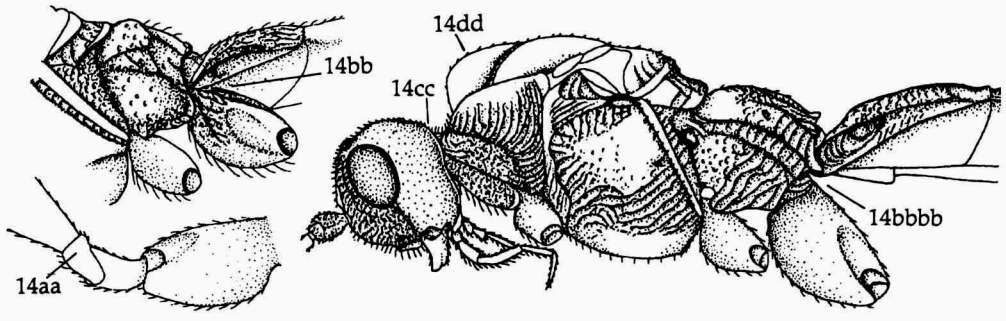


14. Outer side of trochantelli with (sub)apical comb of small pegs (fig. 14a); metasoma connected to propodeum somewhat above hind coxae (fig. 14b); occipital carina absent (fig. 14c); middle lobe of mesoscutum more or less protruding above lateral lobes (fig. 14d) .....**Macrocentrinae**

Rather small cosmopolitan subfamily of endoparasites of larval Lepidoptera. Rather infrequently collected.

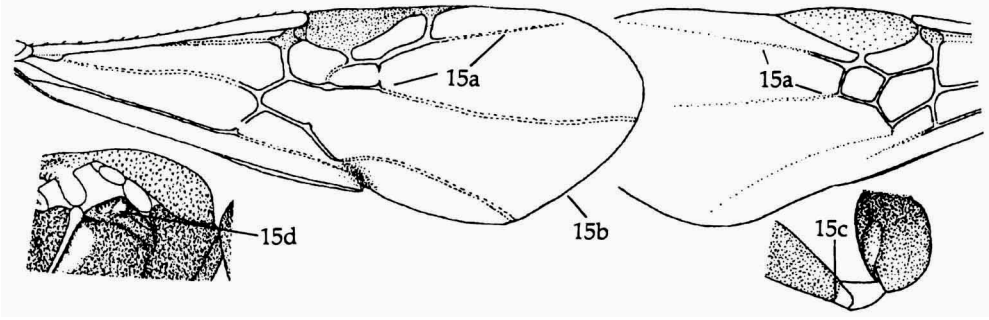


- Trochantelli without pegs (fig. 14aa); metasoma at least partly inserted between hind coxae (fig. 14bb); if slightly above hind coxae (fig. 14bbbb) then occipital carina present (fig. 14cc); middle lobe of mesoscutum similarly convex as lateral lobes (fig. 14dd).....15

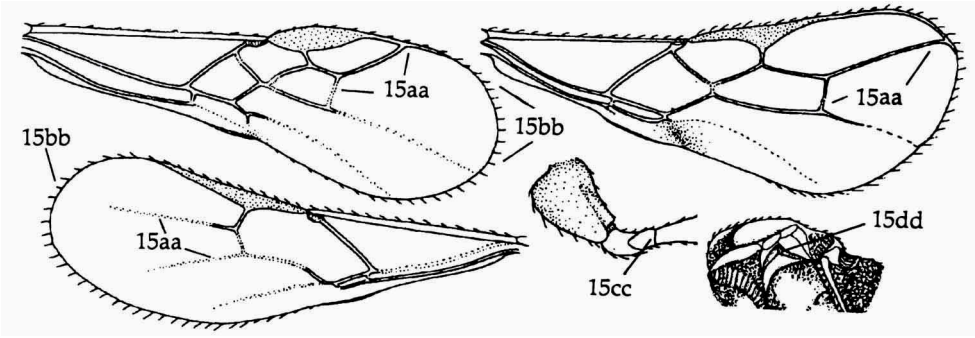


15. Venation of fore wing highly aberrant (fig. 15a); fore wing without fringe (at 80×: fig. 15b); hind trochantellus absent or obsolescent (fig. 15c); anterior subalar depression with tubercle (fig. 15d) ..... **Neoneurinae**

Small Holarctic subfamily, all are probably endoparasites of adult ants (Formicidae). Rarely collected.

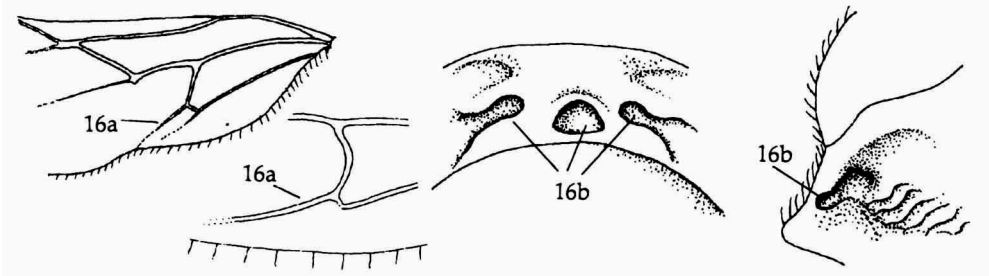


- Venation of fore wing less aberrant (fig. 15aa); fore wing with fringe (at 80×: fig. 15bb); hind trochantellus distinct (fig. 15cc); anterior subalar depression crenulate or smooth (fig. 15dd) 16



16. Vein 2-CU of hind wing present (fig. 16a) **and** fourth-seventh metasomal tergites retracted below third tergite; pronotum with pair of subpronope antero-laterally and with a pronope medio-posteriorly (fig16b) ..... **Sigalphinae**

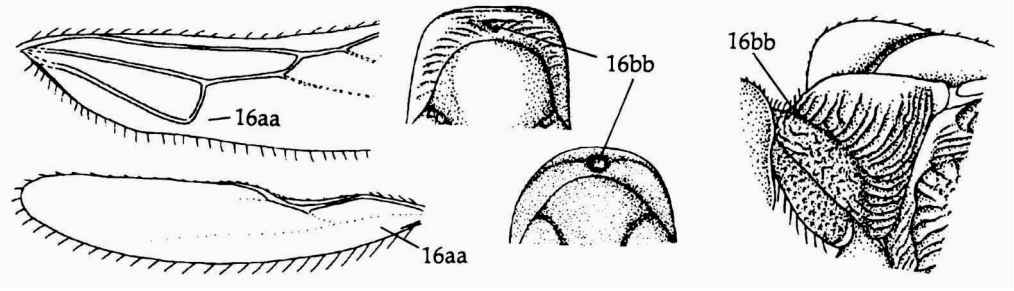
Small cosmopolitan subfamily of endoparasites of larval Lepidoptera. Rarely collected.



- Vein 2-CU of hind wing absent (fig. 16aa); if exceptionally present (Meteorideinae: cf. fig. 16a), then fourth-seventh tergites exposed; pronotum without subpronope and at most with a pronope (fig. 16bb) 17

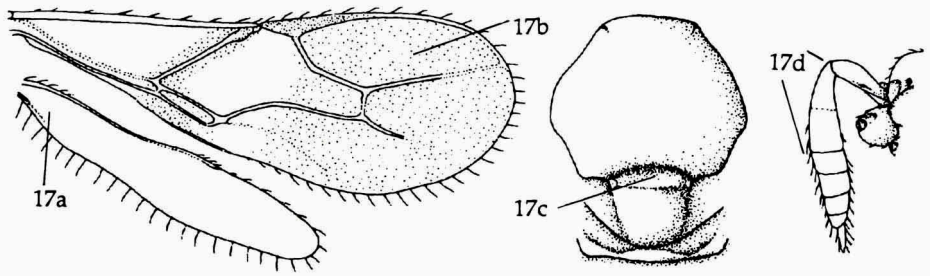
Note. It is just possible that some very rarely collected northern members of the small, principally Australian and Neotropical subfamily **Betylobraconinae** *sensu lato* will key

here. These can be distinguished from all the following subfamilies by their having the fore telotarsus strongly enlarged, distinctly wider than fourth tarsal segment in dorsal view, together with having third and fourth segments shortened (hardly or not longer than wide). A small cosmopolitan subfamily with most of its species in Australia. Biology is uncertain, at least partly parasites of larval Lepidoptera. Comparatively rarely collected.

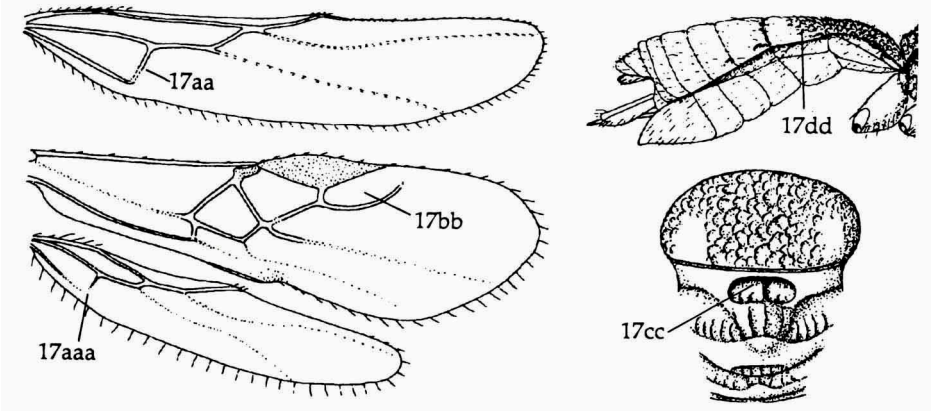


17. Vein cu-a of hind wing absent (fig. 17a) **and** marginal cell of fore wing (as far present) moderately long (fig. 17b); scutellar sulcus nearly always smooth (fig. 17c); metasomal tergites weakly sclerotized (fig. 17d); maxillary palp with 2-4 segments ..... **Aphidiinae**

Rather small cosmopolitan subfamily of endoparasites of adult and nymphal (=larval) aphids (Aphididae). Frequently collected.

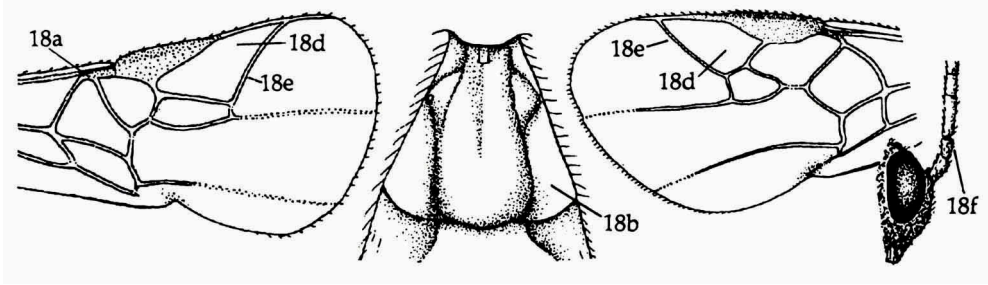


- Vein cu-a of hind wing present (fig. 17aa); if indistinct or absent (fig. 17aaa), then marginal cell of fore wing very short (fig. 17bb); scutellar sulcus nearly always sculptured (fig. 17cc); metasomal tergites moderately to strongly sclerotized (fig. 17dd); maxillary palp with 5-6 segments, exceptionally fewer than 5 18

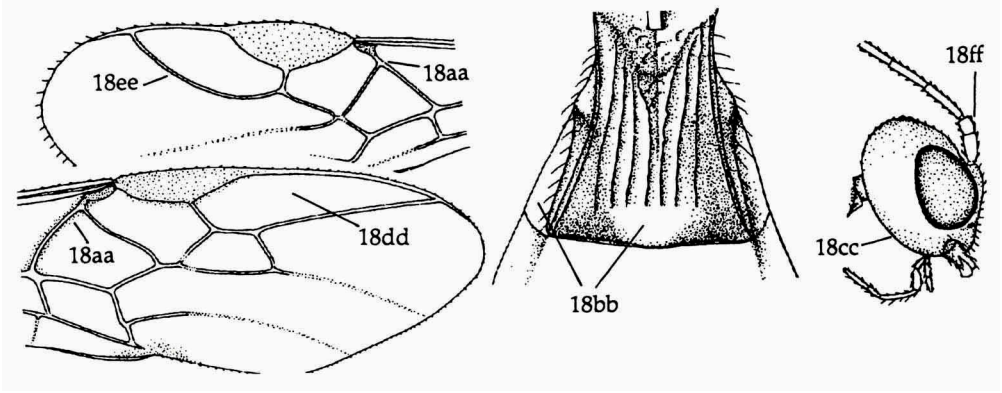


18. Vein 1-M of fore wing abruptly curved at its anterior end (fig. 18a), or first metasomal tergite flattened laterally and its notum and epipleuron not sharply differentiated (fig. 18b); occipital carina absent; marginal cell of fore wing short (fig. 18d) and vein SR1 nearly straight (fig. 18e); pedicellus comparatively large (fig. 18f) ..... **Ichneutinae**

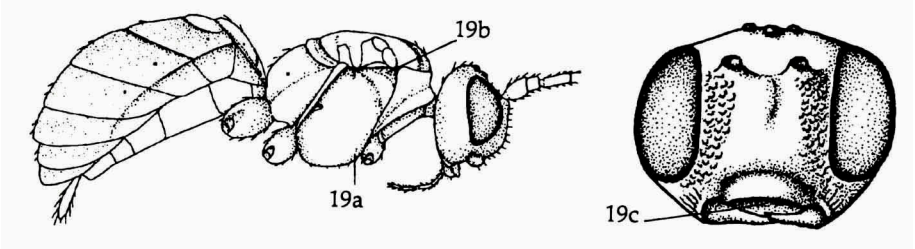
Small cosmopolitan subfamily of (?endo-)parasites of larval Hymenoptera and Lepidoptera. Rarely collected.



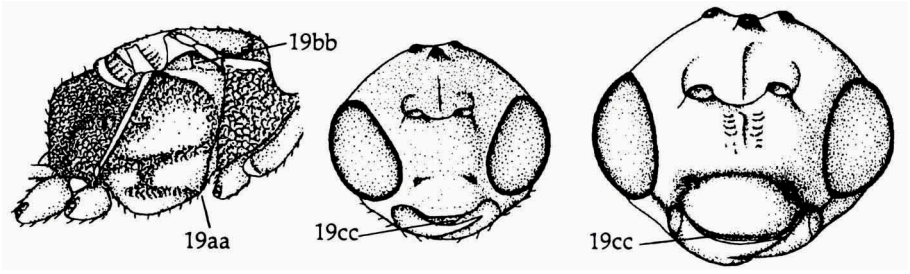
- Vein 1-M of fore wing straight to weakly curved anteriorly (fig. 18aa); first tergite more or less convex laterally and its notum differentiated from epipleuron (fig. 18bb); occipital carina present laterally (fig. 18cc), exceptionally completely absent; marginal cell of fore wing usually longer (fig. 18dd) or vein SR1 curved (fig. 18ee); pedicellus usually small (fig. 18ff) 19



19. Prepectal carina absent laterally (fig. 19a); anterior subalar depression smooth (fig. 19b); frequently with a narrow hypoclypeal depression (fig. 19c) 20

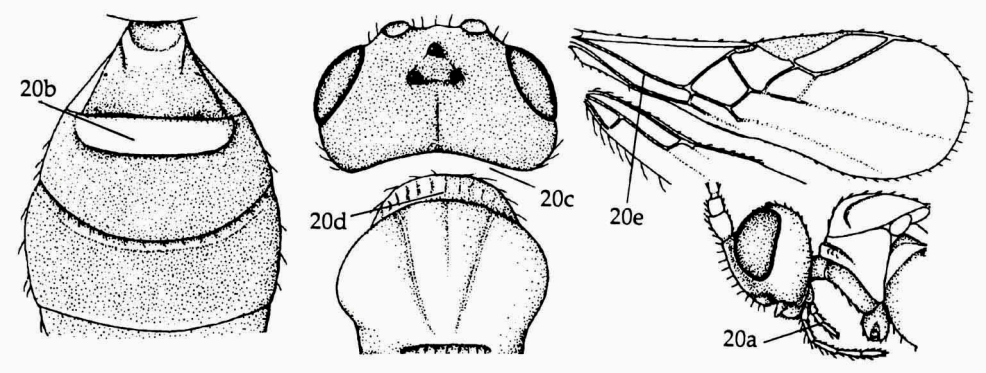


- Prepectal carina present laterally (fig. 19aa); anterior subalar depression usually crenulated (fig. 19bb); hypoclypeal depression absent (fig. 19cc) 21



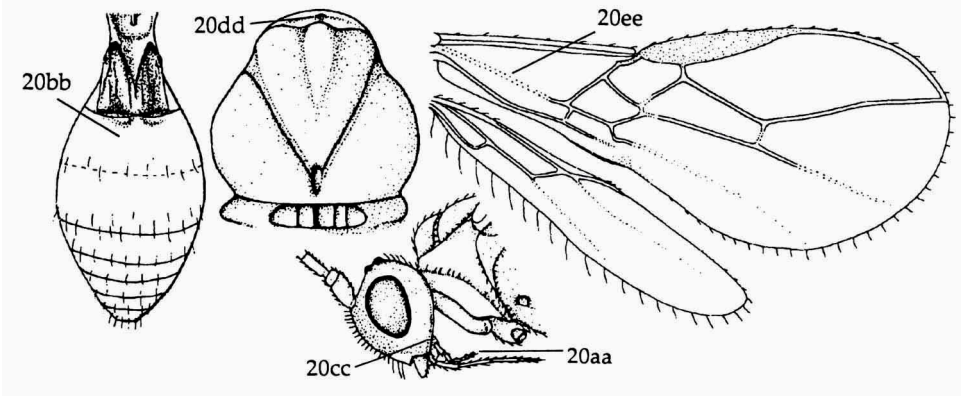
20. Labial palp with 3 segments (fig. 20a); second metasomal tergite usually with a transverse elevated area basally (fig. 20b); main part of occipital carina (fig. 20c) and pronope (fig. 20d) absent; vein M+CU1 of fore wing completely sclerotized (fig. 20e).....**Gnamptodontinae**

Small cosmopolitan subfamily of (?endo-)parasites of larval Lepidoptera. Rarely collected.

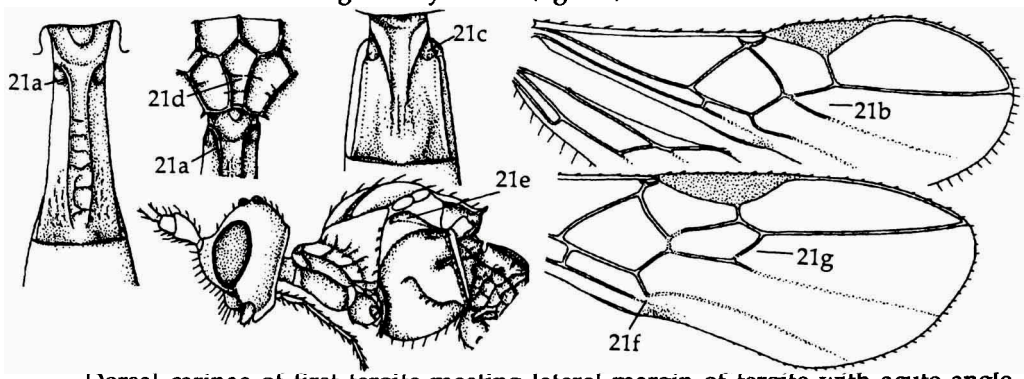


- Labial palp with 4 segments (fig. 20aa); second tergite without transverse elevated area (fig. 20bb); occipital carina usually present laterally (fig. 20cc); pronope more or less developed (fig. 20dd); vein M+CU1 of fore wing often (partly) unsclerotized (fig. 20ee) .....**Opiinae**

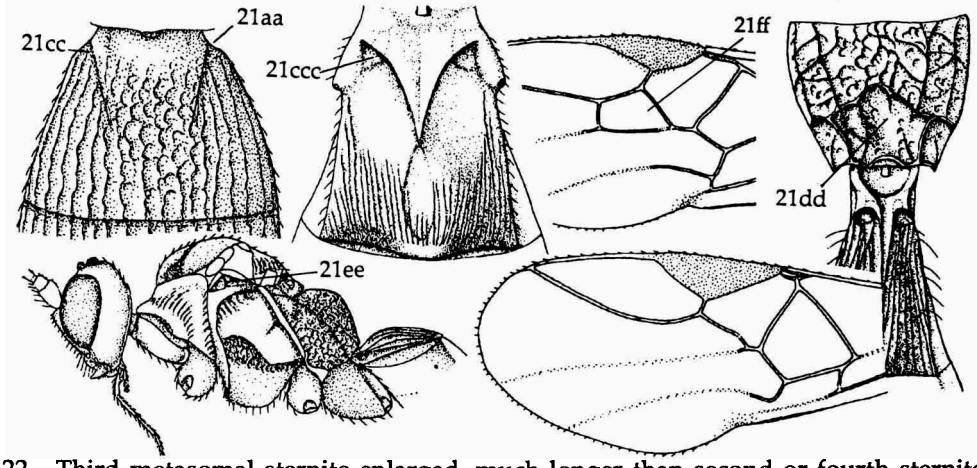
Large cosmopolitan subfamily of endoparasites of larval cyclorraphous Diptera. Frequently collected.



21. Dorsal carinae of first tergite curved anteriorly around the more or less developed dorsope (fig. 21a); vein r-m of fore wing usually absent (fig. 21b), if present (fig. 21g) then is dorsope distinct (fig. 21c); areola of propodeum comparatively narrow (fig. 21d) or absent; anterior subalar depression usually smooth (fig. 21e); vein CU1b of fore wing usually absent (fig. 21f).....22

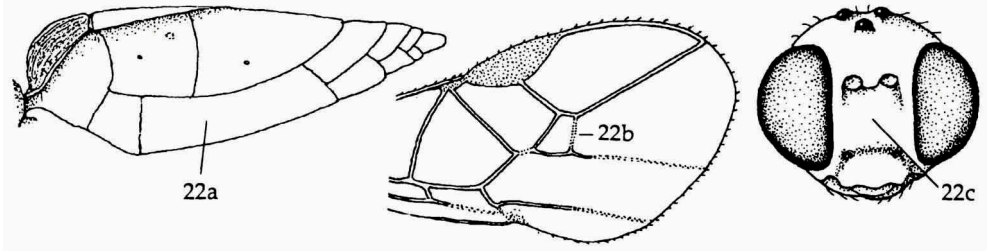


- Dorsal carinae of first tergite meeting lateral margin of tergite with acute angle (fig. 21aa), or carinae absent; dorsope absent or obsolescent (fig. 21cc); if distinct (fig. 21ccc) then areola of propodeum wide (fig. 21dd); anterior subalar depression usually sculptured (fig. 21ee); veins r-m and CU1b of fore wing variable....23



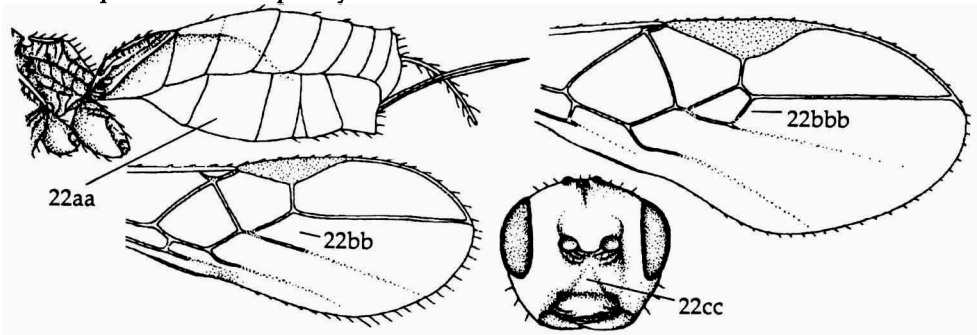
22. Third metasomal sternite enlarged, much longer than second or fourth sternite (fig. 22a); vein 2-CU of hind wing present (cf. fig. 16a); vein r-m of fore wing present (fig. 22b); face (especially of female) comparatively narrow (fig. 22c) ....**Meteorideinae**

Small and nearly cosmopolitan subfamily of endoparasites of larval Lepidoptera. Rarely collected.



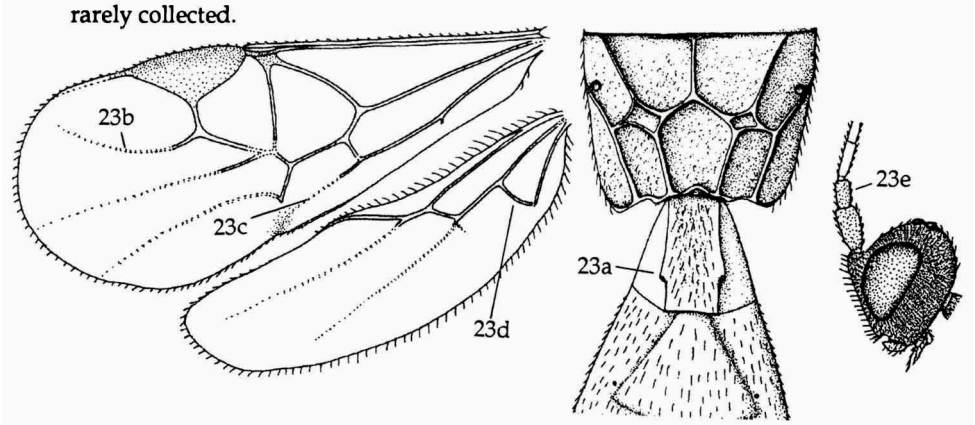
- Third sternite normal, not enlarged if compared with second or fourth sternite (fig. 22aa); vein 2-CU of hind wing absent (cf. fig. 16aa); vein r-m of fore wing usually absent (fig. 22bb), if present (fig. 22bbb) then face normal (fig. 22cc)..... .....**Blacinae**

Rather small cosmopolitan subfamily of endoparasites of larval Coleoptera and Mecoptera. Rather frequently collected.

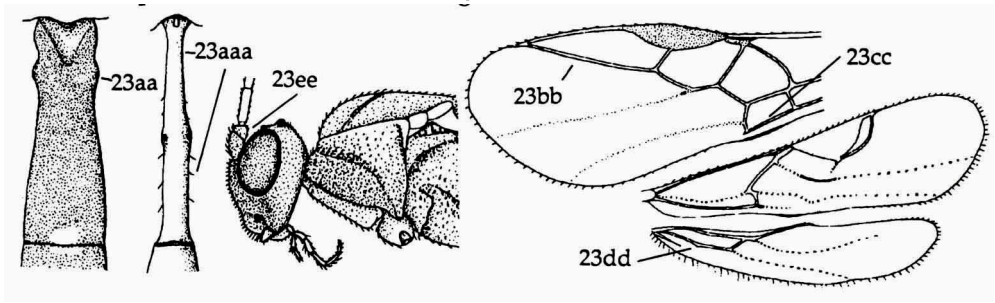


23. Spiracles of first metasomal tergite behind middle of tergite and its notum flattened (fig. 23a); veins SR1 (fig. 23b) and 2-1A (fig. 23c) of fore wing reduced; vein cu-a of hind wing present (fig. 23d); pedicellus comparatively large (fig. 23e)..**Dirrhopinae**

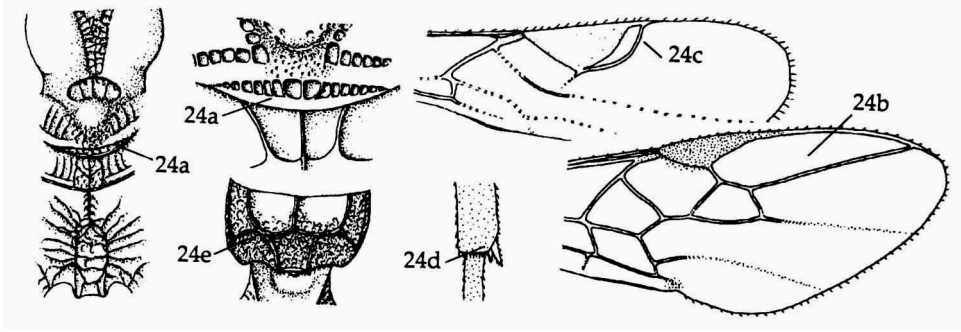
Small Holarctic and Oriental subfamily of endoparasites of larval Lepidoptera. Very rarely collected.



- Spiracles of first tergite in front of middle of tergite or submedially situated (fig. 23aa); if spiracles situated behind middle of first tergite then its notum is distinctly convex (fig. 23aaa); vein SR1 (fig. 23bb), and usually also vein 2-1A (fig. 23cc) of fore wing present; if vein SR1 is absent then vein cu-a of hind wing absent (fig. 23dd); pedicellus medium-sized (fig. 23ee) 24

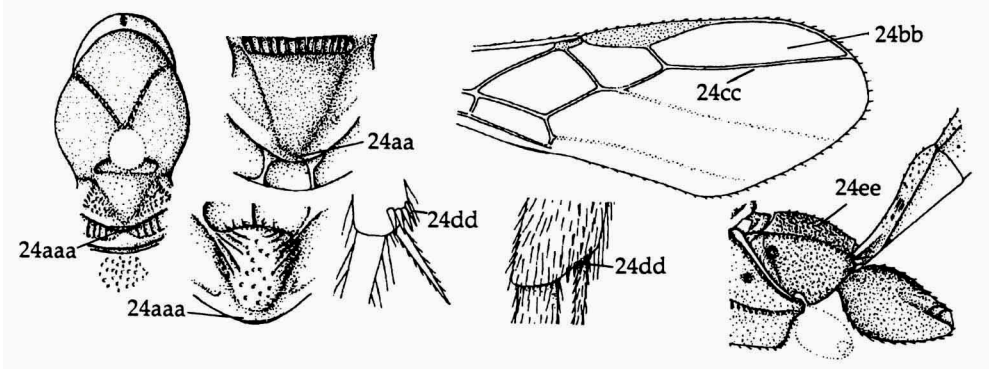


24. Scutellum with a distinct transverse and crenulated depression medio-posteriorly (fig. 24a); marginal cell of fore wing rather wide (fig. 24b), or absent; if narrow then vein SR1 distinctly curved (fig. 24c); hind tibia without pegs apically (fig. 24d); propodeum usually with costulae (fig. 24e).....25



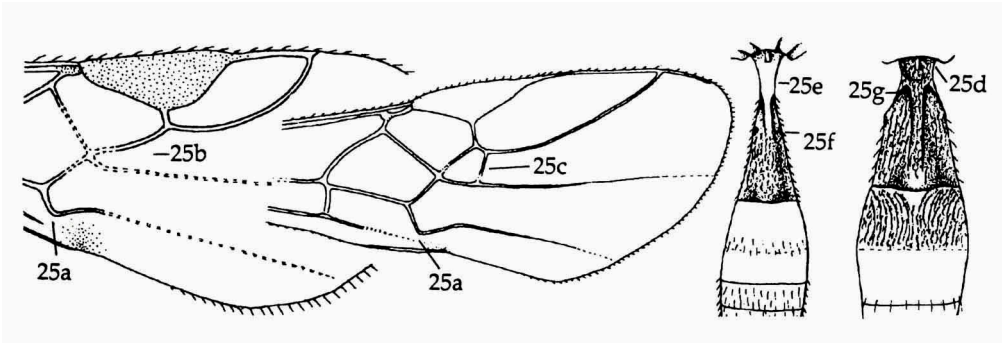
- Scutellum without crenulate depression medio-posteriorly (fig. 24aa), exceptionally with a narrow and shallow impression (fig. 24aaa); marginal cell of fore wing comparatively narrow (fig. 24bb) and vein SR1 straight (fig. 24cc); hind tibia with pegs near base of spurs (fig. 24dd); costulae of propodeum absent or nearly so (fig. 24ee).....**Orgilinae**

Small cosmopolitan subfamily of endoparasites of larval Lepidoptera. Rather frequently collected in the Holarctic region.

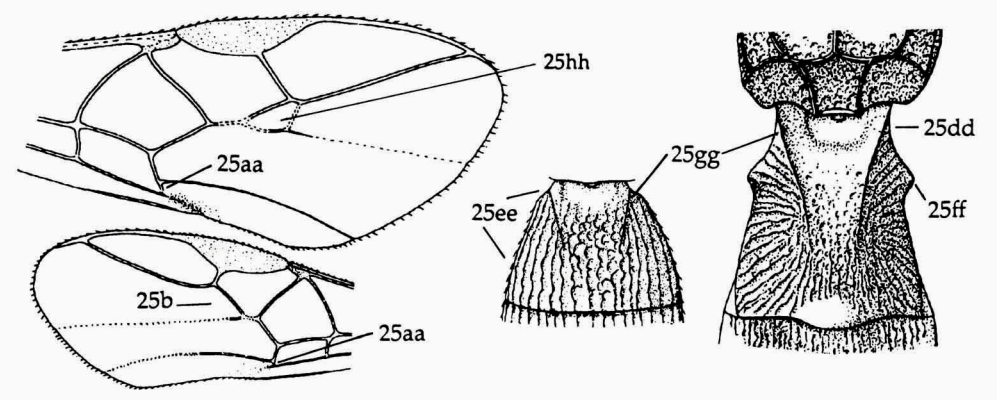


25. Vein CU1b of fore wing absent (fig. 25a); vein r-m of fore wing often absent (fig. 25b), if present (fig. 25c) then is first metasomal tergite petiolate (Meteorini: fig. 25d) or elongate (fig. 25e); spiracle of first tergite often situated medially or behind middle of tergite (fig. 25f); dorsope frequently present (fig. 25g) .....
.....**Euphorinae**

Rather large cosmopolitan subfamily of endoparasites of larval Lepidoptera, of larval and adult Coleoptera, and of mainly adult Heteroptera, Hymenoptera, Neuroptera and Psocoptera. Frequently collected.

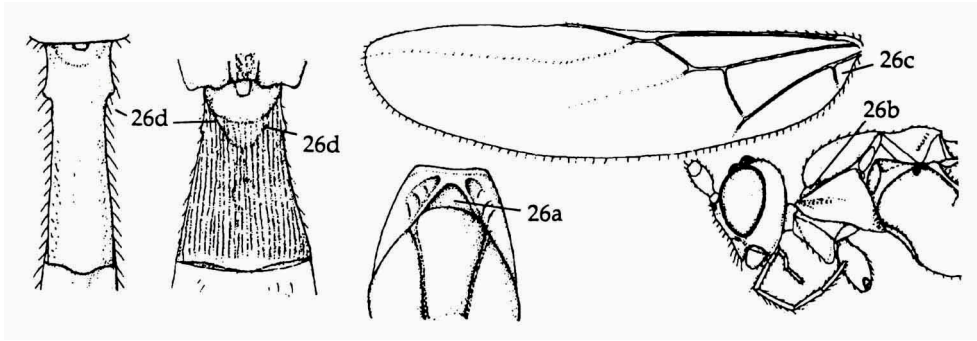


- Vein CU1b of fore wing nearly always present (fig. 25aa), except in *Eubazus* (*Calyptus*); vein r-m of fore wing variable, if absent (fig. 25b; Charmontini: *Charmon*, Helconinae p.p.) then first tergite sessile (fig. 25dd) and robust (fig. 25ee); spiracles of first tergite distinctly in front of middle of tergite (fig. 25ff); dorsope absent (fig. 25gg).....26



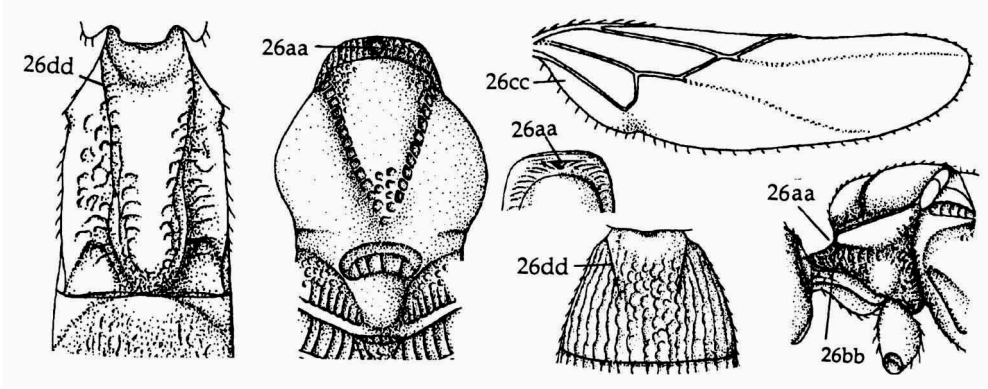
26. Pronope absent and pronotum instead with a (often narrow) antescutellar depression (fig. 26a); or if indistinct (Microtypini: *Microtypus*) then second submarginal cell of fore wing small and triangular (cf. fig. 25hh), or mesoscutum protruding anteriorly (fig. 26b; Charmontini: *Charmon*, has clypeus with row of punctures ventrally, and vein 2A of hind wing present (fig. 26c)); first metasomal tergite nearly always distinctly narrowed behind spiracles and its dorsal carinae (largely) absent (fig. 26d).....**Homolobinae**

Small cosmopolitan subfamily of endoparasites of larval Lepidoptera. Rather infrequently collected. This subfamily probably has to be split into three subfamilies: the Homolobinae *sensu stricto* with the second submarginal cell of fore wing medium-sized (cf. fig. 21ff), the Charmontinae with the second submarginal cell of fore wing absent (fig. 25b), and the Microtypinae with the second submarginal cell small and (sub)triangular (fig. 25hh).



- Pronope more or less developed and antescutellar depression absent (fig. 26aa); mesoscutum not protruding anteriorly (fig. 26bb); vein 2A of hind wing usually absent (fig. 26cc); clypeus without row of punctures ventrally; first tergite almost always not or slightly narrowed behind spiracles, and its dorsal carinae almost always distinctly developed basally (fig. 26dd) ..... **Helconinae**

  Rather small cosmopolitan subfamily of parasites of larval Coleoptera. Rather frequently collected.



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