Australia (New South Wales).——FIG. 215,*10*. **X. hillae*; fore wing, ×5.5 (Riek, 1955).

Xenopanorpa RIEK, 1955, p. 659 [**X. didymovena*; OD]. Little-known wing; RS and M each with 7 or 8 branches. MARTYNOVA, 1962e; WILLMANN, 1978. *Trias.*, Australia (Queensland).

Order SIPHONAPTERA Latreille, 1825

[Siphonaptera LATREILLE, 1825, p. 334]

Small, apterous insects, body laterally compressed. Head sessile on prothorax; compound eyes absent, but 2 lateral ocelli frequently present; antennae short in female, longer in male; mouthparts modified for piercing-sucking, maxillae in form of long, cutting blades; maxillary and labial palpi well developed; prothorax and mesothorax small, metathorax large; legs well developed, hind pair long and used for jumping; abdomen with 10 distinct segments, terga with rows of setae. Combs (ctenidia) in the form of rows of thick, flattened bristles present in some on genal area, pronotum, and, rarely, metanotum. *Oligo.–Holo.*

The adults are blood-sucking, mostly parasites on mammals, especially rodents, and rarely on birds. The larvae are free-living and feed on organic debris, largely the feces of adult fleas.

The fleas constitute a relatively small order of ectoparasites. The only known fossils are two congeneric species in Baltic amber, belonging to a family that is considered to be among the more specialized families of the order (HOLLAND, 1964).

Two apterous insects from the Lower Cretaceous of Australia have been noted by RIEK (1970) and considered by him to belong to the order, but they have not been fully described and remain unnamed. Specialists who have examined the fossils are of the opinion that they are not fleas. Another wingless insect from the Cretaceous (*Saurophthirus longipes* PONOMARENKO, 1976) has also been placed in the Siphonaptera (RASNITSYN, 1980e), but since the specimen has long, slender legs and lacks any indication of the characteristic lateral compression of the body, its placement in the Siphonaptera is very dubious. It is herein assigned to the category Order Uncertain.

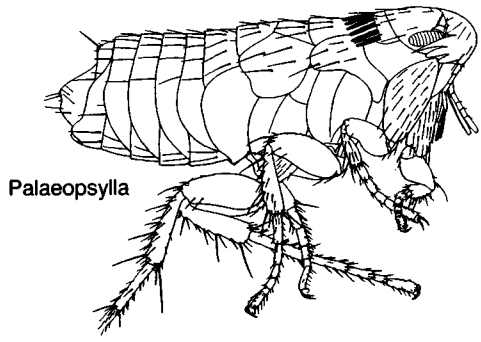


FIG. 216. Hystrichopsyllidae (p. 395).

The origin of the Siphonaptera is by no means clear. Several authors have suggested the derivation of the fleas from the Coleoptera, Diptera, or Mecoptera, but the evidence for each of these is weak and inconclusive (KRISTENSEN, 1975, 1981; HENNIG, 1981). About all that can be said with confidence at the present time is that they are members of the Endopterygota.

Family HYSTRICHOPSYLLIDAE Tiraboschi, 1904

[Hystrichopsyllidae TIRABOSCHI, 1904, p. 242]

Pronotal ctenidium usually present; hind margin of metanotum without spines; hind coxae without spinelike setae on inner surface. Mostly parasites on moles and shrews. [Extinct species of moles and shrews are known from the Oligocene of Europe.] *Oligo.–Holo.*

Palaeopsylla WAGNER, 1903, p. 137. DAMPF, 1911; HENNIG, 1939; HOPKINS & ROTHSCHILD, 1966; PEUS, 1968. *Oligo.*, Europe (Baltic)–*Holo.*——FIG. 216. *P. klebsiana* DAMPF; lateral view, ×30 (Dampf, 1911).

Order DIPTERA Linné, 1758

[Diptera LINNÉ, 1758, p. 584]

Very small to medium-sized insects. Head commonly large. Most of head surface except

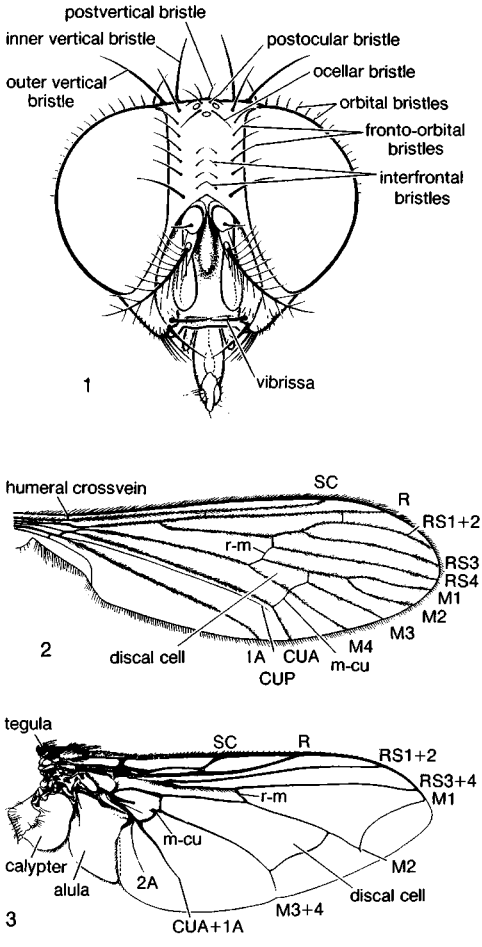


FIG. 217. Diptera; bristle arrangement and fore wing venation.——*1.* Muscoid fly head, showing bristle arrangement and terminology (CSIRO, 1970).——*2.* Fore wing of a recent genus of the suborder Nematocera, *Nothotrichocera,* showing comparatively unspecialized venation pattern (CSIRO, 1970).——*3.* Fore wing of a recent genus of the suborder Brachycera, *Chrysomya,* showing more specialized venational pattern (CSIRO, 1970).

The symbols for crossveins are hyphenated.

the relatively large compound eyes generally bearing prominent bristles, bristle arrangement useful in generic and family classification (Fig. 217,*1*). Antennae diverse; filiform in more generalized members of order (Nematocera), shorter and with fewer segments in more specialized members (Brachycera). Mouthparts of adults suctorial, forming a proboscis that may include stylets for piercing. Mandibles present only in some nematocerous females. Maxillae commonly highly modified, though segmented palpi may be present. Labium forming proboscis, bearing distally a pair of fleshy lobes (labella). Hypopharynx long and slender. Prothorax and metathorax small, metathorax more or less fused with large mesothorax; thorax generally with prominent bristles, especially in higher Brachycera.

Fore wings membranous, with a distinct venation resembling that of generalized Mecoptera though commonly much reduced or otherwise modified. Venational homologies clear in generalized families but uncertain in some specialized families.

Several widely different terminologies have been used for venation in the past, but in recent years most dipterists have agreed on the terminology and the homologies employed here, which are those used by COLLESS and MCALPINE (1970). In the tipuloids (suborder Nematocera, Fig. 217,*2*), which appear to have the least specialized wings among recent Diptera, veins SC and R are straight, independent, and long; RS is dichotomously forked and its branches terminate in the apical region of the wings; M, apparently coalesced with CUA basally, shows neither convexity nor concavity but divides into four terminal and nearly parallel branches; CUA is a strong vein and (in the present interpretation) terminates without forking. CUP is a weak vein, arising from the base of 1A and becoming obsolescent before the wing margin. Vein 1A is nearly straight or gently curved, reaching the hind margin remote from the wing base; 2A is short and independent of 1A. In these tipuloids and other generalized families, the wings tend to be slenderly oval, often petiolate.

In the more highly specialized families, such as the muscoids (suborder Brachycera, Fig. 217,*3*), veins SC and R are greatly shortened and may be coalesced; they often terminate before the wing apex. Vein M tends to fork near the base and its branches in general are reduced; CUA commonly diverges posteriorly just beyond the end of CUP and

coalesces with 1A, forming a compound vein, CUA+1A, which may extend to the wing margin or be very short or virtually absent. Vein 2A is most commonly much reduced or absent. In these specialized families the wings tend to be broad, especially basally, with the development of one or two lobes (calypteres and alulae) along the inner posterior margin.

In all known alate Diptera the hind wings have been modified to halteres, each consisting of a small, slender stalk terminating in a knob; these structures oscillate in flight and function as balancing organs.

With some exceptions, only a few crossveins (humeral, r-m, and m-cu) occur in dipterous wings, although additional crossveins may be present near the points of origin of distal branches of the veins. In some species, parts of the longitudinal veins have become transverse in position and resemble crossveins. Ordinarily, however, there are only a few closed cells in the wings; the discal cell, formed by the forking of M, is the one most commonly present (Fig. 217,*2,3*).

The legs of the Diptera are basically cursorial, though the fore pair may be more or less raptorial in some species. The tarsi typically have five segments.

The abdomen in its generalized form, as seen in the tipuloids, consists of 10 or possibly 11 segments. In the more specialized Diptera the first two segments tend to coalesce, at least externally, and the posterior ones often show distinct telescoping. *Trias.–Holo.*

Adult Diptera occur in virtually all terrestrial habitats, from rain forests to deserts. All are limited to liquid food, which in addition to water may include blood and other tissue fluids of animals, decomposed organic matter, and plant and animal secretions.

The larvae, which typically develop from eggs deposited near the food source, lack true legs in all stages. The body form is diversely modified throughout the order. In the Nematocera the head capsule is distinct, and the mouthparts are normal (Fig. 218,*1*). In the Brachycera the head capsule is reduced to a few minute rods or plates retracted within the thorax, or is completely absent (Fig. 218,*2*), and the mandibles may be retained or replaced by mouthhooks. Most larvae are terrestrial, obtaining oxygen from the atmosphere; others are aquatic, absorbing dissolved oxygen from the water or obtaining air from plant tissues; and still others are endoparasites of other invertebrates (chiefly insects) or occasionally of vertebrates. Pupation occurs in a variety of environments. The pupae of many Nematocera are free (not enclosed in a case), but others are formed within a silken cocoon. The pupae of most Brachycera are also free, but in the highly specialized families, they are enclosed in the hardened exuviae of the larvae (puparia).

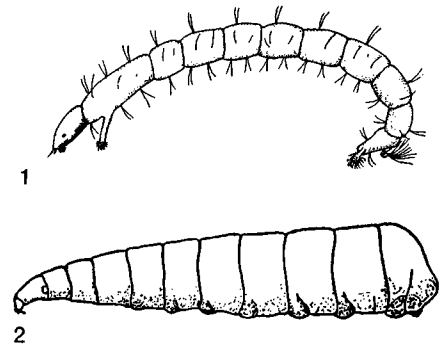


FIG. 218. Diptera; larval forms.——*1.* Larva of *Tanypus,* suborder Nematocera (Brues, Melander, & Carpenter, 1954).——*2.* Muscoid larva, suborder Brachycera (Brues, Melander, & Carpenter, 1954).

The Diptera comprise one of the large and highly diversified orders of insects. Nearly 100,000 existing species have been described, and about half as many more probably remain to be described (COLLESS & MCALPINE, 1970). Their general evolutionary development, from the lower to the higher flies, is fairly clear, but the translation of that sequence into a phylogenetic system of classification has proven difficult. The classification most widely used for many years has recognized two suborders, Nematocera and Brachycera, with the latter divided into two sections, the Orthorrhapha and Cyclorrhapha. Within the past two decades, however, doubts have been expressed about some of these taxa as phy-

logenetic categories (ROHDENDORF, 1964; COLLESS & MCALPINE, 1970; HENNIG, 1973; STEYSKAL, 1974; OLDROYD, 1977), and the diversity of the classifications now being proposed indicates the degree of differences of opinion that still exists on this subject among students of Diptera. COLLESS and MCALPINE (1970), for example, follow the traditional system mentioned above; the families of the suborder Nematocera are grouped into four major divisions, and those of the Brachycera are grouped into Orthorrhapha and Cyclorrhapha. On the other hand, OLDROYD (1977) has proposed the division of the Diptera into three suborders, Superstata, Medescata, and Arescata, based on general ecology and habits, rather than directly on structure. ROHDENDORF (1961c) has proposed two suborders, Archidiptera and Eudiptera, the former to include certain extinct (Triassic) families, the latter to comprise all other families, grouped into 13 infraorders (see below, under the suborder Archidiptera). HENNIG (1973), following the completion of his extensive studies on the morphology of existing Diptera, adopted still another course, recognizing the two suborders Nematocera and Brachycera, with the latter divided into three infraorders, Homoeodactyla, Asilomorpha, and Cyclorrhapha. RICHARDS and DAVIES (1977) introduced a division into three suborders, the Nematocera, Brachycera (=Orthorrhapha), and Cyclorrhapha.

In the present treatment of the Diptera, three suborders are recognized: Archidiptera (including only the Triassic families discussed below), Nematocera, and Brachycera. In view of the arguments presented by ROHDENDORF (1961c) and OLDROYD (1977), the brachycerous families are not divided into the Orthorrhapha and Cyclorrhapha. The number of existing families recognized in the order Diptera ranges from 115 to 140 (COLLESS & MCALPINE, 1970; HENNIG, 1973). About 80 percent of these families are members of the suborder Brachycera. Although family groupings such as superfamilies and infraorders are usually employed to indicate relationships of the families, there is much difference of opinion about the assignment of certain families to these higher categories. Inclusion of extinct families and genera in the classification adds to the difficulty, because some of them appear to be intermediate between family groups, especially in the Brachycera. In the present treatment of the Diptera, superfamilies and comparable family groupings are omitted, but the sequence of families, as well as the family nomenclature, follows that of COLLESS & MCALPINE (1970).

As pointed out by ROHDENDORF (1964), the fossil record of the Diptera has contributed substantially to our understanding of their evolution. Flies are not only numerous as fossils, but their wing venation, which usually provides a basis for family or generic identification, is almost always clearly preserved. The earliest known Diptera have been found in Upper Triassic beds of Kirghiz in the Soviet Union (ROHDENDORF, 1961c, 1962a, 1964). All of these belong to extinct families. Some of the families, assigned to the Archidiptera, appear to have only remote affinities with even the most generalized Nematocera; others seem clearly to belong to existing family groups of the Nematocera (i.e., superfamilies Tipulomorpha and Bibiomorpha). The earliest known Brachycera occur in Jurassic deposits and include, in addition to several extinct families, representatives of the Acroceridae, Nemestrinidae, and Rhagionidae. The few Cretaceous flies that are known support the conclusion based on the lower Tertiary record that by the end of the Mesozoic most of the living families were already in existence. Numerous recent genera have been recognized in lower Tertiary deposits; the specimens in amber are of special interest in this connection, since their excellent preservation allows positive determination of their generic affinities. As might be expected, the percentage of existing genera known from the lower Tertiary varies considerably from family to family: in general, it is higher for the Nematocera than for the Brachycera. For example, about 75 percent of the tipulid and mycetophilid genera of the lower Tertiary are extant, whereas only about 40 percent of the bombyliid and syrphid genera are still existing. Many species

in the Baltic amber are strikingly similar to existing species and one of them, according to HENNIG's very careful study (1966a), seems to be identical with an existing muscid, *Fannia scalaris* FABRICIUS.

The evidence now available indicates that the Diptera were derived from generalized Mecoptera or from ancestral mecopteroid stock, probably during the Permian. By the late Permian the mecopteroid complex had differentiated into three well-defined ordinal lines, the Neuroptera, Trichoptera, and Mecoptera, in addition to a series of little-known families with obscure relationships to those orders. The precise position in this complex of the evolutionary line leading to the Diptera, with reduction of the hind wings and their modification to halteres, is not yet certain.

Suborder ARCHIDIPTERA Rohdendorf, 1961

[Archidiptera ROHDENDORF, 1961c, p. 154][1]

Very small flies. Wings normally developed; veins of unequal thickness and development: C, R, and CUA commonly strong; RS, M, CUP, and 1A weak or obsolescent; numerous crossveins present in all areas but often weak or forming a network. Halteres, body structure, and immature stages unknown. ROHDENDORF, 1961c, 1961d, 1962a, 1964. *Trias.*

This suborder was originally based on several Triassic specimens consisting of isolated wings (ROHDENDORF, 1961d, 1962a) and belonging to four extinct families. The diagnosis of the suborder was therefore limited to the venational features cited above. In a subsequent publication, however, ROHDENDORF (1964) also placed in the suborder Archidiptera the recent family Nymphomyiidae and redefined the suborder by assigning to it the characteristics of that family. His entire revised definition reads as follows (ROHDENDORF, 1964, translated edition): "Head of pupa directed forward, prognathous. Ocelli very large, two in number. Prothorax large, well isolated. Wings of pupa parallel-margined, elongate." Since the Triassic species on which the suborder was based originally are known only by isolated wings, this revised definition has no meaning without the assumption, for which there is no evidence, that the Triassic species had body structures and pupae like those of the Nymphomyiidae.

At the time when ROHDENDORF's revised definition was published, the recent family Nymphomyiidae was known only by a single species, *Nymphomyia alba* TUKUNAGA, from Japan. Since then several other species belonging to different genera have been found in widely scattered localities: New Brunswick and Alberta in Canada, West Bengal, and Primorsk Kray in the eastern Soviet Union (IDE, 1964, 1965; CUTTEN & KEVAN, 1970; ROHDENDORF & KALUGINA, 1974; KEVAN & CUTTEN-ALI-KHAN, 1975). These nymphomyiids collectively show a remarkable combination of generalized and specialized features. They are very small, with a body length of less than 2 mm; their wings are elongate and slender and have only minute vestiges of veins at the wing bases and a marginal fringe of very long hairs. The larvae and pupae are aquatic, and the adults, presumably after nuptial flight, shed their wings and return to water.

Although there is no close agreement among dipterists about the affinities of these remarkable flies (KEVAN & CUTTEN-ALI-KHAN, 1975), there has been a general tendency to accept ROHDENDORF's hypothesis that the family Nymphomyiidae is a member of the suborder Archidiptera (see, however, KEVAN & CUTTEN, 1981). Although the Nymphomyiidae may represent a suborder distinct from the Nematocera and Brachycera, assignment of the family to the suborder Archidiptera as that was defined by ROHDENDORF from the Triassic fossils (1964) is insupportable: the fossils show none of the characteristics of the recent Nymphomyiidae,

[1] CUTTEN and KEVAN (1970) have emended ROHDENDORF's name Archidiptera to read Archaediptera. However, the Greek prefix, meaning primitive or ancient, has been accepted in biological terminology in several forms, including archi- and arche- as well as archae-. The proposed emendation, therefore, seems entirely unnecessary (see NYBAKKEN, 1959, p. 135, 152, 225; BROWN, 1954, p. 99).

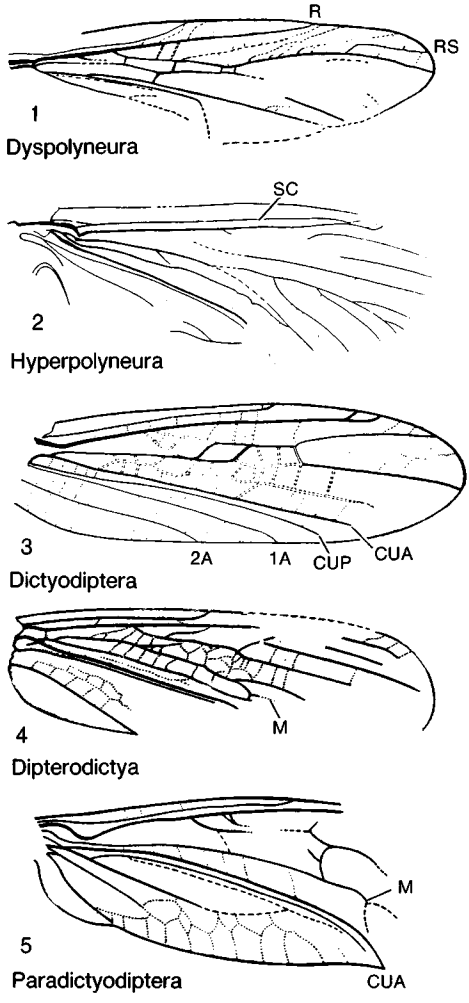


FIG. 219. Dictyodipteridae, Hyperpolyneuridae, and Dyspolyneuridae (p. 400–401).

and the nymphomyiids show none of the features known in the fossils. Accordingly, it seems advisable to consider the subordinal position of the existing family Nymphomyiidae as uncertain and to restrict the suborder Archidiptera, at least for the present, to the Triassic species, as originally proposed by ROHDENDORF. Because our knowledge of these Triassic families is limited to isolated wings, all of which possess a venation quite unlike that postulated for the early dipteran stock, even their assignment to the Diptera should probably be considered uncertain, especially since there is no evidence that they possessed only two wings and halteres.

Family DICTYODIPTERIDAE Rohdendorf, 1961

[Dictyodipteridae ROHDENDORF, 1961d, p. 90]

Small species; wings less than 3.5 mm long and broad basally; veins R and CUA very strong; RS, M, and CUP weak; base of stem R with a prominent bend; RS and M with few branches; crossveins numerous over most of wing including anal area. *Trias.*

Dictyodiptera ROHDENDORF, 1961d, p. 91 [**D. multinervis*; OD]. Crossveins present basally between CUA and CUP; 1A and 2A well developed and nearly parallel. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).—FIG. 219,*3*. **D. multinervis*; wing, ×20 (Rohdendorf, 1964).

Dipterodictya ROHDENDORF, 1961d, p. 92 [**D. tipuloides*; OD]. Bend in stem of R much less pronounced than in *Paradictyodiptera*; M dividing basally. ROHDENDORF, 1962a, 1964. *Trias.*, USSR (Kirghiz).—FIG. 219,*4*. **D. tipuloides*; wing, ×16 (Rohdendorf, 1961d).

Paradictyodiptera ROHDENDORF, 1961d, p. 93 [**P. trianalis*; OD]. Base of stem R strongly bent; M dividing distally; crossveins absent between CUA and CUP; 3 anal veins, connected by a network of crossveins. ROHDENDORF, 1962a, 1964. *Trias.*, USSR (Kirghiz).—FIG. 219,*5*. **P. trianalis*; wing, ×22 (Rohdendorf, 1961d).

Family HYPERPOLYNEURIDAE Rohdendorf, 1961

[Hyperpolyneuridae ROHDENDORF, 1961d, p. 94]

Wing: stem of vein R with sharp break, developed into a short projection towards base of M; SC long, parallel to R and terminating just before end of R; RS apparently with 3 branches; M with 6 branches; crossveins weak and absent from anal area. *Trias.*

Hyperpolyneura ROHDENDORF, 1961d, p. 95 [**P. phryganeoides*; OD]. Wing with M forked just basad of break in stem of R. ROHDENDORF, 1962a, 1964. *Trias.*, USSR (Kirghiz).—FIG. 219,*2*. **H. phryganeoides*; wing, ×20 (Rohdendorf, 1961d).

Family DYSPOLYNEURIDAE Rohdendorf, 1961

[Dyspolyneuridae ROHDENDORF, 1961d, p. 95]

Wing: stem of vein R with sharp break, forming a strong strut joined to base of M; SC short, terminating before midwing; R terminating well before apex of wing. *Trias.*

Dyspolyneura ROHDENDORF, 1961d, p. 96 [**D. longipennis*; OD]. Little-known wing, with all branches of RS directed anteriorly. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).——FIG. 219,*1*. **D. longipennis*; wing, ×18 (Rohdendorf, 1964).

Suborder NEMATOCERA Latreille, 1825

[*nom. transl.* BRAUER, 1883, p. 4, *ex* Nemocera LATREILLE, 1825, p. 482]

Antennae of adults usually filiform, at least as long as thorax, differentiated into scape, pedicel, and flagellum of 6 or more segments; maxillary palpi commonly with 3 to 5 segments; wings very commonly slender; vein CUA not coalesced with 1A and rarely diverging toward it. Larvae with head capsule usually distinct and complete; mandibles typically generalized, dentate and opposite, their chewing movements in horizontal plane of head. Pupae free, usually capable of some movement. HENNIG, 1973. *Trias.–Holo.*

Family DIPLOPOLYNEURIDAE Rohdendorf, 1961

[Diplopolyneuridae ROHDENDORF, 1961d, p. 98]

Wing with crossveins restricted to distal third of wing; veins SC and R very short, terminating about one-quarter wing length from base. Body unknown. [Subordinal position uncertain.] *Trias.*

Diplopolyneura ROHDENDORF, 1961d, p. 98 [**D. mirabilis*; OD]. Little-known wing; characters as in family. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).——FIG. 220,*1*. **D. mirabilis*; wing, ×12.5 (Rohdendorf, 1964).

Family TIPULODICTYIDAE Rohdendorf, 1962

[Tipulodictyidae ROHDENDORF, 1962a, p. 310]

Very small insects. Wing with costal area narrow; vein SC terminating beyond midwing; R smoothly curved basally; RS apparently arising close to wing base, branches usually parallel and terminating on apical margin; CUA, CUP, and posterior branch of M close together and parallel. Body unknown. *Trias.*

Tipulodictya ROHDENDORF, 1962a, p. 311 [**T. minima*; OD]. Costal area with several weak crossveins; main branch of RS arising just before end of SC. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).——FIG. 220,*6*. **T. minima*; wing, ×22 (Rohdendorf, 1964).

Family EOPOLYNEURIDAE Rohdendorf, 1962

[Eopolyneuridae ROHDENDORF, 1962a, p. 311]

Very small insects. Wing broader than in Tipulodictyidae; costal area broad; vein SC weakly formed; stem R with a small break, strut absent; RS arising well before midwing, dividing into 3 branches at midwing; anal area broad. Body unknown. *Trias.*

Eopolyneura ROHDENDORF, 1962a, p. 311 [**E. tenuinervis*; OD]. Termination of RS1+2 remote from end of R; no crossveins between SC and R. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz). —— FIG. 220,*3*. **E. tenuinervis*; wing, ×18 (Rohdendorf, 1964).

Pareopolyneura ROHDENDORF, 1962a, p. 311 [**P. costalis*; OD]. Venation as in *Eopolyneura*, but RS1+2 terminating close to end of R; crossveins present between SC and R. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).

Family MUSIDOROMIMIDAE Rohdendorf, 1962

[Musidoromimidae ROHDENDORF, 1962a, p. 311]

Very small insects. Wing with narrow costal area; vein SC extending almost to midwing; RS with 2 apparent origins from R, one near midwing, the other basal; crossveins mostly weak. Body unknown. *Trias.*

Musidoromima ROHDENDORF, 1962a, p. 311 [**M. crassinervis*; OD]. Branches of M nearly equally spaced; CUA nearly straight for most of its length, with an abrupt bend distally. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).——FIG. 220,*5*. **M. crassinervis*; wing, ×18 (Rohdendorf, 1964).

Family ARCHITIPULIDAE Handlirsch, 1906

[Architipulidae HANDLIRSCH, 1906b, p. 490]

Small flies. Wing slightly narrowed basally; costal area narrow; stem of vein R without an abrupt bend or break; RS usually arising slightly before midwing; branches of RS and M arising distad of midwing; CUA generally straight for most of its length; CUP weak or absent, parallel to CUA; commonly 3 anal veins, 2 of them long. Body unknown. *Trias.–Jur.*

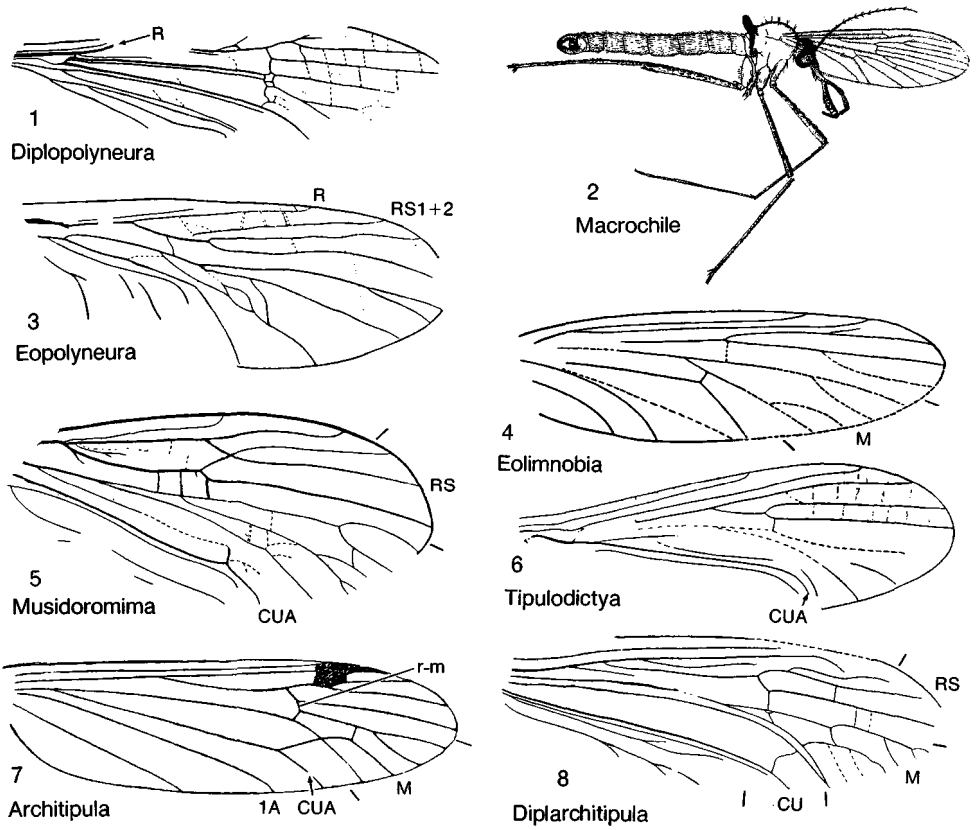


FIG. 220. Diplopolyneuridae, Tipulodictyidae, Eopolyneuridae, Musidoromimidae, Architipulidae, Eolimnobiidae, and Tanyderidae (p. 401–403).

Architipula HANDLIRSCH, 1906b, p. 490 [**A. seebachiana*; SD ROHDENDORF, 1962a, p. 313] [=*Protipula* HANDLIRSCH, 1906b, p. 491 (type, *P. crassa*); *Mesotipula* HANDLIRSCH, 1939, p. 107 (type, *M. brachyptera*); *Paratipula* BODE, 1953, p. 304 (type, *P. acuta*)]. Subcostal area narrow; RS1+2 with a long fork; M with 4 branches; crossvein r-m present. HANDLIRSCH, 1939. *Trias.*, USSR (Kirghiz); *Jur.*, Europe (Germany), USSR (Kazakh).——FIG. 220,7. **A. seebachiana*, Jur., Germany; wing, ×8 (Handlirsch, 1907).

Dictyotipula ROHDENDORF, 1962a, p. 312 [**D. densa*; OD]. Little-known wing fragment; costal area with weak crossveins. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).

Diplarchitipula ROHDENDORF, 1962a, p. 313 [**D. multimedialis*; OD]. Costal area without crossveins; 1 or 2 weak veins, in addition to RS, arising from R near midwing; M with an apparent second main branch arising from wing base, close to and paralleling anterior branch. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz). —— FIG. 220,8. **D. multimedialis*; wing, ×12 (Rohdendorf, 1964).

Eotipula HANDLIRSCH, 1906b, p. 491 [**E. parva*; OD]. Similar to *Architipula*, but much smaller and with less branching of M. ROHDENDORF, 1964. *Jur.*, Europe (Germany).

Haplotipula BODE, 1953, p. 311 [**H. majalis*; OD]. Similar to *Architipula*, but RS1+2 with a very shallow, marginal fork. *Jur.*, Europe (Germany).

Leptotipuloides CARPENTER, 1986, p. 576, *nom. subst. pro Leptotipula* BODE, 1953, p. 312, *non* ALEXANDER, 1917 [**Leptotipula fastigata* BODE, 1953, p. 312; OD]. Similar to *Architipula*, but both RS1+2 and RS3+4 forked. *Jur.*, Europe (Germany).

Liassotipula TILLYARD, 1933, p. 74 [**L. anglicana*; OD]. Similar to *Architipula*, but discal cell longer; fork of M1+2 much longer than that of M3+4. PRIESNER, 1924. *Jur.*, England.

Ozotipula BODE, 1953, p. 313 [**O. tarda*; OD] [=*Mikrotipula* BODE, 1953, p. 314 (type, *M.*

dixaeformis)]. Similar to *Architipula,* but RS2 and RS3 forked. *Jur.,* Europe (Germany).

Family EOLIMNOBIIDAE Rohdendorf, 1962

[Eolimnobiidae Rohdendorf, 1962a, p. 313]

Wing base slightly narrowed; vein SC long, ending on costa; discal cell absent; crossvein r-m at center of wing; 2 anal veins. Body unknown. *Jur.*

Eolimnobia Handlirsch, 1906b, p. 489 [**E. geinitzi*; OD]. Wing length 3.2 times width. Martynov, 1938c; Rohdendorf, 1962a. *Jur.,* Europe (Germany). —— Fig. 220,*4*. **E. geinitzi*; wing, ×4.6 (Rohdendorf, 1962a).

Family TANYDERIDAE Osten-Sacken, 1879

[Tanyderidae Osten-Sacken, 1879, p. 517]

Wing similar to that of Tipulidae, but vein RS with 4 parallel branches; only 1 anal vein. *Oligo.–Holo.*

Tanyderus Philippi, 1865, p. 780. *Holo.*

Macrochile Loew, 1850, p. 37 [**M. spectrum*; OD] [=*Idioplasta* Meunier, 1906a, p. 390, obj.]. SC terminating a little beyond level of fork of RS1+2; crossvein m-cu at fork of M3+4. Maxillary palpi very long. Alexander, 1931. *Oligo.,* Europe (Baltic).——Fig. 220,*2*. **M. spectrum*; whole insect, ×5.3 (Alexander, 1931).

Family TIPULIDAE Leach, 1815

[Tipulidae Leach, 1815, p. 161]

Wing long; vein RS commonly with 3 branches reaching wing margin; discal cell usually present; 2 anal veins leading to wing margin. Ocelli absent; mesonotal suture prominent and V-shaped; legs very long and slender. Larvae aquatic or subaquatic. *Paleoc.–Holo.*

Tipula Linné, 1758, p. 585 [=*Tipulidea* Scudder, 1894, p. 238 (type, *T. consumpta*); *Micrapsis* Scudder, 1894, p. 242 (type, *M. paludis*)]. Handlirsch, 1910b; Meunier, 1914a, 1915a; Cockerell, 1921d; Henriksen, 1922a; Alexander, 1931; Théobald, 1937a; Carpenter & others, 1938; Zeuner, 1938; Piton & Théobald, 1939; Statz, 1944b; Drake & Ruhoff, 1960; Popov, 1961; Hennig, 1967c; Lewis, 1973; Wighton, 1980. *Paleoc.,* Canada (Alberta); *Eoc.,* USA (Colorado), Europe (Denmark); *Oligo.,* USA (Colorado, Montana), Canada (British Columbia), England, Europe (Baltic, France, Germany); *Mio.–Plio.,* Europe (France); *Mio.,* Europe (Germany)–*Holo.*

Adelphomyia Bergroth, 1891, p. 134. Alexander, 1931. *Oligo.,* England, Europe (Baltic)–*Holo.*

Antocha Osten-Sacken, 1859, p. 219. Scudder, 1894. *Oligo.,* USA (Colorado)–*Holo.*

Atarba Osten-Sacken, 1869, p. 127. Cockerell, 1915. *Oligo.,* England–*Holo.*

Austrolimnophila Alexander, 1920b, p. 4. Alexander, 1931. *Oligo.,* Europe (Baltic)–*Holo.*

Ceratocheilus Wesche, 1910, p. 358. Alexander, 1931. *Oligo.,* Europe (Baltic)–*Holo.*

Cladoneura Scudder, 1894, p. 212 [**C. willistoni*; OD]. Similar to *Cladura,* but RS arising more basally; crossvein between R and RS1 near end of SC. *Oligo.,* USA (Colorado).

Cladura Osten-Sacken, 1859, p. 229. Scudder, 1894. *Oligo.,* USA (Colorado)–*Holo.*

Cylindrotoma Macquart, 1834, p. 107. Cockerell, 1920c. *Eoc.,* USA (Colorado)–*Holo.*

Cyttaromyella Meunier, 1915b, p. 229 [**C. bastini*; OD]. Little-known genus. [Family assignment uncertain.] Statz, 1934a. *Oligo.,* Europe (Germany).

Cyttaromyia Scudder, 1877a, p. 751 [**C. fenestrata*; OD]. Little-known genus (wing fragment). Cockerell, 1920c, 1924a; Cockerell & Haines, 1921; Séguy, 1934. *Paleoc.–Plio.,* Europe (France); *Eoc.,* USA (Colorado).

Dactylolabis Osten-Sacken, 1859, p. 240. Alexander, 1931; Statz, 1944b. *Oligo.,* Europe (Baltic, Germany)–*Holo.*

Dasymolophilus Goetghebuer, 1920, p. 132. Alexander, 1931. *Oligo.,* Europe (Baltic)–*Holo.*

Dicranomyia Stephens, 1829, p. 53. Scudder, 1894; Cockerell, 1908a, 1922a; Meunier, 1916b; Cockerell & Haines, 1921. *Oligo.,* England, USA (Colorado)–*Holo.*

Dicranoptycha Osten-Sacken, 1859, p. 217. Alexander, 1931; Statz, 1944b. *Oligo.,* Europe (Baltic, Germany)–*Holo.*

Electrolabis Alexander, 1931, p. 58 [**E. extincta*; OD]. Stem of RS aligned with RS3+4; antennae with 16 segments. *Oligo.,* Europe (Baltic).

Elephantomyia Osten-Sacken, 1859, p. 220. Alexander, 1931; Statz, 1934a. *Oligo.,* Europe (Baltic, Germany)–*Holo.*

Empeda Osten-Sacken, 1869, p. 183. Cockerell, 1921a. *Oligo.,* England–*Holo.*

Epiphragma Osten-Sacken, 1859, p. 238. Cockerell, 1921a. *Oligo.,* England–*Holo.*

Eriocera Macquart, 1838, p. 74. Henriksen, 1922b; Alexander, 1931; Statz, 1944b. *Eoc.,* Europe (Denmark); *Oligo.,* Europe (Baltic, Germany)–*Holo.*

Erioptera Meigen, 1803, p. 262. Alexander, 1931; Théobald, 1937a (as *Ilisia* Rondani, generic

assignment of fossil doubtful); STATZ, 1944b. *Oligo.*, Europe (Baltic, Germany, France)–*Holo.*

Gnophomyia OSTEN-SACKEN, 1859, p. 223. ALEXANDER, 1931. *Oligo.*, Europe (Baltic)–*Holo.*

Gonomyia MEIGEN, 1818, p. 147. COCKERELL, 1921a; COCKERELL & HAINES, 1921; ALEXANDER, 1931; STATZ, 1944b. *Oligo.*, USA (Colorado), England, Europe (Baltic, Germany)–*Holo.*

Gymnastes BRUNETTI, 1911, p. 96. COCKERELL, 1921a. *Oligo.*, England–*Holo.*

Helius LEPELETIER & SERVILLE, 1828, p. 831. ALEXANDER, 1931; STATZ, 1944b. *Oligo.*, Europe (Baltic, Germany)–*Holo.*

Hexatoma LATREILLE, 1809, p. 260. ALEXANDER, 1931. *Oligo.*, Europe (Baltic)–*Holo.*

Holorusia LOEW, 1863, p. 276. COCKERELL & HAINES, 1921. *Oligo.*, England–*Holo.*

Limnobia MEIGEN, 1818, p. 116. COCKERELL, 1921d; STATZ, 1934a; THÉOBALD, 1937a. *Oligo.*, England, Europe (Germany, France)–*Holo.*

Limnocema SCUDDER, 1894, p. 201 [**L. marcescens* SCUDDER, 1894, p. 201; SD CARPENTER, herein]. Similar to *Limnobia* but with a crossvein between R and RS1 near wing apex. *Oligo.*, USA (Colorado).

Limnophila MACQUART, 1834, p. 95. COCKERELL, 1921d; COCKERELL & HAINES, 1921; ALEXANDER, 1931; THÉOBALD, 1937a; STATZ, 1944b; CARPENTER, 1951; WIGHTON, 1980. *Paleoc.*, Canada (Alberta); *Oligo.*, England, Europe (France, Germany, Baltic)–*Holo.*

Limonia MEIGEN, 1803, p. 262. ALEXANDER, 1931. *Oligo.*, Europe (Baltic)–*Holo.*

Macromastix OSTEN-SACKEN, 1886, p. 185. COCKERELL & HAINES, 1921; ALEXANDER, 1931. *Oligo.*, England, Europe (Baltic)–*Holo.*

Manapsis SCUDDER, 1894, p. 222 [**M. anomala*; OD]. Similar to *Tipula*, but vein M1+2 not forked. CARPENTER & others, 1938. *Oligo.*, USA (Colorado).

Megistocera WIEDEMANN, 1828, p. 55. COCKERELL & HAINES, 1921. *Oligo.*, England–*Holo.*

Mongoma WESTWOOD, 1881, p. 364. COCKERELL, 1917b, 1921d. *Oligo.*, England–*Holo.*

Ormosia RONDANI, 1856, p. 180. ALEXANDER, 1931. *Oligo.*, Europe (Baltic)–*Holo.*

Oryctogma SCUDDER, 1894, p. 194 [**O. sackenii*; OD]. Similar to *Cylindrotoma*, but SC deflected distally and ending on R; discal cell short. *Oligo.*, USA (Colorado).

Palaeopoecilostola MEUNIER, 1899c, p. 334 [**P. longicornis* MEUNIER, 1906a, p. 377; SD ALEXANDER, 1931, p. 45]. SC terminating at level of fork of RS; RS1+2 elongate, in alignment with RS. Antennae elongate, segments elongate-cylindrical. ALEXANDER, 1931. *Oligo.*, Europe (Baltic).

Phyllolabis OSTEN-SACKEN, 1877, p. 202. ALEXANDER, 1931. *Oligo.*, Europe (Baltic)–*Holo.*

Pilaria SINTENIS, 1889, p. 398. ALEXANDER, 1931. *Oligo.*, Europe (Baltic)–*Holo.*

Polymera WIEDEMANN, 1821, p. 40. ALEXANDER, 1931. *Oligo.*, Europe (Baltic)–*Holo.*

Pronophlebia SCUDDER, 1877a, p. 750 [**P. rediviva*; OD]. Little-known genus; venation obscure. SCUDDER, 1890. *Eoc.*, USA (Colorado).

Pseudolimnophila ALEXANDER, 1919, p. 917. ALEXANDER, 1931; WIGHTON, 1980. *Paleoc.*, Canada (Alberta); *Oligo.*, Europe (Baltic)–*Holo.*

Rhabdomastix SKUSE, 1889, p. 828. ALEXANDER, 1931; STATZ, 1944b. *Oligo.*, Europe (Baltic, Germany)–*Holo.*

Rhadinobrochus SCUDDER, 1894, p. 223 [**R. extinctus*; OD]. Similar to *Tipula*, but basal cell between M1 and M2 unusually narrow. CARPENTER & others, 1938. *Oligo.*, USA (Colorado).

Ripidia RONDANI, 1856, p. 186. COCKERELL, 1917b. *Oligo.*, England–*Holo.*

Spiladomyia SCUDDER, 1877a, p. 749 [**S. simplex*; OD]. Little-known genus, similar to *Dicranomyia*. SCUDDER, 1890. *Eoc.*, USA (Colorado).

Stibadocerites ZEUNER, 1941a, p. 96 [**S. europeus*; OD]. Similar to *Stibadocerella* (recent), but SC almost reaching to wing apex. *Eoc.*, Scotland.

Tanymera ALEXANDER, 1931, p. 75 [**T. fritschi*; OD]. SC and RS relatively short; RS in alignment with RS1+2. *Oligo.*, Europe (Baltic).

Tanysphyra LOEW, 1850, p. 38 [**T. gracilis*; OD]. SC terminating at level of fork of RS; RS1 and RS2 parallel for their entire lengths. ALEXANDER, 1931. *Oligo.*, Europe (Baltic).

Thaumastoptera MIK, 1866, p. 302. ALEXANDER, 1931. *Oligo.*, Europe (Baltic)–*Holo.*

Trentepohlia BIGOT, 1854, p. 473. ALEXANDER, 1931. *Oligo.*, Europe (Baltic)–*Holo.*

Trichocera MEIGEN, 1803, p. 262. STATZ, 1934a. *Oligo.*, Europe (Germany)–*Holo.*

Trichoneura LOEW, 1850, p. 36 [**T. vulgaris*; OD]. ALEXANDER, 1931. *Oligo.*, Europe (Baltic)–*Holo.*

Tricyphona ZETTERSTEDT, 1837, p. 65. ALEXANDER, 1931. *Oligo.*, Europe (Baltic)–*Holo.*

Ula HALIDAY, 1833, p. 153. STATZ, 1934a. *Oligo.*, Europe (Germany)–*Holo.*

Family PSYCHODIDAE Newman, 1835

[Psychodidae NEWMAN, 1835, p. 388]

Very small flies; wings commonly very hairy, held roof-wise over abdomen; vein RS usually with 4 branches; M usually with 3 branches; CUA with 2 branches, CUA2 commonly very short; anal veins reduced. V-shaped suture on mesonotum absent. Larvae usually in moist, freshwater habitats. *Cret.–Holo.*

Psychoda LATREILLE, 1796, p. 152. COCKERELL, 1915, 1921d; QUATE, 1963; HENNIG, 1972b. *Oligo.*, England, Europe (Baltic); *Mio.*, Mexico–*Holo.*

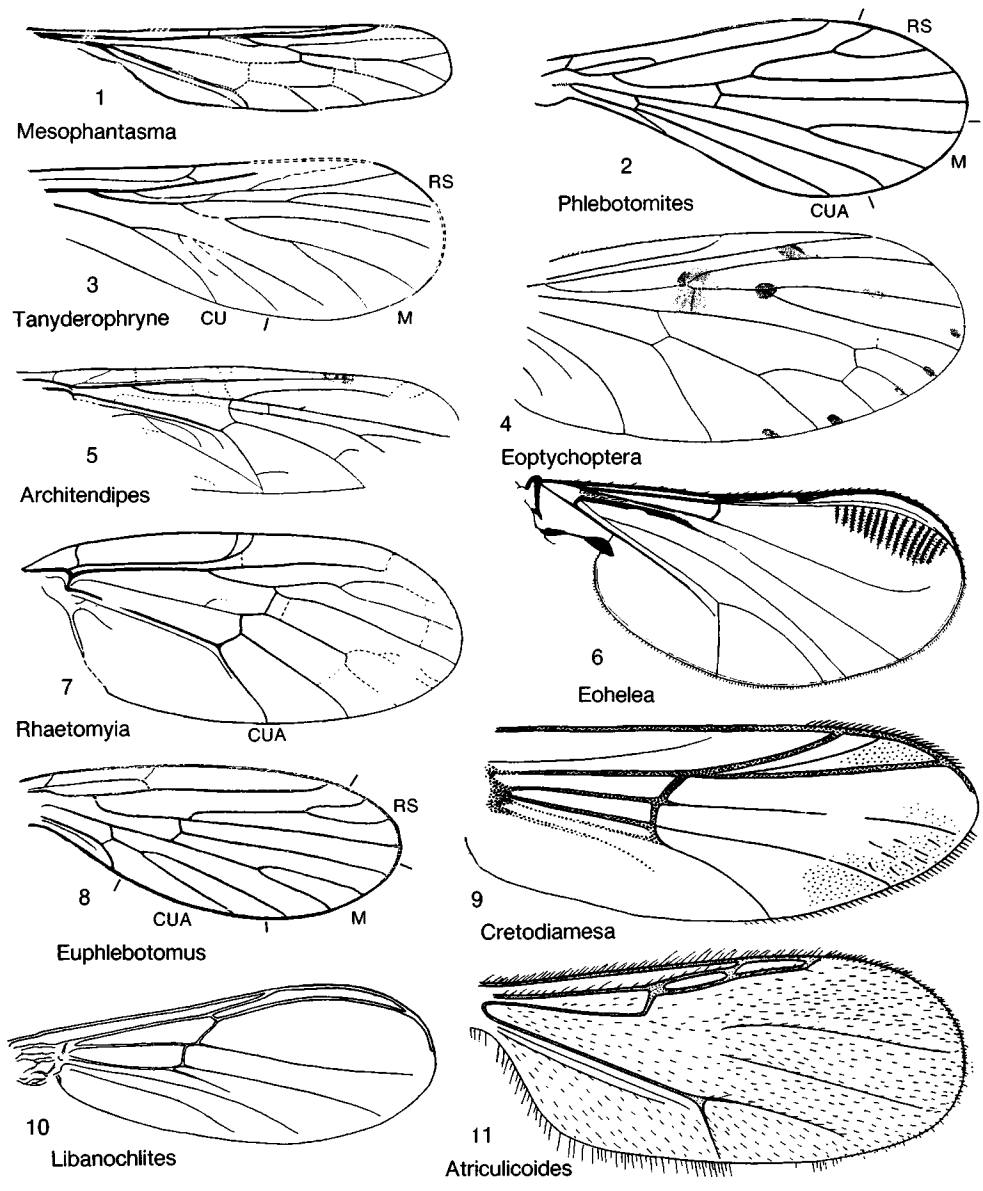


FIG. 221. Psychodidae, Eoptychopteridae, Tanyderophryneidae, Architendipedidae, Chironomidae, Ceratopogonidae, Rhaetomyiidae, and Mesophantasmatidae (p. 404–409).

Brunettia ANNANDALE, 1910, p. 141. QUATE, 1963; HENNIG, 1972b. *Mio.,* Mexico–*Holo.*

Eatonisca MEUNIER, 1905c, p. 253 [**E. tertiaria*; OD]. Little-known genus. HENNIG, 1972b. *Oligo.,* Europe (Baltic)–*Holo.*

Euphlebotomus COCKERELL, 1920e, p. 212 [**E. connectens*; OD]. Similar to *Horaiella* (recent), but RS1+2 forked; RS3+4 forked at about level of origin of RS1+2. EDWARDS, 1929; HENNIG, 1972b. *Mio.,* Burma.——FIG. 221,*8*. **E. connectens*; wing, ×49 (Edwards, 1929).

Lutzomyia FRANÇA, 1927, p. 23. QUATE, 1963; HENNIG, 1972b. *Mio.,* Mexico–*Holo.*

Nemopalpus MACQUART, 1840, p. 101 [=*Palaeosycorax* MEUNIER, 1905b, p. 50 (type, *P. tertiariae*)]. EDWARDS, 1929; HENNIG, 1972b; SCHLÜTER, 1978b. *Oligo.,* Europe (Baltic); *Oligo./Mio.,* Dominican Republic–*Holo.*

Pericoma WALKER, 1856, p. 256. [Generic assignment of fossils doubtful.] MEUNIER, 1905c; HENNIG, 1972b. *Oligo.*, Europe (Baltic)–*Holo.*

Philosepedon EATON, 1904, p. 57. QUATE, 1961; HENNIG, 1972b. *Mio.*, Mexico–*Holo.*

Phlebotomiella MEUNIER, 1906b, p. 103 [**Phlebotomus tipuliformis* MEUNIER, 1905c, p. 254; OD]. Similar to *Phlebotomus*, but crossvein r-m and origin of RS4 near center of wing; wing apex rounded; fifth segment of palpus very short; 4 spines on male genital style. [Probably a synonym of *Phlebotomus*.] *Oligo.*, Europe (Baltic).

Phlebotomites HENNIG, 1972b, p. 39 [**P. brevifilis*; OD]. Similar to *Phlebotomiella*, but with 5 spines on male genital style. *Cret.*, Lebanon. —— FIG. 221,*2*. **P. brevifilis*; wing, ×40 (Hennig, 1972b).

Phlebotomus RONDANI & BERTÉ, 1840, p. 12. FAIRCHILD, 1951; HENNIG, 1972b. *Oligo.*, Europe (Baltic)–*Holo.*

Sycorax HALIDAY, 1839, no. 745. LOEW, 1850; MEUNIER, 1905c; HENNIG, 1972b. *Oligo.*, Europe (Baltic)–*Holo.*

Telmatoscopus EATON, 1904, p. 58. QUATE, 1963; HENNIG, 1972b. *Mio.*, Mexico–*Holo.*

Trichomyia HALIDAY, 1839, no 745. MEUNIER, 1905c; COCKERELL, 1917c, 1917g; QUATE, 1963; HENNIG, 1972b. *Oligo.*, Europe (Baltic); *Oligo./Mio.*, Mexico; *Mio.*, Burma–*Holo.*

Family EOPTYCHOPTERIDAE Handlirsch, 1906

[Eoptychopteridae HANDLIRSCH, 1906b, p. 488]

Wing with uniformly strong veins; vein SC terminating near midwing; branches of RS not close together distally; discal cell large. *Jur.*

Eoptychoptera HANDLIRSCH, 1906b, p. 489 [**Phryganidium simplex* GEINITZ, 1887, p. 203; OD] [=*Proptychoptera* HANDLIRSCH, 1906b, p. 489 (type, *P. liasina*)]. Wing very broad basally; R nearly straight; RS1+2 not forked; RS3+4 with deep fork. HANDLIRSCH, 1920; BODE, 1953. *Jur.*, Europe (Germany). —— FIG. 221,*4*. *E. maculata* (HANDLIRSCH); wing, ×11 (Handlirsch, 1920).

Family TANYDEROPHRYNEIDAE Rohdendorf, 1962

[Tanyderophryneidae ROHDENDORF, 1962a, p. 314]

Wing narrowed basally; vein SC terminating before midwing, with a crossvein connecting to R distally; stem of M much reduced or absent, its posterior branches coalesced in part with those of CU. Antennae apparently short; legs thin; tibial spurs present; abdomen long. *Jur.*

Tanyderophryne ROHDENDORF, 1962a, p. 314 [**T. multinervis*; OD]. Posterior branches of RS apparently coalesced with anterior branches of M. ROHDENDORF, 1964. *Jur.*, USSR (Kazakh). —— FIG. 221,*3*. **T. multinervis*; wing, ×16 (Rohdendorf, 1964).

Family DIXAMIMIDAE Rohdendorf, 1962

[Dixamimidae ROHDENDORF, 1962a, p. 314]

Wing broad; venation poorly known; vein RS arising in basal third of wing; male antennae 15-segmented; maxillary palpi 3-segmented. *Jur.*

Dixamima ROHDENDORF, 1962a, p. 314 [**D. villosa*; OD]. Little-known genus. Second segment of maxillary palpi thickest and curved. ROHDENDORF, 1964. *Jur.*, USSR (Kazakh).

Family DIXIDAE van der Wulp, 1877

[Dixidae VAN DER WULP, 1877, p. 336]

Small flies, similar to the Culicidae. Wing veins without scales; RS1+2 strongly arched; halteres long. Mouthparts not forming a long proboscis. Larvae aquatic. *Oligo.–Holo.*

Dixa MEIGEN, 1818, p. 216 [=*Eriopterites* MEUNIER, 1915a, p. 15 (type, *E. hyalipennis*)]. MEUNIER, 1906a; COCKERELL, 1915, 1921d; HENNIG, 1966b. *Oligo.*, England, Europe (Baltic, France)–*Holo.*

Paradixa TONNOIR, 1924, p. 223. MEUNIER, 1906a; HENNIG, 1966b. *Oligo.*, Europe (Baltic)–*Holo.*

Family CULICIDAE Billberg, 1820

[Culicidae BILLBERG, 1820, p. 122]

Small flies. Wing veins bearing elongate or slender scales; vein RS1+2 aligned with stem RS. Mouthparts usually in form of long proboscis. Larvae aquatic. *Cret.–Holo.*

Culex LINNÉ, 1758, p. 602. [Generic assignment of fossils uncertain.] COCKERELL, 1915; EDWARDS, 1923. *Eoc.*, USA (Colorado, Wyoming); *Oligo.*, England–*Holo.*

Aedes MEIGEN, 1818, p. 13. COCKERELL, 1915; EDWARDS, 1923. *Oligo.*, England–*Holo.*

Anopheles MEIGEN, 1818, p. 10. [Generic assignment of fossil uncertain.] STATZ, 1944b. *Oligo.*, Europe (Germany)–*Holo.*

Chaoborus LICHTENSTEIN, 1800, p. 174 [=*Culicites* HEYDEN, 1862, p. 79 (type, *C. tertiarius*)].

[Fossils are pupae and adults.] MEUNIER, 1904b; HENNIG, 1966b, 1972b. *Oligo.*, Europe (Baltic, Germany)–*Holo.*

Chironomaptera PING, 1928, p. 33 [**Samarura gregaria* GRABAU, 1923, p. 178; OD]. Little-known genus, based on fragments of adults. [Family assignment doubtful.] KALUGINA, 1977, 1980a. *Cret.*, China (Shandong), Mongolia.

Mansonia BLANCHARD, 1901, p. 1046. STATZ, 1944b; ROHDENDORF, 1961c. *Oligo.*, Europe (Baltic)–*Holo.*

Mochlonyx LOEW, 1844, p. 121. MEUNIER, 1902a; EDWARDS, 1923; HENNIG, 1966b. *Oligo.*, Europe (Baltic)–*Holo.*

Family ARCHITENDIPEDIDAE Rohdendorf, 1962

[Architendipedidae ROHDENDORF, 1962a, p. 317]

Small insects. Wing with costal margin nearly straight; costal area moderately wide, with some crossveins; vein SC very close to R; longitudinal veins mainly concentrated in anterior half of wing; main fork of RS at midwing; M very weak; crossveins present between R and M, and between M and CUA. Body unknown. *Trias.*

Architendipes ROHDENDORF, 1962a, p. 317 [**A. tschernovskiji*; OD]. Middle of costal area with several crossveins; basal part of M apparently coalesced with RS. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz). —— FIG. 221,5. **A. tschernovskiji*; wing, ×12 (Rohdendorf, 1964).

Palaeotendipes ROHDENDORF, 1962a, p. 317 [**P. alexii*; OD]. Little-known wing; no crossveins in middle of costal area. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).

Family PROTENDIPEDIDAE Rohdendorf, 1962

[Protendipedidae ROHDENDORF, 1962a, p. 317]

Wing hairy; venation unknown; head small; female antenna with at least 7 segments. *Jur.*

Protendipes ROHDENDORF, 1962a, p. 317 [**P. dasypterus*; OD]. Posterior femora extremely elongate; third and sixth antennal segments cylindrical. ROHDENDORF, 1964. *Jur.*, USSR (Kazakh).

Family CHIRONOMIDAE Macquart, 1838

[Chironomidae MACQUART, 1838, p. 36]

Small flies. Wings long and slender; microtrichia ordinarily present, scales absent; vein SC free but rarely well developed; RS1+2 commonly weak or absent; RS3+4 well developed and ordinarily coalesced with C near wing apex; M1+2 unbranched, extending nearly to wing apex; CUA forked. Body slender; mouthparts not piercing; legs long and thin. *Cret.–Holo.*

Chironomus MEIGEN, 1803, p. 260. MEUNIER, 1904a; THÉOBALD, 1937a; MANI, 1944, 1947b; MELANDER, 1949. *Paleoc.–Plio.*, India; *Eoc.*, USA (Colorado, Wyoming); *Oligo.*, USA (Colorado), Europe (Baltic, Germany, France); *Mio.–Plio.*, Europe (France); *Mio.*, Europe (Germany)–*Holo.*

Cretodiamesa KALUGINA, 1976, p. 88 [**C. taimyrica*; OD]. Antennal flagella of male consisting of several very thin, waferlike segments and a very large terminal segment; plumage flat. Antennae of female with 15 segments. Wings with RS1+2 terminating on costa about midway between terminations of R and RS3+4. *Cret.*, USSR (Asian RSFSR).——FIG. 221,9. **C. taimyrica*; wing of female, ×36 (Kalugina, 1976).

Cricotopiella MEUNIER, 1916a, p. 282 [**C. rostrata*; OD]. Similar to *Cricotopus*, but rostrum as long as the head. *Oligo.*, Europe (Baltic).

Cricotopus VAN DER WULP, 1874, p. 132. MEUNIER, 1904a, 1916a. *Oligo.*, Europe (Baltic)–*Holo.*

Diamesa WALTL, 1837, p. 283. MELANDER, 1949. *Oligo.*, USA (Colorado)–*Holo.*

Electrotenia KALUGINA, 1980b, p. 91 [**E. brundini*; OD]. Male: antennae plumose, with 15 segments, penultimate segment elongate; wings without macrotrichia. Female: antennae with 14 segments. *Cret.*, USSR (Asian RSFSR).

Eurycnemus VAN DER WULP, 1874, p. 135. MEUNIER, 1904a. *Oligo.*, Europe (Baltic)–*Holo.*

Libanochlites BRUNDIN, 1976, p. 149 [**L. neocomicus*; OD]. A podonomine genus of small species related to *Paraboreochlus* and *Boreochlus* (both recent). Female: wing with RS3+4 strongly curved and close to C; palpi reduced; at least 1 spur lacking on middle tibia. *Cret.*, Europe (Lebanon).——FIG. 221,10. **L. neocomicus*; wing of female, ×55 (Brundin, 1976).

Manlayamyia KALUGINA, 1980a, p. 63 [**M. litorina*; OD]. Little-known genus, based on fragments of adults. *Cret.*, Mongolia.

Metriocnemus VAN DER WULP, 1874, p. 136. CARPENTER & others, 1937. *Cret.*, Canada (Manitoba)–*Holo.*

Nomochirus COLLADO, 1926, p. 91 [**N. sampelayoi*; OD]. Similar to *Telmatogeton* (recent), but male with only 7 antennal segments. *Paleoc.–Plio.*, Europe (Spain).

Palpomyia MEIGEN, 1818, p. 82. COCKERELL, 1921d. *Oligo.*, England–*Holo.*

Sendelia DUISBERG, 1868, p. 23. MEUNIER, 1904a. *Oligo.*, Europe (Baltic)–*Holo.*

Smittia HOLMGREN, 1869, p. 47. MEUNIER, 1904a. *Oligo.*, Europe (Baltic)–*Holo.*

Spaniotoma PHILIPPI, 1865, p. 629. CARPENTER & others, 1937. *Cret.*, Canada (Manitoba)–*Holo.*

Tanypus MEIGEN, 1803, p. 261. MEUNIER, 1904a. *Oligo.*, Europe (Baltic)–*Holo.*

Tanytarsus VAN DER WULP, 1874, p. 134. MEUNIER, 1904a. *Oligo.*, Europe (Baltic)–*Holo.*

Family CERATOPOGONIDAE Skuse, 1890

[Ceratopogonidae SKUSE, 1890, p. 222]

Small to very small flies. Similar to Chironomidae but wings broader; vein M1+2 forked; RS3+4 terminating on costal margin nearer to midwing than to apex; anal area reduced. Mouthparts of females modified for piercing and sucking. Larvae aquatic or subaquatic. *Cret.–Holo.*

Ceratopogon MEIGEN, 1803, p. 261. LOEW, 1850; MEUNIER, 1904a; RUBTZOV, 1936; CARPENTER & others, 1937; REMM, 1976. *Cret.*, Canada (Manitoba), USSR (Asian RSFSR); *Oligo.*, Europe (Baltic, Germany)–*Holo.*

Atrichopogon KIEFFER, 1906, p. 53. CARPENTER & others, 1937. *Cret.*, Canada (Manitoba)–*Holo.*

Atriculicoides REMM, 1976, p. 108 [**A. macrophthalmus*; OD]. Similar to *Atrichopogon* and *Culicoides*. Female: wings with abundant hairs; cells between R and RS elongate. Proboscis short; empodium and tibial spurs absent. *Cret.*, USSR (Asian RSFSR). —— FIG. 221,*11*. **A. macrophthalmus*; fore wing of female, ×46 (Remm, 1976).

Baeohelea WIRTH & BLANTON, 1970, p. 95. REMM, 1976. *Cret.*, USSR (Asian RSFSR)–*Holo.*

Culicoides LATREILLE, 1809, p. 251. PALMER, 1957; REMM, 1976. *Cret.*, USSR (Asian RSFSR); *Mio.*, USA (California)–*Holo.*

Dasyhelea KIEFFER, 1913, p. 179. CARPENTER & others, 1937; PALMER, 1957. *Cret.*, Canada (Manitoba); *Mio.*, USA (California)–*Holo.*

Eohelea PETRUNKEVITCH, 1957, p. 208 [**E. stridulans*; OD]. Wing: costa long, marginal, extending to apex; stridulatory organ (transverse ridges) in radial area distally. Antennae with 16 segments; legs slender, femora unarmed; hind tibial comb with 4 spines. WIRTH, 1974. *Oligo.*, Europe (Baltic). —— FIG. 221,*6*. **E. stridulans*; wing, ×78 (Petrunkevitch, 1957).

Johannsenomyia MALLOCH, 1915, p. 332. [Generic assignment of fossils (pupae) doubtful.] COCKERELL, 1919e; PIERCE, 1966. *Mio.*, Burma, USA (California)–*Holo.*

Lasiohelea KIEFFER, 1921, p. 115. CARPENTER & others, 1937. *Cret.*, Canada (Manitoba)–*Holo.*

Miopalpomyia PIERCE, 1966, p. 95 [**M. shilo*; OD]. Little-known genus, based on pupa. *Mio.*, USA (California).

Neoculicoides PIERCE, 1966, p. 93 [**N. jeanneae*; OD]. Little-known genus, based on pupa. *Mio.*, USA (California).

Neopalpomyia PIERCE, 1966, p. 95 [**N. freyi*; OD]. Little-known genus, based on pupae. *Mio.*, USA (California).

Paraculicoides PIERCE, 1966, p. 94 [**P. rouseae*; OD]. Little-known genus, based on pupae. *Mio.*, USA (California).

Parapalpomyia PIERCE, 1966, p. 97 [**P. ryshkoffi*; OD]. Little-known genus, based on pupae. *Mio.*, USA (California).

Protoculicoides BOESEL, 1937, p. 50 [**P. depressus*; OD]. Similar to *Culicoides*, but RS3+4 ending about midway between R and M1+2. *Cret.*, Canada (Manitoba).

Family SIMULIIDAE Newman, 1835

[Simuliidae NEWMAN, 1835, p. 387]

Small, stout flies. Wings very broad, anal area forming a lobe; vein M1+2 forked; M3+4 arising at wing base, obsolescent. Body stout; proboscis short, females blood-sucking. Larvae in running water. *Oligo.–Holo.*

Simulium LATREILLE, 1802, p. 426. MEUNIER, 1904a; RUBTZOV, 1936. *Oligo.*, Europe (Baltic, Germany)–*Holo.*

Nevermannia ENDERLEIN, 1921a, p. 199. ENDERLEIN, 1921b. *Oligo.*, Europe (Baltic)–*Holo.*

Family RHAETOMYIIDAE Rohdendorf, 1962

[Rhaetomyiidae ROHDENDORF, 1962a, p. 318]

Small insects. Wing broad, with broadly rounded apex; vein SC extending to midwing; RS arising just before midwing, with 3 branches; CUP obsolescent and close to CUA; no anal veins. Body unknown. *Trias.*

Rhaetomyia ROHDENDORF, 1962a, p. 318 [**R. necopinata*; OD]. Fork of RS1+2 about two-thirds as long as RS3+4; M3+4 unbranched. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz). —— FIG. 221,*7*. **R. necopinata*; wing, ×16 (Rohdendorf, 1964).

Family MESOPHANTASMATIDAE Rohdendorf, 1962

[Mesophantasmatidae ROHDENDORF, 1962a, p. 319]

Wing narrow and petiolate; veins C, SC, and R close together; SC and R long; RS arising at midwing; M apparently with 3 branches; CUA and CUP close together. *Jur.*

Mesophantasma ROHDENDORF, 1962a, p. 319 [**M. tipuliforme*; OD]. Little-known wing; anterior branch of M simple; posterior branch forked near wing margin. ROHDENDORF, 1964. *Jur.*, USSR (Kazakh). —— FIG. 221,*1*. **M. tipuliforme*; wing, ×7 (Rohdendorf, 1964).

Family BLEPHAROCERIDAE Loew, 1862

[Blepharoceridae LOEW, 1862, p. 6]

Flies similar in general form to the Tipulidae, but wing membranes with a complicated network of veinlike markings caused, apparently, by folds within pupal wing cases. V-shaped mesonotal suture commonly absent; mouthparts elongate. Larvae and pupae in flowing water. *Eoc.–Holo.*

Blepharocera MACQUART, 1843, p. 61. *Holo.*

Paltostomopsis COCKERELL, 1915, p. 489 [**P. ciliatus*; OD]. Little-known genus, apparently similar to *Paltostoma* (recent), but CUA unbranched; anal vein absent. [Family assignment doubtful.] *Oligo.*, England.

Philorites COCKERELL, 1908o, p. 264 [**P. johannseni*; OD]. RS1+2 arising from RS3+4 a short distance beyond origin of RS and terminating below wing apex; proboscis longer than palpi. COCKERELL, 1920c. *Eoc.*, USA (Colorado).

Family PLECIODICTYIDAE Rohdendorf, 1962

[Pleciodictyidae ROHDENDORF, 1962a, p. 319]

Very small insects. All wing veins weak except R and base of RS; R with basal break; RS arising about one-third wing length from base, with several short branches directed anteriorly to R; M very weak, branched. Body unknown. *Trias.*

Pleciodictya ROHDENDORF, 1962a, p. 319 [**P. modesta*; OD]. Anterior margin of wing straight to midwing; R straight beyond break. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).——FIG. 222,*3*. **P. modesta*; wing, ×25 (Rohdendorf, 1964).

Family PROTOLIGONEURIDAE Rohdendorf, 1962

[Protoligoneuridae ROHDENDORF, 1962a, p. 319]

Very small insects. Wing: costal margin with a prominent bulge basally; veins nearly uniformly developed; vein RS arising about one-quarter wing length from base, its branches directed anteriorly but ending on costal margin beyond end of R; M deeply forked. Body unknown. *Trias.*

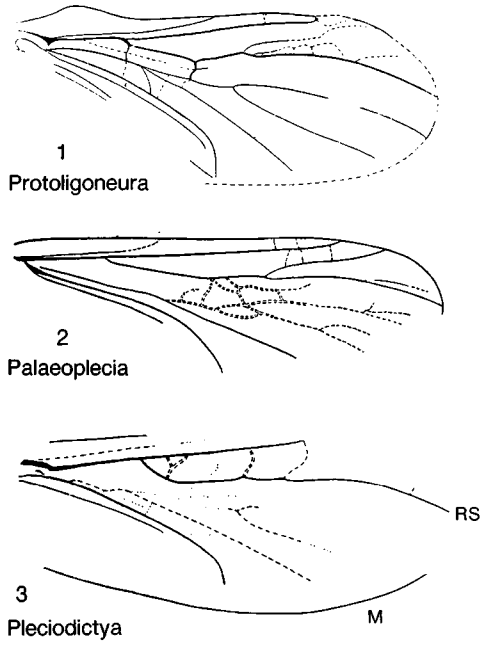


FIG. 222. Pleciodictyidae, Protoligoneuridae, and Palaeopleciidae (p. 409).

Protoligoneura ROHDENDORF, 1962a, p. 319 [**P. fusicosta*; OD]. SC terminating at midwing; RS strong, connected to M by 2 distinct but irregular crossveins. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).——FIG. 222,*1*. **P. fusicosta*; wing, ×22 (Rohdendorf, 1962a).

Family PALAEOPLECIIDAE Rohdendorf, 1962

[Palaeopleciidae ROHDENDORF, 1962a, p. 319]

Wing elongate; basal part of vein R without break or bend; RS arising one-quarter wing length from base, with long anterior branch, parallel to end of R; crossveins present between R and C, RS1+2 and R, and between RS and M. *Trias.*

Palaeoplecia ROHDENDORF, 1962a, p. 319 [**P. rhaetica*; OD]. SC ending about one-third wing length from base; RS3+4 with a narrow fork; branches of M irregular and weak. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).——FIG. 222,*2*. **P. rhaetica*; wing, ×14 (Rohdendorf, 1962a).

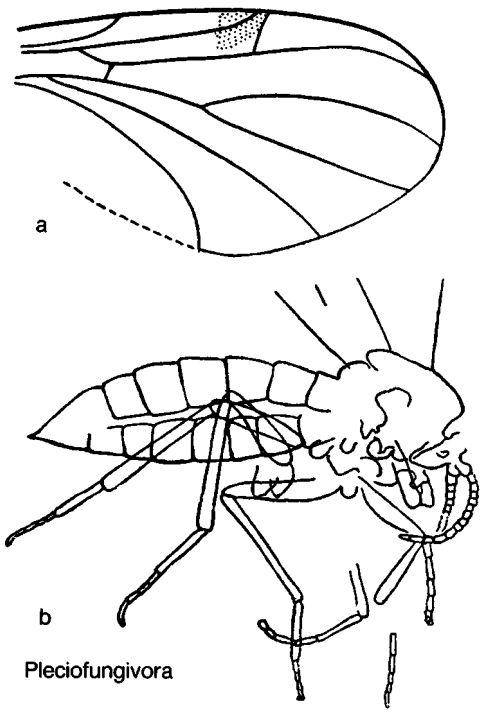


FIG. 223. Pleciofungivoridae (p. 410).

Family PLECIOFUNGIVORIDAE Rohdendorf, 1946

[Pleciofungivoridae ROHDENDORF, 1946, p. 51]

Wing broad; vein SC about one-third of wing length, terminating on costa; RS arising in basal third of wing, with at least 1 branch, usually more; no strong crossveins between R and RS; posterior branch of M not thicker than other branches of M. Antennae with about 15 segments, not longer than head and thorax combined; legs slender; abdomen large, about twice length of head and thorax combined. *Trias.–Jur.*

Pleciofungivora ROHDENDORF, 1938, p. 42 [**P. latipennis*; OD]. RS with a single weak and straight (or nearly so) branch, terminating on costal margin just beyond end of R; SC terminating slightly beyond level of origin of RS. ROHDENDORF, 1946, 1962a, 1964. *Jur.*, USSR (Kazakh).——FIG. 223. *P. major* ROHDENDORF; *a*, wing, ×18.5; *b*, body, ×14 (both Rohdendorf, 1962a).

Allactoneurites ROHDENDORF, 1938, p. 43 [**A. jurassicus*; OD]. Similar to *Palaeohespirinus*, but wing more slender; M3+4 arising near wing base and strongly convex. ROHDENDORF, 1946, 1962a, 1964. *Jur.*, USSR (Kazakh).

Archihesperinus ROHDENDORF, 1962a, p. 321 [**A. phryneoides*; OD]. Wing broad; SC branched; RS with a sigmoidal branch ending on costa. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).——FIG. 224,*1*. **A. phryneoides*; wing, ×21 (Rohdendorf, 1962a).

Archipleciofungivora ROHDENDORF, 1962a, p. 321 [**A. binerva*; OD]. Wing as in *Archihesperinus*; SC unbranched; strong crossvein in costal area. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).

Archipleciomima ROHDENDORF, 1962a, p. 321 [**A. obtusipennis*; OD]. Wing with broadly rounded apex; SC ending in membrane; branch of RS resembling a crossvein to R. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).——FIG. 224,*4*. **A. obtusipennis*; wing, ×29 (Rohdendorf, 1962a).

Eohesperinus ROHDENDORF, 1946, p. 60 [**E. martynovi*; OD]. Wing venation as in *Palaeohesperinus*, but wing much broader. ROHDENDORF, 1962a, 1964. *Jur.*, USSR (Kazakh).

Eopachyneura ROHDENDORF, 1946, p. 57 [**E. trisectoralis*; OD]. Little-known wing; RS with 2 sigmoidal branches leading to costal margin. ROHDENDORF, 1962a, 1964. *Jur.*, USSR (Kazakh).

Palaeohesperinus ROHDENDORF, 1962a, p. 323 [**P. longipennis*; OD]. RS1+2 arising close to crossvein r-m; M3+4 nearly straight. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).——FIG. 224,*2*. **P. longipennis*; wing, ×19 (Rohdendorf, 1962a).

Pleciofungivorella ROHDENDORF, 1946, p. 54 [**P. binerva*; OD]. Little-known insect; SC short; RS with 2 oblique branches, one terminating on R, the other on costa. ROHDENDORF, 1962a, 1964. *Jur.*, USSR (Kazakh).

Polyneurisca ROHDENDORF, 1946, p. 52 [**P. atavina*; OD]. Wing broadly oval; RS with several branches leading to R and costa; base of RS curved abruptly away from R. ROHDENDORF, 1962a, 1964. *Jur.*, USSR (Kazakh).——FIG. 224,*7*. **P. atavina*; wing, ×32 (Rohdendorf, 1962a).

Prohesperinus ROHDENDORF, 1946, p. 56 [**P. abdominalis*; OD]. Wing as in *Palaeohesperinus*, but M3+4 strongly curved. ROHDENDORF, 1962a, 1964. *Jur.*, USSR (Kazakh).——FIG. 224,*5*. **P. abdominalis*; wing, ×17 (Rohdendorf, 1962a).

Protallactoneura ROHDENDORF, 1962a, p. 321 [**P. turanica*; OD]. Little-known wing, similar to *Rhaetofungivorodes*, but branches of RS reticulate and weak. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).

Rhaetofungivora ROHDENDORF, 1962a, p. 320 [**R. reticulata*; OD]. Wing broad; no distinct crossvein in costal area; SC and M weak; R and RS strong; branches of RS variable, from 1 to several or even to a network of weak veins. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).——FIG. 224,*6*. **R. reticulata*; wing, ×29 (Rohdendorf, 1964).

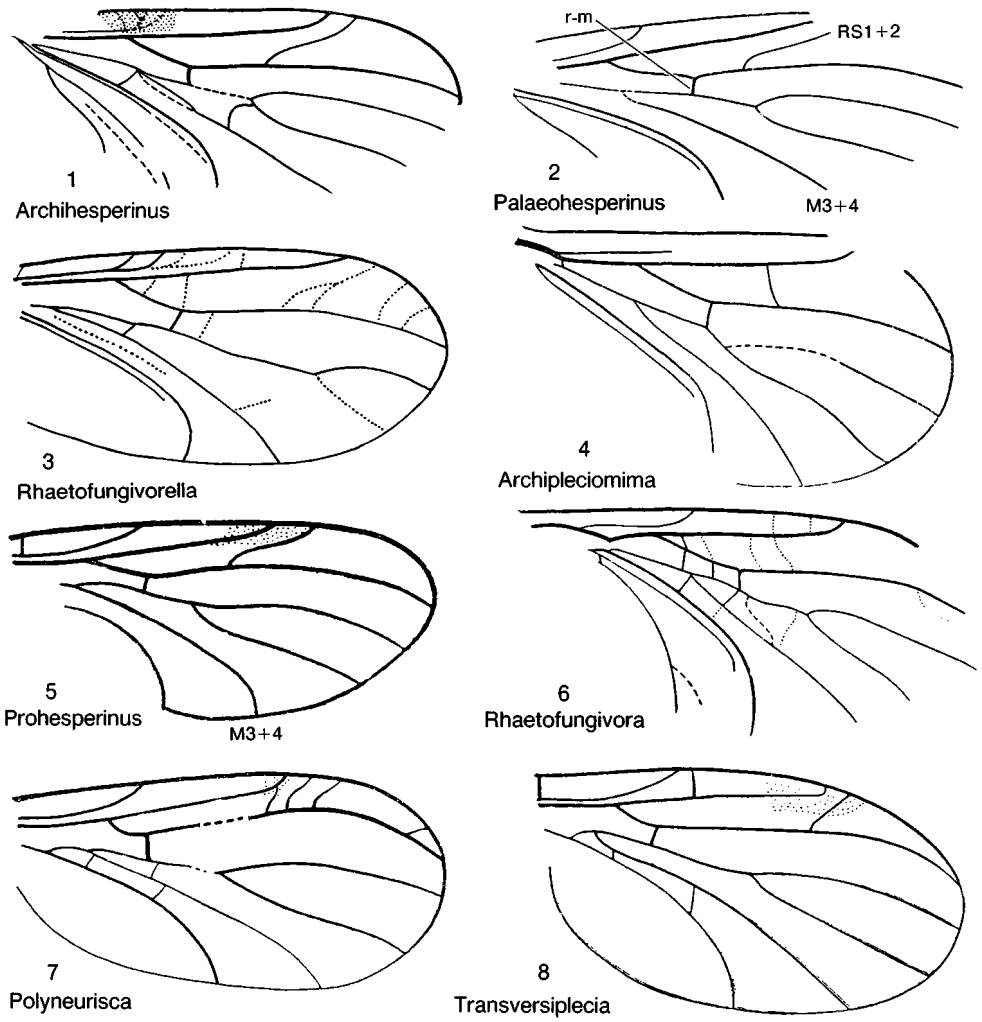


FIG. 224. Pleciofungivoridae (p. 410–411).

Rhaetofungivorella ROHDENDORF, 1962a, p. 320 [**R. subcosta*; OD]. Wing moderately slender. SC with distal branches or short crossveins; RS sigmoidal, with several weak, variable branches, leading either to R or wing margin; one strong crossvein between M and RS, others weak. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz); *Jur.*, USSR (Kazakh).——FIG. 224,*3*. **R. subcosta*; wing, ×28 (Rohdendorf, 1964).

Rhaetofungivorodes ROHDENDORF, 1962a, p. 320 [**R. defectivus*; OD]. Little-known wing, with wide costal area, long SC, and oblique branches on RS. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).

Transversiplecia ROHDENDORF, 1946, p. 53 [**T. transversinervis*; OD]. Wing broadly oval; 1 strong crossvein in subcostal area, 1 oblique crossvein between R and costal margin, and 2 between posterior branch of M and CUA. ROHDENDORF, 1962a, 1964. *Jur.*, USSR (Kazakh).——FIG. 224,*8*. **T. transversinervis*; wing, ×16 (Rohdendorf, 1962a).

Family FUNGIVORITIDAE Rohdendorf, 1946

[*nom. transl.* ROHDENDORF, 1957, p. 91, *ex* Fungivoritinae ROHDENDORF, 1946, p. 79]

Wing with vein R extending nearly to apex; RS arising abruptly from R, without distinct, longitudinal branches; all branches of M equally strong. *Jur.*

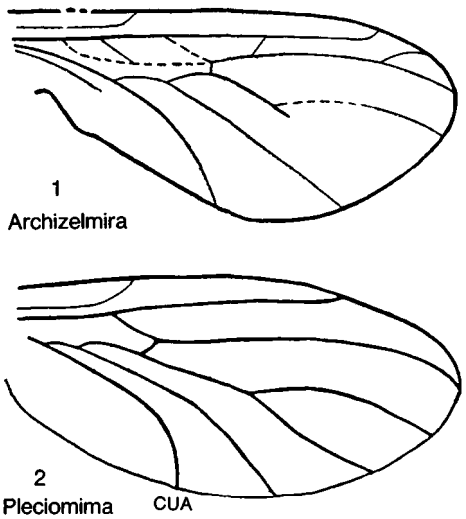


FIG. 225. Archizelmiridae and Pleciomimidae (p. 412).

Fungivorites ROHDENDORF, 1938, p. 46 [**F. latimedius*; OD]. Little-known genus; R almost straight; crossvein r-m very short. ROHDENDORF, 1946, 1962a. *Jur.*, USSR (Kazakh).

Eoboletina ROHDENDORF, 1946, p. 79 [**E. gracilis*; OD]. RS without branches; SC terminating at level of crossvein r-m. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).

Mesosciophila ROHDENDORF, 1946, p. 76 [**M. venosa*; OD]. Wing very broad; RS with a weak anterior branch leading to R; crossvein r-m longer than in *Fungivorites*. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).

Mesosciophilodes ROHDENDORF, 1946, p. 77 [**M. angustipennis*; OD]. Similar to *Mesosciophila*, but wing more slender. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).

Mimalycoria ROHDENDORF, 1946, p. 78 [**M. allactoneuroides*; OD]. Similar to *Eoboletina* but SC shorter. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).

Family ARCHIZELMIRIDAE Rohdendorf, 1962

[Archizelmiridae ROHDENDORF, 1962a, p. 326]

Wing with vein R long, extending nearly to apex of wing; RS with 2 anterior branches, 1 distal, terminating on C near end of R, the other near midwing, short and terminating on R; crossvein r-m very short. Head large; antennae not longer than thorax. *Jur.*

Archizelmira ROHDENDORF, 1962a, p. 326 [**A. kazachstanica*; OD]. Costal area rather wide; SC terminating before midwing. ROHDENDORF, 1946. *Jur.*, USSR (Kazakh).——FIG. 225,*1*. **A. kazachstanica*; wing, ×18 (Rohdendorf, 1962a).

Family PLECIOMIMIDAE Rohdendorf, 1946

[Pleciomimidae ROHDENDORF, 1946, p. 61]

Wing broad; vein SC present but usually weak, extending to about one-third of wing length; RS with strong base and without branches; crossveins absent between branches of M and between M and CUA. *Jur.*

Pleciomima ROHDENDORF, 1938, p. 44 [**P. sepulta*; OD]. R very straight, without basal bend; RS strongly curved posteriorly in distal region. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).——FIG. 225,*2*. **P. sepulta*; wing, ×22 (Rohdendorf, 1938).

Antefungivora ROHDENDORF, 1938, p. 48 [**A. prima*; OD]. Similar to *Pleciomima*, but crossveins between M and RS more remote from origin of RS. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).

Antiquamedia ROHDENDORF, 1938, p. 47 [**A. tenuipes*; OD]. SC very short, recurved and ending on R. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).

Archibio HANDLIRSCH, 1939, p. 105 [**A. mycetophilinus*; OD]. Little-known genus, with M3+4 apparently arising from CUA near wing base. ROHDENDORF, 1964. *Jur.*, Europe (Germany).

Archilycoria ROHDENDORF, 1962a, p. 328 [**A. magna*; OD]. Similar to *Antefungivora*, but crossvein r-m longer. ROHDENDORF, 1964. *Jur.*, USSR (Kazakh).

Lycoriomima ROHDENDORF, 1946, p. 62 [**L. ventralis*; OD]. R curved anteriorly at its distal end; RS only slightly curved posteriorly; CUP distinct. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).

Lycoriomimella ROHDENDORF, 1946, p. 69 [**L. minor*; OD]. R slightly wavy. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).

Lycoriomimodes ROHDENDORF, 1946, p. 67 [**L. deformatus*; OD]. RS sigmoidally curved. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).

Lycorioplecia ROHDENDORF, 1946, p. 66 [**L. elongata*; OD]. Similar to *Lycoriomima*, but CUP indistinct; weak pterostigma present. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).

Megalycoriomima ROHDENDORF, 1962a, p. 326 [**M. magnipennis*; OD]. Little-known insect; RS curved distally; M1+2 indistinct. ROHDENDORF, 1964. *Jur.*, USSR (Kazakh).

Mimallactoneura ROHDENDORF, 1946, p. 72 [**M.*

vetusta; OD]. SC very weak, indistinct; R nearly straight; M and CUP distinct. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).

Paralycoriomima ROHDENDORF, 1946, p. 64 [**P. sororcula*; OD]. SC and CUP distinct; R nearly straight; RS smoothly and gradually curved; CUA abruptly curved distally. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).

Paritonida ROHDENDORF, 1946, p. 74 [**P. brachyptera*; OD]. Crossvein r-m much shorter than basal section of RS. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).

Pleciomimella ROHDENDORF, 1946, p. 71 [**P. karatavica*; OD]. Similar to *Pleciomima* but SC weak distally and R slightly curved distally. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).

Family TIPULOPLECIIDAE Rohdendorf, 1962

[Tipulopleciidae ROHDENDORF, 1962a, p. 328]

Wing much longer than abdomen; vein R straight; RS with at least 2 anterior branches, 1 ending on R. Legs very slender. *Jur.*

Tipuloplecia ROHDENDORF, 1962a, p. 328 [**T. breviventris*; OD]. Little-known genus; RS strongly curved posteriorly. ROHDENDORF, 1964. *Jur.*, USSR (Kazakh).

Family SINEMEDIIDAE Rohdendorf, 1962

[Sinemediidae ROHDENDORF, 1962a, p. 328]

Similar to Tipulopleciidae, but wings more narrow and vein RS without branches; legs stout. *Jur.*

Sinemedia ROHDENDORF, 1962a, p. 328 [**S. angustipennis*; OD]. Little-known genus; crossvein r-m oblique. ROHDENDORF, 1964. *Jur.*, USSR (Kazakh).

Family PARAXYMYIIDAE Rohdendorf, 1946

[Paraxymyiidae ROHDENDORF, 1946, p. 44]

Wing with vein SC short, not extending to midwing; RS with 2 long branches, 1 arising basad of crossvein r-m. *Jur.*

Paraxymyia ROHDENDORF, 1946, p. 45 [**P. quadriradialis*; OD]. Pterostigma present; posterior branch of RS forked. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).——FIG. 226,*2*. **P. quadriradialis*; wing, ×24 (Rohdendorf, 1962a).

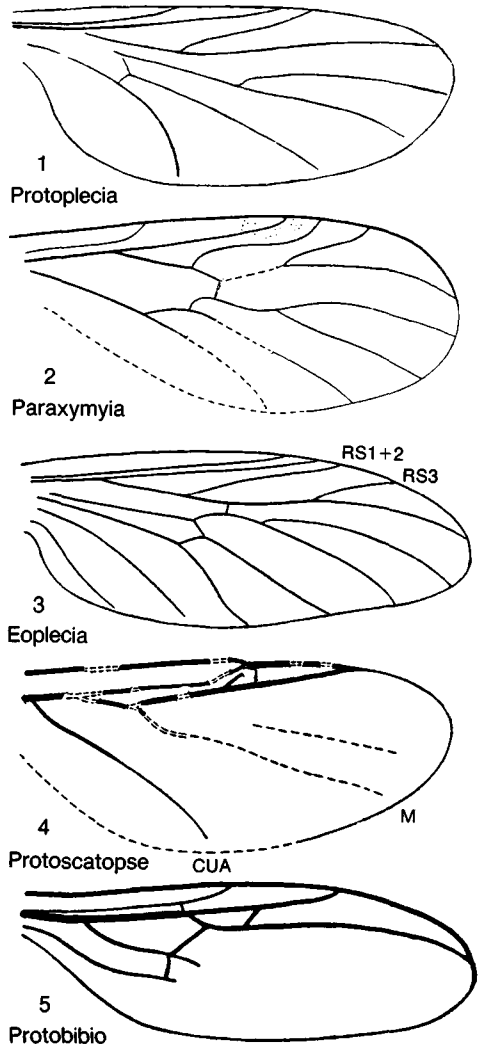


FIG. 226. Paraxymyiidae, Eopleciidae, Protopleciidae, Protobibionidae, and Protoscatopsidae (p. 413–414).

Family EOPLECIIDAE Rohdendorf, 1946

[Eopleciidae ROHDENDORF, 1946, p. 43]

Wing with vein SC long, extending beyond midwing; RS with 2 long, well-developed branches to anterior margin of wing. Body unknown. *Jur.*

Eoplecia HANDLIRSCH, 1920, p. 203 [**E. primitiva*; OD]. M3+4 apparently anastomosed with ante-

rior branch of CUA. HANDLIRSCH, 1939; ROHDENDORF, 1946, 1962a; BODE, 1953. *Jur.*, Europe (Germany).——FIG. 226,*3*. **E. primitiva*; wing, ×18 (Handlirsch, 1939).

Family PROTOPLECIIDAE Rohdendorf, 1946

[Protopleciidae ROHDENDORF, 1946, p. 42]

Wing with vein SC short, commonly ending before midwing; RS with an oblique anterior branch, terminating near end of R. *Jur.*

Protoplecia HANDLIRSCH, 1906b, p. 488 [**Macropeza liasina* GEINITZ, 1884, p. 582; OD]. M1+2 forking distally of fork on RS. ROHDENDORF, 1964. *Jur.*, Europe (Germany).——FIG. 226,*1*. **P. liasina* (GEINITZ); wing, ×16 (Handlirsch, 1907).

Mesoplecia ROHDENDORF, 1938, p. 49 [**M. jurassica*; OD]. SC extending to about midwing; M1+2 forking proximally of fork RS. ROHDENDORF, 1964. *Jur.*, USSR (Kazakh).

Mesopleciella ROHDENDORF, 1946, p. 43 [**M. minor*; OD]. Similar to *Mesoplecia*, but SC much shorter. ROHDENDORF, 1964. *Jur.*, USSR (Kazakh).

Family PROTOBIBIONIDAE Rohdendorf, 1946

[Protobibionidae ROHDENDORF, 1946, p. 46]

Very small insects. Wing with vein RS with 1 short branch leading directly to R near midwing; anterior veins strong. *Jur.*

Protobibio ROHDENDORF, 1946, p. 47 [**P. jurassicus*; OD]. SC extending almost to midwing; crossvein r-m long, oblique. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).——FIG. 226,*5*. **P. jurassicus*; wing, ×36 (Rohdendorf, 1962a).

Family PROTOSCATOPSIDAE Rohdendorf, 1946

[Protoscatopsidae ROHDENDORF, 1946, p. 48]

Wing with anterior veins very strong, veins in rest of wing weak or obsolescent; RS with 2 very short anterior branches leading directly into C just beyond end of R. Antenna short. *Jur.*

Protoscatopse ROHDENDORF, 1946, p. 49 [**P. jurassica*; OD]. CUA almost straight, weak distally. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).——FIG. 226,*4*. **P. jurassica*; wing, ×26 (Rohdendorf, 1962a).

Family SCATOPSIDAE Newman, 1835

[Scatopsidae NEWMAN, 1835, p. 387]

Small to very small flies. Wings with veins R and RS very strong, other veins much weaker; SC vestigial; RS reduced to RS3+4 and unbranched, commonly extending only to midwing. Larvae saprophagous, usually found in rotting vegetation. *Oligo.–Holo.*

Scatopse GEOFFROY, 1762, p. 450. [Generic assignment of fossils doubtful.] MEUNIER, 1904d; MELANDER, 1949. *Oligo.*, USA (Colorado), Europe (Baltic)–*Holo.*

Family BIBIONIDAE Newman, 1835

[Bibionidae NEWMAN, 1835, p. 387]

Small to moderate-sized flies. Wings without discal cell; vein SC well developed, usually extending to midwing; RS forked into RS1+2 and RS3+4 or reduced to unbranched RS3+4; M with 2 branches; CUA1 and CUA2 extending to hind margin of wing. Antennae typically short; eyes of male holoptic. Larvae mostly saprophagous, in soil. *Cret.–Holo.*

Bibio GEOFFROY, 1762, p. 568. BUTLER, 1889; COCKERELL, 1909j, 1921d; MEUNIER, 1915b; PONGRÁCZ, 1928; PITON & THÉOBALD, 1935; MANEVAL, 1936; JAMES, 1937; THÉOBALD, 1937a; STATZ, 1943; MELANDER, 1949; DÜRRENFELDT, 1968. *Oligo.*, Europe (Germany, France), England, USA (Colorado); *Mio.*, Europe (Croatia); *Plio.*, Europe (Germany)–*Holo.*

Bibiodes COQUILLETT, 1904, p. 171. JAMES, 1937. *Oligo.*, USA (Colorado)–*Holo.*

Bibiodites COCKERELL, 1915, p. 493 [**B. confluens*; OD]. Similar to *Bibiodes* (recent), but RS in very brief contact with M1+2. *Oligo.*, England.

Dilophus MEIGEN, 1803, p. 264. DÜRRENFELDT, 1968; HARRIS, 1983. *Eoc.*, New Zealand (North Otago); *Plio.*, Europe (Germany)–*Holo.*

Hesperinus WALKER, 1848, p. 81. MELANDER, 1949. *Oligo.*, USA (Colorado)–*Holo.*

Lithosomyia CARPENTER, 1986, p. 576, *nom. subst. pro Mesomyia* PONGRÁCZ, 1928, p. 174, *non* MACQUART, 1849 [**Bibio brevis* HEER, 1849, p. 225; SD CARPENTER, 1986, p. 576]. Venation as in *Bibio*, but fork of M1+2 shorter. *Mio.*, Europe (Croatia).

Penthetria MEIGEN, 1803, p. 264 [=*Bibiopsis* HEER, 1849, p. 228 (type, *B. cimicoides*); *Protomyia* HEER, 1849, p. 231 (type, *Bibio lygaeoides* UNGER)]. HANDLIRSCH, 1910b; MEUNIER, 1917c, 1918; PONGRÁCZ, 1928; STATZ, 1944b; MELANDER, 1949; LEWIS, 1971b. *Eoc.*, Canada

(British Columbia); *Oligo.,* Europe (Germany), USA (Colorado, Montana); *Mio.,* Europe (Croatia)–*Holo.*

Plecia WIEDEMANN, 1828, p. 72. COCKERELL, 1914f, 1917b, 1921d; THÉOBALD, 1937a; CARPENTER & others, 1938; ZEUNER, 1941a; PETERSON, 1975. *Cret.,* Canada (Manitoba); *Paleoc.–Plio.,* Europe (France); *Eoc.,* Scotland; *Oligo.,* Europe (Germany, France), England, USA (Colorado)–*Holo.*

Family SCIARIDAE Billberg, 1820

[Sciaridae BILLBERG, 1820, p. 121]

Small flies. Wings with vein R short, usually not extending beyond midwing; RS arising from R as a short, transverse vein and connected to M1+2 by the longitudinally arranged crossvein r-m. Coxae enlarged; eyes commonly touching above antennae; tibiae without prominent spines. Larvae mostly saprophagous, in decaying vegetation. *Eoc.–Holo.*

Sciara MEIGEN, 1803, p. 263. SCUDDER, 1878d; COCKERELL, 1910b, 1915, 1916c, 1917c; MEUNIER, 1917c; THÉOBALD, 1937b; ARMBRUSTER, 1938; QUIÉVREUX, 1938; STATZ, 1944c; MELANDER, 1949. *Eoc.,* Canada (British Columbia); *Oligo.,* Europe (Baltic, France, Germany), England, USA (Colorado); *Mio.,* Burma, Europe (Germany)–*Holo.*

Lycoriella FREY, 1942, p. 36. [Generic assignment of fossil doubtful.] MEUNIER, 1904a. *Oligo.,* Europe (Baltic)–*Holo.*

Protosciara QUIÉVREUX, 1938, p. 83 [**P. alsatica*; OD]. Little-known genus; M3+4 apparently forked. [Family assignment doubtful.] *Oligo.,* Europe (Baltic).

Pseudosciara SCHINER, 1866, p. 930 [=*Heeriella* MEUNIER, 1904a, p. 86 (type, *H. bifurcata*)]. FREY, 1942. *Oligo.,* Europe (Baltic)–*Holo.*

Ruebsaameniella MEUNIER, 1903a, p. 165 [**R. semibrachyptera*; OD]. Similar to *Lycoriella* (recent), but female with reduced venation as well as small wings. FREY, 1942. *Oligo.,* Europe (Baltic).

Trichosia WINNERTZ, 1867, p. 173. HEER, 1849; FREY, 1942. *Oligo.,* Europe (Croatia)–*Holo.*

Family MYCETOPHILIDAE Newman, 1835

[Mycetophilidae NEWMAN, 1835, p. 386]

Small to very small flies. Wings with diverse venation. Vein RS1+2 either absent or reduced to short, transverse vein leading to costal margin; stem of RS usually arising as transverse crossvein and joined to M1+2 by crossvein r-m, or coalesced with M1+2 for a short distance; 1A absent. Antennae much longer than head, eyes not touching dorsally; tibiae commonly with strong spines. Larvae typically associated with fungi, developing in their fruiting bodies; some larvae making webs or tubes. *Paleoc.–Holo.*

Mycetophila MEIGEN, 1803, p. 263. COCKERELL, 1915; PITON & THÉOBALD, 1935; THÉOBALD, 1937a. *Oligo.,* USA (Colorado), England, Europe (France, Croatia)–*Holo.*

Acnemia WINNERTZ, 1863, p. 798. COCKERELL, 1921d, 1924a. *Eoc.,* USA (Colorado); *Oligo.,* England–*Holo.*

Allactoneura de MEIJERE, 1907, p. 201. [Generic assignment of fossil doubtful.] THÉOBALD, 1937a. *Oligo.,* Europe (France)–*Holo.*

Allodia WINNERTZ, 1863, p. 826. MEUNIER, 1916b, 1917a, 1922, 1923a; THÉOBALD, 1937a. *Oligo.,* Europe (Baltic, France)–*Holo.*

Anaclileia MEUNIER, 1904a, p. 157. EDWARDS, 1940. *Oligo.,* Europe (Baltic)–*Holo.*

Aneura MARSHALL, 1896, p. 287. [Generic assignment of fossil doubtful.] RIEK, 1954a. *Paleoc.–Eoc.,* Australia (Queensland)–*Holo.*

Archaeboletina MEUNIER, 1904a, p. 160 [**A. tipuliformis*; OD]. Similar to *Speolepta* (recent) but with SC2 only slightly before RS; separation of M3+4 from CUA almost below crossvein r-m; macrotrichia absent from wing membrane and forks of veins. MEUNIER, 1904d; EDWARDS, 1940. *Oligo.,* Europe (Baltic).

Archaemacrocera MEUNIER, 1917a, p. 88 [**A. concinna*; OD]. Similar to *Macrocera,* except in minor venational details. [Probably a synonym of *Macrocera.*] *Oligo.,* Europe (Baltic).

Asindulum LATREILLE, 1805, p. 290. [Generic assignment of fossil doubtful.] STATZ, 1944a. *Oligo.,* Europe (Baltic)–*Holo.*

Austrolocymmerus FREEMAN, 1954, p. 39. [Generic assignment of fossil doubtful.] RIEK, 1954a (as *Centrocnemis*). *Paleoc.–Eoc.,* Australia (Queensland)–*Holo.*

Boletina STAEGER, 1840, p. 233. MEUNIER, 1916b, 1917a, 1920d, 1922, 1923a; STATZ, 1944a; MELANDER, 1949. *Oligo.,* Europe (Baltic, Germany)–*Holo.*

Brachypeza WINNERTZ, 1863, p. 806. MEUNIER, 1917a, 1917c. *Oligo.,* Europe (Baltic, Germany)–*Holo.*

Bradysia WINNERTZ, 1867, p. 180. MEUNIER, 1904a; FREY, 1942. *Oligo.,* Europe (Baltic)–*Holo.*

Burmacrocera COCKERELL, 1917h, p. 326 [**B. petiolata*; OD]. Similar to *Palaeoplatyura,* but crossvein r-m absent; thorax strongly setose. *Mio.,* Burma.

Coelosia WINNERTZ, 1863, p. 796 [=*Palaeophthinia* MEUNIER, 1904a, p. 160 (type, *P. aberrans*)].

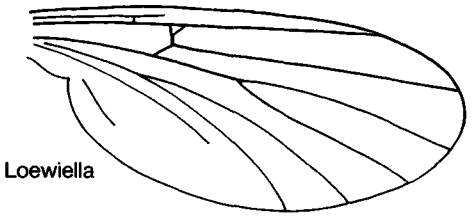


FIG. 227. Mycetophilidae (p. 416).

MEUNIER, 1917a; EDWARDS, 1940. *Oligo.*, Europe (Baltic)–*Holo.*

Cordyla MEIGEN, 1803, p. 263. MEUNIER, 1917a, 1923b; STATZ, 1944a. *Oligo.*, Europe (Baltic, Germany)–*Holo.*

Dianepsia LOEW, 1850, p. 33 [**D. hissa*; OD]. Similar to *Docosia,* but wings short and broad, with very short SC; SC2 present; macrotrichia absent on wing membrane and forks of veins. MEUNIER, 1899a; EDWARDS, 1940. *Oligo.*, Europe (Baltic).

Ditomyia WINNERTZ, 1846, p. 14. STATZ, 1944a. *Oligo.*, Europe (Germany)–*Holo.*

Docosia WINNERTZ, 1863, p. 802. MEUNIER, 1916b, 1917a, 1922, 1923a. *Oligo.*, Europe (Baltic, Germany)–*Holo.*

Dziedzickia JOHANNSEN, 1909, p. 44. [Generic assignment of fossils doubtful.] MEUNIER, 1917b, 1922, 1923a; STATZ, 1944a. *Oligo.*, Europe (Baltic, Germany)–*Holo.*

Ectrepesthoneura ENDERLEIN, 1910, p. 155, *nom. subst. pro Willistoniella* MEUNIER, 1904a, p. 85, *non* MIK, 1895. EDWARDS, 1940; STATZ, 1944a. *Oligo.*, Europe (Baltic, Germany)–*Holo.*

Exechia WINNERTZ, 1863, p. 879. COCKERELL, 1908a; PONGRÁCZ, 1928; THÉOBALD, 1937a; STATZ, 1944a; MELANDER, 1949. *Oligo.*, USA (Colorado), Europe (Baltic, Germany, France); *Mio.*, Europe (Croatia)–*Holo.*

Gnoriste MEIGEN, 1818, p. 243. PONGRÁCZ, 1928. *Oligo.*, Europe (France)–*Holo.*

Heterotricha LOEW, 1850, p. 33 [=*Palaeoheterotricha* MEUNIER, 1904a, p. 62 (type, *P. grandis*)]. FREY, 1942. *Oligo.*, Europe (Baltic)–*Holo.*

Leia MEIGEN, 1818, p. 253. COCKERELL, 1911b; MEUNIER, 1917a, 1918; STATZ, 1944a; SNYDER, 1950. *Oligo.*, USA (Colorado), Europe (Baltic, Germany, France)–*Holo.*

Leptomorphus CURTIS, 1831, pl. 365. MEUNIER, 1917a; COCKERELL, 1920c. *Eoc.*, USA (Colorado); *Oligo.*, Europe (Baltic)–*Holo.*

Loewiella MEUNIER, 1894, p. cxi [**L. incompleta*; SD JOHANNSEN, 1909, p. 44]. Similar to *Dziedzickia,* but stem of M1+2 longer than crossvein r-m; RS3+4 straight or nearly so. EDWARDS, 1940. *Oligo.*, Europe (Baltic).——FIG. 227. **L. incompleta*; wing, ×16 (Johannsen, 1909).

Macrocera MEIGEN, 1803, p. 261. COCKERELL, 1910b; STATZ, 1944a. *Oligo.*, Europe (Baltic, Germany)–*Holo.*

Manota WILLISTON, 1896, p. 260 [=*Cerato* MEUNIER, 1904a, p. 87 (type, *C. longipalpis*)]. JOHANNSEN, 1909; STATZ, 1944a. *Oligo.*, Europe (Baltic, Germany)–*Holo.*

Mycetophaetus SCUDDER, 1892, p. 20 [**M. intermedius*; OD]. Similar to *Sciophila* (recent), but stem of M connected to R by crossvein near wing base. *Oligo.*, USA (Colorado).

Mycomya RONDANI, 1856, p. 194. JOHANNSEN, 1912; COCKERELL, 1914f, 1921d, 1923b; THÉOBALD, 1937a; ROHDENDORF, 1961c. *Oligo.*, USA (Colorado), Europe (Baltic, Germany, France); *Paleoc.–Plio.*, South America (Colombia)–*Holo.*

Necromyza SCUDDER, 1895a, p. 121 [**N. pedata*; OD]. Little-known genus; SC appears to terminate on R just beyond origin of RS. *Mio.*, Europe (Germany).

Neoempheria OSTEN-SACKEN, 1878, p. 9. MEUNIER, 1922, 1923a; QUIÉVREUX, 1938. *Oligo.*, Europe (Baltic, France)–*Holo.*

Neuratelia RONDANI, 1856, p. 195 [=*Proanaclinia* MEUNIER, 1904a, p. 156 (type, *P. gibbosa*; SD EDWARDS, 1940)]. STATZ, 1944a. *Oligo.*, Europe (Baltic, Germany)–*Holo.*

Palaeoanaclinia MEUNIER, 1904a, p. 154 [**P. distincta*; SD JOHANNSEN, 1909, p. 86]. Similar to *Boletina*; wings without macrotrichia on membrane and forks of veins; SC2 absent; stem of M1+2 short. EDWARDS, 1940. *Oligo.*, Europe (Baltic).

Palaeoboletina MEUNIER, 1904a, p. 161 [**P. elongatissima*; SD EDWARDS, 1940, p. 122]. Similar to *Boletina* but with SC2 arising near end of SC. [Possibly a synonym of *Boletina.*] JOHANNSEN, 1909. *Oligo.*, Europe (Baltic).

Palaeodocosia MEUNIER, 1904a, p. 172 [**P. brachypezoides*; OD] [=*Palaeotrichonta* MEUNIER, 1904a, p. 179 (type, *P. brachycamptites*); *Paleosyntemna* MEUNIER, 1922, p. 119 (type, *P. brachypezoides*); *Sciomorpha* MEUNIER, 1923a, p. 25, *nom. nud.*]. JOHANNSEN, 1909; EDWARDS, 1940. *Oligo.*, Europe (Baltic).

Palaeoempalia MEUNIER, 1904a, p. 128, *nom. subst.* herein *pro Sciobia* LOEW, 1850, p. 34, *non* BURMEISTER, 1838 [**P. brongniarti*; SD JOHANNSEN, 1909, p. 117]. Little-known genus, apparently related to *Sciophila* and *Mycomya*; SC reaching costa. MEUNIER, 1916b, 1922, 1923a. *Oligo.*, Europe (Baltic).

Palaeognoriste MEUNIER, 1904a, p. 87 [**P. sciariforme*; OD]. Proboscis elongate; wing venation little known. [Possibly a sciarid.] JOHANNSEN, 1909; MEUNIER, 1912b. *Oligo.*, Europe (Baltic).

Paraleia ARMBRUSTER, 1938, p. 120 [**P. rhymosides*; OD]. Little-known genus. *Mio.*, Europe (Germany).

Phronia WINNERTZ, 1863, p. 857. MEUNIER, 1917a; COCKERELL, 1921d; THÉOBALD, 1937a. *Oligo.*, England, Europe (Baltic, France)–*Holo.*

Phthinia WINNERTZ, 1863, p. 779. STATZ, 1944a. *Oligo.*, Europe (Germany)–*Holo.*

Platyura MEIGEN, 1803, p. 264. MEUNIER, 1917a; COCKERELL, 1921d; SCHMALFUSS, 1979. *Oligo.*, England, Europe (Baltic); *Oligo./Mio.*, Dominican Republic–*Holo.*

Proallodia ARMBRUSTER, 1938, p. 121 [**P. rhymosides*; OD]. Little-known genus. *Mio.*, Europe (Germany).

Proapemon MELANDER, 1949, p. 9 [**P. infernus*; OD]. Venation as in *Hesperodes* (recent) but the 3 ocelli distinct and antennal scape long. *Oligo.*, USA (Colorado).

Proapolephthisa ARMBRUSTER, 1938, p. 119 [**P. manotides*; OD]. Little-known genus. *Mio.*, Europe (Germany).

Proboletina MEUNIER, 1904a, p. 162 [**P. syntemniformis*; OD]. Venation as in *Synapha*. Eyes emarginate above antennae; lateral ocelli touching eyes; palpi 3-segmented; claws with subbasal tooth. EDWARDS, 1940. *Oligo.*, Europe (Baltic).

Proceroplatus EDWARDS, 1925, p. 523. SCHMALFUSS, 1979. *Oligo./Mio.*, Dominican Republic–*Holo.*

Prodelopsis ARMBRUSTER, 1938, p. 122 [**P. epicyptides*; OD]. Little-known genus. *Mio.*, Europe (Germany).

Prodocosia ARMBRUSTER, 1938, p. 120 [**P. rondaniellides*; OD]. Little-known genus. *Mio.*, Europe (Germany).

Proepicypta ARMBRUSTER, 1938, p. 121 [**P. obesa*; OD]. Little-known genus. *Mio.*, Europe (Germany).

Prohadroneura ARMBRUSTER, 1938, p. 119 [**P. dziedzickides*; OD]. Little-known genus. *Mio.*, Europe (Germany).

Proleia ARMBRUSTER, 1938, p. 120 [**P. landrocki*; OD]. Little-known genus. *Mio.*, Europe (Germany).

Promacrocera ARMBRUSTER, 1938, p. 118 [**P. archaica*; OD]. Little-known genus. *Mio.*, Europe (Germany).

Promycetomyia ARMBRUSTER, 1938, p. 119 [**P. neoempherides*; OD]. Little-known genus. *Mio.*, Europe (Germany).

Proneoglaphyroptera MEUNIER, 1904a, p. 169 [**P. eocenica*; OD]. Related to *Leia* and most similar to *Paraleia* but with the 3 ocelli arranged in a straight line, lateral ones touching eyes. COCKERELL, 1926c; EDWARDS, 1940. *Oligo.*, Europe (Baltic).

Pronovakia ARMBRUSTER, 1938, p. 120 [**P. incerta*; OD]. Little-known genus. *Mio.*, Europe (Germany).

Prophronia ARMBRUSTER, 1938, p. 121 [**P. dynatosomides*; OD]. Little-known genus. *Mio.*, Europe (Germany).

Prophthinia ARMBRUSTER, 1938, p. 119 [**P. coelosides*; OD]. Little-known genus. *Mio.*, Europe (Germany).

Protasmanina RIEK, 1954a, p. 60 [**P. nana*; OD]. Similar to *Tasmanina* (recent). SC ending on C after origin of RS; RS transverse from its origin to crossvein r-m; M3+4 arising from CUA basad of forking of M1+2. *Paleoc.–Eoc.*, Australia (Queensland).

Protrichonta ARMBRUSTER, 1938, p. 121 [**P. delopsides*; OD]. Little-known genus. *Mio.*, Europe (Germany).

Rymosia WINNERTZ, 1863, p. 810 [=*Palaeoepicypta* MEUNIER, 1904a, p. 181 (type, *P. longicalcar*)]. COCKERELL, 1921d; THÉOBALD, 1937a; EDWARDS, 1940. *Oligo.*, England, Europe (Baltic, Germany)–*Holo.*

Sciophila MEIGEN, 1818, p. 245. COCKERELL, 1909d; MEUNIER, 1915b. *Oligo.*, USA (Colorado), Europe (Germany)–*Holo.*

Symmerus WALKER, 1848, p. 88. MEUNIER, 1906a. *Oligo.*, Europe (Baltic)–*Holo.*

Synapha MEIGEN, 1818, p. 227. MEUNIER, 1917a. *Oligo.*, Europe (Baltic)–*Holo.*

Syntemna WINNERTZ, 1863, p. 767. MEUNIER, 1904a, 1917a, 1917c, 1922, 1923a. *Oligo.*, Europe (Baltic)–*Holo.*

Tetragoneura WINNERTZ, 1846, p. 18 [=*Sciarella* MEUNIER, 1904a, p. 89 (type, *S. mycetophiliformis*), *non* LENDENFELD, 1884]. COCKERELL, 1909d; MEUNIER, 1914a, 1922, 1923a; EDWARDS, 1940; STATZ, 1944a. *Eoc.*, USA (Colorado); *Oligo.*, Europe (Baltic, Germany)–*Holo.*

Family OLIGOPHRYNEIDAE Rohdendorf, 1962

[Oligophryneidae ROHDENDORF, 1962a, p. 332]

Wing broad; vein SC apparently very short; RS with 2 branches, anterior one simple, posterior one forked distally; discal cell small. Body unknown. *Trias.*

Oligophryne ROHDENDORF, 1962a, p. 332 [**O. fungivoroides*; OD]. SC terminating in membrane; R strong. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz). —— FIG. 228,*4*. **O. fungivoroides*; wing, ×26 (Rohdendorf, 1964).

Family PROTOLBIOGASTRIDAE Rohdendorf, 1962

[Protolbiogastridae ROHDENDORF, 1962a, p. 332]

Wing with broad costal area; vein SC long; R with strong, complicated strut near wing base, joining R to CUA; anterior branch of RS sigmoidal, terminating on costa just beyond R; discal cell prominent. *Trias.*

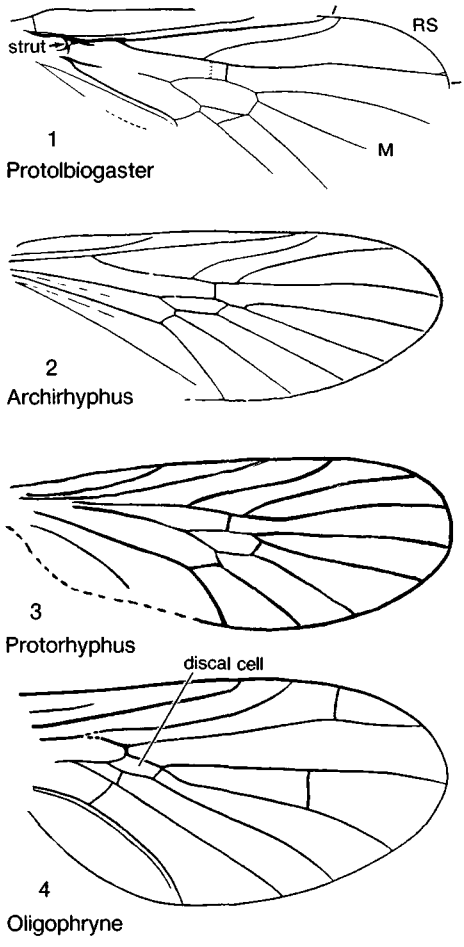


FIG. 228. Oligophryneidae, Protolbiogastridae, and Protorhyphidae (p. 417–418).

Protolbiogaster ROHDENDORF, 1962a, p. 332 [**P. rhaetica*; OD]. M1 and M2 separating before distal end of discal cell. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).——FIG. 228,*1*. **P. rhaetica*; wing, ×12 (Rohdendorf, 1964).

Family PROTORHYPHIDAE Handlirsch, 1906

[Protorhyphidae HANDLIRSCH, 1906b, p. 487]

Wing with vein SC strong, ending before midwing; RS with 2 long, curved branches, directed anteriorly; crossvein r-m midway between origins of these 2 branches; discal cell small. *Trias.–Jur.*

Protorhyphus HANDLIRSCH, 1906b, p. 487 [**Phryganidium simplex* GEINITZ, 1887, p. 203, pl. 5, fig. 13; OD]. M1 and M2 diverging before distal end of discal cell. EDWARDS, 1928; ROHDENDORF, 1962a, 1964. *Trias.*, USSR (Kirghiz); *Jur.*, Europe (Germany).——FIG. 228,*3*. **P. simplex* (GEINITZ); Jur., Germany; wing, ×18 (Handlirsch, 1907).

Archirhyphus HANDLIRSCH, 1939, p. 102 [**A. geinitzi*; OD]. M1 and M2 diverging after distal end of discal cell. ROHDENDORF, 1964. *Jur.*, Europe (Germany), USSR (Kazakh).——FIG. 228,*2*. **A. geinitzi*, Jur., Germany; wing, ×18 (Handlirsch, 1939).

Family PHRAGMOLIGONEURIDAE Rohdendorf, 1962

[Phragmoligoneuridae ROHDENDORF, 1962a, p. 332]

Vein R with a well-developed strut (phragma), connecting base of R with CUA; basal parts of RS and M reduced; RS unbranched. Body unknown. *Trias.*

Phragmoligoneura ROHDENDORF, 1962a, p. 332 [**P. incerta*; OD]. Little-known wing; SC very weak; M forking just before crossvein between RS and M. ROHDENDORF, 1964. *Trias.*, USSR (Kirghiz).

Family ANISOPIDAE Knab, 1912

[Anisopidae KNAB, 1912, p. 111]

Flies of moderate size. Wings: vein SC usually extending about to midwing; discal cell present; RS1+2 terminating on R or C. Body stout; antennae longer than head. Larvae saprophytic, in decaying vegetation. *Jur.–Holo.*

Sylvicola HARRIS, 1776, p. 100 [=*Anisopus* MEIGEN, 1803, p. 264 (type, *A. fuscus*)]. HEER, 1849; MEUNIER, 1904d; COCKERELL, 1921d; EDWARDS, 1928; PONGRÁCZ, 1928. *Oligo.*, England, Europe (Baltic); *Mio.*, Europe (Croatia)–*Holo.*

Asarcomyia SCUDDER, 1890, p. 567 [**A. cadaver*; OD]. Similar to *Sylvicola*, but discal cell shorter. [Probably a synonym of *Sylvicola*.] EDWARDS, 1928. *Eoc.*, USA (Wyoming).

Olbiogaster OSTEN-SACKEN, 1886, p. 20 [=*Pseudadonia* HANDLIRSCH, 1906b, p. 628 (type, *Platyura fittoni* BRODIE, 1845, p. 3, fig. 9); *Mesorhyphus* HANDLIRSCH, 1920, p. 203 (type, *M. nanus*); *Euthereva* COCKERELL, 1920c, p. 251 (type, *E. simplex*)]. EDWARDS, 1928. *Jur.*, England, Europe (Germany); *Eoc.*, USA (Colorado)–*Holo.*

Thiras GIEBEL, 1856, p. 235 [**T. westwoodi*; OD]. Similar to *Olbiogaster*; RS1+2 and discal cell obscure. [Possibly a synonym of *Olbiogaster*.] EDWARDS, 1928. *Jur.*, England.

Family CECIDOMYIDAE Newman, 1835

[Cecidomyidae Newman, 1835, p. 386]

Small to very small flies. Wings weak, hairy, with a reduced venation, sometimes consisting of only 1 or 2 longitudinal veins; SC usually absent; RS typically arising from R as in the Sciaridae; M weakly developed or absent; 1A commonly absent. Antennae typically long and moniliform; tibial spurs absent. Larvae mostly in plant galls; some scavengers in decaying debris; a few predators and parasites. *Cret.–Holo.*

Cecidomyia Meigen, 1803, p. 261. Loew, 1850; Meunier, 1899a; Kieffer, 1913; Naora, 1933a. *Oligo.,* Europe (Baltic), USA (Colorado); *Paleoc.–Plio.,* China (Manchuria)–*Holo.*

Bryocrypta Kieffer, 1896, p. 8. Meunier, 1904a; Kieffer, 1913. *Oligo.,* Europe (Baltic)–*Holo.*

Camptomyia Kieffer, 1894, p. 323. Meunier, 1904a; Kieffer, 1913. *Oligo.,* Europe (Baltic)–*Holo.*

Campylomyza Meigen, 1818, p. 101. Meunier, 1904a; Kieffer, 1913. *Oligo.,* Europe (Baltic)–*Holo.*

Colpodia Winnertz, 1853, p. 185. Meunier, 1904a; Kieffer, 1913. *Oligo.,* Europe (Baltic)–*Holo.*

Cretocatocha Gagné, 1977, p. 58 [**C. mcalpinei*; OD]. Related to *Anocha* (recent), but male antenna setiform, with 8 flagellomeres, distal ones tapering to a bristlelike tip; RS3+4 terminating on costa before wing apex. *Cret.,* Canada (Alberta).——Fig. 229,*5*. **C. mcalpinei*; wing, ×40 (Gagné, 1977).

Cretocordylomyia Gagné, 1977, p. 58 [**C. quadriseries*; OD]. Similar to *Cordylomyia* (recent); flagellomeres of male antenna with 4 crenulate whorls of long setae; R3+4 terminating on costa at wing apex; fork of M3+4 and CUA acute. *Cret.,* Canada (Manitoba).——Fig. 229,*3*. **C. quadriseries*; wing, ×55 (Gagné, 1977).

Cretomiastor Gagné, 1977, p. 60 [**C. ferejunctus*; OD]. Similar to *Leptosyna* (recent), but wing broader and without macrotrichia; 5 tarsomeres present; M absent. *Cret.,* Canada (Alberta, Manitoba).——Fig. 229,*1*. **C. ferejunctus*; holotype female, ×55 (Gagné, 1977).

Cretowinnertzia Gagné, 1977, p. 60 [**C. angustala*; OD]. Similar to *Parwinnertzia* (recent), but wings broader; maxillary palpi with 4 segments. *Cret.,* Canada (Manitoba). —— Fig. 229,*4*. **C. angustala*; holotype female, ×38 (Gagné, 1977).

Dicroneurus Kieffer, 1895, p. 122. Meunier, 1904a; Kieffer, 1913. *Oligo.,* Europe (Baltic)–*Holo.*

Epidosis Loew, 1850, p. 38. Meunier, 1904a; Kieffer, 1913. *Oligo.,* Europe (Baltic)–*Holo.*

Frirenia Kieffer, 1894, p. 201. Meunier, 1904a; Kieffer, 1913. *Oligo.,* Europe (Baltic)–*Holo.*

Heteropeza Winnertz, 1846, p. 13. Meunier, 1904a; Kieffer, 1913. *Oligo.,* Europe (Baltic)–*Holo.*

Lasioptera Meigen, 1818, p. 88. Scudder, 1890; Kieffer, 1913. *Eoc.,* USA (Colorado)–*Holo.*

Ledomyiella Meunier, 1904a, p. 44 [**L. succini* Meunier, 1904a, p. 44; SD Carpenter, herein]. Similar to *Brachyneura* (recent), but M3+4 separating from CUA distally. Kieffer, 1913. *Oligo.,* Europe (Baltic). —— Fig. 229,*2*. **L. succini*; wing, ×90 (Meunier, 1904a).

Lestremia Macquart, 1826, p. 173. Meunier, 1904a; Kieffer, 1913. *Oligo.,* Europe (Baltic)–*Holo.*

Lithomyza Scudder, 1877a, p. 746 [**L. condita*; OD]. Little-known genus, apparently similar to *Anarete* (recent), but wings broader beyond middle and tapering more basally. Scudder, 1890; Kieffer, 1913. *Eoc.,* USA (Colorado).

Meunieria Kieffer, 1904, p. 408 [**Miastor succini* Meunier, 1901a, p. 191; OD]. Similar to *Miastor* (recent), but maxillary palpi with 4 segments. Meunier, 1904a. *Oligo.,* Europe (Baltic).

Mikiola Kieffer, 1896, p. 5. Meunier, 1904a; Kieffer, 1913. *Oligo.,* Europe (Baltic)–*Holo.*

Monardia Kieffer, 1895, p. 111. Meunier, 1904a; Kieffer, 1913. *Oligo.,* Europe (Baltic)–*Holo.*

Monodicrana Loew, 1850, p. 32. Kieffer, 1913. *Oligo.,* Europe (Baltic)–*Holo.*

Neostenoptera Meunier, 1902c, p. 102, *nom. subst. pro Stenoptera* Meunier, 1901a, p. 200, *non* Duponchel, 1838. Kieffer, 1913. *Pleist.,* Africa–*Holo.*

Palaeocolpodia Meunier, 1904a, p. 29 [**P. eocenica*; OD]. Similar to *Holoneurus* (recent), but transverse part of RS straight and not oblique. Kieffer, 1913. *Oligo.,* Europe (Baltic).

Peromyia Kieffer, 1894, p. 205. Loew, 1850; Meunier, 1904a; Kieffer, 1913. *Oligo.,* Europe (Baltic)–*Holo.*

Porricondyla Rondani, 1840, p. 13. Loew, 1850; Kieffer, 1913. *Oligo.,* Europe (Baltic)–*Holo.*

Winnertzia Rondani, 1860, p. 290. Meunier, 1904a; Kieffer, 1913. *Oligo.,* Europe (Baltic)–*Holo.*

Winnertziola Kieffer, 1912, p. 235. Edwards, 1928. *Mio.,* Burma–*Holo.*

Family UNCERTAIN

The following genera, apparently belonging to the order Diptera, suborder Nema-

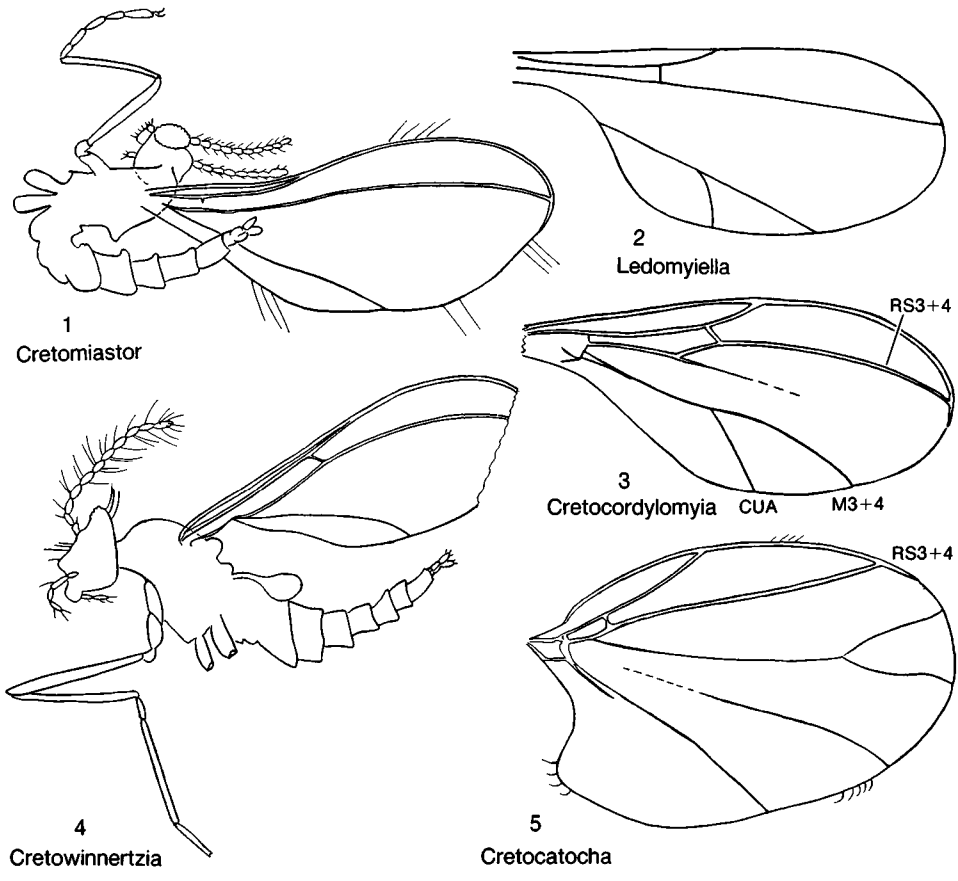


FIG. 229. Cecidomyidae (p. 419).

tocera, are too poorly known to permit family assignment.

Amblylexis BODE, 1953, p. 330 [**A. gibberata*; OD]. Little-known genus. *Jur.,* Europe (Germany).

Amianta BODE, 1953, p. 327 [**A. eurycephala*; OD]. Little-known genus. *Jur.,* Europe (Germany).

Amphipromeca BODE, 1953, p. 324 [**A. acuta*; OD]. Little-known genus. *Jur.,* Europe (Germany).

Apistogrypotes BODE, 1953, p. 329 [**A. inflexa*; OD]. Little-known genus. *Jur.,* Europe (Germany).

Chironomopsis HANDLIRSCH, 1906b, p. 631 [**Chironomus arrogans* GIEBEL, 1856, p. 250; OD]. Little-known genus. PING, 1928; KALUGINA, 1977. *Jur.,* England; *Cret.,* Mongolia, China (Liaoning).

Cormophora BODE, 1953, p. 329 [**C. arucaeformis*; OD]. Little-known genus. *Jur.,* Europe (Germany).

Culiciscolex BODE, 1953, p. 322 [**C. gibberatus*; OD]. Little-known genus. *Jur.,* Europe (Germany).

Cyrtomides BODE, 1953, p. 329 [**C. maculatus*; OD]. Little-known genus. *Jur.,* Europe (Germany).

Ellipes BODE, 1953, p. 328 [**E. laesa*; OD]. Little-known genus. *Jur.,* Europe (Germany).

Empidocampe BODE, 1953, p. 323 [**E. retrocrassata*; OD]. Little-known genus. *Jur.,* Europe (Germany).

Etoptychoptera HANDLIRSCH, 1910b, p. 122 [**E. tertiaria*; OD]. Little-known genus, based on incomplete wing; RS well developed, with 4 branches. [Tentatively placed by HANDLIRSCH in the family Ptychopteridae (recent).] *Eoc.,* Canada (British Columbia).

Propexis BODE, 1953, p. 327 [**P. incerta*; OD]. Little-known genus. *Jur.,* Europe (Germany).

Rhopaloscolex BODE, 1953, p. 326 [**R. longus*; OD]. Little-known genus. *Jur.,* Europe (Germany).

Sphallonymphites BODE, 1953, p. 330 [**S. decurtatus*; OD]. Little-known genus. *Jur.,* Europe (Germany).

Suborder BRACHYCERA Zetterstedt, 1842

[Brachycera Zetterstedt, 1842, p. 1]

Antennae of adults shorter than thorax, commonly consisting of less than 6 segments (total) and terminating in a style or arista; maxillary palpi with 1 or 2 segments; wings often broadly oval; vein CUA diverging toward 1A and often coalescing with it. Larvae with head capsule incomplete or absent; mandibles strongly curved, not opposite, their movements vertical to plane of head. Pupae obtect or coarctate. Hennig, 1973. *Jur.—Holo.*

Family PROTOBRACHYCERONTIDAE Rohdendorf, 1962

[*nom. correct.* Rohdendorf, 1964, p. 197, *pro* Protobrachyceridae Rohdendorf, 1962a, p. 334]

Little-known family, of dubious validity. Small flies; wings with all veins equally strong; M3 and M4 converging distally; discal cell elongate. Hennig, 1967a; Kovalev, 1981. *Jur.*

Protobrachyceron Handlirsch, 1920, p. 205 [**P. liasinum*; OD]. Terminations of SC, R, and RS1+2 about equally spaced; RS3+4 with a prominent terminal fork. Handlirsch, 1939; Rohdendorf, 1962a, 1964. *Jur.,* Europe (Germany).——Fig. 230,*3*. **P. liasinum*; wing, ×12 (Handlirsch, 1939).

Family ARCHISARGIDAE Rohdendorf, 1962

[Archisargidae Rohdendorf, 1962a, p. 334]

Wings long and narrow, subpetiolate; veins SC and R strong, other veins weak; RS with 3 terminal branches. Kovalev, 1981. *Jur.*

Archisargus Rohdendorf, 1938, p. 30 [**A. pulcher*; OD]. SC extending beyond midwing; R almost straight; first fork of RS at midwing. Rohdendorf, 1962a, 1964; Kovalev, 1981. *Jur.,* USSR (Kazakh).

Family PALAEOSTRATIOMYIIDAE Rohdendorf, 1938

[*nom. transl.* Rohdendorf, 1962a, p. 334, *ex* Palaeostratiomyiinae Rohdendorf, 1938, p. 31]

Little-known family. Small flies. Wings broadly oval, narrowed basally; veins nearly uniformly strong; discal cell present, giving rise to all branches of vein M. Body short and broad. Kovalev, 1981. *Jur.*

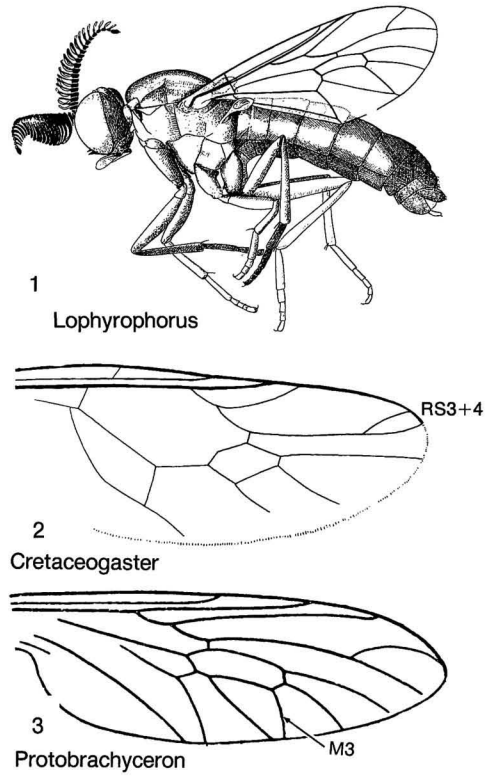


Fig. 230. Protobrachycerontidae, Xylophagidae, and Stratiomyidae (p. 421–422).

Palaeostratiomyia Rohdendorf, 1938, p. 32 [**P. pygmaea*; OD]. Proximal branch of RS sigmoidal; crossvein r-m at about midwing. Kovalev, 1981. *Jur.,* USSR (Kazakh).

Family EOMYIIDAE Rohdendorf, 1962

[Eomyiidae Rohdendorf, 1962a, p. 334]

Wings poorly known, venation delicate; thorax strongly convex above; head and antennae small. Kovalev, 1981. *Jur.*

Eomyia Rohdendorf, 1962a, p. 334 [**E. veterrima*; OD]. Antennae with rounded third segment. Rohdendorf, 1964. *Jur.,* USSR (Kazakh).

Family XYLOPHAGIDAE Fallén, 1810

[Xylophagidae Fallén, 1810, p. 6]

Antennal flagellum typically with 8 or 20 to 36 segments (flagellomeres), commonly subpetiolate or serrate; maxillary palpus

prominent, with two segments; legs slender; tibiae with one or two spurs; wing veins commonly uniformly strong. *Oligo.–Holo.*

Xylophagus MEIGEN, 1803, p. 266. [Generic assignment of fossil doubtful.] HENNIG, 1967a; KOVALEV, 1981. *Oligo.*, Europe (Baltic)–*Holo.*

Chrysothemis LOEW, 1850, p. 38 [**C. speciosa*; OD]. Little-known genus. HENNIG, 1967a. *Oligo.*, Europe (Baltic).

Lophyrophorus MEUNIER, 1902b, p. 397 [**L. flabellatus*; OD]. Similar to *Rachicerus* (recent); antennae with 33 segments in male, 15 in female. [Probably a synonym of *Chrysothemis*.] HENNIG, 1938, 1967a. *Oligo.*, Europe (Baltic).——FIG. 230,*1*. **L. flabellatus*; male, ×7 (Hennig, 1967a).

Trecela CARPENTER, 1986, p. 576, *nom. subst. pro Electra* LOEW, 1850, p. 38, *non* STEVENS, 1831 [**Electra formosa*; OD]. Similar to *Lophyrophus* but with fewer antennal segments. HENNIG, 1967a. *Oligo.*, Europe (Baltic).

Family XYLOMYIDAE Verrall, 1909

[Xylomyidae VERRALL, 1909, p. 217]

Similar to Stratiomyidae, but vein M3 coalesced with M4 distally, closing cell 3m. *Oligo.–Holo.*

Xylomya RONDANI, 1861, p. 11. COCKERELL, 1914b; MELANDER, 1949. *Oligo.*, USA (Colorado)–*Holo.*

Solva WALKER, 1859, p. 98. HENNIG, 1967a. *Oligo.*, Europe (Baltic)–*Holo.*

Family STRATIOMYIDAE Newman, 1835

[Stratiomyidae NEWMAN, 1835, p. 313]

Costa extending only to about wing apex; veins R and RS crowded toward anterior margin of wing and usually stronger than other veins; RS usually arising at level of m-cu crossvein (or slightly beyond); discal cell commonly small; RS3+4 diverging anteriorly, RS4 terminating on margin before apex. Flagellum elongate, usually annulate; tibiae commonly without apical spurs. Larvae elongate, occurring in damp soil or rotting vegetation. *Cret.–Holo.*

Stratiomys GEOFFROY, 1762, p. 475. ENDERLEIN, 1914. *Oligo.*, England, Europe (Germany)–*Holo.*

Beris LATREILLE, 1802, p. 447. JAMES, 1937. *Oligo.*, USA (Colorado)–*Holo.*

Cacosis WALKER, 1851, p. 83. MEUNIER, 1910b. *Oligo.*, Europe (Baltic)–*Holo.*

Cretaceogaster TESKEY, 1971, p. 1659 [**C. pygmaeus*; OD]. Similar to *Birkshiria* (recent) but with RS3+4 long and ending near wing apex. *Cret.*, Canada (Manitoba).——FIG. 230,*2*. **C. pygmaeus*; wing, ×27 (Teskey, 1971).

Cyphomyia WIEDEMANN, 1819, p. 54. COCKERELL, 1916c; JAMES, 1937. *Oligo.*, USA (Colorado)–*Holo.*

Hermetiella MEUNIER, 1908d, p. 264 [**H. bifurcata*; OD]. Similar to *Campreposopa* (recent), but third antennal segment with 7 distinct divisions. *Oligo.*, Europe (Baltic).

Lasiopa BRULLÉ, 1832, p. 307. JAMES, 1937. *Oligo.*, USA (Colorado)–*Holo.*

Moyamyia MELANDER, 1949, p. 26 [**M. limigena*; OD]. Clitellariine flies with pterostigma prominent, distal to discal cell. *Oligo.*, USA (Colorado).

Nemotelus GEOFFROY, 1762, p. 450. [Generic assignment of fossils doubtful.] COCKERELL, 1921e. *Eoc.*, USA (Colorado)–*Holo.*

Oxycera MEIGEN, 1803, p. 265. JAMES, 1937. *Oligo.*, USA (Colorado)–*Holo.*

Protoberis COCKERELL, 1915, p. 494 [**P. obliteratus*; OD]. Similar to *Beris* (recent); wings long; RS3 straight and slightly oblique. *Oligo.*, England.

Rhingiopsis ROEDER, 1886, p. 138. [Generic assignment of fossils doubtful.] COCKERELL, 1910c; JAMES, 1937. *Oligo.*, USA (Colorado)–*Holo.*

Sargus FABRICIUS, 1798, p. 549. [Generic assignment of fossils doubtful.] GIEBEL, 1862. *Eoc.*, USA (Colorado)–*Holo.*

Family EOSTRATIOMYIIDAE Rohdendorf, 1962

[Eostratiomyiidae ROHDENDORF, 1962a, p. 336]

Costa extending around wing apex; discal cell large; several crossveins present between veins RS3+4 and M. KOVALEV, 1981. *Jur.*

Eostratiomyia ROHDENDORF, 1962a, p. 336 [**E. avia*; OD]. Crossveins between RS3+4 and M at midwing; a single crossvein between R and base of RS1+2; anterior border of discal cell convex. ROHDENDORF, 1964. *Jur.*, USSR (Kazakh).——FIG. 231,7. **E. avia*; wing, ×7.5 (Rohdendorf, 1962a).

Family ATHERICIDAE Stuckenberg, 1973

[Athericidae STUCKENBERG, 1973, p. 669]

Similar to Rhagionidae but with RS1+2 curved anteriorly and joining costa at end of R; crossvein r-m joining discal cell near its proximal end. *Oligo.–Holo.*

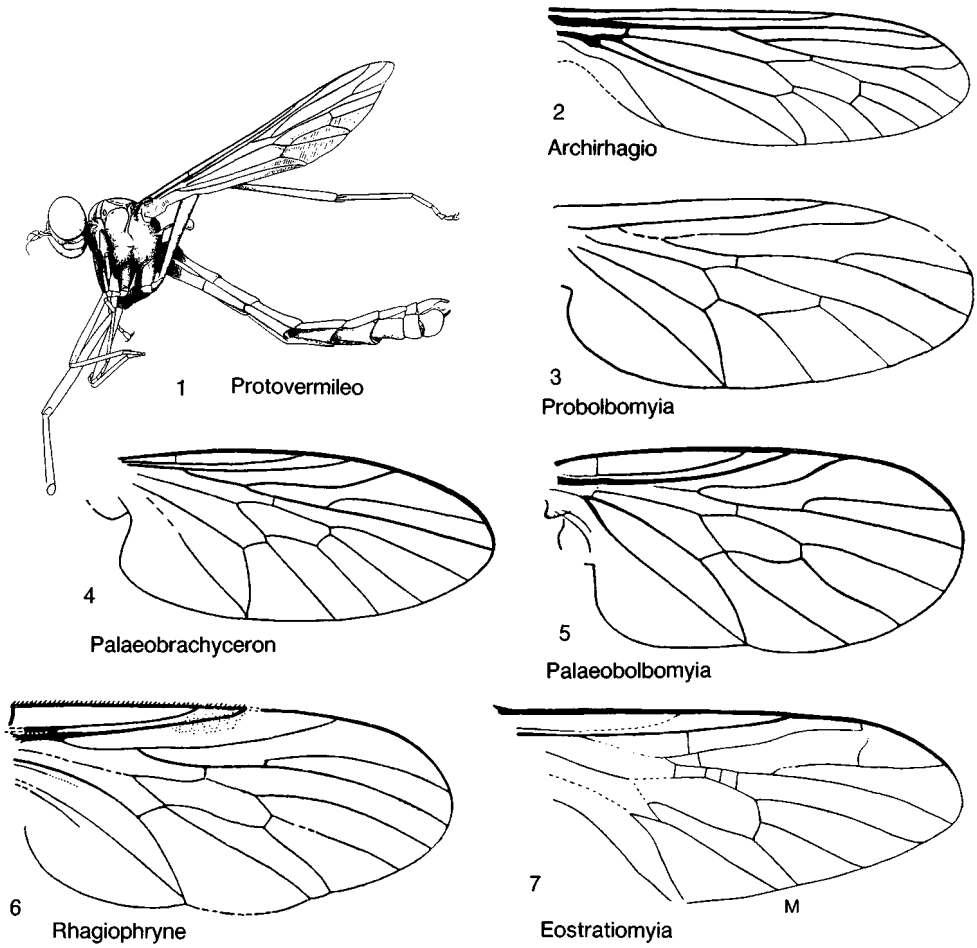


FIG. 231. Eostratiomyiidae and Rhagionidae (p. 422–424).

Atherix MEIGEN, 1803, p. 271. STUCKENBERG, 1974. *Holo.*

Succinatherix STUCKENBERG, 1974, p. 281 [**S. setifera*; OD]. Related to *Ibisia* (recent). Female: hairs on frons arranged in 2 sublateral series; third antennal segment narrowly reniform; tibial spur formula 1,2,2. Wing with discal cell remote from wing margin. *Oligo.*, Europe (Baltic).

Family RHAGIONIDAE Latreille, 1804–1805

[Rhagionidae LATREILLE, 1804–1805, p. 328] [=Rhagionempididae ROHDENDORF, 1938, *nom. transl.* ROHDENDORF, 1962a, p. 336, *ex* Rhagionempidinae ROHDENDORF, 1938, p. 33]

Vein SC extending at least to midwing; RS1+2 joining costa beyond end of R; RS3+4 commonly deeply forked. Flagellum with 8 segments in generalized forms, fewer segments in more specialized species; basal flagellar segment becoming swollen and bearing a style. Larvae very diverse, occurring in damp soil, rotting wood, or sand. KOVALEV, 1982. *Jur.–Holo.*

Rhagio FABRICIUS, 1775, p. 761 [=*Palaeohilarimorpha* MEUNIER, 1902b, p. 400 (type, *P. bifurcata*)]. COCKERELL, 1909b; THÉOBALD, 1937b; MELANDER, 1949; HENNIG, 1967a. *Oligo.*, Europe (Baltic, France), USA (Colorado)–*Holo.*

Archirhagio ROHDENDORF, 1938, p. 35 [**A. obscurus*; OD]. Wing narrow and long; fork of RS3+4 shallow and broad; main fork of M just beyond

midwing. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).——FIG. 231,*2*. **A. obscurus*; wing, ×4 (Rohdendorf, 1962a).

Atrichops VERRALL, 1909, p. 291. COCKERELL, 1914b. *Oligo.*, USA (Colorado)–*Holo.*

Bolbomyia LOEW, 1850, p. 39. HENNIG, 1967a. *Oligo.*, Europe (Baltic)–*Holo.*

Chrysopilus MACQUART, 1826, p. 403. COCKERELL, 1921d; STATZ, 1940; HENNIG, 1967a. *Oligo.*, Europe (Baltic, Germany), England, USA (Colorado)–*Holo.*

Dialysis WALKER, 1850, p. 4. COCKERELL, 1908h. *Oligo.*, USA (Colorado)–*Holo.*

Ija KOVALEV, 1981, p. 93 [**I. problematica*; OD]. Little-known genus; vein 1A obsolescent distally, not reaching wing margin. [Family assignment doubtful.] *Jur.*, USSR (Asian RSFSR).

Jurabrachyceron KOVALEV, 1981, p. 92 [**J. abbreviatum*; OD]. Similar to *Palaeobrachyceron*, but wing lacking vein M3. *Jur.*, USSR (Asian RSFSR).

Palaeobolbomyia KOVALEV, 1982, p. 94 [**P. sibirica*; OD]. Similar to *Jurabrachyceron*. Arista of antenna not segmented; RS1+2 slightly sigmoidal; RS4 aligned with stem of RS3+4; sides of discal cell not parallel. *Jur.*, USSR (Asian RSFSR).—— FIG. 231,*5*. **P. sibirica*; wing, ×20 (Kovalev, 1982).

Palaeobrachyceron KOVALEV, 1981, p. 87 [**P. handlirschi*; OD]. Wing: M with 4 branches; RS3 and RS4 almost parallel; SC terminating almost at midwing. *Jur.*, USSR (Asian RSFSR).—— FIG. 231,*4*. **P. handlirschi*; wing, ×17 (Kovalev, 1981).

Palaeoptiolina KOVALEV, 1982, p. 89 [**P. scobloi*; OD]. Similar to *Rhagionempis* but with a much longer fork on vein RS3+4. *Jur.*, USSR (Asian RSFSR).

Probolbomyia USSATCHOV, 1968, p. 620 [**P. modesta*; OD]. Related to *Bolbomyia*. RS1+2 nearly straight, arising at level of middle of stem of M; stem of M well developed, not coalesced with CUA; discal cell pentagonal; CUA curving in an arc to 1A at wing margin. *Jur.*, USSR (Kazakh).——FIG. 231,*3*. **P. modesta*; wing, ×18 (Ussatchov, 1968).

Protorhagio ROHDENDORF, 1938, p. 37 [**P. capitatus*; OD]. Wing moderately broad; RS forking shortly after its origin; first fork of M at midwing. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).

Protovermileo HENNIG, 1967a, p. 26 [**P. electrus*; OD]. Similar to *Vermileo* (recent), but arista with 6 distinct segments. *Oligo.*, Europe (Baltic).—— FIG. 231,*1*. **P. electrus*; whole insect, ×5 (Hennig, 1967a).

Rhagionempis ROHDENDORF, 1938, p. 34 [**R. tabanicornis*; OD]. Little-known genus, apparently similar to *Ussatchovia*. ROHDENDORF, 1962a, 1964; KOVALEV, 1982. *Jur.*, USSR (Kazakh).

Rhagiophryne ROHDENDORF, 1962a, p. 337 [**R. bianalis*; OD]. Wing short and broad; RS3+4 forking just beyond midwing. ROHDENDORF, 1964. *Jur.*, USSR (Kazakh).—— FIG. 231,*6*. **R. bianalis*; wing, ×14 (Rohdendorf, 1962a).

Symphoromyia FRAUENFELD, 1867, p. 497. PARAMONOV, 1936; THÉOBALD, 1937b; HENNIG, 1967a; STUCKENBERG, 1974. *Oligo.*, Europe (Baltic, France)–*Holo.*

Ussatchovia KOVALEV, 1982, p. 91 [**U. jurassica*; OD]. Similar to *Probolbomyia*; stem of RS3+4 much longer than stem of RS and nearly 3 times as long as fork of RS3+4; RS3 and RS4 diverging at a nearly symmetrical angle. Arista of antenna segmented distally. *Jur.*, USSR (Asian RSFSR).

Family TABANIDAE Leach, 1815

[Tabanidae LEACH, 1815, p. 161]

Fork of vein RS3+4 shorter than in Rhagionidae; RS3 and RS4 widely divergent distally, including wing apex between them; 1A nearly straight, usually coalesced with CUA distally. Mandibles absent in males; fore tibiae with spurs. Larvae in rotting vegetation or wood. *Eoc.–Holo.*

Tabanus LINNÉ, 1758, p. 601. COCKERELL, 1909b; DÜRRENFELDT, 1968. *Oligo.*, USA (Colorado); *Plio.*, Europe (Germany)–*Holo.*

Chrysops MEIGEN, 1800, p. 23. COCKERELL, 1921d; PITON, 1940a. *Eoc.*, Europe (France); *Oligo.*, England–*Holo.*

Silvius MEIGEN, 1820, p. 27. [Generic assignment of fossils doubtful.] MEUNIER, 1902b; MELANDER, 1946; HENNIG, 1967a. *Oligo.*, Europe (Baltic), USA (Colorado)–*Holo.*

Family ACROCERIDAE Leach, 1815

[Acroceridae LEACH, 1815, p. 162]

Venation diversely modified, often reduced. Head small; eyes holoptic in both sexes; flagellum not divided. Larvae, in early stages, parasitic on spiders. *Jur.–Holo.*

Acrocera MEIGEN, 1803, p. 266. *Holo.*

Archocyrtus USSATCHOV, 1968, p. 622 [**A. gibbosus*; OD]. RS1+2 absent (apparently completely coalesced with R); RS3+4 with a short distal fork; RS3 just meeting end of R; M with 3 branches. Antennae large, flagellum at least as long as first and second antennal segments combined. *Jur.*, USSR (Kazakh).——FIG. 232,*4*. **A.*

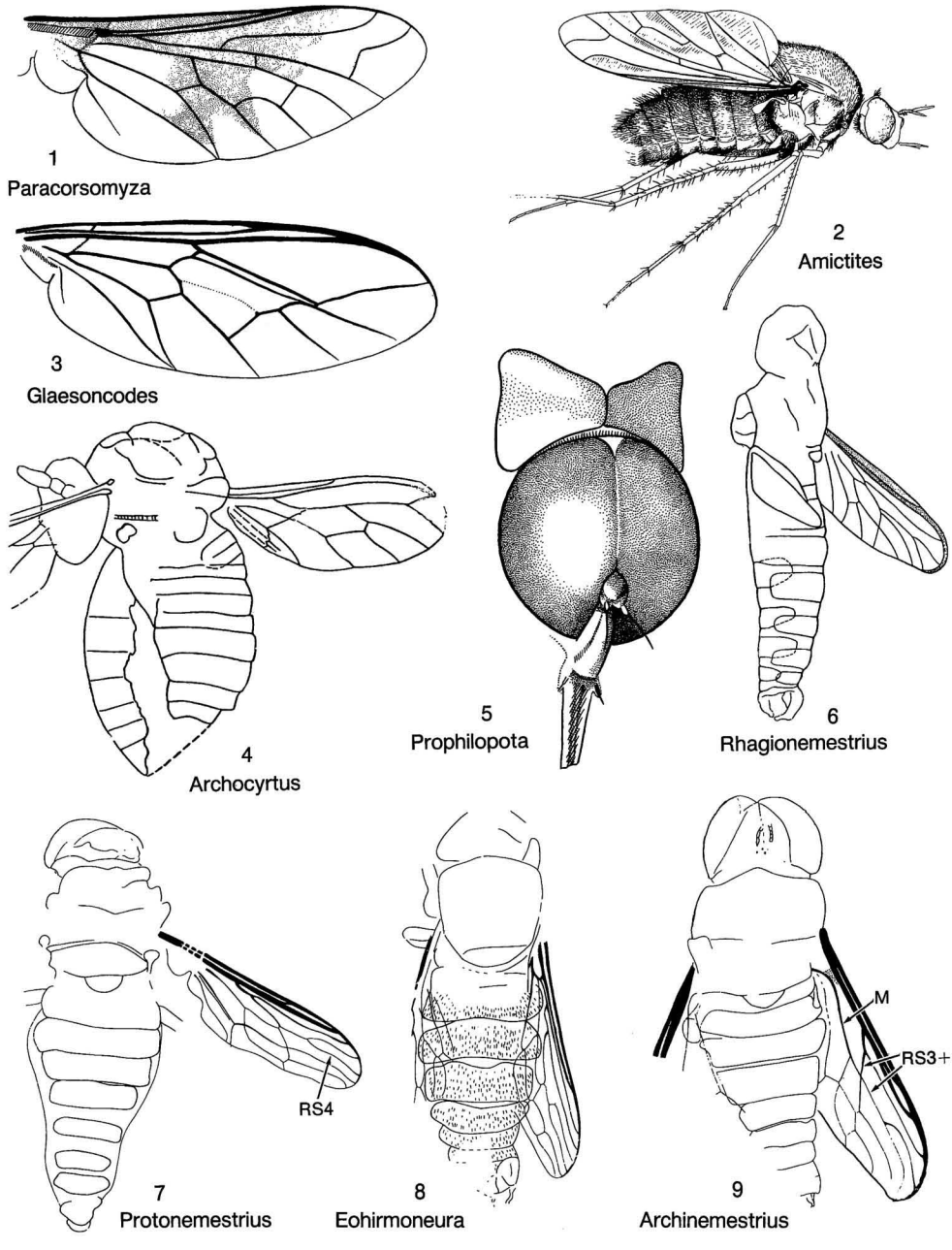


FIG. 232. Acroceridae, Nemestrinidae, and Bombyliidae (p. 424–427).

gibbosus; whole specimen, ×15 (Ussatchov, 1968).

Glaesoncodes HENNIG, 1968, p. 4 [**G. completinervis*; OD]. Similar to *Ogcodes* (recent); eyes naked; wing venation more nearly complete than in *Ogcodes*. *Oligo.*, Europe (Baltic). —— FIG. 232,*3*. **G. completinervis*; wing, ×11 (Hennig, 1968).

Prophilopota HENNIG, 1966e, p. 9 [**P. succinea*; OD]. Similar to *Philopota* (recent), but face

(frons) small and more nearly flat. *Oligo.*, Europe (Baltic).——Fig. 232,5. **P. succinea*; head, ×22 (Hennig, 1966e).

Villalites Hennig, 1966e, p. 19 [**V. electrica*; OD]. Similar to *Villalus* (recent), but proboscis prominent and as long as in *Holops* (recent). *Oligo.*, Europe (Baltic).

Family NEMESTRINIDAE Macquart, 1834

[Nemestrinidae Macquart, 1834 in Macquart, 1834–1835, p. 370]

Wing with fork of vein RS3+4 very narrow; RS3 and RS4 nearly parallel and terminating on wing margin before apex; M1 and M2 also parallel and terminating on margin before apex; stem of RS3+4 and stem of M1+2 aligned to form a diagonal vein near midwing. Larvae parasitic on Orthoptera and certain coleopterous larvae. *Jur.–Holo.*

Nemestrina Latreille, 1809, p. 307. *Holo.*

Archinemestrius Rohdendorf, 1968, p. 181 [**A. karatavicus*; OD]. Wing tip slightly falcate; M1, M2, and RS4 curved distally and terminating on hind margin of wing, below apex; RS3+4 briefly touching M1+2; M2 short. Head short, apparently lacking a long proboscis. *Jur.*, USSR (Kazakh).——Fig. 232,9. **A. karatavicus*; whole insect, ×5 (Rohdendorf, 1968).

Eohirmoneura Rohdendorf, 1968, p. 187 [**E. carpenteri*; OD]. Similar to *Hirmoneura* and belonging to subfamily Hirmoneurinae; diagonal vein incomplete, not reaching posterior wing margin. *Jur.*, USSR (Kazakh).——Fig. 232,8. **E. carpenteri*; whole insect, ×3.5 (Rohdendorf, 1968).

Hirmoneura Meigen, 1820, p. 132 [=*Hirmoneurites* Cockerell, 1910c, p. 283 (type, *H. willistoni*)]. Bequaert & Carpenter, 1936. *Oligo.*, USA (Colorado)–*Holo.*

Neorhynchocephalus Lichtwardt, 1909, p. 512. Cockerell, 1908g; Bequaert & Carpenter, 1936; Bernardi, 1974. *Oligo.*, USA (Colorado)–*Holo.*

Prohirmoneura Handlirsch, 1906b, p. 633 [**P. jurassica*; OD]. Little-known genus, apparently belonging to subfamily Hirmoneurinae. Bequaert & Carpenter, 1936; Ussatchov, 1968. *Jur.*, Europe (Bavaria).

Prosoeca Schiner, 1867, p. 311 [=*Palembolus* Scudder, 1878a, p. 526 (type, *P. florigerus*)]. Meunier, 1903a; Bequaert & Carpenter, 1936. *Oligo.*, USA (Colorado)–*Holo.*

Protonemestrius Rohdendorf, 1968, p. 182 [**P. martynovi*; OD]. Similar to *Archinemestrius*, but RS4 slightly curved and terminating on anterior margin at apex. Proboscis sometimes elongate. *Jur.*, USSR (Kazakh).—— Fig. 232,7. **P. martynovi*; whole insect, ×5.5 (Rohdendorf, 1968).

Rhagionemestrius Ussatchov, 1968, p. 621 [**R. rapidus*; OD]. SC very long, terminating slightly proximad of forking of RS3+4; stem of M well developed; M2 and M3 originating from a single point on discal cell. *Jur.*, USSR (Kazakh).—— Fig. 232,6. **R. rapidus*; whole insect, ×6 (Ussatchov, 1968).

Family BOMBYLIIDAE Latreille, 1802

[Bombyliidae Latreille, 1802a, p. 427]

Small to large flies, generally with a conspicuous covering of hair. Venation unusually diverse; veins RS and M usually with 3 branches; distal parts of RS1+2 and RS3 commonly curved anteriorly; wing apex usually between RS3 and RS4; discal cell long. Larvae parasitic on immature stages of endopterygote insects. *Oligo.–Holo.*

Bombylius Linné, 1758, p. 606. Meunier, 1915a. *Oligo.*, Europe (France)–*Holo.*

Acreotrichites Cockerell, 1917b, p. 376 [**A. scopulicornis*; OD]. Similar to *Acreotrichus* (recent), but crossvein r-m well before middle of discal cell. *Oligo.*, USA (Colorado).

Alepidophora Cockerell, 1909d, p. 54 [**A. peali*; OD]. Similar to *Panturbes* (recent); RS1+2 ending on costa at a very obtuse angle; crossvein r-m located beyond midwing; discal cell long and narrow. Cockerell, 1914c; Melander, 1949; Lewis, 1972. *Oligo.*, USA (Colorado, Montana).

Alomatia Cockerell, 1914d, p. 721 [**A. fusca*; OD]. Similar to *Lithocosmus*, but crossvein r-m at end of basal quarter of discal cell; cell between RS4 and M1 not narrowed at wing margin. Cockerell, 1914c. *Oligo.*, USA (Colorado).

Amictites Hennig, 1966e, p. 9 [**A. regiomontana*; OD]. Similar to *Amictus* (recent), but wing with very broad axillary area; tibiae with prominent spines. *Oligo.*, Europe (Baltic).——Fig. 232,2. **A. regiomontana*; whole insect, ×3 (Hennig, 1966e).

Amphicosmus Coquillett, 1891, p. 219. Melander, 1949. *Oligo.*, USA (Colorado)–*Holo.*

Apolysis Loew, 1860, p. 86. Melander, 1949. *Oligo.*, USA (Colorado)–*Holo.*

Dischistus Loew, 1855, p. 45. Théobald, 1937a. *Oligo.*, Europe (France)–*Holo.*

Dolichomyia Wiedemann, 1830, p. 642. Cockerell, 1917a. *Oligo.*, USA (Colorado)–*Holo.*

Exoprosopa Macquart, 1840, p. 35. Théobald, 1937a. *Oligo.*, Europe (France)–*Holo.*

Geron Meigen, 1820, p. 223. [Generic assignment of fossils doubtful.] Cockerell, 1914f; Théobald, 1937a; Paramonov, 1939. *Oligo.*, USA (Colorado), Europe (France)–*Holo.*

Geronites Cockerell, 1914c, p. 230 [**G. stig-*

malis; OD]. Similar to *Geron* (recent), but crossvein r-m situated well before middle of discal cell. *Oligo.*, USA (Colorado).

Glabellula Bezzi, 1902, p. 191. Schlüter, 1976b. *Oligo./Mio.*, Dominican Republic–*Holo.*

Glaesamictus Hennig, 1966f, p. 12 [**B. hafniensis*; OD]. Similar to *Amictites*, but vertex much broader and tibiae with fewer and weaker spines; axillary area of wing small. *Oligo.*, Europe (Baltic).

Lithocosmus Cockerell, 1909b, p. 72 [**L. coquilletti*; OD] [=*Protophthiria* Cockerell, 1914d, p. 720 (type, *P. palpalis*)]. A cyllenine genus, with anal cell open at wing margin; distal part of R curving anteriorly toward wing margin; crossvein r-m slightly basad of middle of discal cell. Melander, 1949; Evenhuis, 1984. *Oligo.*, USA (Colorado).

Megacosmus Cockerell, 1909a, p. 10 [**M. mirandus*; OD]. Similar to *Paracosmus* (recent), but RS1+2 more recurved distally. Cockerell, 1911b, 1914c. *Oligo.*, USA (Colorado).

Melanderella Cockerell, 1909b, p. 70 [**M. glossalis*; OD]. Similar to *Dolichomyia*, but distal portion of vein M3 straight and CUA and 1A touching at wing margin. Hind femora incrassate. Cockerell, 1911b; Melander, 1949. *Oligo.*, USA (Colorado).

Pachysystropus Cockerell, 1909d, p. 56 [**P. rohweri*; OD]. Similar to *Systropus*, but RS4 and M1 as well as CUA and 1A coalesced just before wing margin. Cockerell, 1910c. *Oligo.*, USA (Colorado).

Palaeoamictus Meunier, 1916a, p. 275 [**P. spinosus*; OD]. Little-known genus, probably belonging to subfamily Cylleniinae. Hennig, 1966f. *Oligo.*, Europe (Baltic).

Palaeogeron Meunier, 1914a, p. 195 [**P. vetustus*; OD]. Similar to *Geron*, but cell between CUA and 1A open. *Oligo.*, Europe (France).

Paracorsomyza Hennig, 1966f, p. 4 [**P. crassirostris*; OD]. Similar to *Callynthrophora* and *Gnumyia* (both recent) but differing by its longer proboscis and long and uniformly slender first antennal segment. RS1+2 strongly sigmoidal. *Oligo.*, Europe (Baltic).——Fig. 232,*1*. **P. crassirostris*; wing, ×9 (Hennig, 1966f).

Phthiria Meigen, 1803, p. 268. Timon-David, 1944a. *Oligo.*, Europe (France)–*Holo.*

Praecythera Théobald, 1937b, p. 168 [**P. sardii*; OD]. Similar to *Cythera* (recent), but RS forking basad of fork of M. *Oligo.*, Europe (France).

Proglabellula Hennig, 1966f, p. 15 [**P. electrica*; OD]. Similar to *Glabellula*, but short piece of M3+4 present and wing longer. *Oligo.*, Europe (Baltic).

Proplatypygus Hennig, 1969b, p. 58 [**P. succineus*; OD]. Similar to *Platypygus* (recent) but with proboscis relatively short and occiput only slightly arched. *Oligo.*, Europe (Baltic).

Protepacmus Cockerell, 1916c, p. 94 [**P. setosus*; OD]. Similar to *Alepidophora*, but wings much longer. *Oligo.*, USA (Colorado).

Protolomatia Cockerell, 1914d, p. 723 [**P. antiqua*; OD]. Similar to *Lomatia* (recent), but crossvein r-m less oblique. Cockerell, 1914c, 1916c. *Oligo.*, USA (Colorado).

Systropus Wiedemann, 1820, p. 18. Meunier, 1917c; Cockerell, 1921d. *Oligo.*, Europe (Germany), England–*Holo.*

Tithonomyia Evenhuis, 1984, p. 160 [**Protophthiria atra* Melander, 1949, p. 33; OD]. Little-known genus, apparently close to the bombyliines. *Oligo.*, USA (Colorado).

Usia Latreille, 1802, p. 430. Statz, 1940. *Oligo.*, Europe (Germany)–*Holo.*

Verrallites Cockerell, 1913f, p. 230 [**V. cladurus*; OD]. Somewhat similar to *Lepidophora* (recent), but CUA and 1A widely separated on wing margin. *Oligo.*, USA (Colorado).

Villa Lioy, 1864, p. 732. Handlirsch, 1907. *Oligo.*, Europe (France); *Mio.*, Europe (Italy)–*Holo.*

Family THEREVIDAE Newman, 1835

[Therevidae Newman, 1835, p. 391]

Vein M with 4 branches, all terminating on wing margin; anal cell closed; 1A and CUA meeting before wing margin. Larvae predaceous, usually found in soil. *Oligo.–Holo.*

Thereva Latreille, 1796, p. 167. Théobald, 1937a. *Oligo.*, Europe (France)–*Holo.*

Glaesorthactia Hennig, 1967c, p. 3 [**Thereva magnicornis* Meunier, 1908d, p. 260; OD]. Similar to *Orthactia* (recent), but eyes of male separated. *Oligo.*, Europe (Baltic).

Nebritus Coquillett, 1894, p. 98. Melander, 1949. *Oligo.*, USA (Colorado)–*Holo.*

Paraclia Enderlein, 1936, p. 88. [Generic assignment of fossils doubtful.] Statz, 1940. *Oligo.*, Europe (Germany)–*Holo.*

Psilocephala Zetterstedt, 1838, p. 525. [Generic assignment of fossils doubtful.] Cockerell, 1909b, 1916c; Hennig, 1967c. *Oligo.*, Europe (Baltic), USA (Colorado); *Mio.*, Burma–*Holo.*

Rueppellia Kertész, 1909, p. 148. [Generic assignment of fossils doubtful.] Cockerell, 1927b. *Oligo.*, USA (Colorado)–*Holo.*

Family MYDIDAE Latreille, 1806

[Mydidae Latreille, 1806, p. 293]

All branches of veins RS, M1, and M2 terminating on wing margin before apex; antennae long and conspicuously clubbed. Larvae in rotting wood; apparently predaceous on Coleoptera. *Oligo.–Holo.*

Mydas FABRICIUS, 1794, p. 252. COCKERELL, 1913d. *Oligo.*, USA (Colorado)–*Holo.*

Family PROTOMPHRALIDAE Rohdendorf, 1957

[Protomphralidae ROHDENDORF, 1957, p. 91]

Little-known flies. Vein RS with 4 branches, all terminating on costal margin, its stem remote from costal margin. *Jur.*

Protomphrale ROHDENDORF, 1938, p. 39 [**P. martynovi*; OD]. Wings relatively short and narrow, with convex costal margin. ROHDENDORF, 1957, 1962a, 1964. *Jur.*, USSR (Kazakh).

Family ASILIDAE Latreille, 1804–1805

[Asilidae LATREILLE, 1804–1805, p. 305]

Wing venation generalized, close to basic pattern in Brachycera; veins RS3 and RS4 only slightly divergent distally; M3+4 unbranched. Vertex of head usually concave; flagellum with a terminal style; mouthparts forming a straight proboscis, commonly longer than head; thorax and legs with strong setae. Larvae in soil or rotting wood. *Eoc.–Holo.*

Asilus LINNÉ, 1758, p. 605. HEER, 1849; LOEW, 1850; MEUNIER, 1908c, 1915a; COCKERELL, 1909b, 1911b, 1914f, 1921d, 1921e; JAMES, 1939; MELANDER, 1946. *Eoc.*, USA (Colorado); *Oligo.*, Europe (Baltic), USA (Colorado); *Mio.*, Europe (Germany)–*Holo.*

Asilopsis COCKERELL, 1920c, p. 250 [**A. fusculus*; OD]. Little-known genus; marginal cell (below R) closed well before wing apex. [Family assignment doubtful.] *Eoc.*, USA (Colorado).

Ceraturgus WIEDEMANN, 1824, p. 12. JAMES, 1939. *Oligo.*, USA (Colorado)–*Holo.*

Cophura OSTEN-SACKEN, 1887, p. 181. COCKERELL, 1913e; JAMES, 1939. *Oligo.*, USA (Colorado)–*Holo.*

Dioctria MEIGEN, 1803, p. 270. COCKERELL, 1909d, 1917f; JAMES, 1939. *Oligo.*, USA (Colorado)–*Holo.*

Holopogon LOEW, 1847, p. 473. [Generic assignment of fossil doubtful.] HULL, 1960. *Mio.*, USA (Montana)–*Holo.*

Leptogaster MEIGEN, 1803, p. 269. UNGER, 1841; MELANDER, 1946. *Oligo.*, USA (Colorado); *Mio.*, Europe (Croatia)–*Holo.*

Lestomyia WILLISTON, 1883, p. 19. JAMES, 1939. *Oligo.*, USA (Colorado)–*Holo.*

Machimus LOEW, 1849, p. 1. TIMON-DAVID, 1944a. *Oligo.*, Europe (France)–*Holo.*

Microstylum MACQUART, 1838, p. 26. COCKERELL, 1908h, 1909n. *Oligo.*, USA (Colorado)–*Holo.*

Nicodes JAENNICKE, 1867, p. 355. COCKERELL, 1909n. *Oligo.*, USA (Colorado)–*Holo.*

Palaeomolobra HULL, 1962, p. 23 [**Senoprosopis antiquus* JAMES, 1939, p. 43; OD]. Similar to *Lestomyia* but with only a weak spine on anterior tibia; marginal cell (below R) widely open at margin. *Oligo.*, USA (Colorado).

Philonicus LOEW, 1849, p. 144. JAMES, 1939. *Oligo.*, USA (Colorado)–*Holo.*

Proctacanthus MACQUART, 1838, p. 120. COCKERELL, 1921d. *Oligo.*, England–*Holo.*

Pseudophrisson DÜRRENFELDT, 1968, p. 45 [**P. primus*; OD]. Little-known genus, apparently similar to *Antiphrisson* (recent). *Plio.*, Europe (Germany).

Saropogon LOEW, 1847, p. 439. COCKERELL, 1914b. *Oligo.*, USA (Colorado)–*Holo.*

Senoprosopis MACQUART, 1838, p. 130. JAMES, 1939; MELANDER, 1949; HULL, 1957, 1960. *Oligo.*, USA (Colorado)–*Holo.*

Stenocinclis SCUDDER, 1878b, p. 751 [**S. anomala*; OD]. Similar to *Dioctria*; marginal cell (below R) open; RS3+4 arising directly from R before origin of RS1+2. [Family assignment doubtful.] SCUDDER, 1890. *Eoc.*, USA (Wyoming).

Taracticus LOEW, 1872, p. 64. COCKERELL, 1910c, 1911b. *Oligo.*, USA (Colorado)–*Holo.*

Family EREMOCHAETIDAE Ussatchov, 1968

[Eremochaetidae USSATCHOV, 1968, p. 617]

Costa extending along wing margin nearly to vein RS4; SC extending beyond midwing; RS1+2 terminating on R; middle portion of RS3+4 forming part of anterior side of discal cell; CUA with a strong angle at crossvein m-cu; 1A present. Antenna with a large flagellum, clearly segmented. *Jur.*

Eremochaetus USSATCHOV, 1968, p. 618 [**E. asilicus*; OD]. RS1+2 terminating on R near wing apex; RS3+4 forked distally; M with 4 branches; 1A extending to wing margin. *Jur.*, USSR (Kazakh).——FIG. 233,*2*. **E. asilicus*; whole specimen, ×7.3 (Ussatchov, 1968).

Pareremochaetus USSATCHOV, 1968, p. 619 [**P. minor*; OD]. Similar to *Eremochaetus*, but RS1+2 coalesced with R shortly after origin of RS; M with 4 branches; 1A not reaching wing margin. *Jur.*, USSR (Kazakh).——FIG. 233,*1*. **P. minor*; whole specimen, ×10 (Ussatchov, 1968).

Family PROTEMPIDIDAE Ussatchov, 1968

[Protempididae USSATCHOV, 1968, p. 623]

Wing broad, with very narrow base; vein RS3 short; discal cell present; M with 3

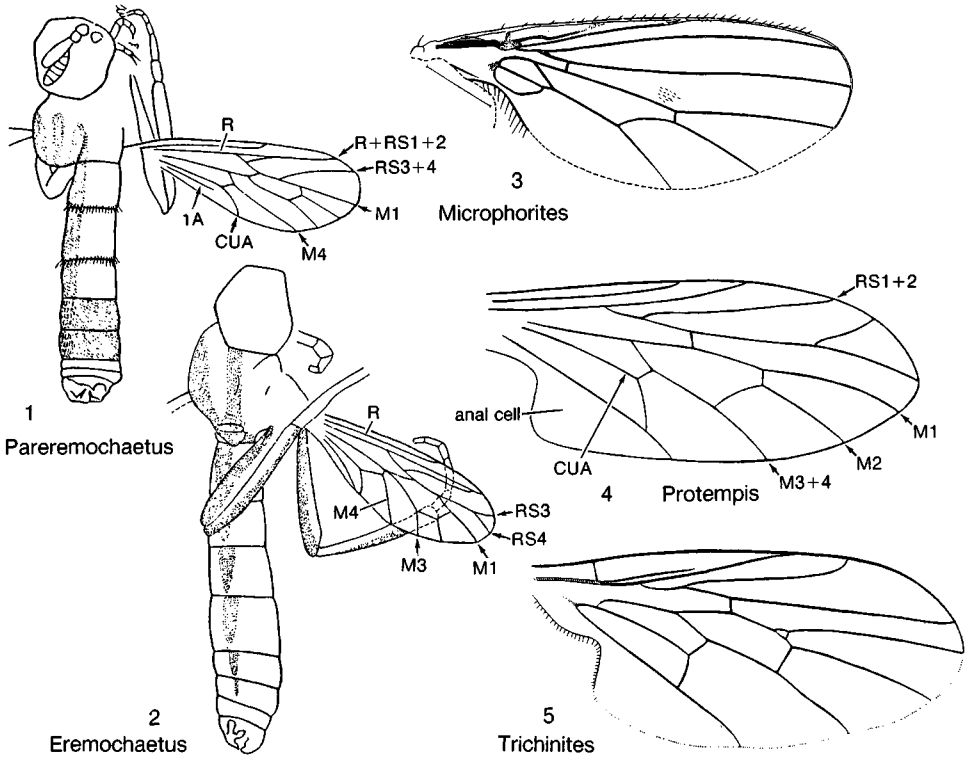


FIG. 233. Eremochaetidae, Protempididae, and Empididae (p. 428–430).

branches; anal cell closed and petiolate; antennal style with 2 segments. *Jur.*

Protempis USSATCHOV, 1968, p. 623 [**P. antennata*; OD]. M3+4 forming part of posterior margin of discal cell. HENNIG, 1970. *Jur.*, USSR (Kazakh).——FIG. 233,*4*. **P. antennata*; wing, ×20 (Hennig, 1970).

Family EMPIDIDAE Latreille, 1804–1805

[Empididae LATREILLE, 1804–1805, p. 310]

In generalized species veins M1+2 and RS3+4 forked, in more specialized species either or both veins may be unbranched; CUA short, commonly recurved distally and terminating on 1A. Proboscis usually straight and elongate. Larvae in decaying vegetation or aquatic. NEGROBOV, 1978. *Cret.–Holo.*

Empis LINNÉ, 1758, p. 603. STATZ, 1940; MELANDER, 1949. *Oligo.*, USA (Colorado), Europe (Baltic, Germany)–*Holo.*

Acallomyia MELANDER, 1927, p. 140. MELANDER, 1949. *Oligo.*, USA (Colorado)–*Holo.*

Archichrysotus NEGROBOV, 1978, p. 84 [**A. hennigi*; OD]. A microphorine with 2 terminal branches on vein M. *Cret.*, USSR (Asian RSFSR).

Archiplatypalpus KOVALEV, 1974, p. 84 [**A. cretaceus*; OD]. Similar to *Platypalpus* but with holoptic eyes in male, and only a single longitudinal row of spinules on ventral surface of middle femora. *Cret.*, USSR (Asian RSFSR).

Chelifera MACQUART, 1823, p. 150. MELANDER, 1927. *Oligo.*, Europe (Baltic)–*Holo.*

Chelipoda MACQUART, 1823, p. 148. MELANDER, 1927. *Oligo.*, Europe (Baltic)–*Holo.*

Cretomicrophorus NEGROBOV, 1978, p. 82 [**C. rohdendorfi*; OD]. Similar to *Microphorites* but with antennae on apical third of head; wing with RS3+4 terminating at wing apex. *Cret.*, USSR (Asian RSFSR).

Cretoplatypalpus KOVALEV, 1978, p. 72 [**C. archaeus*; OD]. Similar to *Archiplatypalpus*, but with eyes separated and with 6 scutellar bristles. SUESS, 1979. *Cret.*, USSR (Asian RSFSR).

Drapetiella MEUNIER, 1908h, p. 97 [**D. definita*; OD]. Little-known genus, possibly close to *Euthyneura* (recent); discal cell open. MELANDER, 1927. *Oligo.*, Europe (Baltic)–*Holo.*

Drapetis MEIGEN, 1822, p. 91. MELANDER, 1927. *Oligo.*, Europe (Baltic)–*Holo.*

Dysaletria LOEW, 1860, p. 7. MELANDER, 1927. *Oligo.,* Europe (Baltic)–*Holo.*

Ecommocydromia SCHLÜTER, 1978a, p. 103 [**E. difficilis*; OD]. Little-known genus; costa extending to end of M1+2; SC and R much reduced; RS3+4 not forked. *Cret.,* Europe (Germany).

Electrocyrtoma COCKERELL, 1917c, p. 22 [**E. burmanica*; OD]. Similar to *Bicellaria* (recent) but with longer arista and with slender tibiae and tarsi; discal cell open. MELANDER, 1927. *Mio.,* Burma.

Euthyneuriella MEUNIER, 1908h, p. 112 [**E. longirostris*; OD]. Little-known genus, possibly a synonym of *Trichina* (recent). *Oligo.,* Europe (Baltic)–*Holo.*

Hilara MEIGEN, 1822, p. 1. COLLADO, 1926; MELANDER, 1927. *Oligo.,* Europe (Baltic, Spain); *Mio.,* Europe (Germany)–*Holo.*

Hybos MEIGEN, 1803, 269. MELANDER, 1927. *Oligo.,* Europe (Baltic)–*Holo.*

Leptopeza MACQUART, 1827, p. 143. MELANDER, 1927. *Oligo.,* Europe (Baltic)–*Holo.*

Meghyperiella MEUNIER, 1908h, p. 112 [**M. porphyropsoides*; OD]. Related to *Leptopeza* but with more generalized arista. MELANDER, 1927. *Oligo.,* Europe (Baltic)–*Holo.*

Micrempis MELANDER, 1927, p. 298. *Oligo.,* Europe (Baltic)–*Holo.*

Microphorites HENNIG, 1971b, p. 16 [**M. extinctus*; OD]. Similar to *Microphorus* but with anal angle of wing margin rounded. *Cret.,* Europe (Lebanon).——FIG. 233,3. **M. extinctus*; wing, ×46 (Hennig, 1971b).

Microphorus MACQUART, 1827, p. 139. HANDLIRSCH, 1910b; HENNIG, 1971b. *Eoc.,* Canada (British Columbia); *Oligo.,* Europe (Baltic)–*Holo.*

Oedalea MEIGEN, 1820, p. 355. MELANDER, 1927. *Oligo.,* Europe (Baltic)–*Holo.*

Palaeoleptopeza MEUNIER, 1908h, p. 111 [**P. gracilis*; OD]. Similar to *Leptopeza* but with spinose hind femora. MELANDER, 1927. *Oligo.,* Europe (Baltic).

Palaeoparamesia MEUNIER, 1902d, p. 98 [**P. proosti*; OD]. Little-known genus, probably a synonym of *Clinocera* (recent). MEUNIER, 1908d; MELANDER, 1927. *Oligo.,* Europe (Baltic).

Parathalassiella MEUNIER, 1908h, p. 106 [**P. problematica*; OD]. Little-known genus; RS3+4 forked; discal cell present; arista as long as rest of antenna. MELANDER, 1927. *Oligo.,* Europe (Baltic).

Platypalpus MACQUART, 1827, p. 92. MELANDER, 1927. *Oligo.,* Europe (Baltic)–*Holo.*

Progloma JAMES, 1937, p. 247 [**P. rohweri*; OD]. Similar to *Gloma* (recent), but fork of RS3+4 distal to end of RS1+2 and discal cell relatively shorter. JAMES, 1939. *Oligo.,* USA (Colorado).

Protoedalea COCKERELL, 1920c, p. 252 [**P. brachystoma*; OD]. Similar to *Oedalea,* but R and RS1+2 longer, discal cell narrower, and M1+2 abbreviated. MELANDER, 1927. *Eoc.,* USA (Colorado).

Ragas WALKER, 1837, p. 229. [Generic assignment of fossils doubtful.] MELANDER, 1927. *Oligo.,* Europe (Baltic)–*Holo.*

Rhamphomyia MEIGEN, 1822, p. 42. COCKERELL, 1921e; MELANDER, 1927, 1949; STATZ, 1940. *Eoc.,* USA (Colorado); *Oligo.,* USA (Colorado), Europe (Baltic, Germany)–*Holo.*

Tachydromia MEIGEN, 1803, p. 269. MELANDER, 1927; TIMON-DAVID, 1944a. *Oligo.,* Europe (Baltic, France)–*Holo.*

Tachypeza MEIGEN, 1830, p. 341. MELANDER, 1927, 1949. *Oligo.,* Europe (Baltic), USA (Colorado)–*Holo.*

Timalphes MELANDER, 1927, p. 97. *Oligo.,* Europe (Baltic)–*Holo.*

Trichinites HENNIG, 1970, p. 7 [**T. cretaceus*; OD]. Related to *Trichina* and *Trichinomyia* (recent), but with 3 branches of M arising from closed discal cell; arista longer than third antennal segment. *Cret.,* Europe (Lebanon).——FIG. 233,5. **T. cretaceus*; wing, ×34 (Hennig, 1970).

Trichopeza RONDANI, 1856, p. 150. MELANDER, 1927. *Oligo.,* Europe (Baltic)–*Holo.*

Family DOLICHOPODIDAE Latreille, 1809

[Dolichopodidae LATREILLE, 1809, p. 290]

Costa extending along wing margin as far as vein M1 (or M1+2); RS1+2 and RS3+4 unbranched; SC very short, ending on R, or in subcostal space; 1A very short, not reaching wing margin. Flagellum usually with long, thin arista. Larvae in rotting vegetation, under bark, etc.; mostly predaceous. *Cret.–Holo.*

Dolichopus LATREILLE, 1796, p. 159. [Generic assignment of fossils doubtful.] MEUNIER, 1907–1908, 1908i; THÉOBALD, 1937a; STATZ, 1940. *Oligo.,* Europe (France, Germany, Baltic)–*Holo.*

Achalcus LOEW, 1857, p. 30. [Generic assignment of fossils doubtful.] MEUNIER, 1907–1908. *Oligo.,* Europe (Baltic)–*Holo.*

Anepsiomyia BEZZI, 1902, p. 192. [Generic assignment of fossils doubtful.] MEUNIER, 1907–1908. *Oligo.,* Europe (Baltic)–*Holo.*

Argyra MACQUART, 1834, p. 456. [Generic assignment of fossils doubtful.] MEUNIER, 1907–1908. *Oligo.,* Europe (Baltic)–*Holo.*

Campsicnemus HALIDAY, 1832, p. 357. [Generic assignment of fossils doubtful.] MEUNIER, 1907–1908. *Oligo.,* Europe (Baltic)–*Holo.*

Chrysotus MEIGEN, 1824, p. 40. [Generic assignment of fossils doubtful.] MEUNIER, 1907–1908. *Oligo.,* Europe (Baltic, Roumania)–*Holo.*

Diaphorus MEIGEN, 1824, p. 32. MEUNIER, 1907–1908. *Oligo.,* Europe (Baltic)–*Holo.*

Gheynius MEUNIER, 1907–1908, p. 8 [**G. bifurcatus*; OD]. Little-known genus; third antennal segment with a long, median arista between 2 projections from segment. *Oligo.,* Europe (Baltic).

Gymnopternus LOEW, 1857, p. 10. MEUNIER, 1908i. *Oligo.,* Europe (Baltic)–*Holo.*

Hercostomus LOEW, 1857, p. 9. QUIÉVREUX, 1938. *Oligo.,* Europe (France)–*Holo.*

Hygroceleuthus LOEW, 1857, p. 10. MEUNIER, 1908i. *Oligo.,* Europe (Baltic)–*Holo.*

Lyroneurus LOEW, 1857, p. 38. [Generic assignment of fossil doubtful.] MEUNIER, 1907–1908. *Oligo.,* Europe (Baltic)–*Holo.*

Medetera FISCHER VON WALDHEIM, 1819, p. 7. [Generic assignment of fossil doubtful.] MEUNIER, 1907–1908. *Oligo.,* Europe (Baltic)–*Holo.*

Nematoproctus LOEW, 1857, p. 40. [Generic assignment of fossil doubtful.] MEUNIER, 1907–1908. *Oligo.,* Europe (Baltic)–*Holo.*

Neurigona RONDANI, 1856, p. 142. [Generic assignment of fossil doubtful.] MEUNIER, 1907–1908. *Oligo.,* Europe (Baltic)–*Holo.*

Oncopygus LOEW, 1873, p. 44. [Generic assignment of fossil doubtful.] STATZ, 1940. *Oligo.,* Europe (Germany)–*Holo.*

Palaeochrysotus MEUNIER, 1907–1908, p. 270 [**P. horridus* MEUNIER, 1907–1908, p. 270; SD CARPENTER, herein] [=*Palaeomedeterus* MEUNIER, 1895c, p. 173, *nom. nud.*]. Little-known genus, apparently related to *Medetera*. MEUNIER, 1906c. *Oligo.,* Europe (Baltic).

Poecilobothrus MIK, 1878, p. 3. [Generic assignment of fossil doubtful.] MEUNIER, 1908i. *Oligo.,* Europe (Baltic)–*Holo.*

Prochrysotus MEUNIER, 1907–1908, p. 269. *Oligo.,* Europe (Baltic)–*Holo.*

Prosystenus NEGROBOV, 1976, p. 122 [**P. zherichini*; OD]. Arista of antenna apical or nearly so, with 2 segments; third antennal segment short, rounded. Wing with SC very short; CUA+1A absent. *Paleoc./Eoc.,* USSR (Asian RSFSR).

Retinitus NEGROBOV, 1978, p. 86 [**R. nervosus*; OD]. Wing with SC reduced, terminating on R remote from costal margin; RS3+4 terminating at wing apex; basal crossvein between RS3+4 and M1+2 absent. [Family assignment of genus doubtful.] *Cret.,* USSR (Asian RSFSR).

Sciapus ZELLER, 1842, p. 831. [Generic assignment of fossil doubtful.] MEUNIER, 1907–1908; STATZ, 1940. *Oligo.,* Europe (Baltic, Germany)–*Holo.*

Systenus LOEW, 1857, p. 34. [Generic assignment of fossil doubtful.] MEUNIER, 1907–1908. *Oligo.,* Europe (Baltic)–*Holo.*

Thinophilus WAHLBERG, 1844, p. 37. [Generic assignment of fossil doubtful.] MEUNIER, 1907–1908. *Oligo.,* Europe (Baltic)–*Holo.*

Thrypticus GERSTÄCKER, 1864, p. 43. [Generic assignment of fossil very doubtful.] MEUNIER, 1907–1908; NEGROBOV, 1978. *Oligo.,* Europe (Baltic)–*Holo.*

Wheelerenomyia MEUNIER, 1907–1908, p. 58 [**W. eocenica*; OD]. Affinities of genus uncertain; first antennal segment cylindrical; second nearly spherical; third enlarged basally, tapering distally. *Oligo.,* Europe (Baltic).

Xanthochlorus LOEW, 1857, p. 42. [Generic assignment of fossil doubtful.] STATZ, 1940. *Oligo.,* Europe (Germany)–*Holo.*

Xiphandrium LOEW, 1857, p. 36. [Generic assignment of fossil doubtful.] MEUNIER, 1907–1908. *Oligo.,* Europe (Baltic)–*Holo.*

Family PLATYPEZIDAE Fallén, 1815

[Platypezidae FALLÉN, 1815, p. 1]

Small flies, with covering of short hairs; wings broad; vein SC complete and separate from R; RS3+4 unbranched, the cell below open; M1+2 usually forked distally; head broad; eyes large; antennae porrect, 2 basal segments short, third with a terminal arista; thorax broad; legs short; hind tarsi with at least basal segment flattened or bearing prominent projections. Larvae fungivorous. *Eoc.–Holo.*

Platypeza MEIGEN, 1803, p. 272. *Holo.*

Callomyia MEIGEN, 1804, p. 311. [Generic assignment of fossil doubtful.] COCKERELL, 1909d. *Eoc.,* USA (Colorado)–*Holo.*

Eucallimyia COCKERELL, 1911b, p. 82 [**E. fortis*; OD]. Similar to *Callomyia,* but R terminating on costal margin midway between ends of SC and RS1+2. *Oligo.,* USA (Colorado).

Family SCIADOCERIDAE Schmitz, 1929

[Sciadoceridae SCHMITZ, 1929, p. 3]

Similar to Platypezidae and Phoridae, but vein SC fused with R for most of its length; RS1+2 not coalesced with RS3+4; third antennal segment with a subterminal arista. Larval history unknown. *Cret.–Holo.*

Sciadocera WHITE, 1917, p. 218. *Holo.*

Archiphora SCHMITZ, 1929, p. 9. HENNIG, 1964; MCALPINE & MARTIN, 1966. *Oligo.,* Europe (Baltic)–*Holo.*

Prioriphora MCALPINE & MARTIN, 1966, p. 532 [**P. canadambra*; OD]. Costa ending near

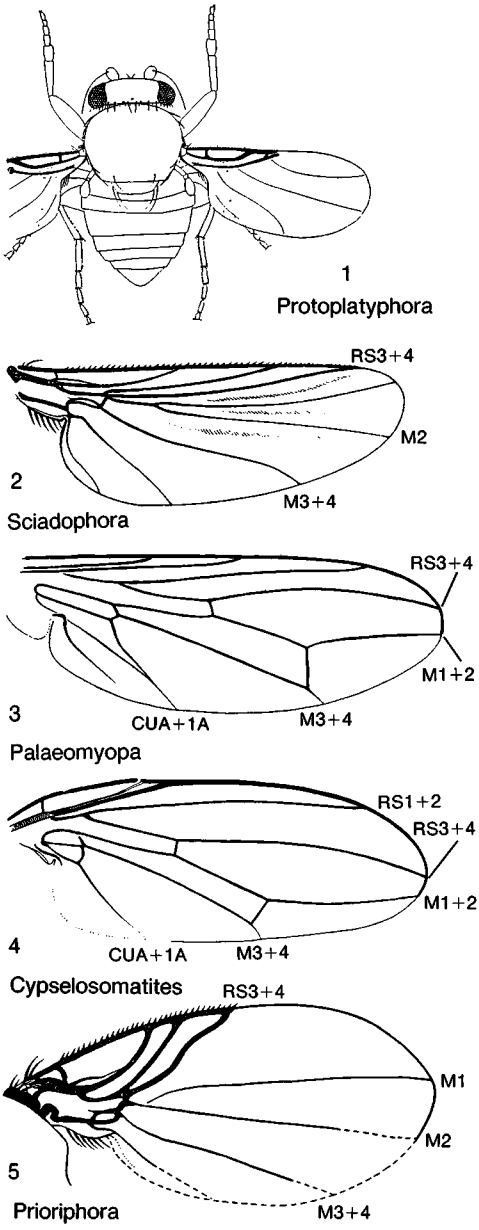


FIG. 234. Sciadoceridae, Phoridae, Conopidae, and Cypselosomatidae (p. 431–435).

midwing; branches of RS close together toward wing base; RS3+4 terminating on wing margin at about midwing. *Cret.*, Canada (Alberta). ——FIG. 234,5. **P. canadambra*; wing, ×50 (McAlpine & Martin, 1966).

Sciadophora MCALPINE & MARTIN, 1966, p. 529 [**S. bostoni*; OD]. Costa extending almost to wing apex and branches of RS extending along most of costal margin; RS3+4 terminating almost at wing apex; discal cell absent; mesopleuron with bristles. *Cret.*, Canada (Manitoba).——FIG. 234,2. **S. bostoni*; wing, ×36 (McAlpine & Martin, 1966).

Family PALAEOPHORIDAE Rohdendorf, 1951

[Palaeophoridae ROHDENDORF, 1951, p. 106, *nom. subst. pro* Archiphoridae ROHDENDORF, 1938, p. 40]

Little-known family, apparently related to the Phoridae. Antennae short, with 3 segments, and bearing a segmented arista; prothorax dilated anteriorly, covering the small head. Wings with vein SC apparently absent; R and RS strong and thick; RS3+4 unbranched. *Jur.*

Palaeophora ROHDENDORF, 1951, p. 106, *nom. subst. pro Archiphora* ROHDENDORF, 1938, p. 41, *non* SCHMITZ, 1929 [**Archiphora ancestrix*; OD]. Discal cell present; M1+2 coalesced with RS3+4. ROHDENDORF, 1964. *Jur.*, USSR (Kazakh).

Family PHORIDAE Newman, 1835

[Phoridae NEWMAN, 1835, p. 396]

Minute to small flies. Wings relatively large, rarely greatly reduced or absent; in normal wings, veins R and RS short and thick, other veins weak; M1, M2, and M3+4 widely separated and appearing to arise from RS. Head typically small, flattened, with small eyes; thorax large and usually arched; legs short but well developed, hind femora laterally flattened. Larvae mostly scavengers, some parasitic. *Oligo.–Holo.*

Phora LATREILLE, 1796, p. 169. BRUES, 1908a; MEUNIER, 1912e; MELANDER, 1949. *Oligo.*, USA (Colorado), Europe (Baltic)–*Holo.*

Anevrina LIOY, 1864, p. 77. BRUES, 1939a. *Oligo.*, Europe (Baltic)–*Holo.*

Aphiochaeta BRUES, 1903, p. 337. BRUES, 1908a; MEUNIER, 1912e. *Oligo.*, Europe (Baltic)–*Holo.*

Chaetocnemistoptera BORGMEIER, 1923, p. 51. BRUES, 1939a. *Oligo.*, Europe (Baltic), USA (Colorado)–*Holo.*

Conicera MEIGEN, 1830, p. 226. MEUNIER, 1912e; BRUES, 1939a. *Oligo.*, Europe (Baltic)–*Holo.*

Diplonevra LIOY, 1864, p. 77. BRUES, 1923b, 1939a; DÜRRENFELDT, 1968. *Oligo.*, Europe (Baltic)–*Holo.*

Electrophora BRUES, 1939a, p. 426. *Oligo.*, Europe (Baltic)–*Holo.*

Hypoceridites BRUES, 1939a, p. 428 [**H. dubitatis*; OD]. Tibiae with isolated bristles near

basal third; postantennal bristles proclinate; wing venation similar to that of *Nossibea* (recent). *Oligo.*, Europe (Baltic).

Megaselia RONDANI, 1856, p. 137. BRUES, 1939a. *Oligo.*, Europe (Baltic)–*Holo.*

Paraspiniphora MALLOCH, 1912, p. 412. BRUES, 1939a. *Oligo.*, Europe (Baltic)–*Holo.*

Phalacritophora ENDERLEIN, 1912, p. 21. STATZ, 1940. *Oligo.*, Europe (Germany)–*Holo.*

Protophorites BRUES, 1939a, p. 430 [**P. fimbriatus*; OD]. RS1+2 forked and bearing prominent setae over its entire length; 8 scutellar bristles present. *Oligo.*, Europe (Baltic).

Protoplatyphora BRUES, 1939a, p. 431 [**P. tertiaria*; OD]. Similar to *Aenigmatias* (recent), but scutellum with bristles and fore tarsus only slightly thickened. *Oligo.*, Europe (Baltic). —— FIG. 234,*1*. **P. tertiaria*; whole specimen, ×15 (Brues, 1939a).

Triphleba RONDANI, 1856, p. 136. BRUES, 1939a. *Oligo.*, Europe (Baltic)–*Holo.*

Family IRONOMYIIDAE McAlpine & Martin, 1966

[Ironomyiidae MCALPINE & MARTIN, 1966, p. 528]

Vein SC coalesced with R for most of its length, but free basally and as it joins costal margin; RS3+5 terminating at wing apex; R and RS not markedly stronger than other veins. *Cret.–Holo.*

Ironomyia WHITE, 1917, p. 216. *Holo.*

Cretonomyia MCALPINE, 1973, p. 106 [**C. pristina*; OD]. Similar to *Ironomyia* (recent), but mouthparts shorter and labellae apparently broader and padlike; postvertical bristles strongly developed; front and hind tibiae lacking preapical dorsal bristles. *Cret.*, Canada (Manitoba).

Family PIPUNCULIDAE Zetterstedt, 1842

[Pipunculidae ZETTERSTEDT, 1842, p. 4]

Small flies. Wings relatively long; vein M1 free from RS3+4 at its termination; M2 not reaching wing margin; cell below R+RS elongate. Head large, broader than thorax, and nearly spherical; eyes very large; antennae small, with dorsal arista. Larvae parasitic on Hemiptera (Homoptera). *Oligo.–Holo.*

Pipunculus LATREILLE, 1802, p. 463. *Holo.*

Cephalosphaera ENDERLEIN, 1936, p. 129. CARPENTER & HULL, 1939; ACZEL, 1948. *Oligo.*, Europe (Baltic)–*Holo.*

Metanephrocerus ACZEL, 1948, p. 120 [**Protonephrocerus collini* CARPENTER & HULL, 1939, p. 13; OD]. Similar to *Protonephrocerus* but with short and fine ocellar bristles. *Oligo.*, Europe (Baltic).

Nephrocerus ZETTERSTEDT, 1838, p. 578. CARPENTER & HULL, 1939; ACZEL, 1948. *Oligo.*, Europe (Baltic)–*Holo.*

Protonephrocerus COLLIN, 1931, p. 52. CARPENTER & HULL, 1939; ACZEL, 1948. *Oligo.*, USA (Colorado)–*Holo.*

Verrallia MIK, 1899, p. 137. MEUNIER, 1903b; CARPENTER & HULL, 1939; ACZEL, 1948. *Oligo.*, Europe (Baltic)–*Holo.*

Family SYRPHIDAE Leach, 1815

[Syrphidae LEACH, 1815, p. 162]

Small to large flies. Wings of moderate size; vein M1 coalesced with RS3+4 distally; a veinlike fold present between RS and M. Head variable in shape; third antennal segment with a short dorsal arista, rarely a terminal style. Larvae in rotting vegetation or liquid media; some predaceous. *Eoc.–Holo.*

Syrphus FABRICIUS, 1775, p. 762. HULL, 1945, 1949, 1960. *Eoc.*, USA (Colorado); *Oligo.*, USA (Colorado), Europe (Baltic); *Mio.*, Europe (Croatia), USA (Montana)–*Holo.*

Archalia HULL, 1945, p. 305 [**A. femorata*; OD]. Allied to *Rhingia* (recent). Crossvein r-m situated well before middle of discal cell; apical crossvein sigmoidal, joining RS3+4 well back from wing apex. Hind femora massive. HULL, 1949. *Oligo.*, USA (Colorado).

Archisyrphus HULL, 1960, p. 270 [**A. opacus*; OD]. Similar to *Cheilosia*, but RS3+4 nearly straight; cell below RS3+4 with a sharply acute angle distally; M1+2 nearly straight distally, at end of discal cell. *Mio.*, USA (Montana).

Asarcina MACQUART, 1842, p. 77. HULL, 1945, 1949. *Eoc.*, USA (Wyoming)–*Holo.*

Cacogaster HULL, 1945, p. 297 [**C. novamaculata*; OD]. Related to *Rhingia*. Cell below R open; RS3+4 straight, ending at wing apex; crossvein r-m situated well before middle of discal cell. MEUNIER, 1908h. *Oligo.*, USA (Colorado).

Cheilosia MEIGEN, 1822, p. 296. COCKERELL, 1909b, 1916c; COCKERELL & LEVEQUE, 1931; THÉOBALD, 1937a; STATZ, 1940; TIMON-DAVID, 1944a; HULL, 1945, 1949; RÖDER, 1980. *Eoc.*, USA (Wyoming, Colorado); *Oligo.*, Europe (Baltic, France, Germany), USA (Colorado)–*Holo.*

Cheilosialepta HULL, 1945, p. 285 [**C. baltica*; OD]. Venation as in *Myiolepta*; face (frons) nontuberculate; hind femora without spines. *Oligo.*, Europe (Baltic).

Chrysogaster MEIGEN, 1800, p. 32. HULL, 1945, 1949. *Oligo.*, USA (Colorado)–*Holo.*

Doliomyia HULL, 1945, p. 328 [**D. chalybea*; OD]. Similar to *Eumerus* (recent); hind femora slender

and without spines; eyes bare. *Oligo.,* Europe (Baltic).

Eoxylota HULL, 1945, p. 324 [**Xylota pulchra* MEUNIER, 1904c, p. 207; OD]. Related to *Xylota,* but crossvein r-m less sigmoidal and face somewhat tuberculate. HULL, 1949. *Oligo.,* Europe (Baltic).

Epistrophe WALKER, 1852, p. 242. STATZ, 1940. *Oligo.,* Europe (Germany)–*Holo.*

Eristalis LATREILLE, 1804, p. 194. THÉOBALD, 1937a. *Oligo.,* Europe (France)–*Holo.*

Megaxylota HULL, 1945, p. 340 [**M. magnifemur*; OD]. Similar to *Xylota*; hind femora greatly thickened, without spines; face concave. HULL, 1949. *Oligo.,* Europe (Baltic).

Merodon MEIGEN, 1803, p. 274. HULL, 1945, 1949. *Oligo.,* Europe (Germany)–*Holo.*

Metasyrphus MATSUMURA, 1917, p. 147. HULL, 1945, 1949. *Oligo.,* USA (Colorado)–*Holo.*

Myiolepta NEWMAN, 1838, p. 373 [=*Arctolepta* HULL, 1945, p. 287 (type, *A. calamitans*); *Sericolepta* HULL, 1945, p. 303 (type, *S. maculata*)]. STATZ, 1940; HULL, 1945, 1949. *Oligo.,* Europe (Baltic)–*Holo.*

Palaeoascia MEUNIER, 1893, p. cclix [**P. uniappendiculata*; OD]. Similar to *Spheginoides* (recent); marginal crossveins straight; eyes holoptic; face (frons) tuberculate; hind femora but little thickened, without double row of spines. HANDLIRSCH, 1908b; HULL, 1945, 1949. *Oligo.,* Europe (Baltic).

Palaeoeristalis HULL, 1945, p. 333 [**P. tesselatus*; OD]. Similar to *Eristalis,* but RS3+4 with only slight curve. HULL, 1949. *Eoc.,* USA (Colorado).

Palaeopipiza MEUNIER, 1902d, p. 103 [**P. xenos*; OD]. Related to *Azpeytia* (recent); RS3+4 convex, diverging from RS1+2 apically; face flat; hind femora short and slender. HULL, 1945, 1949. *Oligo.,* Europe (Baltic).

Palaeosphegina MEUNIER, 1904c, p. 204 [**P. elegantula*; OD]. Venation as in *Sphegina,* but vena spuria absent; face tuberculate. HULL, 1945, 1949. *Oligo.,* Europe (Baltic).

Pipiza FALLÉN, 1810, p. 11. HULL, 1945, 1949. *Oligo.,* Europe (Baltic, Germany)–*Holo.*

Platycheirus LEPELETIER & SERVILLE, 1825, p. 513. CARPENTER & others, 1938; HULL, 1945; MELANDER, 1949. *Oligo.,* USA (Colorado); *Mio.,* Europe (Croatia)–*Holo.*

Protochrysotoxum HULL, 1945, p. 326 [**P. sphinx*; OD]. Similar to *Chrysotoxum* (recent); RS3+4 straight; crossvein r-m situated well before middle of discal cell. HULL, 1949. *Oligo.,* USA (Colorado).

Protorhingia HULL, 1945, p. 289 [**P. carpenteri*; OD]. Venation as in *Rhingia,* but face concave. HULL, 1949. *Oligo.,* Europe (Baltic).

Pseudosphegina HULL, 1945, p. 313 [**P. dichoptica*; OD]. Venation as in *Sphegina,* but face tuberculate; males narrowly dichoptic. HULL, 1949, 1957. *Oligo.,* Europe (Baltic).

Ptilocephala HULL, 1945, p. 335. HULL, 1949. *Oligo.,* Europe (Baltic)–*Holo.*

Rhingia SCOPOLI, 1763, p. 358. HULL, 1945, 1949. *Oligo.,* USA (Colorado)–*Holo.*

Sphegina MEIGEN, 1822, p. 193. THÉOBALD, 1937a; HULL, 1945, 1949. *Oligo.,* Europe (France), USA (Colorado)–*Holo.*

Spheginascia MEUNIER, 1904c, p. 205 [**S. biappendiculata*; OD]. Similar to *Cheilosia.* Eyes holoptic; lower face of male with broad, convex, tuberculate bulge; face of female convex, without bulge; hind femora slender, spinose. HULL, 1945, 1949; RÖDER, 1980. *Oligo.,* Europe (Baltic).

Temnostoma LEPELETIER & SERVILLE, 1828, p. 518. STATZ, 1940. *Oligo.,* Europe (Germany)–*Holo.*

Xylotosyrphus HULL, 1945, p. 339 [**X. pulchrafenestra*; OD]. Similar to *Xylota* (recent), but crossvein r-m well before middle of discal cell; hind femora enlarged. HULL, 1949. *Eoc.,* USA (Utah).

Family CONOPIDAE Latreille, 1802

[Conopidae LATREILLE, 1802a, p. 442]

Flies of moderate size. Wings slender; vein M1+2 close to or fused with RS3+4 near wing margin; CUA+1A extending to wing margin; cell below R+RS very long and slender; head broad; proboscis very long, often geniculate; third antennal segment with dorsal arista or terminal style. Larvae saprophagous, phytophagous, predaceous, or parasitic. *Oligo.–Holo.*

Conops LINNÉ, 1758, p. 604. *Holo.*

Palaeomyopa MEUNIER, 1912a, p. 177 [**P. tertiaria*; OD] [=*Palaeosicus* MEUNIER, 1916a, p. 280 (type, *P. loewi*)]. Generalized conopids, apparently close to basic stock of family; cell below RS3+4 open; third antennal segment short; arista arising dorsally and consisting of 3 segments. HENNIG, 1966c. *Oligo.,* Europe (Baltic). —— FIG. 234,*3*. **P. tertiaria*; wing, ×6 (Hennig, 1966c).

Family OTITIDAE Aldrich, 1932

[Otitidae ALDRICH, 1932, p. 7]

Small to large flies. Wings usually conspicuously marked with maculations; vein R commonly with prominent setae; cell below CUP (anal cell) usually with pointed apex; proboscis short. Larvae saprophagous. *Oligo.–Holo.*

Otites LATREILLE, 1804, p. 196. *Holo.*

Melieria ROBINEAU-DESVOIDY, 1830, p. 715. COCKERELL, 1917b; MELANDER, 1949. *Oligo.,* USA (Colorado)–*Holo.*

Scholastes Loew, 1873, p. 38. Cockerell, 1921c. *?Plio./Pleist.*, England–*Holo.*

Stenomyites Cockerell, 1915, p. 497 [**S. fuscipennis*; OD]. Similar to *Eumetopiella* (recent), but wings not narrow and elongate. *Oligo.*, England.

Family TEPHRITIDAE Newman, 1835

[Tephritidae Newman, 1835, p. 396]

Small to moderate-sized flies. Wings commonly spotted or banded; vein SC abruptly bent anteriorly near its distal end and joining costa at right angles; costal break commonly present, before termination of R; R setose; cell behind CUP acute distally. Larvae phytophagous. *Mio.–Holo.*

Tephrites Latreille, 1804, p. 196. *Holo.*

Oxyna Robineau-Desvoidy, 1830, p. 755. [Generic assignment of fossil doubtful.] Dürrenfeldt, 1968. *Plio.*, Europe (Germany)–*Holo.*

Pseudacidia Shiraki, 1933, p. 216. Korneyev, 1982. *Mio.*, USSR (European RSFSR)–*Holo.*

Family RICHARDIIDAE Loew, 1868

[Richardiidae Loew, 1868, p. 2]

Similar to Otitidae, but cell below vein CUP without pointed apex; costal break present. Larvae apparently saprophagous. *Oligo.–Holo.*

Richardia Robineau-Desvoidy, 1830, p. 728. *Holo.*

Pachysomites Cockerell, 1916c, p. 95 [**P. inermis*; OD]. Venation much as in *Richardia* (recent), but R extending nearly to wing apex; RS1+2 curving anteriorly just before terminating. *Oligo.*, USA (Colorado).

Urortalis Cockerell, 1917b, p. 378 [**U. caudatus*; OD]. Ovipositor very long and tapering; wing without markings; RS1+2 straight distally, not curved as in *Richardia* (recent). *Oligo.*, USA (Colorado).

Family CYPSELOSOMATIDAE Hendel, 1931

[Cypselosomatidae Hendel, 1931, p. 5]

Small flies. Wings of moderate size; costal break present at end of vein SC; CUA+1A typically short, not reaching wing margin; M3+4 not usually continuing beyond end of discal cell; third antennal segment with a short spinelike arista; vibrissae typically present. Larvae, so far as known, developing in bat dung in caves. Hennig, 1958. *Oligo.–Holo.*

Cypselosoma Hendel, 1913, p. 105. *Holo.*

Cypselosomatites Hennig, 1965, p. 38 [**C. succini*; OD]. Costa with a distinct break at end of SC; terminal parts of RS3+4 and M1+2 convergent; CUA+1A reaching wing margin; ocellar bristles stout. *Oligo.*, Europe (Baltic).—Fig. 234,*4*. **C. succini*; wing, ×15 (Hennig, 1965).

Family PSEUDOPOMYZIDAE McAlpine, 1966

[Pseudopomyzidae McAlpine, 1966, p. 683]

Similar to Cypselosomatidae but with the postvertical bristles convergent. Larvae saprophagous. *Oligo.–Holo.*

Pseudopomyza Strobl, 1893, p. 284. *Holo.*

Eopseudopomyza Hennig, 1971c, p. 7 [**E. kuehmei*; OD]. Similar to *Pseudopomyzella* (recent) but with larger eyes and relatively smaller genae; mesopleural setae absent. *Oligo.*, Europe (Baltic).

Family MICROPEZIDAE Loew, 1862

[Micropezidae Loew, 1862, p. 38]

Flies of moderate size, usually slender. Wings long; costal break absent; cell below vein RS3+4 at least narrowed apically, often closed; basal piece of CUA straight; fronto-orbital bristles and oral vibrissae absent; antennae short, third segment with a dorsal arista; legs long and slender. Larvae saprophagous, often in rotting wood. *Oligo.–Holo.*

Micropeza Meigen, 1803, p. 276. *Holo.*

Calobata Meigen, 1803, p. 276. [Generic assignment of fossil doubtful.] Statz, 1940. *Oligo.*, Europe (Germany)–*Holo.*

Electrobata Hennig, 1965, p. 41 [**E. myrmecia*; OD]. Similar to *Crepidochetus* (recent) but without thickened bases of middle and hind femora; arista without long hairs; ocellar setae absent. Hennig, 1966c, 1967b, 1969a. *Oligo.*, Europe (Baltic).—Fig. 235,*1*. **E. myrmecia*; head, oblique view from above, ×33 (Hennig, 1965).

Family MEGAMERINIDAE Hendel, 1913

[Megamerinidae Hendel, 1913, p. 90]

Similar to Psilidae; fronto-orbital bristles reduced, usually only 1 pair; hind femora thickened and spiny. *Oligo.–Holo.*

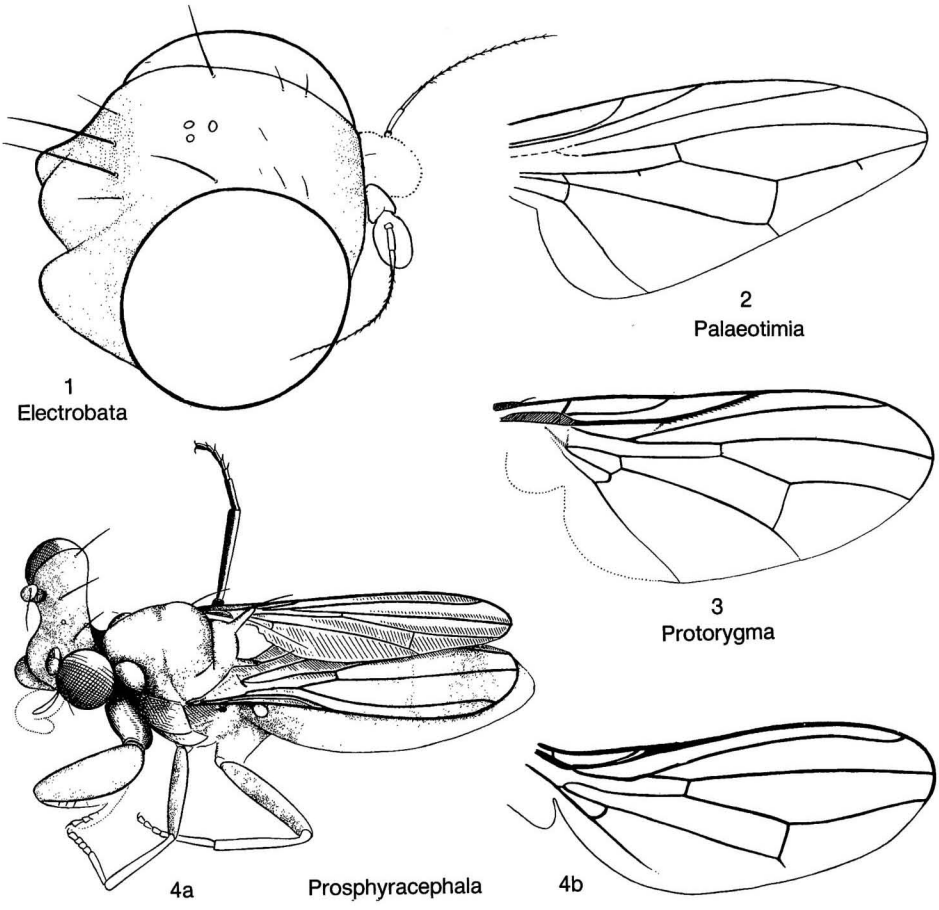


FIG. 235. Micropezidae, Diopsidae, Sepsidae, and Dryomyzidae (p. 435–437).

Megamerina RONDANI, 1861, p. 10. *Holo.*
Palaeotanypeza MEUNIER, 1917a, p. 101 [**P. spinosa*; OD]. Generalized megamerinids, with 2 pairs of fronto-orbital bristles; fore and hind femora thickened. HENNIG, 1965, 1969a. *Oligo.,* Europe (Baltic).

Family DIOPSIDAE Billberg, 1820

[Diopsidae BILLBERG, 1820, p. 115]

Small to medium-sized flies, allied to the Megamerinidae. Vein SC coalesced at least partially with R; basal crossvein between M1+2 and M3+4 absent; eyes typically stalked; fore femora thickened and spiny on ventral surface; postvertical bristles absent; only 1 pair of fronto-orbital and 1 pair of vertical bristles present. *Oligo.–Holo.*

Diopsis LINNÉ, 1775, p. 5. *Holo.*
Prosphyracephala HENNIG, 1965, p. 63 [**Sphyracephala succini* LOEW, 1873, p. 102; OD]. Anal cell short, not narrow; CUA+1A continuing as straight line the posterior border of anal cell; notopleural bristles absent. HENNIG, 1969a; LEWIS, 1971a. *Oligo.,* Europe (Baltic), USA (Montana).——FIG. 235,*4*. **P. succini* (LOEW); *a,* whole insect, ×15; *b,* wing, ×18 (both Hennig, 1965).

Family PSILIDAE Walker, 1853

[Psilidae WALKER, 1853, p. 148]

Small to medium-sized flies; costal break prominent; vein SC incomplete, not extending beyond costal break; antennae usually long; arista pubescent; oral vibrissae absent; pleural bristles of thorax absent. Larvae phytophagous, occurring in stems or roots or under bark. *Oligo.–Holo.*

Psila MEIGEN, 1803, p. 278. *Holo.*
Electrochyliza HENNIG, 1965, p. 69 [**E. succini*;

OD]. Similar to *Chyliza* (recent) but more thickset in general form; hair-covering relatively short; palpi not broadened. HENNIG, 1969a. *Oligo.*, Europe (Baltic).

Family SEPSIDAE Walker, 1833

[Sepsidae WALKER, 1833b, p. 244]

Small flies, similar to Sciomyzidae, but with at least 1 bristle on lower margin of metathoracic spiracle; palpi vestigial; abdomen elongate, constricted basally. Larvae saprophagous. *Oligo.–Holo.*

Sepsis FALLÉN, 1810, p. 17. [Generic assignment of fossil doubtful.] STATZ, 1940. *Oligo.*, Europe (Baltic)–*Holo.*

Protorygma HENNIG, 1965, p. 83 [**P. electricum*; OD]. Generalized sepsids, close to stem of family; third antennal segment about as long as broad, decidedly oval; terminal part of M1+2 parallel to RS3+4; CUA+1A reaching hind margin of wing. *Oligo.*, Europe (Baltic).——FIG. 235,*3*. **P. electricum*; wing, ×16 (Hennig, 1965).

Themira ROBINEAU-DESVOIDY, 1830, p. 745. MELANDER, 1949. *Oligo.*, USA (Colorado)–*Holo.*

Family DRYOMYZIDAE Schiner, 1864

[Dryomyzidae SCHINER, 1864, p. 38]

Flies of moderate size, similar to the Sciomyzidae but without femoral bristles. Larvae saprophagous or fungivorous. *Paleoc.–Holo.*

Dryomyza FALLÉN, 1820, p. 15. [Generic assignment of fossils doubtful.] COCKERELL, 1923b; STATZ, 1940. *Oligo.*, Europe (Germany); *Paleoc.–Plio.*, South America (Colombia)–*Holo.*

Palaeotimia MEUNIER, 1908d, p. 266 [**P. lhoesti*; OD]. Dryomyzids with 2 pairs of fronto-orbital bristles; third antennal segment short, elliptical. Wings broad basally; RS3+4 and M1+2 convergent distally. HENNIG, 1940, 1969a. *Oligo.*, Europe (Baltic). —— FIG. 235,*2*. **P. lhoesti*; wing, ×9 (Hennig, 1940).

Prodryomyza HENNIG, 1965, p. 73 [**P. electrica*; OD]. Similar to *Palaeotimia,* but terminal portions of RS3+4 and M1+2 not converging, and R with prominent setae distally. *Oligo.*, Europe (Baltic).

Family SCIOMYZIDAE Fallén, 1820

[Sciomyzidae FALLÉN, 1820, p. 1]

Costal break absent; vein SC independent of R and terminating on costa well before end of R; cell cup short, not produced into an acute angle distally; vibrissae absent; no bristle on lower margin of metathoracic spiracle. Larvae chiefly predaceous on snails. *Oligo.–Holo.*

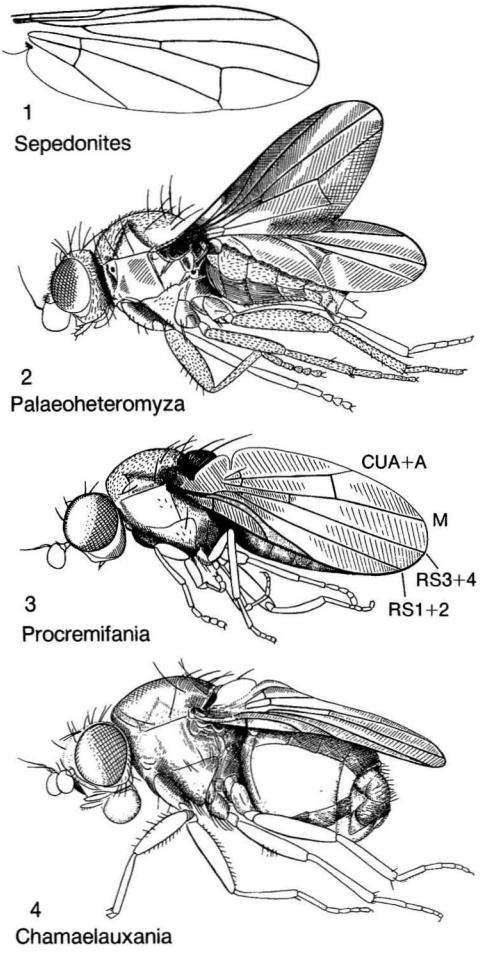


FIG. 236. Sciomyzidae, Chamaemyiidae, and Lauxaniidae (p. 437–438).

Sciomyza FALLÉN, 1820, p. 11. SCUDDER, 1878d; COCKERELL, 1909a. *Eoc.*, Canada (British Columbia); *Oligo.*, USA (Colorado)–*Holo.*

Palaeoheteromyza MEUNIER, 1904f, p. 26 [**P. crassicornis*; OD]. Sciomyzines with very large third antennal segment. HENNIG, 1965, 1969a. *Oligo.*, Europe (Baltic). —— FIG. 236,*2*. **P. crassiformis*; whole specimen, ×12 (Hennig, 1965).

Prophaeomyia HENNIG, 1965, p. 87 [**P. loewi*; OD]. Related to *Pelidnoptera* (recent). Middle and hind tibiae with several setae above preapical spines; terminal part of R bearing many short hairs. HENNIG, 1967b. *Oligo.*, Europe (Baltic).

Prosalticella HENNIG, 1965, p. 92 [**P. succini*; OD]. Similar to *Salticella* (recent), but propleural bris-

tles weakly developed and the sternopleura pilose. Wings with RS3+4 and M1+2 almost parallel distally. HENNIG, 1969a. *Oligo.*, Europe (Baltic).

Sepedonites HENNIG, 1965, p. 102 [**S. baltica*; OD]. Related to *Sepedon* (recent). SC strong for its entire length, terminating well before end of R; CUA+1A reaching margin of wing. *Oligo.*, Europe (Baltic). —— FIG. 236,*1*. **S. baltica*; wing, ×7.5 (Hennig, 1965).

Tetanocera DUMÉRIL, 1800, p. 439. [Generic assignment of fossil doubtful.] THÉOBALD, 1937a. *Oligo.*, Europe (France)–*Holo.*

Family CHAMAEMYIIDAE Hendel, 1910

[Chamaemyiidae HENDEL, 1910, p. 313]

Small flies. Costa without break; vein SC complete, in some species coalesced with R for a short distance; CUA+1A not reaching wing margin; cell cup closed; postvertical bristles convergent or absent; oral vibrissae absent; fore and hind tibiae without preapical bristles. Larvae predaceous on Coccidae and other Homoptera. *Oligo.–Holo.*

Chamaemyia MEIGEN, 1803, p. 278. *Holo.*

Procremifania HENNIG, 1965, p. 116 [**P. electrica*; OD]. Similar to *Cremifania* (recent), but wings with cell below R relatively broader; head with larger, rounded eyes and with correspondingly narrow genae. *Oligo.*, Europe (Baltic). —— FIG. 236,*3*. **P. electrica*; whole specimen, ×18 (Hennig, 1965).

Family LAUXANIIDAE Macquart, 1835

[Lauxaniidae MACQUART, 1835 in MACQUART, 1834–1835, p. 506]

Small flies. Wings with vein SC complete; costal break absent; cell cup closed; CUA+1A short; oral vibrissae very poorly developed or absent; postvertical bristles convergent; only 2 fronto-orbital bristles. Larvae saprophagous or phytophagous. *Oligo.–Holo.*

Lauxania LATREILLE, 1804, p. 196. *Holo.*

Chamaelauxania HENNIG, 1965, p. 106 [**C. succini*; OD]. Head rounded; eyes vertically elliptical; third antennal segment oval, somewhat longer than broad. *Oligo.*, Europe (Baltic). —— FIG. 236,*4*. **C. succini*; whole specimen, ×10.5 (Hennig, 1965).

Hemilauxania HENNIG, 1965, p. 109 [**H. incurviseta*; OD]. Similar to *Chamaelauxania*, but costal margin (to level of RS1+2) with short, thick spines among fine hairs; second segment of arista relatively shorter and third with slightly longer pubescence. *Oligo.*, Europe (Baltic).

Sapromyza FALLÉN, 1810, p. 18. MELANDER, 1949. *Oligo.*, USA (Colorado)–*Holo.*

Family HELEOMYZIDAE Loew, 1862

[Heleomyzidae LOEW, 1862, p. 126]

Medium-sized flies. Costal break present, costal margin usually with short bristles; cell behind stem of vein M and cell behind vein CUP closed; vibrissae well developed; postvertical bristles convergent; antennae short, third segment usually rounded. Larvae saprophagous or phytophagous. *Oligo.–Holo.*

Heleomyza FALLÉN, 1810, p. 19. [Generic assignment of fossils doubtful.] MEUNIER, 1914b; THÉOBALD, 1937a; TIMON-DAVID, 1944a. *Oligo.*, Europe (Germany, France)–*Holo.*

Chaetohelomyza HENNIG, 1965, p. 148 [**C. electrica*; OD]. Little-known genus with 2 pairs of stout setae on prosternum, 3 dorsoventral setae on middle tibiae, and 3 stout sternopleural setae on thorax. *Oligo.*, Europe (Baltic).

Electroleria HENNIG, 1965, p. 150 [**Leria alacris* MEUNIER, 1904f, p. 25; OD]. Related to *Leria* (recent), but CUA+1A extending to wing margin; propleural setae absent. *Oligo.*, Europe (Baltic).

Heteromyiella HENDEL, 1910, p. 309. COCKERELL, 1914f. *Oligo.*, USA (Colorado)–*Holo.*

Heteromyza FALLÉN, 1820, p. 1. [Generic assignment of fossil doubtful.] HENNIG, 1965. *Oligo.*, Europe (Baltic)–*Holo.*

Protosuillia HENNIG, 1965, p. 143 [**Heleomyza media* MEUNIER, 1904f, p. 24; OD]. Similar to *Suillia* but with 2 fronto-orbital bristles. *Oligo.*, Europe (Baltic).

Suillia ROBINEAU-DESVOIDY, 1830, p. 642. [Generic assignment of fossil doubtful.] HENNIG, 1965. *Oligo.*, Europe (Baltic)–*Holo.*

Trixoscelis RONDANI, 1856, p. 134. MELANDER, 1949. *Oligo.*, USA (Colorado)–*Holo.*

Family CHYROMYIDAE Frey, 1921

[Chyromyidae FREY, 1921, p. 219]

Very small, stout flies. Wings with vein SC free, ending on costa; costal break typically present, though weak; cell behind stem of M closed; CUA+1A not reaching wing margin. Palpi typically reduced; postvertical bristles always present, convergent and short; alula only slightly developed. Larvae scav-

engers, in bird or rodent nests or in rotting wood. *Oligo.–Holo.*

Chyromya ROBINEAU-DESVOIDY, 1830, p. 621. *Holo.*
Gephyromyiella HENNIG, 1965, p. 158 [**G. electrica*; OD]. Costal break absent; costal margin evenly pubescent; SC and R parallel; RS3+4 and M1+2 nearly parallel, with slight convergence distally; crossvein r-m at about level of end of SC. *Oligo.,* Europe (Baltic).

Family PALLOPTERIDAE Loew, 1862

[Pallopteridae LOEW, 1862, p. 56]

Similar to Lonchaeidae, but postvertical bristles present and propleural bristles commonly absent; wings with vein SC complete, terminating very close to R. Larvae saprophagous or phytophagous. *Oligo.–Holo.*

Palloptera FALLÉN, 1820, p. 23. *Holo.*
Pallopterites HENNIG, 1967b, p. 4 [**P. electrica*; OD]. Similar to *Palloptera* (recent) but with only 1 pair of scutellar bristles. *Oligo.,* Europe (Baltic).

Family LONCHAEIDAE Rondani, 1856

[Lonchaeidae RONDANI, 1856, p. 118]

Stout flies, small to moderate in size. Wings with vein SC complete, ending on costal margin; oral vibrissae absent; 1 pair of fronto-orbital bristles; postocular bristles divergent; anterior and posterior tibiae without preapical bristles. Larvae saprophagous or phytophagous. *Oligo.–Holo.*

Lonchaea FALLÉN, 1820, p. 25. *Holo.*
Glaesolonchaea HENNIG, 1967b, p. 15 [**G. electrica*; OD]. Hind margin of mesopleura with a single bristle. *Oligo.,* Europe (Baltic).
Morgea HENNIG, 1967b, p. 11 [**M. mcalpinei*; OD]. Hind margin of mesopleura completely lacking bristles. HENNIG, 1969a. *Oligo.,* Europe (Baltic).

Family PIOPHILIDAE Macquart, 1835

[Piophilidae MACQUART, 1835 in MACQUART, 1834–1835, p. 531]

Small flies. Wing with costal break at end of SC; cell behind stem of vein M and cell behind vein CUP complete; CUA+1A not reaching wing margin; oral vibrissae strongly developed; postvertical bristles well developed, at least slightly divergent; mesopleural bristles absent. Larvae saprophagous, usually in dead animal tissue. *Oligo.–Holo.*

Piophila FALLÉN, 1810, p. 20. *Holo.*
Mycetaulus LOEW, 1845, p. 37. MELANDER, 1949. *Oligo.,* USA (Colorado)–*Holo.*

Family PRONEOTTIOPHILIDAE Hennig, 1969

[Proneottiophilidae HENNIG, 1969a, p. 11]

Similar to Piophilidae but with 3 strong, reclinate fronto-orbital bristles; terminations of veins SC and R widely separated on costal margin. *Oligo.*

Proneottiophilum HENNIG, 1969a, p. 15 [**P. extinctum*; OD]. Head rounded in profile; eyes higher than long; third antennal segment elongate-oval. Costa with stout setae on dorsal surface. *Oligo.,* Europe (Baltic). —— FIG. 237,*2*. **P. extinctum*; wings and body, ×7 (Hennig, 1969a).

Family OPOMYZIDAE Fallén, 1810

[Opomyzidae FALLÉN, 1810, p. 10]

Small, slender flies. Costal break at end of vein SC; cell behind stem of M and cell behind CUP complete; oral vibrissae absent; only 1 pair of fronto-orbital bristles; postvertical bristles divergent. Larvae in stems of grasses. *Oligo.–Holo.*

Opomyza FALLÉN, 1820, p. 10. [Generic assignment of fossil doubtful.] STATZ, 1940. *Oligo.,* Europe (Germany)–*Holo.*

Family CLUSIIDAE Frey, 1921

[Clusiidae FREY, 1921, p. 220]

Small flies, similar to the Agromyzidae; second antennal segment with an outer, angular projection; 2 to 4 fronto-orbital bristles. Larvae in moist, rotting wood. *Oligo.–Holo.*

Clusia HALIDAY, 1838, p. 188. *Holo.*
Clusiodes COQUILLETT, 1904, p. 93. [Generic assignment of fossil doubtful.] STATZ, 1940. *Oligo.,* Europe (Germany)–*Holo.*
Electroclusiodes HENNIG, 1965, p. 136 [**Agromyza meunieri* HENDEL, 1923, p. 145; OD]. Head with 4 pairs of fronto-orbital setae; tibiae lacking apical spines; wing with crossvein r-m not very remote from crossvein between M1+2 and

M3+4. HENNIG, 1969a. *Oligo.*, Europe (Baltic). ——FIG. 237,*4*. **E. meunieri* (HENDEL); whole insect, ×7.8 (Hennig, 1965).

Family ACARTOPHTHALMIDAE Czerny, 1928

[Acartophthalmidae CZERNY, 1928, p. 3]

Similar to Clusiidae, but postvertical bristles remote from each other; eyes pubescent; arista short, only a little longer than rest of antenna. Wing with veins SC and R divergent; costa broken only near wing base. *Oligo.–Holo.*

Acartophthalmus CZERNY, 1902, p. 256. *Holo.*

Acartophthalmites HENNIG, 1965, p. 130 [**A. tertiaria*; OD]. Similar to *Acartophthalmus* (recent), but insects about twice as large as those of *Acartophthalmus*; thorax with a distinct color pattern. *Oligo.*, Europe (Baltic).——FIG. 237,*5*. **A. tertiaria*; wing, ×5 (Hennig, 1965).

Family ODINIIDAE Hendel, 1918

[Odiniidae HENDEL, 1918, p. 112]

Similar to Agromyzidae. Wings with costa weakly developed or absent between terminations of veins RS3+4 and M1+2; fore and hind tibiae with short preapical bristles. Larvae saprophagous, living in galleries of wood-boring insects. *Oligo.–Holo.*

Odinia ROBINEAU-DESVOIDY, 1830, p. 648. *Holo.*

Protodinia HENNIG, 1965, p. 124 [**P. electrica*; OD]. Related to *Odinia* (recent). Costal break at end of SC; costa extending to termination of RS3+4; CUA+1A reaching to hind margin of wing. Eyes vertically elliptical; third antennal segment approximately square in general form. *Oligo.*, Europe (Baltic).

Family AGROMYZIDAE Bigot, 1852

[Agromyzidae BIGOT, 1852, p. 486]

Small flies. Wings with costal break at end of vein SC; cell below stem of M complete; costa strongly developed as far as end of M1+2; preapical tibial bristles absent. Larvae leaf-miners or gall-makers. *Oligo.–Holo.*

Agromyza FALLÉN, 1810, p. 21. THÉOBALD, 1937a; MELANDER, 1949. *Oligo.*, Europe (France), USA (Colorado)–*Holo.*

Melanagromyza HENDEL, 1920, p. 114. MELANDER, 1949. *Oligo.*, USA (Colorado)–*Holo.*

Phytomyza FALLÉN, 1810, p. 21. HERING, 1930. *Oligo.*, Europe (France) HERING, *Oligo.*, Europe (France)–*Holo.*

Family CARNIDAE Frey, 1921

[Carnidae FREY, 1921, p. 149]

Similar to Milichiidae, but labella rounded, not elongate, and proboscis not geniculate. Larvae saprophagous. *Oligo.–Holo.*

Carnus NITZSCH, 1818, p. 284. *Holo.*

Meoneurites HENNIG, 1965, p. 185 [**M. enigmatica*; OD]. Similar to *Neomeoneurites* (recent), but margin of mouth not protruding; longitudinal axis of eye vertical, not oblique; distance between ends of RS1+2 and RS3+4 clearly shorter than that between ends of RS3+4 and M1+2. HENNIG, 1972a. *Oligo.*, Europe (Baltic).

Family PERISCELIDIDAE Oldenberg, 1914

[Periscelididae OLDENBERG, 1914, p. 41]

Costa without break and extending beyond end of vein RS3+4; SC very short, not reaching wing margin; 1 pair of fronto-orbital bristles; postvertical bristles divergent. Larvae in fermenting tree sap or in leaf mines of weevils. *Oligo./Mio.–Holo.*

Periscelis LOEW, 1858, p. 113. STURTEVANT, 1963. *Oligo./Mio.*, Mexico (Chiapas)–*Holo.*

Family NEUROCHAETIDAE McAlpine, 1978

[Neurochaetidae MCALPINE, 1978, p. 274]

Related to the Periscelididae but with 3 or more fronto-orbital bristles; vibrissae not displaced high above projecting lower ridge of face (epistoma). Wings with costal break present at end of vein SC. Larvae apparently feeding on microorganisms associated with araceous plants. *Oligo.–Holo.*

Neurochaeta MCALPINE, 1978, p. 278. *Holo.*

Anthoclusia HENNIG, 1965, p. 165 [**A. gephyrea*; OD]. Wings unusually broad; SC weak; terminations of RS1+2 and RS3+4 nearer together than terminations of RS3+4 and M1+2; CUA+1A not reaching wing margin; third antennal segment of male oval, directed ventrally. HENNIG, 1967b, 1969a, 1971a. *Oligo.*, Europe (Baltic).——FIG. 237,*6*. **A. gephyrea*; *a*, whole insect, ×20; *b*, male antenna, arista incomplete, ×150 (both Hennig, 1965).

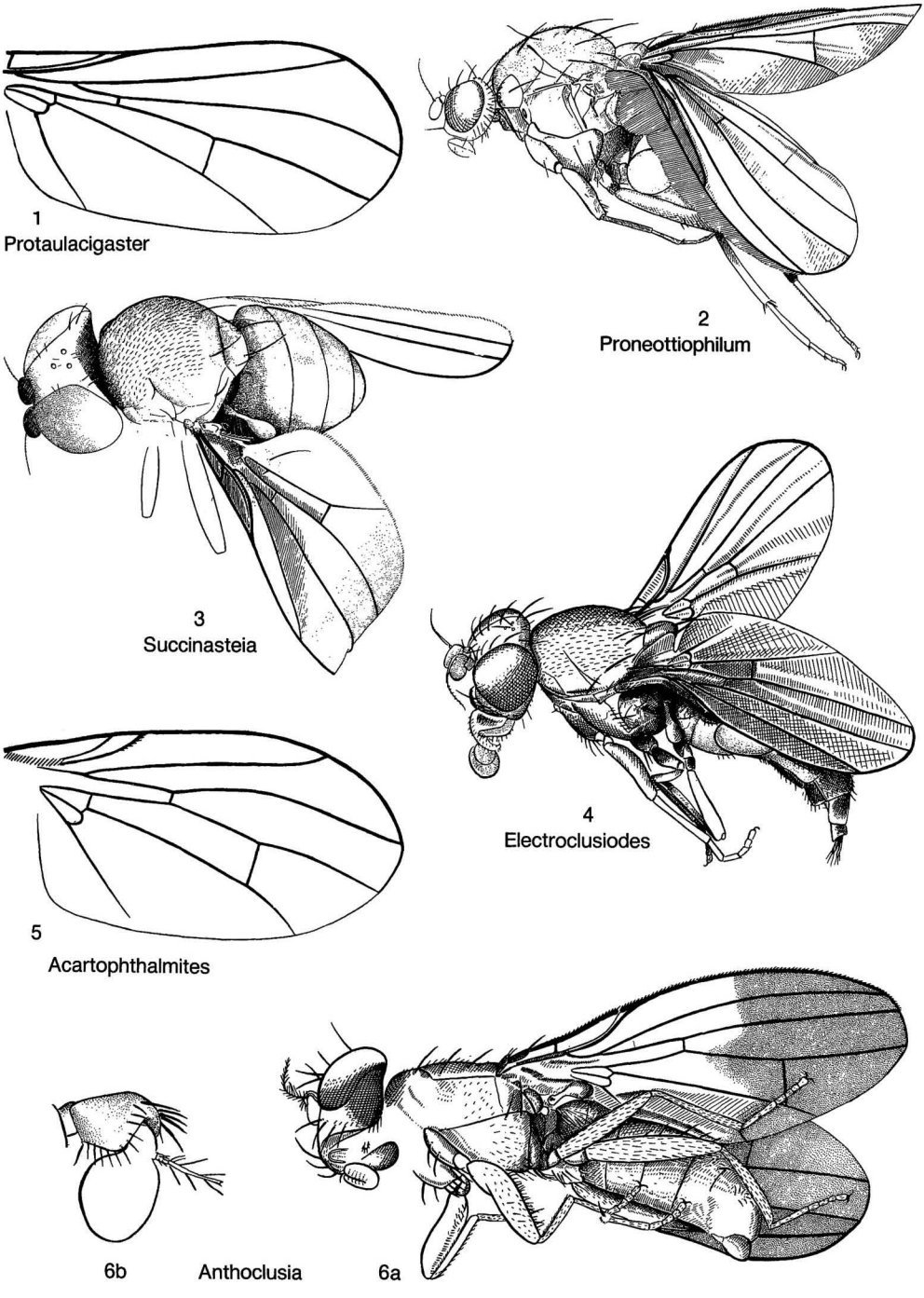


FIG. 237. Proneottiophilidae, Clusiidae, Acartophthalmidae, Neurochaetidae, Aulacigastridae, and Asteiidae (p. 439–442).

Family ANTHOMYZIDAE Bigot, 1852

[Anthomyzidae Bigot, 1852, p. 486]

Small, slender flies, with much structural diversity. Oral vibrissae present; frons usually desclerotized; postvertical bristles divergent when present; usually 3 pairs of fronto-orbital bristles present, at least 1 pair of which are reclinate. Larvae saprophagous, some probably phytophagous. Hennig, 1971a. *Oligo.–Holo.*

Anthomyza Fallén, 1810, p. 20. [Generic assignment of fossil doubtful.] Statz, 1940; Hennig, 1971a. *Oligo.*, Europe (Germany)–*Holo.*

Protanthomyza Hennig, 1965, p. 169 [**P. collarti*; OD]. Costal break at end of SC absent; mesopleura with stout bristles on hind margin. *Oligo.*, Europe (Baltic).

Xenanthomyza Hennig, 1967b, p. 19 [**X. larssoni*; OD]. Arista of antenna with only short hairs. *Oligo.*, Europe (Baltic).

Family AULACIGASTRIDAE Duda, 1924

[Aulacigastridae Duda, 1924, p. 173]

Similar to the Periscelididae, but costal break usually present; vein SC coalesced with R distally; ocellar bristles and usually postvertical bristles absent. Larvae saprophagous, as far as known, in fermenting tree sap. *Oligo.–Holo.*

Aulacigaster Macquart, 1835, p. 579. *Holo.*

Protaulacigaster Hennig, 1965, p. 162 [**P. electrica*; OD]. Similar to *Aulacigaster* (recent) but without costal break at end of SC; CUA+1A extending to hind wing margin. *Oligo.*, Europe (Baltic).——Fig. 237,*1*. **P. electrica*; wing, ×22 (Hennig, 1965).

Family ASTEIIDAE Rondani, 1856

[Asteiidae Rondani, 1856, p. 27]

Small to minute flies. Wings long; costal break absent; vein SC incomplete, not reaching costal margin; RS1+2 diverging anteriorly shortly after its origin, usually terminating on costa before midwing; CUA+1A absent; oral vibrissae well developed; only 1 or 2 pairs of fronto-orbital bristles present. Larvae fungivorous. *Oligo.–Holo.*

Asteia Meigen, 1830, p. 88. *Holo.*

Succinasteia Henning, 1969a, p. 31 [**S. carpenteri*; OD]. Termination of RS1+2 on costa about equidistant between terminations of R and RS3+4; 2 reclinate fronto-orbital bristles present. *Oligo.*, Europe (Baltic).——Fig. 237,*3*. **S. carpenteri*; whole insect, ×24 (Hennig, 1969a).

Family CAMILLIDAE Frey, 1921

[Camillidae Frey, 1921, p. 65]

Small flies, similar to Drosophilidae, but vein CUA+1A very short or absent. Larvae saprophagous, usually in rodent nests. *Oligo.–Holo.*

Camilla Haliday, 1836, p. 281. *Holo.*

Protocamilla Hennig, 1965, p. 195 [**P. succini*; OD]. Costal margin with 2 breaks; basal crossvein present; CUA+1A absent; dorsal preapical bristles on all tibiae. *Oligo.*, Europe (Baltic).

Family DIASTATIDAE Frey, 1921

[Diastatidae Frey, 1921, p. 220]

Similar to Ephydridae (recent) but with only 1 costal break and with convergent postvertical bristles present. Larvae apparently saprophagous, in rotting wood. *Oligo.–Holo.*

Diastata Meigen, 1830, p. 94. *Holo.*

Pareuthychaeta Hennig, 1965, p. 191 [**P. electrica*; OD]. Venation much as in *Euthychaeta* (recent); third antennal segment oval; 1 pair of reclinate and 1 pair of proclinate fronto-orbital bristles, latter fairly remote from former. Hennig, 1967b. *Oligo.*, Europe (Baltic).

Family DROSOPHILIDAE Rondani, 1856

[Drosophilidae Rondani, 1856, p. 27]

Small flies. Costal break present; vein SC incomplete or coalesced with R distally; CUA+1A short. Proclinate fronto-orbital bristles located near eye margins; mesopleural bristles absent. Larvae mostly fungivorous. *Oligo.–Holo.*

Drosophila Fallén, 1823, p. 4. [Generic assignment of fossil doubtful.] Cockerell, 1923b. *Oligo.*, South America (Colombia)–*Holo.*

Curtonotum Macquart, 1842, p. 350. [Generic assignment of fossil doubtful.] Théobald, 1937a. *Oligo.*, Europe (France)–*Holo.*

Electrophortica Hennig, 1965, p. 202 [**E. succini*; OD]. Similar to *Amiota* (recent); 3 pairs of fronto-orbital bristles; costa extending to M1+2; distal portions of RS3+4 and M1+2 nearly parallel. *Oligo.*, Europe (Baltic).

Family MILICHIIDAE Schiner, 1864

[Milichiidae Schiner, 1864, p. 296]

Small flies. Costa with 2 breaks, 1 at end of vein SC, the other near humeral vein; cell behind stem of M and cell behind CUP closed; oral vibrissae present; postvertical bristles not divergent; labella elongate. Larvae saprophagous in various habitats. *Oligo.–Holo.*

Milichia Meigen, 1830, p. 131. *Holo.*

Phyllomyza Fallén, 1810, p. 20. Sabrosky, 1963; Hennig, 1967b. *Oligo.,* Europe (Baltic); *Mio.,* Mexico (Chiapas)–*Holo.*

Pseudodesmometopa Hennig, 1971c, p. 14 [**P. succineum*; OD]. Similar to *Desmometopa* (recent), but labellae shorter and cerci of female cuspidate. *Oligo.,* Europe (Baltic).

Family CRYPTOCHAETIDAE Brues & Melander, 1932

[Cryptochaetidae Brues & Melander, 1932, p. 342]

Small flies. Costa with 2 breaks; cell behind stem of vein M open to discal cell; CUA+1A absent; 2A well developed; third antennal segment much enlarged; fronto-orbital bristles and ocellar bristles absent. Larvae endoparasitic on certain Homoptera. *Oligo.–Holo.*

Cryptochaetum Rondani, 1875, p. 167. *Holo.*

Phanerochaetum Hennig, 1965, p. 179 [**P. tuxeni*; OD]. Similar to *Cryptochaetum* (recent) but with a distinct, though short, arista. Hennig, 1969a. *Oligo.,* Europe (Baltic).

Family CHLOROPIDAE Rondani, 1856

[Chloropidae Rondani, 1856, p. 26]

Small flies. Vein CUA+1A and cell behind CUP absent; proboscis with elongate labella; proclinate and reclinate fronto-orbital bristles absent. Larval habits very diverse: parasitic, saprophagous, or phytophagous. *Oligo.–Holo.*

Chloropa Meigen, 1803, p. 278. [Generic assignment of fossil doubtful.] Statz, 1940. *Oligo.,* Europe (Germany)–*Holo.*

Hippelates Loew, 1863, p. 36. [Generic assignment of fossil doubtful.] Cockerell, 1915. *Oligo.,* England–*Holo.*

Oscinella Becker, 1910, p. 150. [Generic assignment of fossil doubtful.] Statz, 1940. *Oligo.,* Europe (Germany)–*Holo.*

Protoscinella Hennig, 1965, p. 203 [**P. electricus*; OD]. Head higher than long; eyes vertically elliptical; third antennal segment large and rounded; arista short, with short hairs; labellae of proboscis slender and long; costa extending to termination of M1+2. *Oligo.,* Europe (Baltic).

Protoscinis Cockerell, 1917b, p. 380 [**P. perparvus*; OD]. Similar to *Oscinella,* but crossvein r-m nearer wing base. *Oligo.,* England.

Family SCATOPHAGIDAE Robineau-Desvoidy, 1830

[Scatophagidae Robineau-Desvoidy, 1830, p. 614]

Similar to Anthomyidae but with silky hairs below occiput. Larvae saprophagous or phytophagous, including a few leaf-miners. *Oligo.–Holo.*

Scatophaga Fabricius, 1803, p. 277. Statz, 1940. *Oligo.,* Europe (Germany)–*Holo.*

Norellisoma Hendel, 1910, p. 308. Statz, 1940. *Oligo.,* Europe (Germany)–*Holo.*

Family GASTEROPHILIDAE Girschner, 1896

[Gasterophilidae Girschner, 1896, p. 63]

Muscoid flies, with mouthparts vestigial in adults. Vein M1+2 extending nearly straight to wing margin, not curved abruptly toward RS3+4. Larvae parasitic in alimentary tract of mammals. *Pleist.–Holo.*

Gasterophilus Leach, 1817, p. 162. *Holo.*

Cobboldia Brauer, 1887, p. 218. [Fossils are larvae from frozen mammoth; living species of *Cobboldia* are parasites of elephants.] Grunin, 1973. *Pleist.,* USSR (Asian RSFSR)–*Holo.*

Family MUSCIDAE Latreille, 1802

[Muscidae Latreille, 1802a, p. 453]

Small to large flies. Vein M1+2 with an abrupt bend toward RS3+4 in midwing area; CUA+1A not reaching hind margin; antennae with dorsal arista. Larvae saprophagous, phytophagous, or predaceous. *Oligo.–Holo.*

Musca Linné, 1758, p. 589. *Holo.*

Fannia Robineau-Desvoidy, 1830, p. 567. [Fossil record is of *F. scalaris,* a widely distributed extant species.] Hennig, 1966a. *Oligo.,* Europe (Baltic)–*Holo.*

Family GLOSSINIDAE Malloch, 1929

[Glossinidae Malloch, 1929, p. 553]

Flies of moderate size, similar to Muscidae, but vein M1+2 nearly straight in

midwing area; proboscis in both sexes strongly sclerotized and elongate, its base bulbous. Larval development completed in abdomen of adult female. *Oligo.–Holo.*

Glossina WIEDEMANN, 1830, p. 253 [=*Paloestrus* SCUDDER, 1892, p. 18 (type, *P. oligocenus*); *Cockerellitha* TOWNSEND, 1938, p. 166 (type, *Glossina osborni* COCKERELL, 1909e); *Lithoglossina* TOWNSEND, 1938, p. 166 (type, *Glossina armatipes* COCKERELL, 1917a)]. COCKERELL, 1907d, 1916b; BEQUAERT, 1930b; TOWNSEND, 1942. *Oligo.,* USA (Colorado)–*Holo.*

Family EOPHLEBOMYIIDAE Cockerell, 1925

[Eophlebomyiidae COCKERELL, 1925c, p. 230]

Little-known flies, apparently related to the Anthomyiidae. *Eoc.*

Eophlebomyia COCKERELL, 1924a, p. 4 [**E. claripennis*; OD]. Cell below vein M3+4 open; tibiae smooth. COCKERELL, 1925c. *Eoc.,* USA (Colorado).

Family CALLIPHORIDAE Brauer & von Bergenstamm, 1889

[Calliphoridae BRAUER & von BERGENSTAMM, 1889, p. 156]

Flies medium-sized to large. Similar to Sarcophagidae (recent), but arista plumose to its tip; commonly with 2 notopleural bristles. Larvae mostly scavengers, usually in carrion; some parasitic on snails or earthworms, and a few causing cutaneous myiasis in mammals. *Cret.–Holo.*

Calliphora ROBINEAU-DESVOIDY, 1830, p. 433. *Holo.*

Cretaphormia MCALPINE, 1970, p. 345 [**C. fowleri*; OD]. Puparium about 13 mm long; flies shaped as in *Protophormia* (recent). *Cret.,* Canada (Alberta).

Family HIPPOBOSCIDAE Samouelle, 1819

[Hippoboscidae SAMOUELLE, 1819, p. 302]

Wings long; veins SC, R, and RS strong, ending on anterior margin well before apex; M1+2, M3+4, and CUA+1A usually reaching wing margin but weakly developed; cell behind stem of M open to discal cell; body dorsoventrally flattened; proboscis porrect. Adults ectoparasites on mammals and birds. Larval development completed in abdomen of adult female. *Oligo.–Holo.*

Hippobosca LINNÉ, 1758, p. 607. *Holo.*

Lynchia WEYENBERGH, 1881, p. 195. STATZ, 1940; HENNIG, 1966a. *Oligo.,* Europe (Germany)–*Holo.*

Family UNCERTAIN

The following genera, apparently belonging to the order Diptera, suborder Brachycera, are too poorly known to permit assignment to families.

Acanthomyites COCKERELL, 1921e, p. 33 [**A. aldrichi*; OD]. Little-known genus of stout flies, with many large bristles on head, abdomen, and legs. [Wing unknown; probably a muscoid.] *Eoc.,* USA (Colorado).

Adipterites TOWNSEND, 1938, p. 166 [**Dipterites obovatus* HEER, 1865, fig. 323; OD]. Little-known larva. HEER, 1849; TOWNSEND, 1942. *Mio.,* Europe (Germany).

Anthracida GERMAR, 1849, p. 64 [**A. xylotona*; OD]. Little-known genus. *Oligo.,* Europe (Germany).

Arthropiella MEUNIER, 1908d, p. 262 [**A. eocenia*; OD]. Little-known genus, possibly related to the Xylophagidae. HENNIG, 1967a. *Oligo.,* Europe (Baltic).

Burmitempis COCKERELL, 1917g, p. 367 [**B. halteralis*; OD]. Little-known genus. Discal cell open; structure of RS and M uncertain; halteres enormous. Head broad, dichoptic. MELANDER, 1927. *Mio.,* Burma.

Dipterites HEER, 1849, p. 254 [**D. obsoleta*; OD]. Little-known genus, probably belonging to suborder Brachycera. *Mio.,* Europe (Germany).

Electrotachina TOWNSEND, 1938, p. 166 [**E. smithii*; OD]. Little-known genus (adult). TOWNSEND, 1942. *Oligo.,* Europe (Baltic).

Eoasilidea BODE, 1953, p. 315 [**E. fragmentosa*; OD]. Little-known genus, based on wing fragment; placed in new family Eoasilidae, without diagnosis. *Jur.,* Europe (Germany).

Eomyza COCKERELL, 1924d, p. 200 [**E. holoptera*; OD]. Little-known genus, based on wing fragment. HENNIG, 1965. *Eoc.,* USA (Colorado).

Epidia WEYENBERGH, 1869, p. 258 [**E. wulpi*; OD]. Little-known genus. *Jur.,* Europe (Germany).

Homoeoptychopteris BODE, 1953, p. 317 [**H. incerta*; OD]. Little-known genus, based on wing fragment. *Jur.,* Europe (Germany).

Liassonympha BODE, 1953, p. 331 [**L. compacta*; OD]. Little-known genus, based on pupa. *Jur.,* Europe (Germany).

Lithexorista TOWNSEND, 1921, p. 133 [**L. scudderi*; OD]. Little-known genus (adult). TOWNSEND, 1942. *Eoc.,* USA (Wyoming).

Lithohypoderma TOWNSEND, 1916, p. 129 [**Musca ascarides* SCUDDER, 1877a, p. 756; OD]. Genus known only from larvae and pupae; larvae with well-developed mouth-hooks; integument setose.

[Probably subaquatic and saprophagous.] SCUDDER, 1890; COCKERELL, 1907f, 1916c; TOWNSEND, 1942; BRADLEY, 1931. *Eoc.*, USA (Colorado, Utah).

Lithotachina TOWNSEND, 1921, p. 133 [**Echinomya antiqua* HEER, 1849, p. 247; OD]. Little-known genus (adult). TOWNSEND, 1942. *Mio.*, Europe (Germany).

Muscidites HEYDEN & HEYDEN, 1866, p. 157 [**M. deperditus*; OD]. Little-known genus (larva). TOWNSEND, 1942. *Oligo.*, Europe (Germany).

Pachyuronympha ROHDENDORF, 1964, p. 212 [**P. karatauensis*; OD]. Little-known genus, based on fragment of pupa. *Jur.*, USSR (Kazakh).

Protocyrtus ROHDENDORF, 1938, p. 39 [**P. jurassicus*; OD]. Little-known genus, based on wing fragment. ROHDENDORF, 1962a. *Jur.*, USSR (Kazakh).

Remalia GIEBEL, 1856, p. 199 [**R. sphinx*; OD]. Little-known genus, probably a muscoid. HULL, 1945. *Jur.*, England.

Syrphopsis ZEUNER, 1931, p. 316 [**S. globosiceps*; OD]. Little-known genus. HULL, 1945. *Mio.*, Europe (Germany).

Vinculomusca TOWNSEND, 1938, p. 166 [**Musca vinculata* SCUDDER, 1877a, p. 758; OD]. Little-known genus (larva). TOWNSEND, 1942. *Eoc.*, USA (Colorado).

Order HYMENOPTERA Linné, 1758

[Hymenoptera LINNÉ, 1758, p. 553]

Minute to medium-sized insects. Head free and usually very motile; compound eyes large, often holoptic in males; antennae diversely formed, especially so within the suborder Symphyta; sexual dimorphism of the antennae common in the suborder Apocrita; mouthparts of most species mandibulate and adapted for chewing, but labrum, in some Apocrita, modified to form a proboscis. Prothorax small; metathorax small and fused with the large mesothorax; abdomen broadly attached to thorax in the Symphyta, but in the Apocrita first abdominal segment fused with metathorax, with distinct constriction present between modified first abdominal segment (propodeum) and remaining segments (collectively termed the gaster, see Fig. 240), and with first gastral segment typically reduced to a narrow neck (petiole); female abdomen usually with an ovipositor. Wings membranous, hind pair much smaller than fore pair; in some species females (and more rarely males) apterous. Wing venation highly specialized, even the most generalized members of the order (Xyelidae) showing some reduction and coalescence of main veins.

Attempts to homologize the wing veins with those of other insects have resulted in several interpretations. The one proposed by Ross (1936) is now generally accepted and is used here, with slight changes in terminology suggested by RASNITSYN (1969, 1975). In the family Xyelidae (suborder Symphyta, Fig. 238), which seems to have the least specialized venation among the Hymenoptera, all main veins are present, but the basal parts of veins M and CUA are fused to near midwing, and M diverges anteriorly and coalesces with RS for a short distance; RS has two branches; CUA is long but very irregular; CUP is short, obsolescent, or absent; 1A is long and strong; 2A is irregular and close to the posterior border of the wing; R is the strongest vein in the wing and terminates at a conspicuous pterostigma; a distinct break or interruption of the sclerotization may occur just before the pterostigmal area, and the pterostigma itself may have a clear or white spot near its center. The size and shape of the pterostigma, the extent and nature of the coalescence of RS and M, and the positions of the several crossveins are structural features usually employed in the diagnoses of genera and families of the Symphyta and many of the Apocrita. Within the Apocrita, however, there is a much greater diversity of venational patterns than within the Symphyta. In the Tiphiidae, for example, the venation is sufficiently similar to that of the xyelids to enable the determination of the homologies without difficulty (Fig. 239,*1*); but in other families of parasitic wasps the venation may be reduced to one or two veins, with stumps of a few others. In these the homologies are not clear, and different terms are usually applied to such veins (Fig. 239,*2*). The venation of the hind wing of the Hymenoptera is generally much more reduced than that of the fore wing, and since the hind wing is very rarely preserved

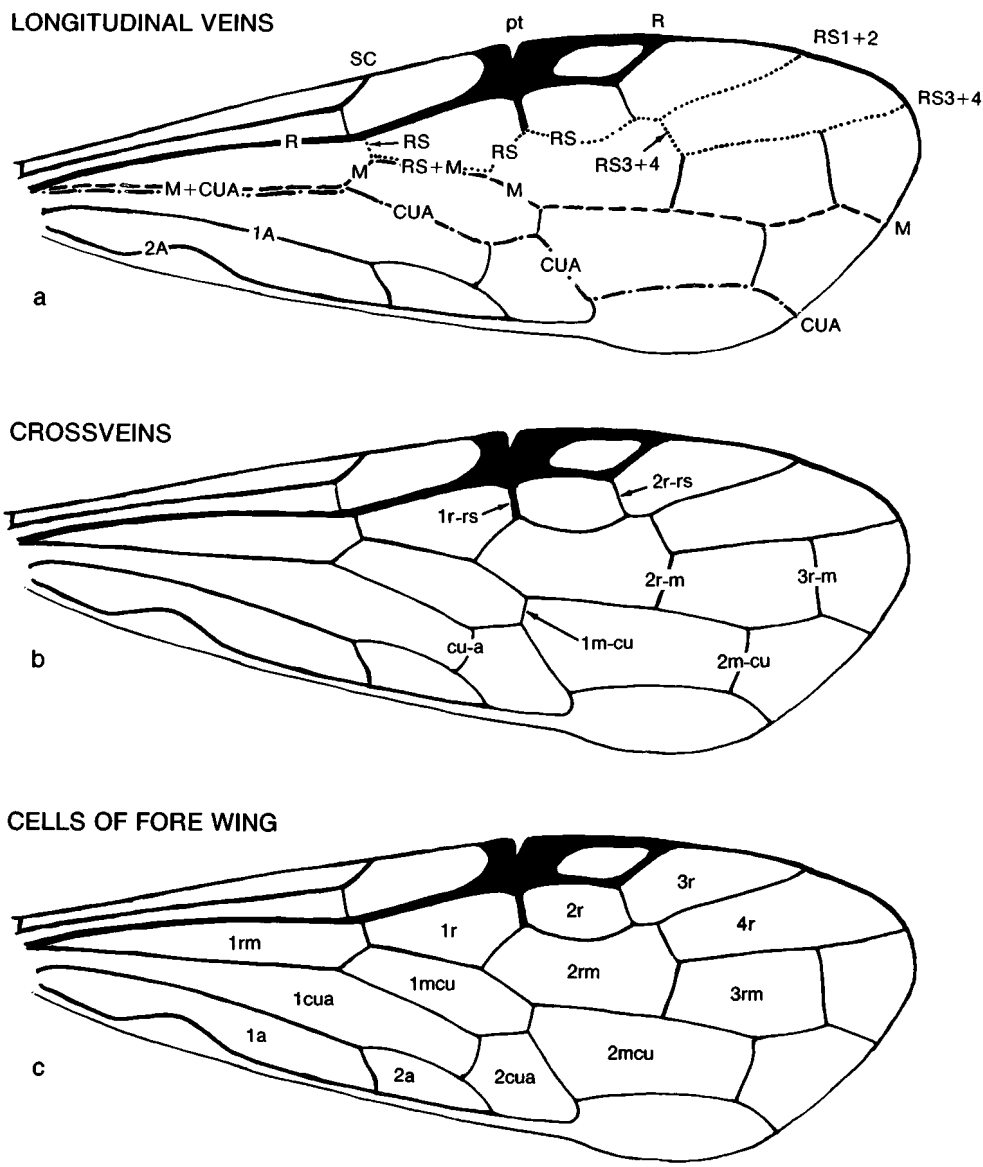
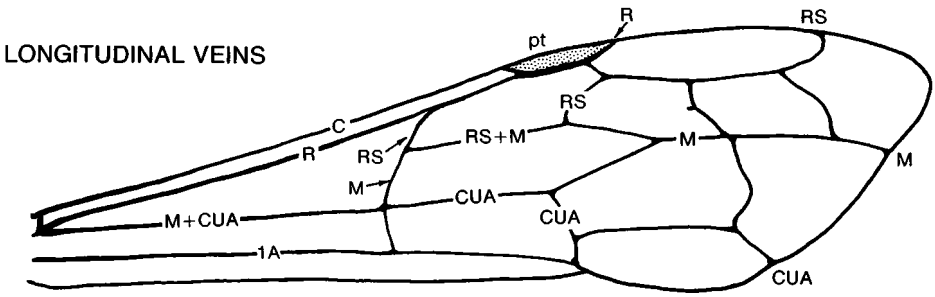


FIG. 238. Hymenoptera; suborder Symphyta, venational pattern of the fore wing of *Angaridyela vitimica* RASNITSYN, Xyelidae, from the Cretaceous of the USSR; *a,* terminology of the longitudinal veins; *b,* terminology of the crossveins; *c,* terminology of the cells. The symbols for crossveins are hyphenated to avoid confusion with those for the cells. SC, subcosta; pt, pterostigma; R, radius; RS, radial sector (dotted line); M, media (dashed line); CUA, anterior cubitus (dot-and-dash line); A, anal (adapted from Rasnitsyn, 1969).

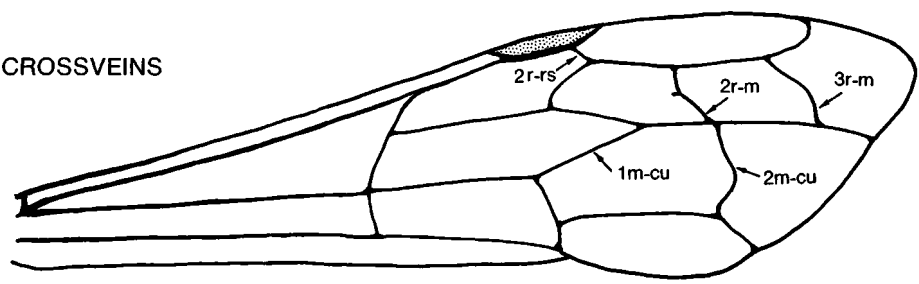
in fossils, it is not used here in the taxonomic diagnoses.

The legs of the Hymenoptera are basically cursorial, but in some, as in certain wasps, they are adapted for digging or nest building. In others, the fore tibiae and basal segments of the fore tarsi combine to form a comblike structure, used for cleaning the antennae; and in the bees the hind legs may have structures in the form of a brush (scopa) or a basket (corbicula) for carrying pollen.

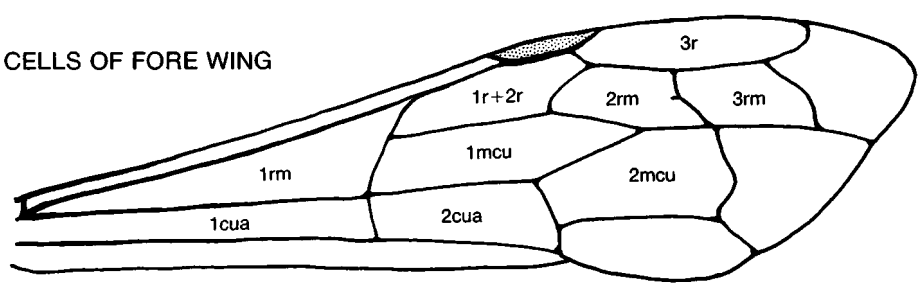
Larvae develop from eggs usually depos-



1a



1b



1c

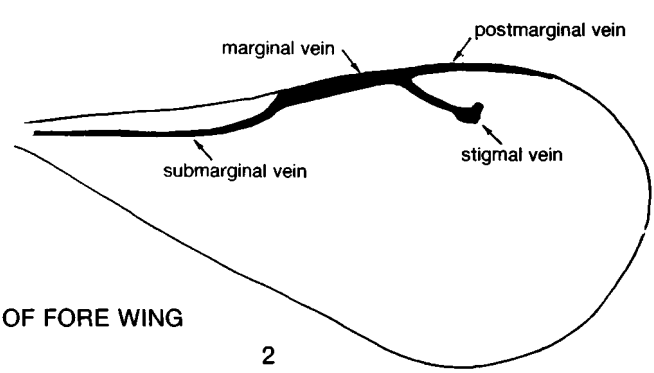


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FIG. 239. Hymenoptera; fore wing venation in the suborder Apocrita.——*1a–c.* Venational pattern of the fore wing of *Myzinum* sp., Tiphiidae; *a,* veins; *b,* crossveins; *c,* cells. Terms are as in Figure 238 with the addition of C, costa. Note the slight reduction of the venation with the apparent loss of the subcosta, the absence of the fork in the radial sector, and the loss of crossvein 1r-rs.——*2.* Fore wing of *Meraporus* sp., Pteromalidae, showing the terminology of the reduced venation (from Brues, Melander, & Carpenter, 1954).

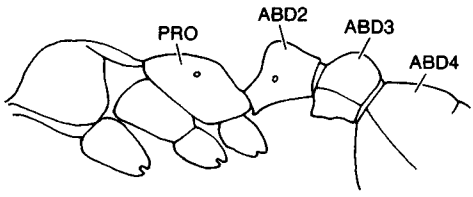


FIG. 240. Hymenoptera; lateral view of the thorax and basal abdominal segments of *Myrmica* sp., suborder Apocrita, Formicidae; PRO, propodeum or first abdominal segment; ABD2, second abdominal segment; ABD3 and ABD4, third and fourth abdominal segments (adapted from Brues, Melander, & Carpenter, 1954).

ited in specific environments and show even greater diversity of form than those of the Diptera. The larvae of the Symphyta, with a strongly sclerotized head capsule, well-developed mandibles, and three pairs of thoracic legs, resemble caterpillars (Fig. 241,*b*). These are mostly foliage feeders and apparently represent the primitive type of hymenopterous larvae. The larvae of the Apocrita, on the other hand, have at most a weakly sclerotized head and are apodous (Fig. 241,*a*). Most of them are parasitoid or predaceous; only a few are phytophagous, feeding on pollen and nectar. Pupation occurs in various environments, and in most species the pupae are exarate and encased in a cocoon.

Adults are very diverse in habitat. Most feed to some extent on nectar and are therefore important pollinators. *Trias.–Holo.*

The order Hymenoptera is at least as large and diverse as the Diptera, and probably even more of its recent species remain undescribed. Nearly 90 existing families are generally recognized. The present division of the order into two suborders, Symphyta and Apocrita, extends well back into the last century, and the general evolutionary implications of that division still seem valid. Some existing families of the Symphyta, such as the Xyelidae, are far more generalized than any family of the Apocrita. Morphological and geological evidence suggests that the Apocrita may have been derived from unknown ancestors related to the Siricidae, early in the Jurassic Period. The Apocrita is by far the larger and more complex of the two suborders at the present time, but attempts to group its families into two categories have resulted in only informal sections. One of these includes the parasitic wasps (previously termed the Terebrantia) and the other, the ants, wasps, bees, and their relatives, collectively referred to as the aculeates. However, there are no characteristics, morphological or behaviorial, that actually delimit these sections.

The families of both suborders are usually grouped into superfamilies, but there is much difference of opinion about the positions of certain families in this hierarchy and the degrees of relationship between the superfamilies. Grouping of the families becomes even more difficult when the Mesozoic genera are added, because many of the Jurassic families, often represented by few genera, do not fall into existing superfamilies as defined on recent species. The most detailed and significant account of the evolution of the Hymenoptera is that of Dr. A. P. RASNITSYN (1980b), who is responsible for most of our knowledge of the Mesozoic Hymenoptera.

The earliest appearance of the order is in the Triassic of Australia and the Soviet Union. All of these Triassic fossils appear to belong to the existing family Xyelidae (suborder Symphyta), and their diversity is remarkable, especially in comparison with the small size of the family at present. Not until the Upper Jurassic are other existing families known: the Pamphiliidae, Anaxyelidae, and Siricidae of the Symphyta and the Megalyridae and Heloridae of the Apocrita. In the Cretaceous many existing families appear, including the highly specialized chalcidoid families Trichogrammatidae, Mymaridae, and Tetracampidae among the parasitic wasps, and the family Formicidae among the aculeates. At present 78 families of the order are represented in the fossil record; 22 of them are extinct, but of that number only two are aculeates.

The diversity of the Xyelidae in the Triassic is an indication that the order probably arose in the early Triassic or possibly the very

late Permian. Study of some 40,000 Permian insects from the Soviet Union, United States, and Australia has failed to turn up any recognizable members of the order, but most of the Permian specimens are from the middle Permian or later. In the absence of evidence to the contrary, the Hymenoptera are generally assumed to have arisen from primitive neuropteroid stock, probably unknown terrestrial relatives of the sialoid Neuroptera. RASNITSYN (1980b) has recently proposed that the ancestral line was within the extinct order Miomoptera, which is known from the Upper Carboniferous and Permian. This order has previously been considered to belong to the orthopteroid complex, but RASNITSYN believes it to have been endopterygote and closely related to the Neuroptera. Whether or not the Miomoptera are in fact reasonable candidates for the ancestors of the Hymenoptera, however, will not really become clear until we have more information than we do now about the structure and life history of the members of that order.

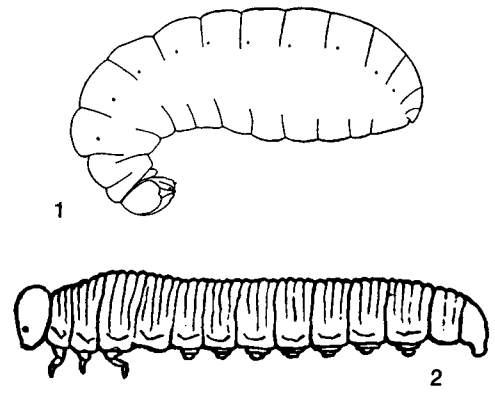


FIG. 241. Hymenoptera, larvae.——*1*. Apocrita, family Formicidae (from Wheeler & Wheeler, 1952).——*2*. Symphyta, family Tenthredinidae (from Brues, Melander, & Carpenter, 1954).

Suborder SYMPHYTA Gerstaecker, 1867

[Symphyta GERSTAECKER, 1867, p. 2]

Adults with abdomen broadly attached to thorax, without pronounced constriction between the first and second segments of abdomen. Larvae with thoracic legs. *Trias.–Holo.*

Family XYELIDAE Newman, 1835

[Xyelidae NEWMAN, 1835, p. 379]

Fore wing with vein RS usually having 2 branches; basal section of RS at least slightly slanted toward wing apex; crossveins 1r-rs always present; crossvein 2r-rs attached to RS proximally to crossvein 2r-m; crossveins 3r-m and 2m-cu always present. Antennae with many segments, third segment compound, much longer and thicker than remaining flagellar segments; fore tibiae with 2 apical spurs; ovipositor well developed, usually flat. Larvae living in plant tissues or on foliage. *Trias.–Holo.*

Xyela DALMAN, 1819, p. 122. STATZ, 1936b. *Oligo.*, Europe (Germany)–*Holo.*

Angaridyela RASNITSYN, 1966, p. 75 [**A. vitimica*; OD]. Fore wing with pterostigma sclerotized basally and membranous distally; SC connected to R (by a short crossvein or branch of SC) just before origin of RS; basal section of RS slightly shorter than basal section of M. RASNITSYN, 1969. *Cret.*, USSR (Kazakh).—— FIG. 242,*6*. **A. vitimica*; wings and body, ×7 (Rasnitsyn, 1969).

Anomoxyela RASNITSYN, 1966, p. 72 [**Anaxyela incerta* RASNITSYN, 1963, p. 95; OD]. Fore wing similar to that of *Lydoxyela*, but RS3+4 only slightly curved distally and without a sharp angle at crossvein 3r-m; termination of RS1+2 closer to pterostigma than to end of RS3+4. RASNITSYN, 1969. *Jur.*, USSR (Kazakh).——FIG. 242,*5*. **A. incerta* (RASNITSYN); wings and body, ×5.5 (Rasnitsyn, 1966).

Anthoxyela RASNITSYN, 1977a, p. 99 [**S. baissensis*; OD]. Fore wing with pterostigma sclerotized basally only; SC connected to R only a very short distance beyond origin of RS; basal section of RS 1.5 times length of basal section of M; crossvein 2m-cu slightly basad of middle of cell 3rm. KRASSILOV & RASNITSYN, 1982. *Cret.*, USSR (Asian RSFSR).—— FIG. 242,*1*. **A. baissensis*; fore wing, ×4 (Rasnitsyn, 1977a).

Archexyela RIEK, 1955, p. 657 [**A. crosbyi*; OD]. Fore wing with crossvein 1r-rs running into base of pterostigma; pterostigma sclerotized at base only; crossvein 2m-cu situated slightly before apex of cell 3rm; crossvein 2r-rs meeting RS1+2 close to fork of RS. RASNITSYN, 1969. *Trias.*, Australia (Queensland).—— FIG. 242,*2*. **A. crosbyi*; fore wing, ×4 (Riek, 1955).

Asioxyela RASNITSYN, 1964, p. 92 [**A. smilodon*;

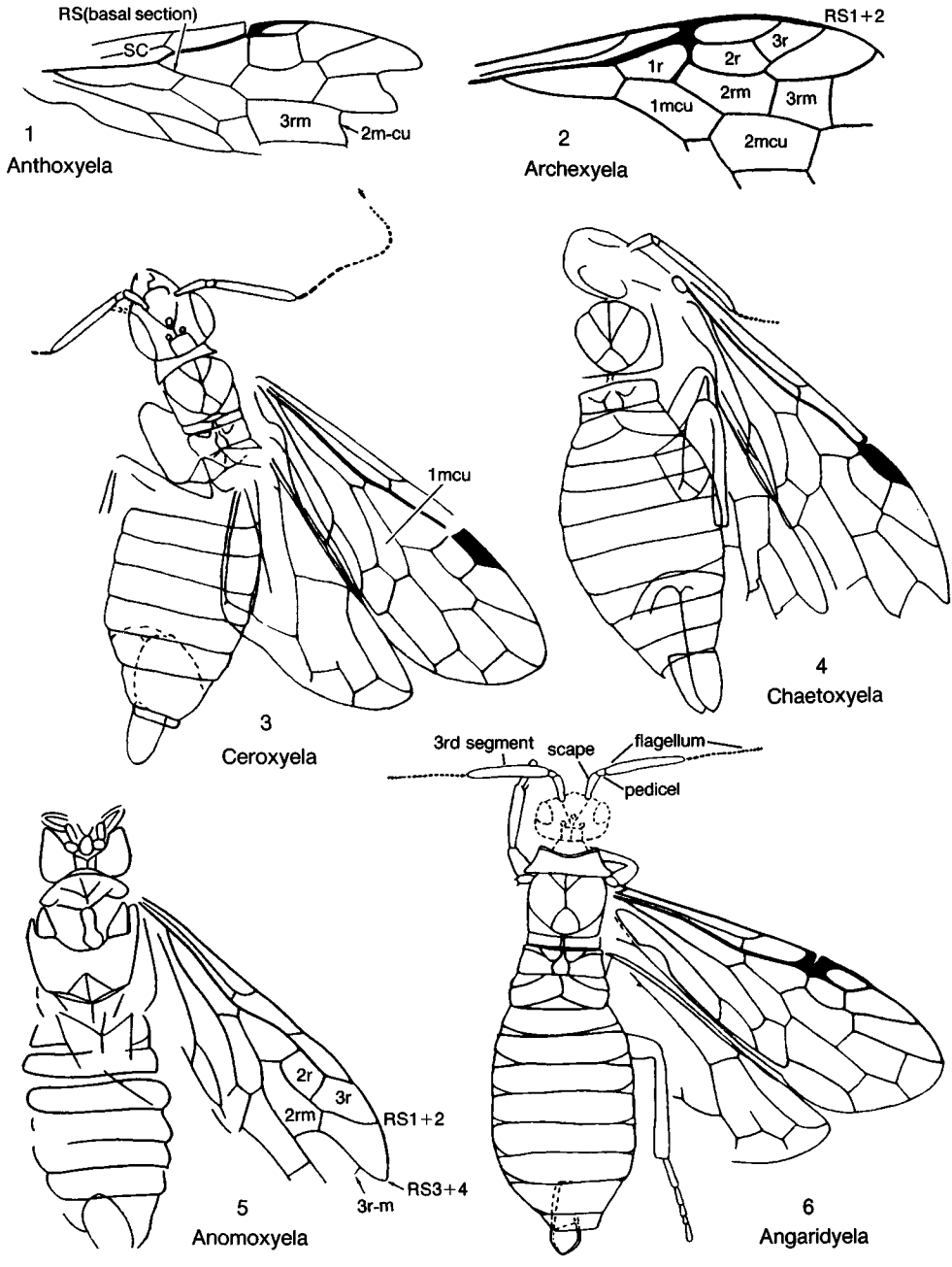


FIG. 242. Xyelidae (p. 449–451).

OD]. Fore wing with pterostigma sclerotized, but with center membranous; basal section of RS about 1.5 times length of basal section of M; crossvein 2r-rs joined to RS just beyond its fork. Head with large, crescent-shaped mandibles. RASNITSYN, 1969. *Trias.*, USSR (Kirghiz).

Baissoxyela RASNITSYN, 1969, p. 54 [**B. tarsalis*; OD]. Little-known genus. Fore wing with R almost straight; space between costal margin and R uniform. Terminal part of flagellum of antennae short but with about 16 segments. *Cret.*, USSR (Asian RSFSR).

Ceroxyela Rasnitsyn, 1966, p. 80 [**C. dolichocera*; OD]. Fore wing with pterostigma sclerotized but with membranous area basally; SC connected to R beyond origin of RS; basal section of RS slightly shorter than basal section of M; cell 1mcu very narrow. Rasnitsyn, 1969. *Cret.*, USSR (Kazakh). —— Fig. 242,*3*. **C. dolichocera*; wings and body, ×6 (Rasnitsyn, 1969).

Chaetoxyela Rasnitsyn, 1966, p. 82 [**C. hirsuta*; OD]. Fore wing with pterostigma fully sclerotized; SC connected to R at origin of RS; basal section of RS slightly shorter than basal section of M. Rasnitsyn, 1969. *Cret.*, USSR (Kazakh). ——Fig. 242,*4*. **C. hirsuta*; wings and body, ×4 (Rasnitsyn, 1969).

Enneoxyela Rasnitsyn, 1966, p. 73 [**E. crassicauda*; OD]. Little-known genus. Fore wing with pterostigma narrow; SC connected to R beyond origin of RS; termination of RS1+2 closer to pterostigma than to end of RS3+4. Rasnitsyn, 1969. *Jur.*, USSR (Kazakh).

Eoxyela Rasnitsyn, 1965, p. 487 [**E. scoliura*; OD]. Fore wing shorter than body; R nearly straight; basal section of RS much longer than basal section of M; cell 4r much longer than cell 3r. Rasnitsyn, 1969, 1983a. *Jur.*, USSR (Kazakh). —— Fig. 243,7. **E. scoliura*; fore wing, ×9 (Rasnitsyn, 1969).

Euryxyela Rasnitsyn, 1964, p. 94 [**E. euryptera*; OD]. Fore wing unusually broad; pterostigma fully sclerotized; basal section of RS longer than basal section of M; RS3+4 diverging anteriorly at crossvein 3r-m; crossvein 2r-rs joining RS at its fork. Rasnitsyn, 1969. *Trias.*, USSR (Kirghiz).—— Fig. 243,*1*. **E. euryptera*; fore wing, ×5.8 (Rasnitsyn, 1969).

Ferganoxyela Rasnitsyn, 1969, p. 47 [**F. sogdiana*; OD]. Fore wing broadly triangular; pterostigma large; RS1+2 terminating halfway between pterostigma and RS3+4. *Trias.*, USSR (Kirghiz). —— Fig. 243,6. **F. sogdiana*; fore wing, ×8.5 (Rasnitsyn, 1969).

Gigantoxyela Rasnitsyn, 1966, p. 81 [**G. quadrifurcata*; OD]. Fore wing as in *Chaetoxyela*, but SC connected to R well before origin of RS. Rasnitsyn, 1969. *Cret.*, USSR (Kazakh).

Kirghizoxyela Rasnitsyn, 1966, p. 70 [**K. mirabilis*; OD]. Fore wing similar to that of *Orthoxyela*, but SC absent and R only slightly thickened at base of pterostigma. Rasnitsyn, 1969. *Jur.*, USSR (Kirghiz).

Leioxyela Rasnitsyn, 1969, p. 49 [**L. mollis*; OD]. Fore wing with pterostigma fully sclerotized; crossvein 2r-rs much nearer to apex of pterostigma than to crossvein 1r-rs; cells 1r and 2r of about same length. *Trias.*, USSR (Kirghiz).

Liadoxyela Martynov, 1937a, p. 41 [**L. praecox*; OD]. Little-known genus. Fore wing with R strongly thickened at base of pterostigma, curved; area between R and costal margin widest near origin of RS; cell 1r only slightly longer than cell 2r. Rasnitsyn, 1966, 1969, 1983a. *Jur.*, USSR (Kirghiz, Asian RSFSR). —— Fig. 243,*2*. **L. praecox*; fore wing, ×4 (Rasnitsyn, 1969).

Lithoxyela Rasnitsyn, 1969, p. 43 [**L. fenestralis*; OD]. Fore wing with uniformly narrow costal area; pterostigma not fully sclerotized; end of RS1+2 closer to end of RS3+4 than to pterostigma. *Trias.*, USSR (Kirghiz). —— Fig. 243,*4*. **L. fenestralis*; fore wing, ×5.5 (Rasnitsyn, 1969).

Lydoxyela Rasnitsyn, 1966, p. 71 [**L. excellens*; OD]. Fore wing with SC connected to R proximal of origin of RS; basal section of RS about half as long as basal section of M; crossvein 1r-rs longer than 2r-rs; RS3+4 with an abrupt anterior bend at crossvein 3r-m; RS1+2 apparently absent. Rasnitsyn, 1969. *Jur.*, USSR (Kazakh). —— Fig. 243,*5*. **L. excellens*; wings and body, ×6 (Rasnitsyn, 1966).

Madygella Rasnitsyn, 1969, p. 51 [**M. analoga*; OD]. Fore wing with pterostigma well sclerotized; SC distinct and well developed; R straight; basal section of RS shorter than RS+M. *Trias.*, USSR (Kirghiz).—— Fig. 243,*3*. **M. analoga*; fore wing, ×12. (Rasnitsyn, 1969).

Madygenius Rasnitsyn, 1969, p. 45 [**M. extraradius*; OD]. Fore wing with costal area narrow; pterostigma sclerotized; end of RS1+2 much closer to RS3+4 than to pterostigma; 2 crossveins between RS1+2 and RS3+4. *Trias.*, USSR (Kirghiz).——Fig. 244,7. **M. extraradius*; fore wing, ×7.5 (Rasnitsyn, 1969).

Megaxyela Ashmead, 1898, p. 206. Brues, 1908b; Zhelochovtzev & Rasnitsyn, 1972. *Oligo.*, USA (Colorado)–*Holo.*

Microxyelecia Rasnitsyn, 1969, p. 54 [**M. brachycera*; OD]. Fore wing with R straight; distance between costal margin and R uniform but narrower than in *Baissoxyela*. Flagellum relatively longer than in *Baissoxyela*. *Jur.*, USSR (Kazakh).

Nigrimonticola Rasnitsyn, 1966, p. 77 [**N. longicornis*; OD]. Little-known genus. Fore wing as in *Ophthalmoxyela*, but basal section of RS half as long as basal section of M; RS1+2 terminating closer to pterostigma than to end of RS3+4. Rasnitsyn, 1969. *Jur.*, USSR (Kazakh).

Ophthalmoxyela Rasnitsyn, 1966, p. 78 [**O. brachyura*; OD]. Little-known genus. Fore wing with pterostigma sclerotized but with clear spot near center; basal section of RS almost twice as long as basal section of M. Rasnitsyn, 1969. *Jur.*, USSR (Kazakh).

Orthoxyela Rasnitsyn, 1983a, p. 91 [**O. rectiradiata*; OD]. Related to *Kirghizoxyela*, but fore wing with SC well developed; R conspicuously thickened at base of pterostigma. *Jur.*, USSR (Asian RSFSR).

Oryctoxyela Rasnitsyn, 1969, p. 45 [**O. anomala*; OD]. Fore wing with costal area narrow; RS1+2

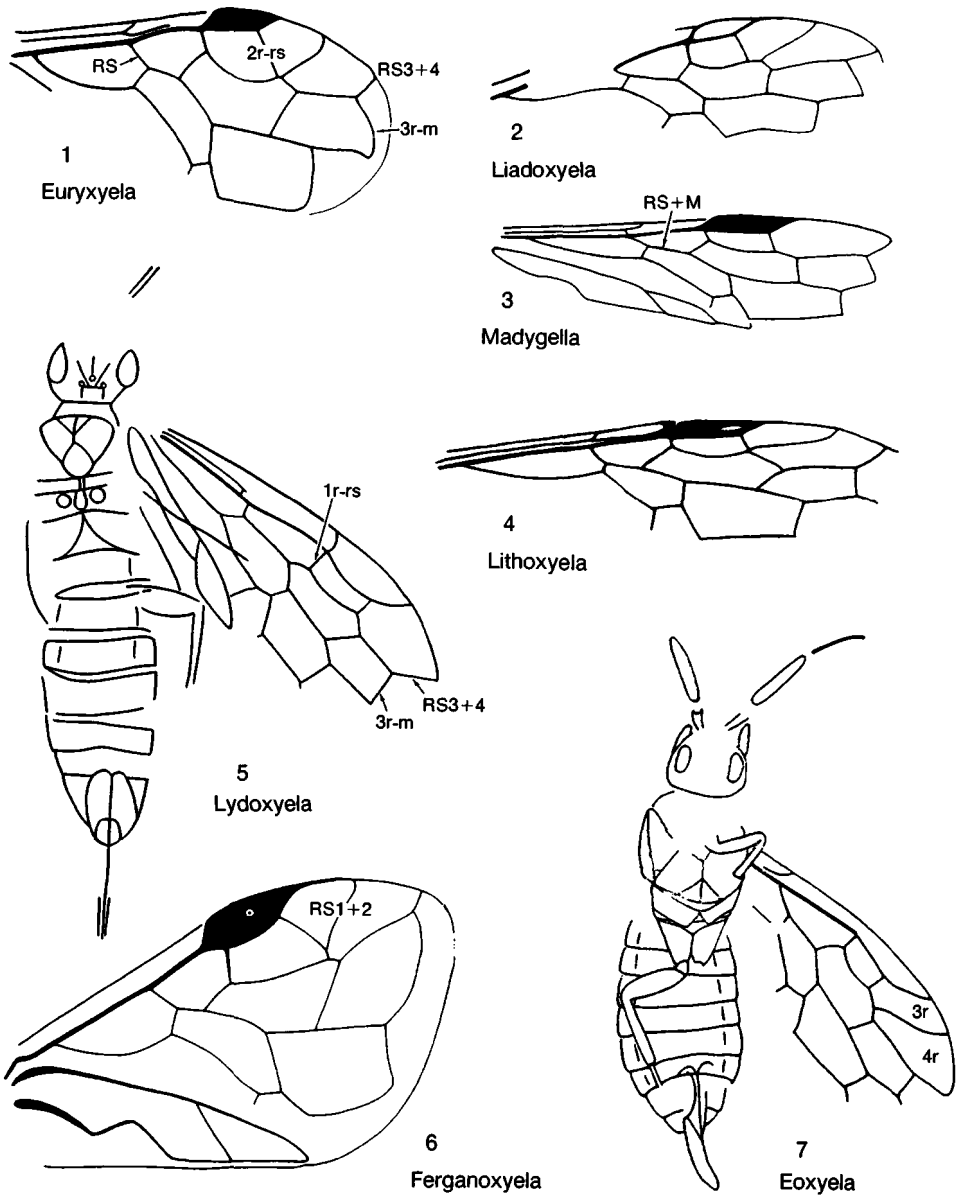


FIG. 243. Xyelidae (p. 451).

about twice as far from pterostigma as from RS3+4. *Trias.*, USSR (Kirghiz).——FIG. 244,3. **O. anomala*; fore wing, ×5 (Rasnitsyn, 1969).

Pinicolites MEUNIER, 1920c, p. 896 [**P. grasiosus*; OD]. Similar to *Pleroneura* (recent), but SC in fore wing extending beyond level of origin of RS. STATZ, 1936b; RASNITSYN, 1969. *Oligo.*, Europe (Germany).

Sirecomima RASNITSYN, 1969, p. 51 [**S. xiphophora*; OD]. Fore wing with pterostigma weakly sclerotized and narrow; basal section of RS much longer than RS+M. *Trias.*, USSR (Kirghiz).——FIG. 244,6. **S. xiphophora*; fore wing, ×16 (Rasnitsyn, 1969).

Spathoxyela RASNITSYN, 1969, p. 53 [**Eoxyela fossilis* RASNITSYN, 1965, p. 487; OD]. Fore wing with R straight; distance between R and costal margin narrow and uniform; SC free from R; termination of RS1+2 slightly closer to end of RS3+4 than to pterostigma; crossvein 2r-rs distal to center of pterostigma. KRASSILOV & RASNITSYN, 1982. *Cret.*, USSR (Kazakh, Asian

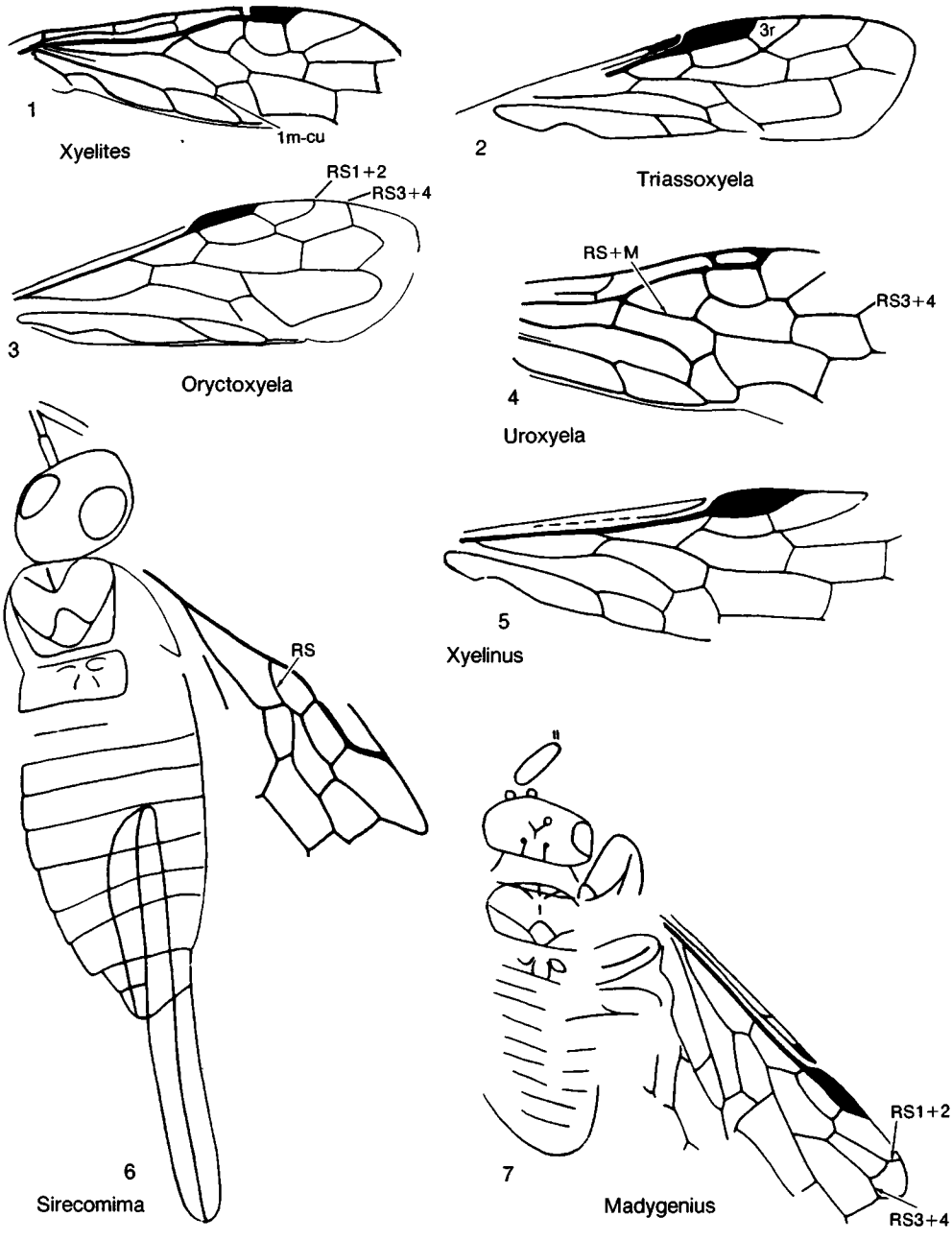


FIG. 244. Xyelidae (p. 451–454).

RSFSR).——FIG. 245,*2*. **S. fossilis* (RASNITSYN); wings and body, ×10 (Rasnitsyn, 1977a).

Triassoxyela RASNITSYN, 1964, p. 89 [**T. foveolata*; OD]. Fore wing similar to that of *Xyelinus,* but cell 3r short. RASNITSYN, 1969. *Trias.,* USSR (Kirghiz).—— FIG. 244,*2*. **T. foveolata*; fore wing, ×9.5 (Rasnitsyn, 1969).

Uroxyela RASNITSYN, 1966, p. 84 [**U. sicicauda*; OD]. Fore wing with center of pterostigma not sclerotized; termination of SC before origin of RS; basal section of RS obsolescent; RS3+4 directed anteriorly beyond crossvein 3r-m. *Cret.,* USSR (Kazakh).——FIG. 244,*4*. **U. sicicauda*; fore wing, ×11 (Rasnitsyn, 1966).

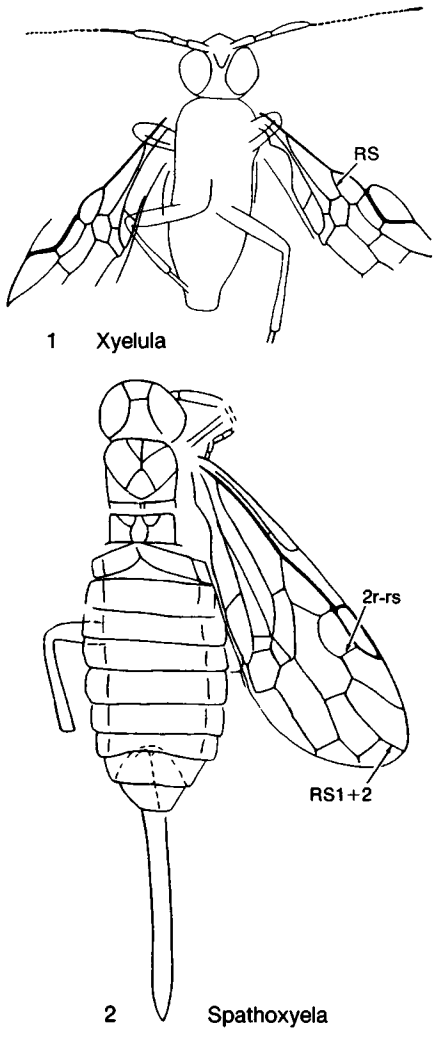


FIG. 245. Xyelidae (p. 454).

Xiphoxyela RASNITSYN, 1969, p. 46 [*X. *procrusta*; OD]. Costal area narrow; pterostigma sclerotized; RS1+2 apparently absent or weak. *Trias.*, USSR (Kirghiz).

Xyelinus RASNITSYN, 1964, p. 95 [*X. *angustiradius*; OD]. Fore wing slender, at least twice as long as wide; costal area narrow; basal section of RS much shorter than basal section of M; cells 2r, 3r, and 4r elongate. RASNITSYN, 1969. *Trias.*, USSR (Kirghiz).——FIG. 244,*5*. *X. *angustiradius*; fore wing, ×10 (Rasnitsyn, 1969).

Xyelisca RASNITSYN, 1969, p. 53 [*S. *leptopoda*; OD]. Little-known genus. Fore wing with SC terminating at level of origin of RS. Thorax punctate. *Jur.*, USSR (Kazakh).

Xyelites RASNITSYN, 1966, p. 83 [*X. *trigeminus*; OD]. Fore wing with pterostigma fully sclerotized; SC terminating just before origin of RS; basal section of RS very short; end of RS1+2 slightly closer to end of RS3+4 than to pterostigma; RS3+4 straight or nearly so; crossvein 1m-cu very short. RASNITSYN, 1969. *Cret.*, USSR (Kazakh).——FIG. 244,*1*. *X. *trigeminus*; fore wing, ×7 (Rasnitsyn, 1969).

Xyelula RASNITSYN, 1969, p. 52 [*X. *hybrida*; OD]. Fore wing with pterostigma very broad; R strongly curved; basal section of RS more than twice as long as basal section of M. *Jur.*, USSR (Kazakh). ——FIG. 245,*1*. *X. *hybrida*; head, thorax, and fore wings, ×10 (Rasnitsyn, 1969).

Family XYELOTOMIDAE Rasnitsyn, 1968

[Xyelotomidae RASNITSYN, 1968, p. 224]

Fore wing: vein RS developed between M and crossvein 1r-rs; 2r-rs present; cell 3r closed at wing apex. Antennae as in Xyelidae but with fewer (not more than 8) and thicker segments, third segment fully as large as in Xyelidae. RASNITSYN, 1969. *Jur.–Cret.*

Xyelotoma RASNITSYN, 1968, p. 225 [*X. *nigricornis*; OD]. Little-known genus. Fore wing with pterostigma fully sclerotized. RASNITSYN, 1969. *Jur.*, USSR (Kazakh).

Pseudoxyela RASNITSYN, 1968, p. 227 [*P. *heteroclita*; OD]. Fore wing with pterostigma sclerotized basally only, mostly membranous; SC connected to R well before origin of RS; basal section of RS about half as long as basal section of M. RASNITSYN, 1969. *Jur.*, USSR (Kazakh).

Undatoma RASNITSYN, 1977a, p. 100 [*U. *dahurica*; OD]. Fore wing with pterostigma very large and center membranous; SC apparently absent; RS not forked; basal section of RS very short, about one-eighth length of basal section of M; cell 1r very small. *Cret.*, USSR (Kazakh).—— FIG. 246,*1*. *U. *dahurica*; fore wing, ×8.5 (Rasnitsyn, 1977a).

Xyelocerus RASNITSYN, 1968, p. 226 [*X. *admirandus*; OD]. Fore wing with pterostigma sclerotized but with clear area in center; SC weak, apparently not connected to R; basal section of M about 5 times as long as that of RS. RASNITSYN, 1969. *Jur.*, USSR (Kazakh).——FIG. 246,*2*. *X. *admirandus*; fore wing, ×7 (Rasnitsyn, 1968).

Family TENTHREDINIDAE Latreille, 1804–1805

[Tenthredinidae LATREILLE, 1804–1805, p. 109]

Fore wing: vein RS usually unbranched; crossvein 2r-rs sometimes present; M joining RS near its origin or joining directly to R

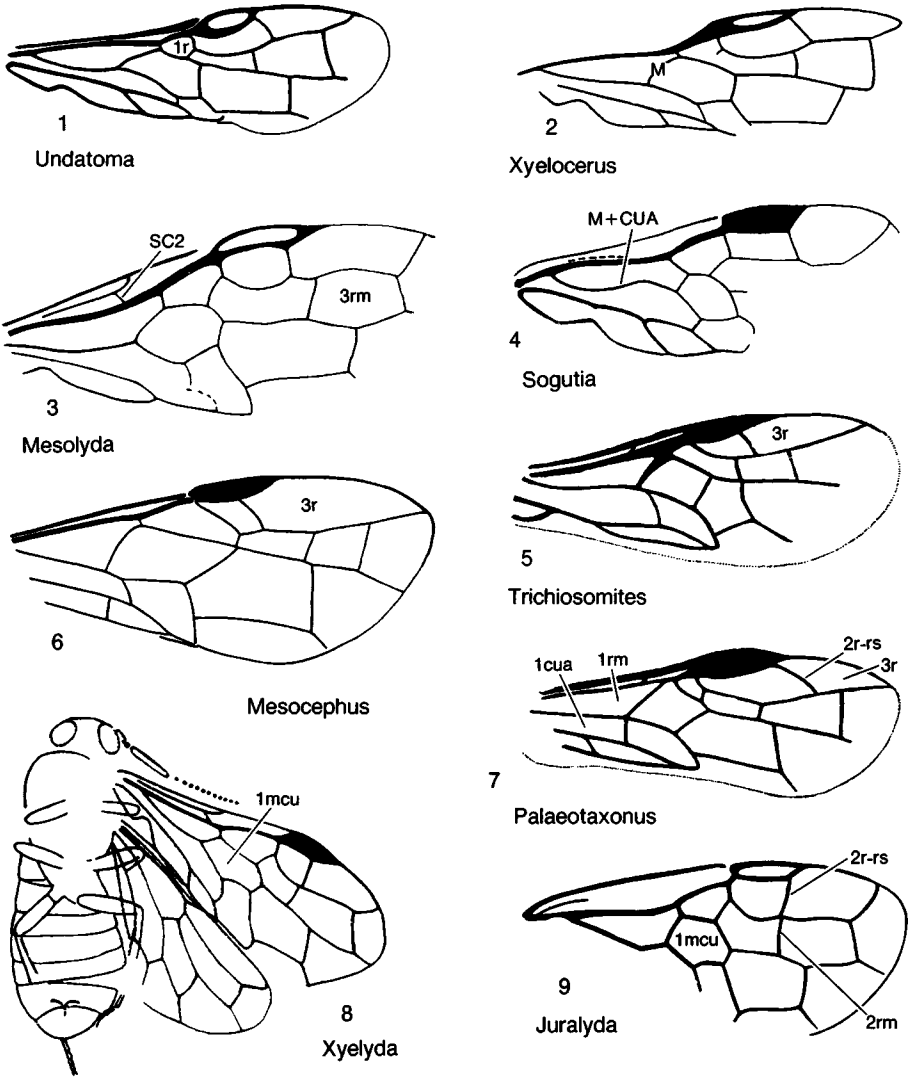


FIG. 246. Xyelotomidae, Tenthredinidae, Cimbicidae, Xyelydidae, Pamphiliidae, Cephidae, and Uncertain (p. 454–463).

near origin of RS; crossvein 2m-cu present. Antennae filiform, rarely with more than 9 segments, third segment short; pronotum with hind border deeply emarginate; fore tibiae with 2 apical spurs; ovipositor short, flat. Larvae foliage feeders. *Eoc.–Holo.*

Tenthredo LINNÉ, 1758, p. 555. BRUES, 1908b; ROHWER, 1908c; COCKERELL, 1914a, 1917f, 1927d; MEUNIER, 1923c; STATZ, 1936b; PITON, 1940a. *Oligo.,* USA (Colorado); Europe (Germany, France)–*Holo.*

Athalia LEACH, 1817, p. 126. [Generic assignment of fossil doubtful.] COCKERELL, 1906c, 1927d; ZHELOCHOVTZEV & RASNITSYN, 1972. *Oligo.,* USA (Colorado)–*Holo.*

Caliroa COSTA, 1859, p. 59. COCKERELL, 1909n, 1916b, 1917f. *Oligo.,* USA (Colorado)–*Holo.*

Cladius ILLIGER, 1807, p. 190. COCKERELL, 1914f. *Oligo.,* USA (Colorado)–*Holo.*

Dineura DAHLBOM, 1835, p. 5. BRUES, 1908b; ROHWER, 1908b, 1908c. *Oligo.,* USA (Colorado)–*Holo.*

Dolerus PANZER, 1801, pl. 11. MEUNIER, 1923b.

Oligo., Europe (Germany); *Mio.*, Europe (France)–*Holo.*

Eohemichroa Zhelochovtzev & Rasnitsyn, 1972, p. 323 [**Hemichroa eophila* Cockerell, 1906d, p. 501; OD]. Similar to *Hemichroa* but with a short distance between anal cells of fore wing, stouter antennae, and longer first segment of hind tarsus. Adams, 1967. *Oligo.*, USA (Colorado).

Eriocampa Hartig, 1837, p. 279. Brues, 1908b; Cockerell, 1910c, 1911b, 1914f, 1922d; Théobald, 1937a. *Oligo.*, USA (Colorado), Europe (France)–*Holo.*

Fenusa Leach, 1817, p. 126 [=*Lithoryssus* Brues, 1906, p. 491 (type, *L. parvus*)]. Rohwer, 1908b; Zhelochovtzev & Rasnitsyn, 1972. *Oligo.*, USA (Colorado)–*Holo.*

Florissantinus Zhelochovtzev & Rasnitsyn, 1972, p. 320 [**F. angulatus*; OD]. Similar to *Hemichroa*, but M of fore wing straight, not bent at crossveins 2r-m and 3r-m. *Oligo.*, USA (Colorado).

Hemichroa Stephens, 1835, p. 55. Cockerell, 1906d, 1916b. *Oligo.*, USA (Colorado)–*Holo.*

Hoplocampa Hartig, 1837, p. 276. Cockerell, 1927c; Statz, 1936b. *Oligo.*, Europe (Germany), USA (Colorado)–*Holo.*

Leucempria Enslin, 1913, p. 187. Statz, 1936b. *Oligo.*, Europe (Germany)–*Holo.*

Mesoneura Hartig, 1837, p. 228 [=*Lisconeura* Rohwer, 1908b, p. 529 (type, *Scolioneura vexabilis* Brues, 1908b, p. 263)]. Rasnitsyn, 1969; Zhelochovtzev & Rasnitsyn, 1972. *Oligo.*, USA (Colorado)–*Holo.*

Nortonella Rohwer, 1908c, p. 592 [**N. typica*; OD]. Fore wing as in *Macrophya* (recent) but SC absent. *Oligo.*, USA (Colorado).

Palaeotaxonus Brues, 1908b, p. 266 [**P. typicus*; OD]. Fore wing as in *Taxonus*, but cell 1cua not longer than cell 1rm; cell 3r long, pointed apically; crossvein 2r-rs strongly oblique. Rohwer, 1908b; Cockerell, 1917f. *Oligo.*, USA (Colorado).——Fig. 246,7. **P. typicus*; fore wing, ×5.2 (Brues, 1908b).

Pseudosiobla Ashmead, 1898, p. 308. [Generic assignment of fossil doubtful.] Rohwer, 1908b. *Oligo.*, USA (Colorado)–*Holo.*

Rhogogaster Konow, 1884, p. 338. [Generic assignment of fossil doubtful.] Brues, 1908b; Gibson, 1980. *Oligo.*, USA (Colorado)–*Holo.*

Selandria Leach, 1817, p. 126. Cockerell, 1910c. *Oligo.*, USA (Colorado)–*Holo.*

Taeniurites Cockerell, 1917b, p. 382 [**T. fortis*; OD]. Fore wing as in *Macrophya* (recent), but body structure as in *Strongylogaster* (recent). Cockerell, 1927d. *Oligo.*, USA (Colorado).

Taxonus Hartig, 1837, p. 297. Heer, 1849; Konow, 1897; Pongrácz, 1928. *Eoc.*, USA (Wyoming); *Mio.*, Europe (Germany)–*Holo.*

Tenthredinites Meunier, 1915a, p. 11 [**T. bifasciata;* OD]. Little-known genus. Fore wing with 2 dark transverse bands. [Possibly a junior synonym of *Tenthredo.*] Loew, 1850. *Oligo.*, Europe (France).

Family ELECTROTOMIDAE Rasnitsyn, 1977

[Electrotomidae Rasnitsyn, 1977b, p. 1304]

Little-known family, apparently related to the Argidae, and based on mature larva (prepupa). Head relatively large, as in Blasticotomidae; tenth abdominal tergite conical, as in Xyelidae; antennae not contiguous with ocelli; false legs absent from ninth abdominal segment. *Oligo.*

Electrotoma Rasnitsyn, 1977b, p. 1307 [**E. succini*; OD]. Head capsule with 15 to 20 long setae; body with short pubescence. *Oligo.*, Europe (Baltic).

Family ARGIDAE Konow, 1890

[Argidae Konow, 1890, p. 229]

Fore wing with crossvein 2r-rs absent; vein M joined to R before origin of RS; RS joined or nearly joined to R distally near wing apex. Antennae with 3 segments, the last compound and very long; fore tibiae with 2 apical spurs. Larvae foliage feeders. *Oligo.–Holo.*

Arge Schrank, 1802, p. 209. *Holo.*

Sterictiphora Billberg, 1820, p. 99. Rohwer, 1908c; Zhelochovtzev & Rasnitsyn, 1972. *Oligo.*, USA (Colorado)–*Holo.*

Family CIMBICIDAE Kirby, 1837

[Cimbicidae Kirby in Richardson, Swainson, & Kirby, 1837, p. 254]

Fore wing with crossvein 2r-rs present. Antennae clubbed but third segment not enlarged; pronotum with hind border deeply emarginate. Larvae foliage feeders. *Eoc.–Holo.*

Cimbex Olivier, 1790, p. 762. Cockerell, 1922d. *Oligo.*, USA (Colorado)–*Holo.*

Eopachylosticta Malaise, 1945, p. 14 [**Amasis byrami* Cockerell, 1924a, p. 10; OD]. Similar to *Pseudopachylosticta* (recent), but head strongly enlarged behind eyes and mesonotal lobes separated by deep furrows. Zhelochovtzev & Rasnitsyn, 1972. *Eoc.*, USA (Colorado).

Trichiosomites Brues, 1908b, p. 259 [**T. obliviosus*; OD]. Similar to *Zeraea* (recent); cell 3r long; cell 1cua only a little longer than cell 1rm. Antennae with 6 segments. *Oligo.*, USA (Colo-

rado).——FIG. 246,5. **T. obliviosus*; fore wing, ×5.5 (Brues, 1908b).

Family BLASTICOTOMIDAE Thomson, 1871

[Blasticotomidae THOMSON, 1871, p. 13]

Fore wing with vein R close to and nearly coalesced with costa; M extending distally beyond crossvein 3r-m; CUA extending distally beyond crossvein 2m-cu. Antennae with 3 or 4 segments, third very long, fourth short or absent. Larvae stem borers. *Oligo.–Holo.*

Blasticotoma KLUG, 1834, p. 251. *Holo.*

Paremphytus BRUES, 1908b, p. 265. ZHELOCHOVTZEV & RASNITSYN, 1972. *Oligo.*, USA (Colorado)–*Holo.*

Family DIPRIONIDAE Rohwer, 1911

[Diprionidae ROHWER, 1911, p. 220]

Fore wing with crossvein 2r-rs absent. Antennae with at least 13 segments and almost always serrate or pectinate; third segment not elongate, shorter than total length of all other flagellar segments. Larvae on coniferous foliage. *Oligo.–Holo.*

Diprion SCHRANK, 1802, p. 209. BRUES, 1908b. *Oligo.*, USA (Colorado)–*Holo.*

Family XYELYDIDAE Rasnitsyn, 1968

[Xyelydidae RASNITSYN, 1968, p. 192]

Fore wing: vein SC with 2 branches, posterior branch joining R basad of origin of RS; crossvein 1m-cu much shorter than half length of section of M distal to it; cell 1mcu large; M+CUA only slightly curved. Antennae multisegmented; third segment commonly much enlarged and elongate, more than a third length of antenna. *Jur.*

Xyelyda RASNITSYN, 1968, p. 193 [*X. *excellens*; OD]. Fore wing with posterior branch of SC strongly oblique; cells 1r and 1mcu narrow and long; cell 1r longer than cell 2rm; length of cell 1mcu more than twice its width; pterostigma fully sclerotized; crossvein 1m-cu much shorter than the section of CUA adjoining it distally. RASNITSYN, 1969, 1983b. *Jur.*, USSR (Kazakh).——FIG. 246,8. *X. *excellens*; fore wing, ×5.6 (Rasnitsyn, 1969).

Ferganolyda RASNITSYN, 1983b, p. 61 [*F. *cubitalis*; OD]. Similar to *Xyelyda*, but cell 1r shorter than cell 2rm; anterior border of cell 1mcu almost straight. *Jur.*, USSR (Kazakh).

Mesolyda RASNITSYN, 1963, p. 86 [*M. *jurassica*; OD]. Fore wing with basal section of RS very short and almost perpendicular to longitudinal axis of wing; posterior branch of SC only slightly oblique; cell 3rm not widened distally, shorter than cell 2mcu. RASNITSYN, 1969, 1983b. *Jur.*, USSR (Kazakh).——FIG. 246,3. *M. *jurassica*; fore wing, ×6 (Rasnitsyn, 1969).

Prolyda RASNITSYN, 1968, p. 194 [*P. *karatavica*; OD]. Fore wing with posterior branch of SC very short; basal section of RS oblique and relatively long; cell 3rm widened distally. RASNITSYN, 1963, 1983b. *Jur.*, USSR (Kazakh).

Sagulyda RASNITSYN, 1983b, p. 57 [*S. *ferganica*; OD]. Similar to *Xyelyda*. Fore wing with crossvein 1m-cu about as long as section of CUA adjoining it distally. *Jur.*, USSR (Kirghiz).

Strophandria RASNITSYN, 1968, p. 195 [*S. *grossa*; OD]. Similar to *Mesolyda*. Fore wing with basal section of RS more than half as long as basal section of M; cell 3rm widened distally and longer than cell 2mcu. RASNITSYN, 1969, 1983b. *Jur.*, USSR (Kazakh).

Family PARAPAMPHILIIDAE Rasnitsyn, 1968

[Parapamphiliidae RASNITSYN, 1968, p. 191]

Fore wing with vein SC apparently absent; area between R and costal margin broad, widest at origin of RS; basal section of RS much longer than basal section of M; cell 3r very narrow and long. *Jur.*

Parapamphilius RASNITSYN, 1968, p. 192 [*P. *confusus*; OD]. Fore wing with pterostigma sclerotized at base. Head considerably wider than pronotum. RASNITSYN, 1969. *Jur.*, USSR (Kazakh).

Family PAMPHILIIDAE Cameron, 1890

[Pamphiliidae CAMERON, 1890, p. 84]

Fore wing with vein SC absent or obsolescent; RS unbranched; crossvein 2r-rs present. Antennae with at least 13 segments, third not elongate; pronotum with hind margin straight or only slightly concave; fore tibiae with 2 apical spurs; ovipositor short. Larvae foliage feeders, usually in rolled leaves. *Jur.–Holo.*

Pamphilius LATREILLE, 1802, p. 303. *Holo.*

Atocus SCUDDER, 1892, p. 25 [*A. *defessus*; OD]. Similar to *Neurotoma* (recent), but antennae very

short and with a small number of segments; basal section of RS in fore wing longer than in *Neurotoma*. BRUES, 1908b; COCKERELL, 1908c; ZHELOCHOVTZEV & RASNITSYN, 1972; RASNITSYN, 1983b. *Oligo.*, USA (Colorado).

Juralyda RASNITSYN, 1977a, p. 102 [**J. udensis*; OD]. Fore wing with pterostigma narrow, only margins sclerotized; basal section of RS about equal in length to crossvein 1r-rs; crossvein 3r-m nearly perpendicular to longitudinal axis of wing; cell 1mcu very short. *Jur.*, USSR (Kazakh). ——FIG. 246,*9*. **J. udensis*; fore wing, ×5 (Rasnitsyn, 1977a).

Tapholyda RASNITSYN, 1983b, p. 65 [**Cephaleia caplani*; OD]. Apparently related to *Acantholyda* (recent). Antennae with less than 20 segments, third segment only a little longer than fourth; head transverse. Fore wing with cells 1r and 1mcu twice as long as their width. COCKERELL, 1933a, 1940b; ZHELOCHOVTZEV & RASNITSYN, 1972. *Oligo.*, USA (Colorado); *Mio.*, USSR (Asian RSFSR).

Family CEPHIDAE Newman, 1835

[Cephidae NEWMAN, 1835, p. 411]

Fore wing with vein SC absent; RS unbranched; basal section of RS very short; crossvein 2r-rs joined to RS proximally to 2r-m; cell 2r short; cell 1mcu large. Antennal segments little differentiated; prothorax large; fore tibiae with 1 apical spur; abdomen somewhat constricted between first and second segments; ovipositor flat. Larvae stem or twig borers. *Jur.–Holo.*

Cephus LATREILLE, 1802, p. 303. *Holo.*

Electrocephus KONOW, 1897, p. 37 [**E. stralendorffi*; OD]. Similar to *Janus*, but 18-segmented antennae much shorter and thicker; third antennal segment almost a third longer than fourth, penultimate segment shorter than broad. *Oligo.*, Europe (Baltic).

Janus STEPHENS, 1835, p. 107. COCKERELL, 1913b. *Oligo.*, USA (Colorado)–*Holo.*

Mesocephus RASNITSYN, 1968, p. 196 [**M. sibiricus*; OD]. Similar to *Pachycephus* (recent), but cell 3r of fore wing wide and cell 2rm nearer wing apex. RASNITSYN, 1963. *Jur.*, USSR (Kazakh). ——FIG. 246,*6*. **M. sibiricus*; fore wing, ×7 (Rasnitsyn, 1969).

Family GIGASIRICIDAE Rasnitsyn, 1968

[Gigasiricidae RASNITSYN, 1968, p. 197]

Fore wing: vein SC well developed; basal section of RS slanted toward apex of wing, longer than basal section of M; crossveins 2r-m, 3r-m, and 2m-cu well developed. Antennae with third segment enlarged and elongate. *Jur.*

Gigasirex RASNITSYN, 1968, p. 197 [**G. longipes*; OD]. Fore wing with pterostigma fully sclerotized; SC free from R; RS+M shorter than basal section of RS. RASNITSYN, 1969. *Jur.*, USSR (Kazakh).

Liasirex RASNITSYN, 1968, p. 198 [**L. sogdianus*; OD]. Fore wing with pterostigma incompletely sclerotized; section of R between base of RS and pterostigma strongly arched; basal section of RS more than twice as long as basal section of M. RASNITSYN, 1969. *Jur.*, USSR (Kazakh).——FIG. 247,*2*. **L. sogdianus*; fore wing, ×4 (Rasnitsyn, 1969).

Protosirex RASNITSYN, 1969, p. 62 [**P. xyelopterus*; OD]. Fore wing with SC contiguous with R; pterostigma narrow, strongly sclerotized; basal section of RS less than twice as long as basal section of M; RS+M longer than basal section of RS. *Jur.*, USSR (Kazakh).——FIG. 247,*1*. **P. xyelopterus*; fore wing, ×6 (Rasnitsyn, 1969).

Family KARATAVITIDAE Rasnitsyn, 1963

[Karatavitidae RASNITSYN, 1963, p. 96]

Fore wing with vein SC apparently absent; basal section of RS directed toward wing apex and longer than basal section of M; crossvein 2r-rs situated before center of pterostigma. Antennae setaceous; ovipositor very slender. *Jur.*

Karatavites RASNITSYN, 1963, p. 97 [**K. angustus*; OD]. Fore wing with basal section of RS 1.5 times as long as basal section of M; cell 2rm longer than cell 1r but shorter than cell 3rm. Antennae thin, setaceous, with long segments. RASNITSYN, 1968, 1969. *Jur.*, USSR (Kazakh). —— FIG. 247,*4*. *K. medius* RASNITSYN; fore wing, ×6 (Rasnitsyn, 1969).

Family SEPULCIDAE Rasnitsyn, 1968

[*nom. transl.* RASNITSYN, 1969, p. 63, *ex* Sepulcinae RASNITSYN, 1968, p. 210]

Fore wing with basal section of vein RS slanting toward wing apex; cell 1mcu large, with basal-posterior margin sigmoidal. *Jur.*

Sepulca RASNITSYN, 1968, p. 210 [**S. mirabilis*; OD]. Fore wing with pterostigma completely sclerotized; SC coalesced with R, only distal end of SC free, appearing like a crossvein. RASNITSYN,

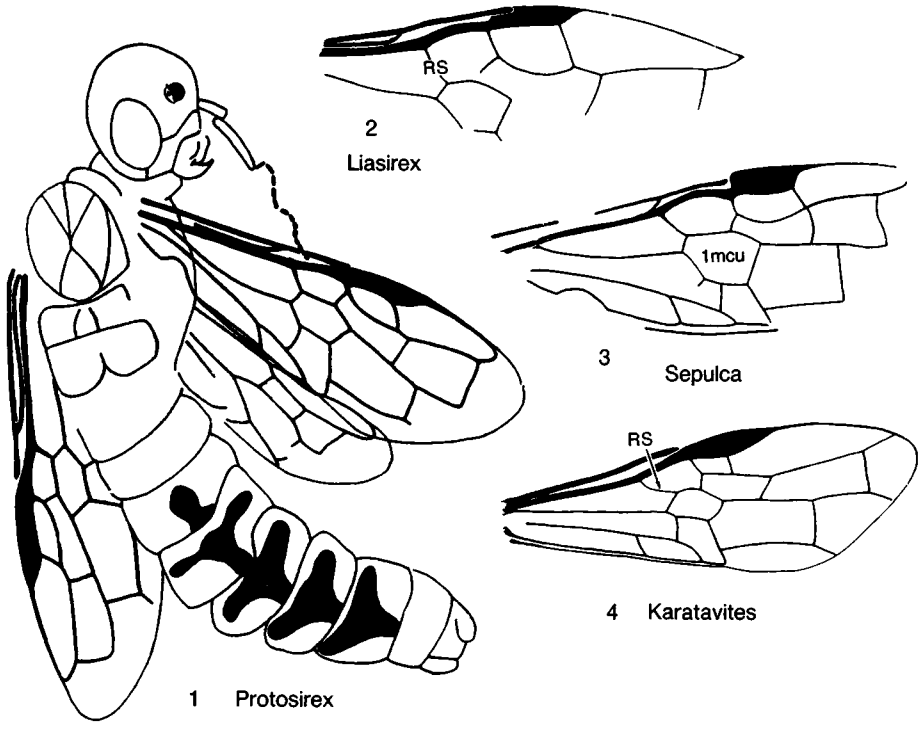


FIG. 247. Gigasiricidae, Karatavitidae, and Sepulcidae (p. 458–459).

1969. *Jur.,* USSR (Kazakh).——FIG. 247,*3*. **S. mirabilis*; fore wing, ×7 (Rasnitsyn, 1969).

Sepulenia RASNITSYN, 1968, p. 210 [**S. syricta*; OD]. Similar to *Sepulca,* but SC completely coalesced with R. RASNITSYN, 1969. *Jur.,* USSR (Kazakh).

Family ANAXYELIDAE Martynov, 1925

[Anaxyelidae MARTYNOV, 1925d, p. 754] [=Syntexidae BENSON, 1935, p. 539]

Fore wing: vein SC coalesced with R, at most appearing as a crossvein proximal to origin of RS; basal section of RS slanted toward wing apex and longer than basal section of M; crossveins 3r-m and 2m-cu present; cell 1mcu with 5 or 6 corners. No recent genera of the family are known as fossils. *Jur.–Holo.*

Anaxyela MARTYNOV, 1925d, p. 754 [**A. gracilis*; OD]. Fore wing with pterostigma weakly sclerotized, extending only slightly beyond basal margin of cell 3r; RS+M distinct. Basal half of antennae dark; ovipositor sheaths thin. RASNITSYN, 1963, 1968. *Jur.,* USSR (Kazakh).——FIG. 248,*3*. **A. gracilis*; wings and body, ×5 (Rasnitsyn, 1969).

Anasyntexis RASNITSYN, 1968, p. 208 [**A. strophandra*; OD]. Fore wing with pterostigma sclerotized; basal section of RS 1.5 times longer than basal section of M; RS+M shorter than basal section of M. RASNITSYN, 1969. *Jur.,* USSR (Kazakh).——FIG. 249,*5*. **A. strophandra*; fore wing, ×6.5 (Rasnitsyn, 1969).

Brachysyntexis RASNITSYN, 1969, p. 70 [**Syntexyela brachyura* RASNITSYN, 1968, p. 202; OD]. Fore wing with pterostigma sclerotized, not extending to middle of cell 3r; RS+M shorter than section of CUA between its divergence from M and its union with crossvein cu-a; basal section of RS more than twice as long as basal section of M. Antennae broad basally, much narrowed distally. *Jur.,* USSR (Kazakh).—— FIG. 248,*2*. **B. brachyura* (RASNITSYN); wings and body, ×8 (Rasnitsyn, 1969).

Dolichostigma RASNITSYN, 1968, p. 200 [**D. tenuipes*; OD]. Fore wing with pterostigma sclerotized, extending at least to center of cell 3r; RS and M joined at a single point of contact; cell 1mcu narrowed distally. RASNITSYN, 1969. *Cret.,* USSR (Kazakh).—— FIG. 249,*4*. **D. tenuipes*; wings and body, ×4.5 (Rasnitsyn, 1969).

Kempendaja RASNITSYN, 1968, p. 207 [**K. jacu-*

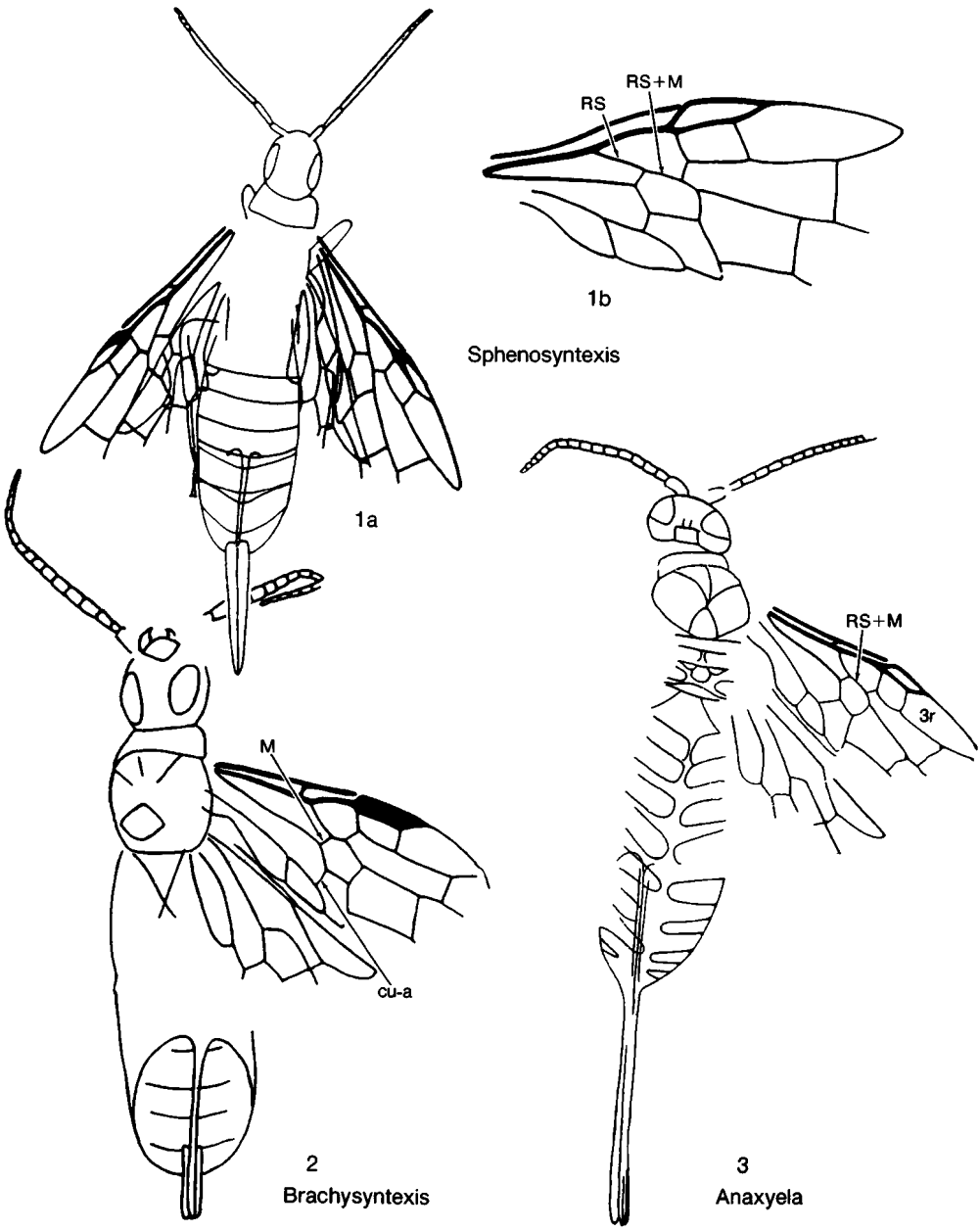


FIG. 248. Anaxyelidae (p. 459–461).

tensis; OD]. Similar to *Brachysyntexis,* but pterostigma not sclerotized. RASNITSYN, 1969. *Cret.,* USSR (Kazakh).——FIG. 249,*2*. **K. jacutensis*; fore wing, ×7.3 (Rasnitsyn, 1969).

Kulbastavia RASNITSYN, 1968, p. 207 [**Anaxyela macrura* RASNITSYN, 1963, p. 92; OD]. Fore wing with pterostigma sclerotized; basal section of RS more than twice as long as basal section of M and slightly longer than RS+M; crossvein cu-a nearly at level of center of cell 1mcu. Ovipositor longer than body. RASNITSYN, 1969. *Jur.,* USSR (Kazakh). —— FIG. 249,*1*. **K. macrura* (RASNITSYN); wings and body, ×4 (Rasnitsyn, 1969).

Sphenosyntexis RASNITSYN, 1969, p. 67 [**Anaxyela antonovi* RASNITSYN, 1963, p. 90; OD]. Fore wing with pterostigma weakly sclerotized; basal section of RS aligned with RS+M, forming a straight line. Antennae filiform, with dark basal

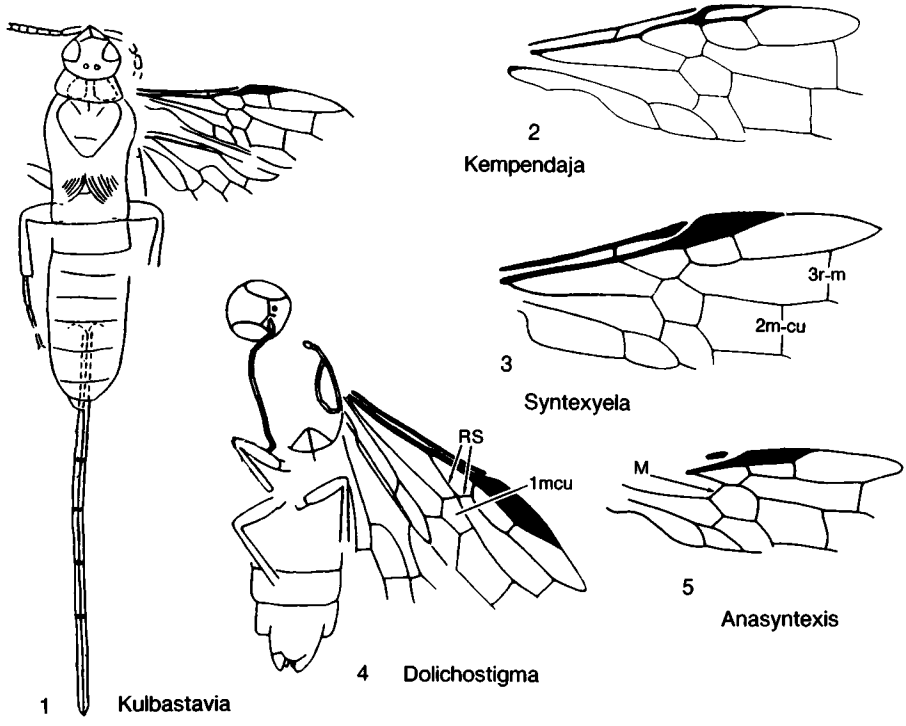


FIG. 249. Anaxyelidae (p. 459–461).

and apical segments. RASNITSYN, 1968. *Jur.*, USSR (Kazakh).——FIG. 248,*1a*. *S. pallicornis* RASNITSYN; wings and body, ×6 (Rasnitsyn, 1969).——FIG. 248,*1b*. **S. antonovi* (RASNITSYN); fore wing, ×10 (Rasnitsyn, 1969).

Syntexyela RASNITSYN, 1968, p. 201 [**Anaxyela media* RASNITSYN, 1963, p. 94; OD]. Fore wing with pterostigma sclerotized; section of M between crossveins 2m-cu and 3r-m about equal in length to crossvein 2m-cu. RASNITSYN, 1969. *Jur.*, USSR (Kazakh).——FIG. 249,*3*. **S. media* (RASNITSYN); fore wing, ×7 (Rasnitsyn, 1969).

Urosyntexis RASNITSYN, 1969, p. 71 [**Syntexyela magna* RASNITSYN, 1968, p. 201; OD]. Similar to *Syntexyela*, but section of M between crossveins 2m-cu and 3r-m about half length of crossvein 2m-cu. RASNITSYN, 1963. *Jur.*, USSR (Kazakh).

Family PRAESIRICIDAE Rasnitsyn, 1968

[*nom. transl.* RASNITSYN, 1983b, p. 62, *ex* Praesiricinae RASNITSYN, 1968, p. 216]

Antennal segmentation nearly homonomous, third segment usually slightly longer than following segments; head large, mandibles long and narrow. Fore wing with vein SC apparently absent; origin of RS remote from pterostigma; cell 3r not broadened distally; M+CUA arcuate. *Jur.–Cret.*

Praesirex RASNITSYN, 1968, p. 216 [**P. hirtus*; OD]. Fore wing with basal section of RS short, inclined toward wing base; cell 1mcu large; crossvein 1m-cu much shorter than section of CUA adjoining it distally. RASNITSYN, 1969, 1983b. *Cret.*, USSR (Asian RSFSR).

Aulidontes RASNITSYN, 1983b, p. 64 [**A. mandibulatus*; OD]. Similar to *Praesirex*. Fore wing with basal section of RS long; cell 1mcu relatively large and long. *Jur.*, USSR (Kazakh).

Xyelydontes RASNITSYN, 1983b, p. 64 [**X. sculpturatus*; OD]. Similar to *Praesirex*. Fore wing with basal section of RS short and inclined toward wing apex; cell 1mcu small. *Cret.*, USSR (Mongolia).

Family PSEUDOSIRICIDAE Handlirsch, 1906

[Pseudosiricidae HANDLIRSCH, 1906b, p. 574] [=Myrmiciidae MAA, 1949, p. 17; Megapteritidae MAA, 1949, p. 77]

Fore wing with venation reduced; crossveins 3r-m and 2m-cu absent; vein SC either present or obsolescent; basal section of RS slanted toward wing apex or wing base. *Jur.–Eoc.*

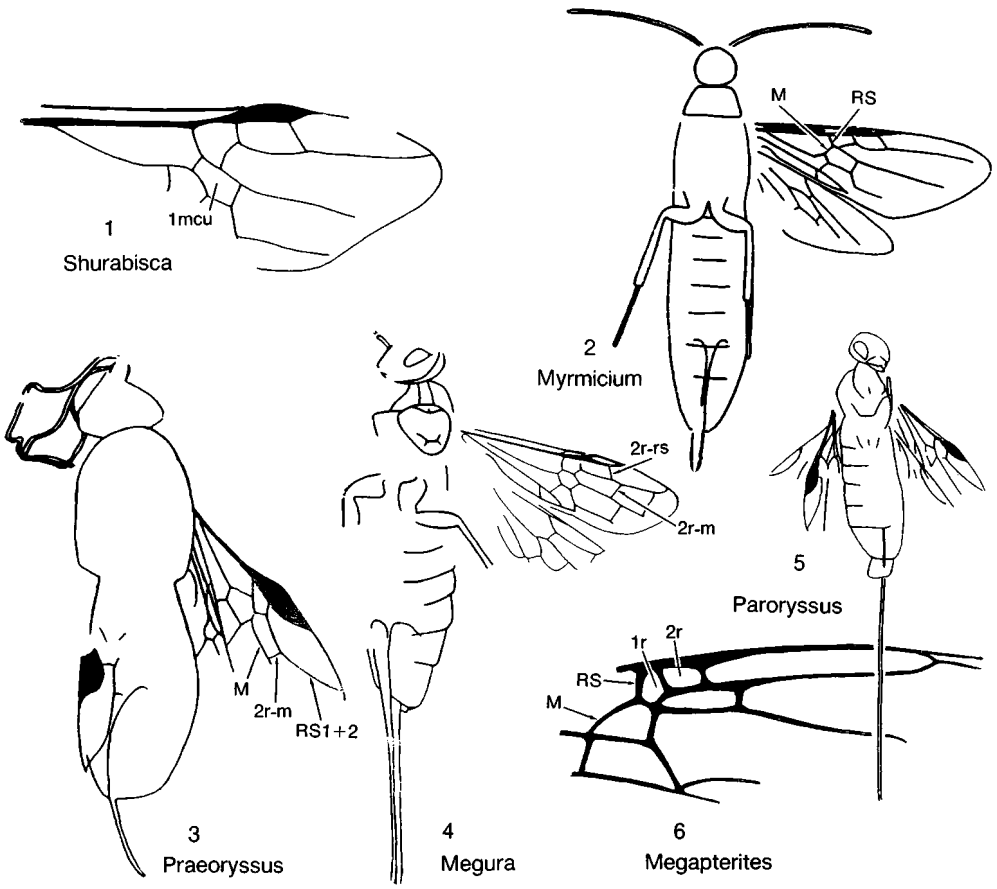


FIG. 250. Pseudosiricidae, Siricidae, and Paroryssidae (p. 462–463).

Myrmicium WESTWOOD, 1854, p. 396 [**M. heeri*; OD] [=*Hagenia* WEYENBERGH, 1869, p. 250 (type, *Sphinx schroeteri* GERMAR, 1839, p. 193); *Pseudosirex* WEYENBERGH, 1873, p. 238 (type, *P. darwini*); *Rhipidorhabdus* OPPENHEIM, 1885, p. 344 (type, *Sphinx schroeteri* GERMAR, 1839, p. 193); *Fabellovena* OPPENHEIM, 1885, p. 344 (type, *F. karschi*)]. Fore wing with basal section of RS strongly slanted toward wing apex and only slightly longer than basal section of M; RS+M very short, touching only a corner of cell 1mcu. MAA, 1949; RASNITSYN, 1968, 1969; SMITH, 1978. *Jur.*, England, Europe (Germany). —— FIG. 250,*2*. *M. schroeteri* (GERMAR); wings and body, ventral view, ×1 (Rasnitsyn, 1969).

Eoponera CARPENTER, 1929b, p. 301 [**E. berryi*; OD]. Little-known genus, apparently related to *Myrmicium*; basal section of M much longer than basal section of RS; crossvein 2r-rs absent. BARONI URBANI, 1980d; RASNITSYN, 1980b. *Eoc.*, USA (Tennessee).

Formicium WESTWOOD, 1854, p. 388 [**F. brodei*; OD]. Little-known genus. Fore wing with basal section of RS arising from R at an acute angle and about one-quarter as long as basal section of M. COCKERELL, 1921b; RASNITSYN, 1969, 1980b. *Jur.*, England.

Megapterites COCKERELL, 1920a, p. 278 [**M. mirabilis*; OD]. Fore wing with basal section of RS perpendicular to R and about half as long as basal section of M; cell 1r shorter than cell 2r. COCKERELL, 1921b; MAA, 1949; RASNITSYN, 1969, 1980b. *Eoc.*, England. —— FIG. 250,*6*. **M. mirabilis*; fore wing, ×1 (Cockerell, 1921b).

Shurabisca RASNITSYN, 1968, p. 217 [**S. liassica*; OD]. Fore wing with basal section of RS almost twice as long as basal section of M; cell 1mcu much wider distally than basally. RASNITSYN, 1969. *Jur.*, USSR (Kazakh).—— FIG. 250,*1*. **S. liassica*; fore wing, ×3.8 (Rasnitsyn, 1969).

Family SIRICIDAE Billberg, 1820

[Siricidae BILLBERG, 1820, p. 98]

Fore wing with vein SC short or absent; crossveins 1r-rs, 3r-m, and 2m-cu present;

basal section of RS perpendicular to R or slanted toward wing base. Antennae with many segments, not markedly differentiated; pronotum with hind margin deeply emarginate; fore tibiae with 1 of the 2 apical spurs small or absent; abdomen terminating in a spine or horn. Larvae wood boring. *Jur.–Holo.*

Sirex Linné, 1761, p. 396 [=*Urocerites* Heer, 1867, p. 36 (type, *U. spectabilis*)]. Konow, 1898; Maa, 1949; Smith, 1978. *Mio.*, Europe (Yugoslavia)–*Holo.*

Aulisca Rasnitsyn, 1968, p. 212 [**A. odontura*; OD]. Fore wing with basal section of RS about equal in length to RS+M and directed posteriorly; crossvein 2r-rs more distal than crossvein 2r-m. Rasnitsyn, 1969. *Jur.*, USSR (Kazakh).

Eosirex Piton, 1940a, p. 229 [**E. ligniticus*; OD]. Little-known genus. Fore wing with cell 2rm broad; crossvein 2r-m sigmoidal. *Eoc.*, Europe (France).

Eoxeris Maa, 1949, p. 78 [**Urocerus klebsi* Brues, 1926, p. 168; OD]. Similar to *Urocerus* (recent). Fore wing with apical angle of cell 1rm obtuse; cell 2r relatively short and below proximal part of pterostigma; cell 2cua very long. Maa, 1949. *Oligo.*, Europe (Baltic).

Megaulisca Rasnitsyn, 1968, p. 213 [**M. grossa*; OD]. Fore wing as in *Megura*, but basal section of RS much longer than RS+M. Rasnitsyn, 1969. *Jur.*, USSR (Kazakh).

Megura Rasnitsyn, 1968, p. 214 [**M. magnifica*; OD]. Fore wing with basal section of RS about as long as RS+M and curved posteriorly or apically; crossvein 2r-rs situated proximally to 2r-m. Rasnitsyn, 1969. *Jur.*, USSR (Kazakh).——Fig. 250,*4*. **M. magnifica*; wings and body, ×2.4 (Rasnitsyn, 1969).

Family PARORYSSIDAE Martynov, 1925

[Paroryssidae Martynov, 1925d, p. 755]

Fore wing with reduced venation; crossveins 2m-cu and 3r-m absent; vein RS distinct between cells 1r and 2rm. Ovipositor well developed. *Jur.*

Paroryssus Martynov, 1925d, p. 756 [**P. extensus*; OD]. Little-known genus, similar to *Praeoryssus*. Fore wing with R sharply curved between origin of RS and pterostigma. Prothorax elongate; ovipositor straight and longer than body. Rasnitsyn, 1963, 1968. *Jur.*, USSR (Kazakh).——Fig. 250,*5*. **P. extensus*; wings and body, ×5.5 (Rasnitsyn, 1969).

Microryssus Rasnitsyn, 1968, p. 221 [**M. brachyurus*; OD]. Similar to *Praeoryssus*, but crossvein 2r-m absent. Rasnitsyn, 1969. *Jur.*, USSR (Kazakh).

Praeoryssus Rasnitsyn, 1968, p. 219 [**P. venosus*; OD]. R straight between origin of RS and pterostigma; crossvein 2r-m present. Prothorax short; ovipositor shorter than body, curved forward. Rasnitsyn, 1969. *Jur.*, USSR (Kazakh).——Fig. 250,*3*. **P. venosus*; wings and body, ×8 (Rasnitsyn, 1969).

Family UNCERTAIN

The following genera, apparently belonging to the order Hymenoptera, suborder Symphyta, are too poorly known to permit assignment to families.

Phenacoperga Cockerell, 1908c, p. 113 [**Perga coloradensis* Cockerell, 1907f, p. 446; OD]. Little-known genus, probably related to the Cimbicidae; cell 3r of fore wing with very smoothly curved posterior margin. Rohwer, 1908b. *Oligo.*, USA (Colorado).

Pseudocimbex Rohwer, 1908b, p. 526 [**P. clavata*; OD]. Similar to *Phenacoperga*, but cell 3r with very irregular posterior margin. *Oligo.*, USA (Colorado).

Sogutia Rasnitsyn, 1977a, p. 101 [**S. liassica*; OD]. Fore wing with pterostigma fully sclerotized; basal section of vein RS slightly longer than RS+M, which is about as long as basal section of M; M+CUA sigmoidally curved. [Probably related to Xyelydidae.] *Jur.*, USSR (Kirghiz).——Fig. 246,*4*. **S. liassica*; fore wing, ×17 (Rasnitsyn, 1977a).

Suborder APOCRITA Gerstaecker, 1867

[Apocrita Gerstaecker, 1867, p. 1]

Adults: first abdominal segment (propodeum) fused to metathorax and structurally a part of it (see Fig. 240); deep constriction between propodeum and second abdominal segment; gaster often petiolate. Larvae apodous. *Jur.–Holo.*

Family EPHIALTITIDAE Handlirsch, 1906

[Ephialtitidae Handlirsch, 1906b, p. 577]

Fore wing with crossvein 2r-m present; crossvein 1r-rs obsolescent, occasionally reaching pterostigma; cell 2a often closed. Antennae diverse, setaceous or clubbed, with 12 to 30 segments; propodeum commonly large, flat or weakly convex, often not ele-

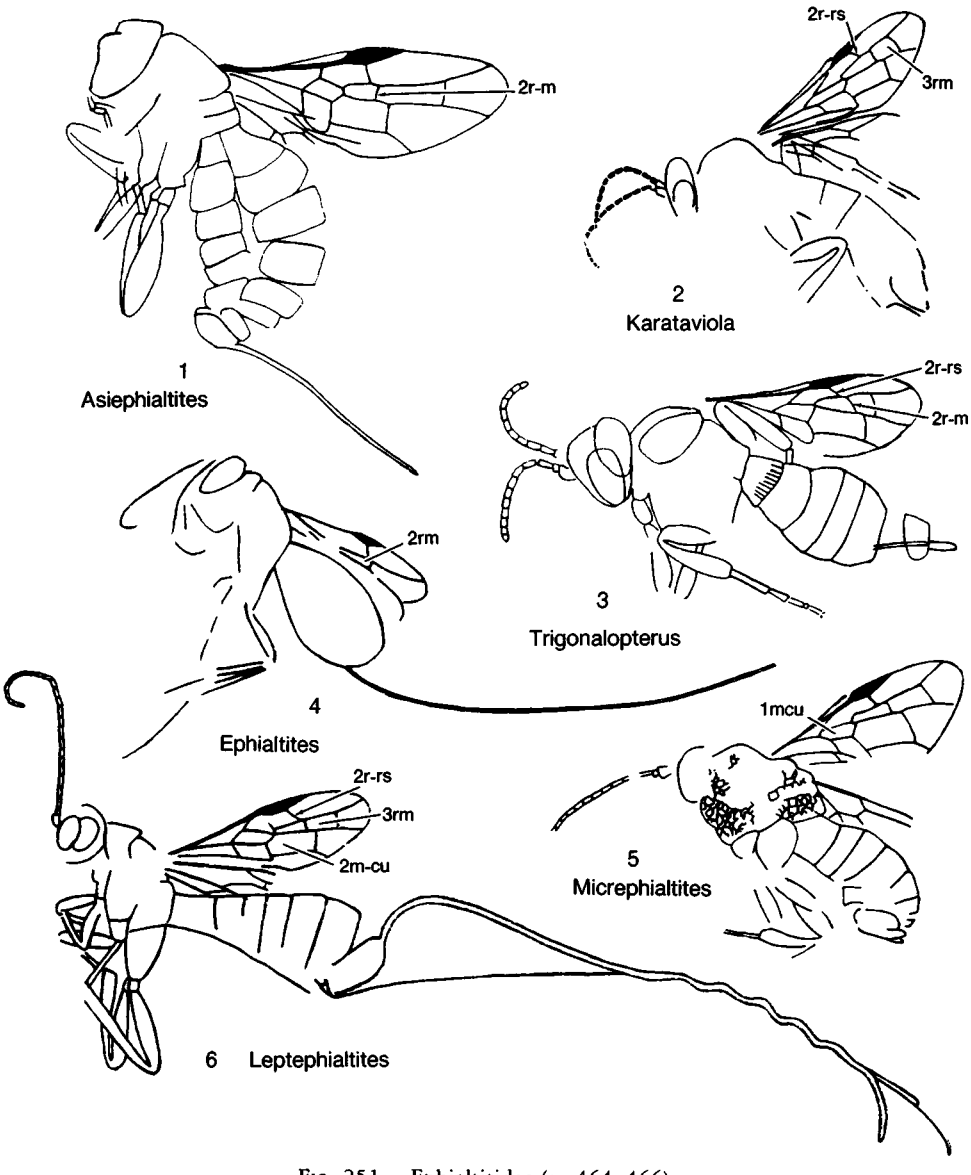


FIG. 251. Ephialtitidae (p. 464–466).

vated over base of second abdominal segment. *Jur.*

Ephialtites MEUNIER, 1903c, p. 4 [**E. jurassicus*; OD]. Little-known genus. Fore wing with pterostigma short; crossvein cu-a situated at origin of M from CUA+M; cell 2rm very narrow and long. Ovipositor twice length of body, strongly curved. HANDLIRSCH, 1906b; RASNITSYN, 1975. *Jur.*, Europe (Spain).—FIG. 251,*4*. **E. jurassicus*; wings and body, ×4 (Rasnitsyn, 1975).

Asiephialtites RASNITSYN, 1975, p. 29 [**A. niger*; OD]. Fore wing similar to that of *Stephanogaster* but not more than 4 mm long. Gaster widest at middle. *Jur.*, USSR (Kazakh).—FIG. 251,*1*. **A. niger*; wing and body, ×9 (Rasnitsyn, 1975).

Karataviola RASNITSYN, 1975, p. 51 [**K. micrura*; OD]. Fore wing with basal section of RS arising near pterostigma and directed toward wing base; crossvein 1r-rs absent; crossvein 2r-m not slanted and situated distally to 2r-rs; cell 3rm shorter than cell 2rm. Antennae setaceous, with at least

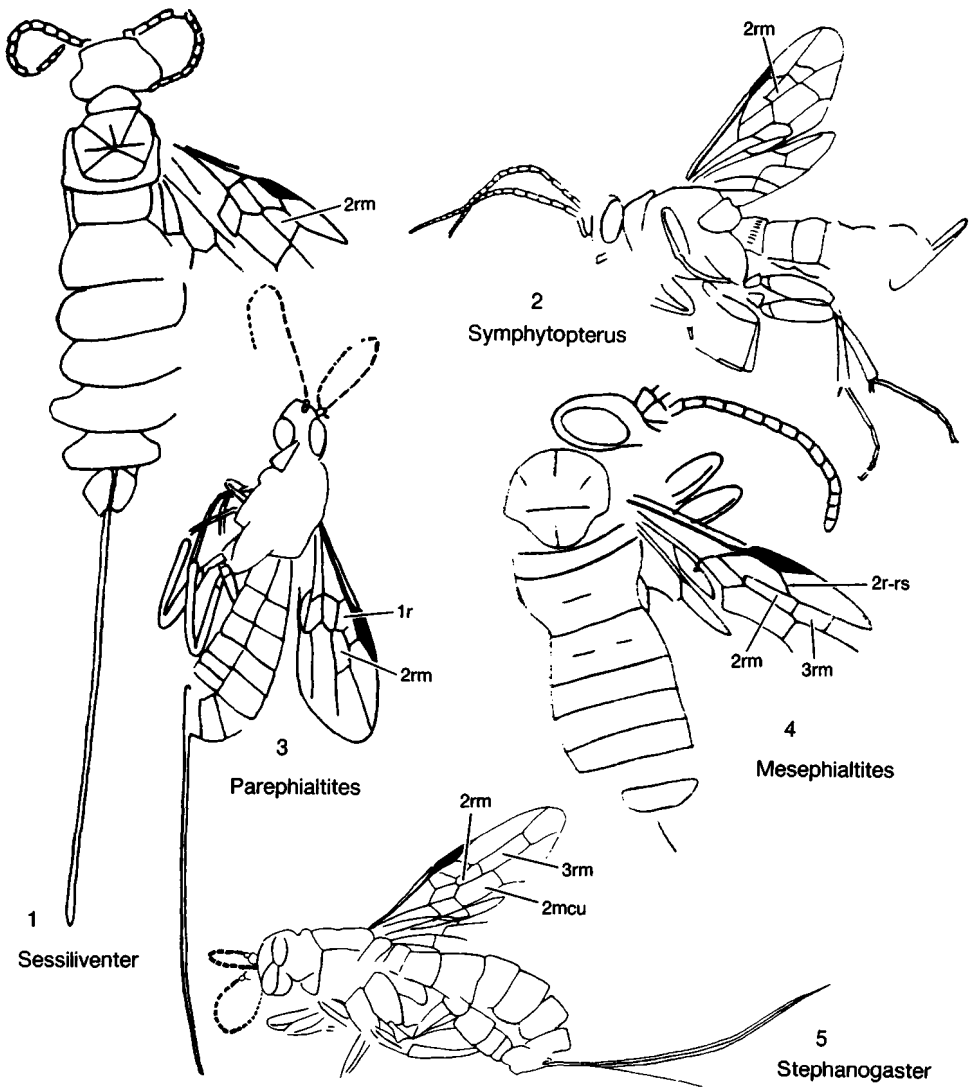


FIG. 252. Ephialtitidae (p. 465–466).

15 segments; ovipositor very short. *Jur.*, USSR (Kazakh).——FIG. 251,*2*. **K. micrura*; wings and body, ×3.6 (Rasnitsyn, 1975).

Leptephialtites RASNITSYN, 1975, p. 33 [**L. caudatus*; OD]. Fore wing with basal section of RS arising close to pterostigma and directed toward wing base; proximal border of cell 2rm distal of base of pterostigma; cell 3rm shorter than 2mcu; crossvein 1r-rs missing in some species. Antennae with from 16 to 30 segments; ovipositor longer than gaster, often much longer than body; gaster usually broadest distally. *Jur.*, USSR (Kazakh).——FIG. 251,*6*. **L. caudatus*; body and wings, ×6 (Rasnitsyn, 1975).

Mesephialtites RASNITSYN, 1975, p. 32 [**M. paurocerus*; OD]. Fore wing with basal section of RS arising close to base of pterostigma and directed obliquely toward wing base; proximal border of cell 2rm slightly distal to base of pterostigma; cell 3rm shorter than cells 2rm and 2mcu; crossvein 1r-rs absent. Antennae with 15 segments; gaster widest along middle. *Jur.*, USSR (Kazakh).——FIG. 252,*4*. **M. paurocerus*; wings and body, ×9 (Rasnitsyn, 1975).

Micrephialtites RASNITSYN, 1975, p. 48 [**M. minor*; OD]. Fore wing with basal section of RS remote from pterostigma and directed toward wing base; crossvein 1r-rs absent; cells 2rm and 3rm long.

Ovipositor very short, barely projecting beyond end of gaster. *Jur.,* USSR (Kazakh).——Fig. 251,*5*. **M. minor*; wings and body, ×8 (Rasnitsyn, 1975).

Parephialtites Rasnitsyn, 1975, p. 32 [**P. reductus*; OD]. Fore wing with basal section of RS very short, directed slightly toward wing apex; crossveins 3r-m and 2m-cu absent; cell 2a closed; cell 2rm with proximal border distal to base of pterostigma. Antennae with 20 segments; propodeum barely extending over base of second abdominal segment; gaster widest at level of segments 6 and 7; ovipositor only slightly longer than body. *Jur.,* USSR (Kazakh). —— Fig. 252,*3*. **P. reductus*; wings and body, ×6.7 (Rasnitsyn, 1975).

Sessiliventer Rasnitsyn, 1975, p. 39 [**S. temporalis*; OD]. Fore wing with basal section of RS very short and slanted toward wing base; proximal border of cell 2rm distal to base of pterostigma; crossveins 1r-rs and 3r-rm absent. Antennae with 15 to 17 segments; gaster broadest near middle; ovipositor longer than abdomen, but not longer than body. *Jur.,* USSR (Kazakh).——Fig. 252,*1*. **S. temporalis*; wings and body, ×7.8 (Rasnitsyn, 1975).

Stephanogaster Rasnitsyn, 1975, p. 27 [**S. magna*; OD]. Fore wing at least 5 mm long; pterostigma long; basal section of RS arising near base of pterostigma and nearly perpendicular to R; proximal border of cell 2rm distal to base of pterostigma; cell 3rm longer than cell 2mcu; crossvein cu-a situated at origin of M from M+CUA. Antennae setaceous, with at least 20 segments; gaster broad posteriorly; ovipositor long, but not as long as body. *Jur.,* USSR (Kazakh).—— Fig. 252,*5*. **S. magna*; wing and body, ×3.5 (Rasnitsyn, 1975).

Symphyogaster Rasnitsyn, 1975, p. 49 [**S. cylindrica*; OD]. Similar to *Micrephialtites,* but crossvein 3r-m absent in fore wing. Antennae with 19 segments. *Jur.,* USSR (Kazakh).

Symphytopterus Rasnitsyn, 1975, p. 42 [**S. nigricornis*; OD]. Fore wing with basal section of RS strongly slanted toward base of wing; proximal border of cell 2rm at about level of base of pterostigma. Antennae apparently with from 12 to 24 segments; gaster narrowed toward apex, widest near middle. *Jur.,* USSR (Kazakh). —— Fig. 252,*2*. **S. nigricornis*; wings and body, ×5 (Rasnitsyn, 1975).

Trigonalopterus Rasnitsyn, 1975, p. 51 [**T. brachycerus*; OD]. Fore wing with basal section of RS close to pterostigma and directed toward wing base; crossvein 1r-rs absent; crossvein 2r-m oblique, close to crossvein 2r-rs. Antennae with 12 segments; ovipositor short. *Jur.,* USSR (Kazakh).——Fig. 251,*3*. **T. brachycerus*; wing and body, ×7.7 (Rasnitsyn, 1975).

Family STEPHANIDAE Leach, 1815

[Stephanidae Leach, 1815, p. 142]

Fore wing with costal space broad; distal veins weak or obsolescent. Antennae multisegmented, with at least 20 segments; head spherical, with a circular row of 5 teeth around median ocellus; cervix long; hind coxae long, hind femora swollen. Larvae parasitic on wood-boring insects, mostly Coleoptera. *Oligo.–Holo.*

Stephanus Panzer, 1805, p. 77. *Holo.*

Electrostephanus Brues, 1933, p. 12 [**E. brevicornis*; OD]. Fore wing similar to that of *Stephanus* (recent), but basal section of M directed slightly anteriorly. Antennae with not more than 23 segments. *Oligo.,* Europe (Baltic).——Fig. 253,*6*. **E. brevicornis*; wings and body, ×10 (Brues, 1933).

Protostephanus Cockerell, 1906b, p. 57 [**P. ashmeadi*; OD]. Little-known genus. Hind femora toothed. [Family assignment doubtful.] Brues, 1933; Rasnitsyn, 1963. *Oligo.,* USA (Colorado).

Family MEGALYRIDAE Schletterer, 1890

[Megalyridae Schletterer, 1890, p. 198]

Similar to the Stephanidae, but antennae commonly with fewer segments, segments long and narrow; gaster subsessile. Larvae apparently parasitic on certain wood-boring beetles. *Jur.–Holo.*

Megalyra Westwood, 1832, p. 790. *Holo.*

Brachycleistogaster Rasnitsyn, 1975, p. 64 [**B. karatavica*; OD]. Fore wing with basal section of RS shorter than basal section of M; crossveins 3r-m and 2m-cu absent; crossvein 2r-m present. Antennae filiform, with 13 to 15 segments; ovipositor short. *Jur.,* USSR (Kazakh). —— Fig. 253,*1*. **B. karatavica*; wings and body, ×13 (Rasnitsyn, 1975).

Cleistogaster Rasnitsyn, 1975, p. 53 [**C. buriatica*; OD]. Fore wing with pterostigma slender; basal section of RS shorter than basal section of M; crossveins 2r-m and 3r-m present. *Jur.,* USSR (Kazakh); *Cret.,* USSR (Asian RSFSR). ——Fig. 253,*5*. **C. buriatica,* Jur.; wings and body, ×6 (Rasnitsyn, 1975).

Cretocleistogaster Rasnitsyn, 1975, p. 72 [**C. vitimica*; OD]. Fore wing with pterostigma very short and broad at middle; basal section of RS longer than basal section of M; crossveins 2r-m, 3r-m, and 2m-cu absent. Antennae with about 15 segments; ovipositor short. *Cret.,* USSR (Asian RSFSR).

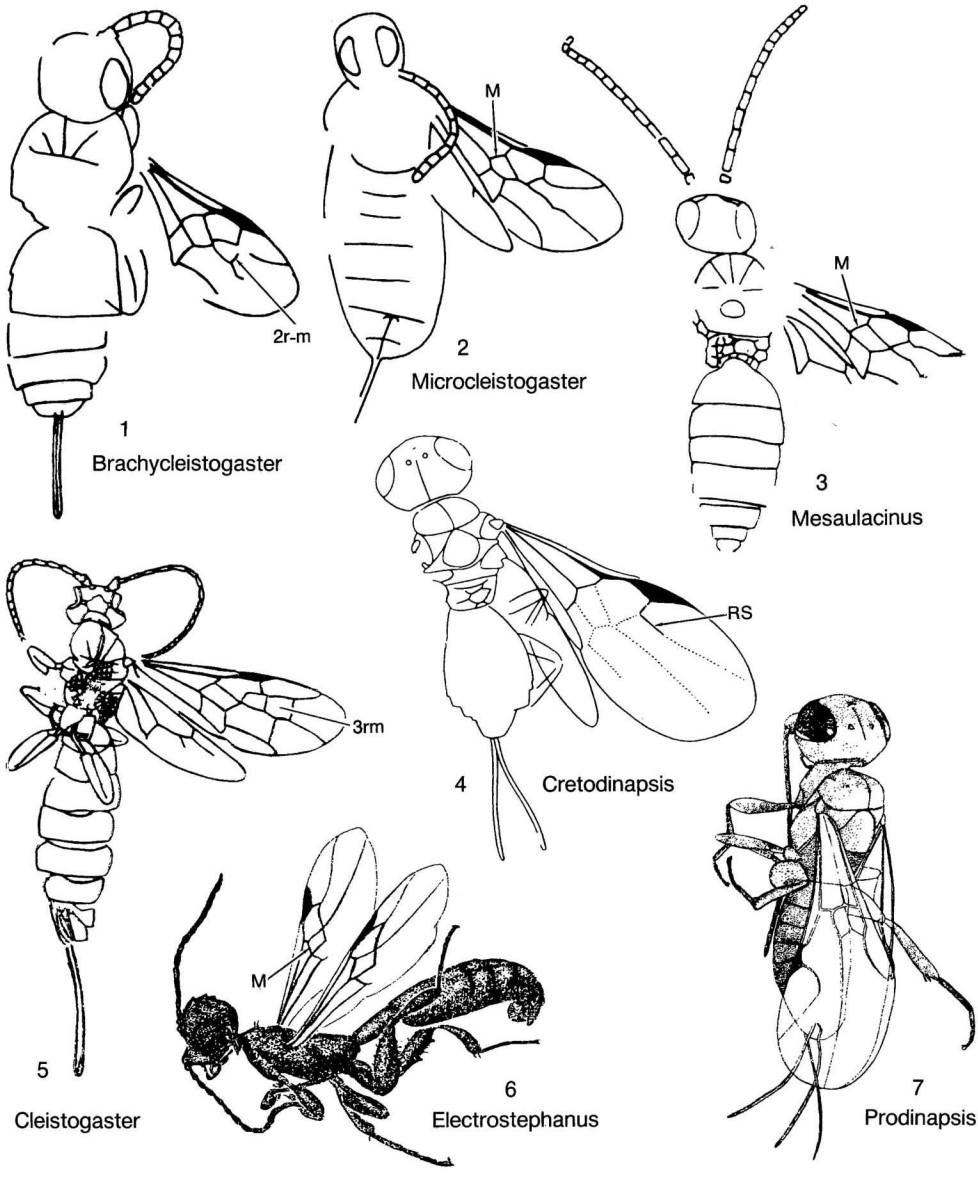


FIG. 253. Stephanidae and Megalyridae (p. 466–468).

Cretodinapsis RASNITSYN, 1977a, p. 106 [**C. caucasica*; OD]. Fore wing with RS, as it connects to crossvein 2r-rs, perpendicular to it; RS obsolescent, but distinct between cells 1r+2r and 3r; R curved at origin of RS. Head broader than thorax; ovipositor shorter than body. *Cret.*, USSR (Azerbaijan). —— FIG. 253,*4*. **C. caucasica*; wings and body, ×24 (Rasnitsyn, 1977a).

Leptocleistogaster RASNITSYN, 1975, p. 57 [**L. pallida*; OD]. Fore wing as in *Cleistogaster,* but crossvein 2m-cu absent or reduced to only stubs. Antennae with 10 to 21 segments. *Jur.*, USSR (Kazakh).

Mesaulacinus MARTYNOV, 1925d, p. 757 [**M. oviformis*; OD]. Fore wing with basal section of RS shorter than basal section of M; crossvein 3r-m absent or obsolescent, with stubs present. Antennae apparently with 12 to 20 segments, distal ones shortened. RASNITSYN, 1975. *Jur.*, USSR (Kazakh). —— FIG. 253,*3*. *M. areolatus*

RASNITSYN; wings and body, ×11 (Rasnitsyn, 1975).

Microcleistogaster RASNITSYN, 1975, p. 69 [**M. parvula*; OD]. Fore wing with pterostigma narrow; basal section of RS shorter than basal section of M; crossveins 2r-m, 3r-m, and 2m-cu absent. Body stout; antennae with less than 15 segments; distal segment shorter than others. *Jur.*, USSR (Kazakh).——FIG. 253,*2*. **M. parvula*; wings and body, ×18 (Rasnitsyn, 1975).

Prodinapsis BRUES, 1923c, p. 31 [**P. succinalis*; OD]. Similar to *Dinapsis* (recent). Fore wing with pterostigma small, elongate; RS short, curved. Antennae filiform, with 14 segments; antennal grooves (scrobes) present; hind coxae very large; ovipositor long. BRUES, 1923a, 1933. *Oligo.*, Europe (Baltic).——FIG. 253,*7*. **P. succinalis*; wings and body, ×16 (Brues, 1933).

Family TRIGONALIDAE Cresson, 1887

[Trigonalidae CRESSON, 1887, p. 37]

Fore wing: venation generalized, with pterostigma, veins RS2 and RS3 (usually), RS+M, and cells 2rm and 3rm present; costal space open. Antennae multisegmented. Larvae mostly hyperparasites on other Hymenoptera or Diptera. *Cret.–Holo.*

Trigonalys WESTWOOD, 1835, p. 52. [Generic assignment of fossils doubtful.] COCKERELL, 1917e; STATZ, 1938b. *Oligo.*, Europe (Germany); *Mio.*, Burma–*Holo.*

Cretogonalys RASNITSYN, 1977a, p. 106 [**C. taimyricus*; OD]. Fore wing wit basal section of RS nearly perpendicular to R; cell 1mcu very short, much shorter than cell 2rm. Head narrow, with large, protruding eyes; antennae with 16 segments. *Cret.*, USSR (Asian RSFSR).

Family MAIMETSHIDAE Rasnitsyn, 1975

[Maimetshidae RASNITSYN, 1975, p. 73]

Fore wing with costal area distinct; pterostigma narrow; basal section of vein RS slanted slightly toward wing base; distal part of RS (beyond crossvein 2r-rs) curved, closing cell 3r; crossvein 2r-m present. Hind wing with venation reduced; RS very short; abdomen with second segment short and narrow; ovipositor well developed. *Cret.*

Maimetsha RASNITSYN, 1975, p. 74 [**M. arctica*; OD]. Fore wing with basal section of RS arising far from pterostigma; cell 3r short, broad; crossveins 3r-m and 2m-cu obsolescent. Gaster broadly oval. *Cret.*, USSR (Asian RSFSR). —— FIG. 254,*4*. **M. arctica; a*, body, lateral view, *b*, wings and body, dorsal view, both ×22 (Rasnitsyn, 1975).

Family STIGMAPHRONIDAE Kozlov, 1975

[Stigmaphronidae KOZLOV, 1975, p. 75]

Fore wing widest distally, venation greatly reduced; veins C and R thick; pterostigma long. Antennae with 11 segments; posterior ocelli almost contiguous with compound eyes; hind tibiae broad and flattened; tibial spurs long; tarsi long, with 5 segments. *Cret.*

Stigmaphron KOZLOV, 1975, p. 77 [**S. orphne*; OD]. Fore wing with RS absent. Antennae clubbed; tibial spur formula 1,2,3; spurs long and thin; hind coxae as long as wide; all femora strongly broadened; hind legs twice as long as forelegs. *Cret.*, USSR (Asian RSFSR).——FIG. 254,*1*. **S. orphne*; wings and body, ×50 (Kozlov, 1975).

Allocotidus MUESEBECK, 1963, p. 129 [**A. bruesi*; OD]. Female similar to those of *Stigmaphron*, but antenna short, not clubbed, and flagellar segments (except the last) broader than long. RASNITSYN, 1975. *Cret.*, USA (Alaska).

Elasmomorpha KOZLOV, 1975, p. 78 [**E. melpomene*; OD]. Fore wing with RS almost reaching wing apex. Tibial spur formula 2,2,2. Antennal scape 3 times as long as maximum width and as long as following 5 segments combined. *Cret.*, USSR (Asian RSFSR).——FIG. 254,*3*. **E. melpomene*; wings and body, ×38 (Kozlov, 1975).

Hippocoon KOZLOV, 1975, p. 80 [**H. evadne*; OD]. Fore wing with RS almost reaching wing margin. Tibial spur formula 2,2,2. Antennae not clubbed, length of antennal scape only about 1.3 times its greatest width and equal to 2 following segments combined. *Cret.*, USSR (Asian RSFSR). —— FIG. 254,*5*. **H. evadne*; wings and body, ×50 (Kozlov, 1975).

Family MEGASPILIDAE Ashmead, 1888

[Megaspilidae ASHMEAD, 1888, p. 49]

Fore wing with pterostigma large, linear, or absent. Antennae with same number of segments in both sexes; middle tibiae with 2 spurs; sixth gastric tergite lacking a netlike area Larvae parasitic on braconids and chalcids. MASNER & DESSART, 1967. *Cret.–Holo.*

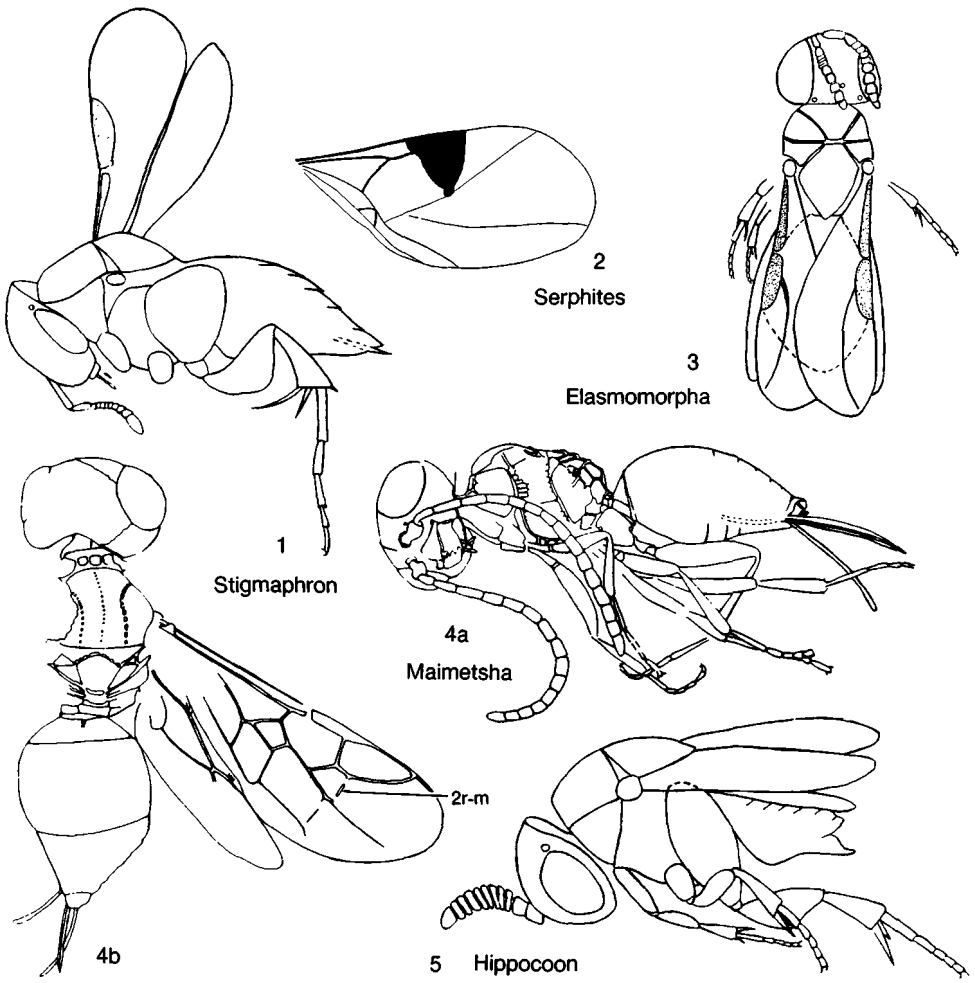


FIG. 254. Maimetshidae, Stigmaphronidae, and Serphitidae (p. 468–470).

Megaspilus WESTWOOD, 1829, p. 37. *Holo.*

Conostigmus DAHLBOM, 1858, p. 291. BRUES, 1940a; DESSART, 1977; ALEKSEYEV & RASNITSYN, 1981. *Cret.,* USSR (Asian RSFSR); *Oligo.,* Europe (Baltic)–*Holo.*

Lagynodes FÖRSTER, 1841, p. 46. BRUES, 1940a; DESSART, 1976. *Oligo.,* Europe (Baltic)–*Holo.*

Lygocerus FÖRSTER, 1856, p. 97. [Generic assignment of fossils doubtful.] CARPENTER & others, 1937. *Cret.,* Canada (Manitoba)–*Holo.*

Prolagynodes ALEKSEYEV & RASNITSYN, 1981, p. 127 [**P. penniger*; OD]. Related to *Lagynodes.* Female: wings fully developed; marginal vein of fore wing forming a slightly conical pterostigma; mesonotum with 3 complete furrows. *Cret.,* USSR (Asian RSFSR).

Family MESOSERPHIDAE Kozlov, 1970

[*nom. transl.* KOZLOV, 1975, p. 82, *ex* Mesoserphinae KOZLOV, 1970, p. 205]

Similar to Proctotrupidae, but cells 1mcu and 2cua present in fore wing; gaster of female with 7 visible tergites; antennae of female with 15 or more segments. *Jur.*

Mesoserphus KOZLOV, 1968, p. 239 [**M. karatavicus*; OD]. Cell 1mcu of fore wing nearly rectangular; M curved distally. KOZLOV, 1970, 1975. *Jur.,* USSR (Kazakh).

Mesohelorus MARTYNOV, 1925d, p. 758 [**M. muchini*; OD]. Similar to *Mesoserphus,* but cell

1mcu nearly triangular in fore wing; M straight distally. RASNITSYN, 1975. *Jur.*, USSR (Kazakh).

Udaserphus RASNITSYN, 1983a, p. 91 [**U. transbaicalicus*; OD]. Similar to *Mesoserphus*, but much smaller; antennal segments broadened apically. Fore wing with RS+M, basal section of RS, and crossvein 1m-cu complete; basal section of M reduced. *Jur.*, USSR (Asian RSFSR).

Family SERPHITIDAE Brues, 1937

[Serphitidae BRUES, 1937, p. 33]

Male: fore wing with pterostigma very large, extending to center of wing; vein SC remote from C; other veins reduced; M and CU nearly obsolescent. Antennae with 10 segments and long scape; flagellum clavate; mandibles large; prothorax short. *Cret.*

Serphites BRUES, 1937, p. 33 [**S. paradoxus*; OD]. Right mandible with 3 long, curved teeth directed inward; antennae inserted below middle of frons; femora slightly thickened near middle. *Cret.*, Canada (Manitoba).——FIG. 254,*2*. **S. paradoxus*; fore wing, ×33 (Brues, 1937).

Family PROCTOTRUPIDAE Leach, 1815

[Proctotrupidae LEACH, 1815, p. 145]

Fore wing with venation reduced; distal veins obsolescent or absent; pterostigma usually prominent; cell 2r+3r small to very small, closed; cells 1mcu and 2cua absent. Antennae with 13 segments, inserted at middle of frons, not on a projection; gaster of female terminating in a series of fused plates; ovipositor appearing to arise from apex of gaster. *Oligo.–Holo.*

Proctotrupes LATREILLE, 1796, p. 108. BRUES, 1910, 1923a. *Oligo.*, Europe (Baltic), USA (Colorado)–*Holo.*

Cryptoserphus KIEFFER, 1907, p. 288. BRUES, 1940a. *Oligo.*, Europe (Baltic)–*Holo.*

Family HELORIDAE Förster, 1856

[Heloridae FÖRSTER, 1856, p. 20]

Fore wing with pterostigma present, sometimes small; costal space open, commonly narrow; cell 2r+3r small, triangular; several closed cells usually present. Antennae not arising from a projection, commonly with 15 segments. Larvae parasitic on diverse types of insects. *Jur.–Holo.*

Helorus LATREILLE, 1802, p. 309. STATZ, 1938b. *Oligo.*, Europe (Baltic)–*Holo.*

Protohelorus KOZLOV, 1968, p. 237 [**P. mesozoicus*; OD]. Fore wing with cell 1mcu more than 3 times as long as its maximum width. Antennae with 20 segments. *Jur.*, USSR (Kazakh).

Family DIAPRIIDAE Haliday, 1833

[Diapriidae HALIDAY, 1833, p. 274]

Fore wing venation usually reduced to a compound vein extending along anterior border of wing and consisting of the submarginal and marginal veins and a very small stigmal vein. Antennae with 11 to 15 segments, usually arising on a frontal projection. *Oligo.–Holo.*

Diapria LATREILLE, 1796, p. 110. *Holo.*

Aclista FÖRSTER, 1856, p. 128. BRUES, 1906; THÉOBALD, 1937a; STATZ, 1938b. *Oligo.*, USA (Colorado), Europe (Germany, France)–*Holo.*

Aneurhynchus WESTWOOD, 1832, p. 129. COCKERELL, 1921a. *Oligo.*, England–*Holo.*

Archaebelyta MEUNIER, 1923b, p. 84 [**A. superba*; OD]. Little-known genus, apparently related to *Lithobelyta*; pterostigma absent in fore wing. [Family assignment doubtful.] MEUNIER, 1923c. *Oligo.*, Europe (Germany).

Cinetus JURINE, 1807, p. 310. BRUES, 1910; MANEVAL, 1938. *Oligo.*, Europe (Baltic), USA (Colorado)–*Holo.*

Galesimorpha BRUES, 1910, p. 12 [**G. wheeleri*; OD]. Similar to *Psilus* (recent); compound vein of fore wing submarginal, ending at pterostigma near midwing. *Oligo.*, USA (Colorado).

Lithobelyta COCKERELL, 1921a, p. 22 [**L. reducta*; OD]. Similar to *Cinetus*, but pterostigma absent. *Oligo.*, England.

Miota FÖRSTER, 1856, p. 13. [Generic assignment of fossils doubtful.] COCKERELL, 1921a. *Oligo.*, England–*Holo.*

Pantolyta FÖRSTER, 1856, p. 128. MANEVAL, 1938. *Oligo.*, Europe (Baltic)–*Holo.*

Paramesius WESTWOOD, 1832, p. 129. BRUES, 1910. *Oligo.*, USA (Colorado)–*Holo.*

Zygota FÖRSTER, 1856, p. 128. [Generic assignment of fossils doubtful.] COCKERELL, 1921a. *Oligo.*, England–*Holo.*

Family JURAPRIIDAE Rasnitsyn, 1983

[Jurapriidae RASNITSYN, 1983a, p. 92]

Similar to Diapriidae; venation much reduced. Antennal scape relatively small, only slightly longer than twice its width; cells 1r+2r+1mcu forming an undivided compound cell. *Jur.*

Jurapria RASNITSYN, 1983a, p. 93 [**J. sibirica*; OD]. Antennae of female with 15 segments and slightly thickened distally but not forming a club; RS arising from R close to pterostigma. *Jur.,* USSR (Asian RSFSR).

Family PELECINOPTERIDAE Brues, 1933

[Pelecinopteridae BRUES, 1933, p. 17]

Fore wing similar to that of Pelecinidae (recent). Antennae with 13 segments; hind tibiae clavate; hind tarsus with fourth segment short; female abdomen with 6 tubular segments, male abdomen with 7 tubular segments. [Probably a synonym of Pelecinidae.] *Oligo.*

Pelecinopteron BRUES, 1933, p. 19 [**P. tubuliforme*; OD]. Fore wing with pterostigma very narrow, acute apically; cell 1mcu small; cell 2rm larger. KOZLOV, 1974. *Oligo.,* Europe (Baltic). ——FIG. 255,*8*. **P. tubuliforme; a,* male, wings and body, ×6; *b,* female, wings and body, ×5 (both Brues, 1933).

Family SCELIONIDAE Thomson, 1858

[Scelionidae THOMSON, 1858, p. 417]

Fore wing with venation much reduced, without closed cells, and with a distinct compound vein along anterior margin of wing; costal space often open; stigmal vein usually present, but often thin or obsolescent. Antennae with 10 to 12 segments, rarely the distal 4 or 5 segments fused to form a club; middle tibia with 1 spur. Larvae parasitic on eggs of diverse insects. *Cret.–Holo.*

Scelio LATREILLE, 1805, p. 226. *Holo.*

Aneurobaeus KIEFFER, 1912, p. 87. BRUES, 1940b. *Oligo.,* Europe (Baltic)–*Holo.*

Archaeoscelio BRUES, 1940b, p. 88 [**A. rugosus*; OD]. Male: fore wing with SC apparently remote from costal margin, several thickenings associated with its termination. Body very short and stout; antennae with 14 segments, geniculate and filiform; legs slender, femora and tibiae clavate. Female: similar to male, but segments of flagellum thick, forming a long club. [Family assignment doubtful.] *Oligo.,* Europe (Baltic).——FIG. 255,*5*. **A. rugosus,* female; wings and body, ×17 (Brues, 1940b).

Baryconus FÖRSTER, 1856, p. 101. CARPENTER & others, 1937. *Cret.,* Canada (Manitoba)–*Holo.*

Brachyscelio BRUES, 1940b, p. 76 [**B. cephalotes*; OD]. Female: fore wing with venation present; basal section of M strong, nearly perpendicular to costal margin of wing; pterostigma absent; SC free from C. Head about twice as wide as long; antennae with 12 segments, geniculate; legs slender. [Family assignment doubtful.] *Oligo.,* Europe (Baltic).——FIG. 255,*1*. **B. cephalotes*; wings and body, ×23 (Brues, 1940b).

Ceratobaeoides DODD, 1913, p. 337. BRUES, 1940b. *Oligo.,* Europe (Baltic)–*Holo.*

Chromoteleia ASHMEAD, 1893, p. 209. MANEVAL, 1938; BRUES, 1940b. *Oligo.,* Europe (Baltic)–*Holo.*

Dissolcus ASHMEAD, 1893, p. 164. BRUES, 1940b. *Oligo.,* Europe (Baltic)–*Holo.*

Electroteleia BRUES, 1940b, p. 80 [**E. stigmatica*; OD]. Female: fore wing with pterostigma forming a thick ridge on wing margin; RS terminating on wing margin just beyond pterostigma but well before wing apex. Antennae long, with 12 segments, terminal 7 or 8 segments shorter and thicker than others. Male: similar to female, but antennae filiform, distal segments not thickened. *Oligo.,* Europe (Baltic).——FIG. 255,*2*. **E. stigmatica*; male, wings and body, ×11 (Brues, 1940b).

Hadronotoides DODD, 1913, p. 171. BRUES, 1940b. *Oligo.,* Europe (Baltic)–*Holo.*

Hadronotus FÖRSTER, 1856, p. 101. COCKERELL, 1909k. *Oligo.,* Europe (Baltic)–*Holo.*

Hoploteleia ASHMEAD, 1893, p. 227. BRUES, 1940b. *Oligo.,* Europe (Baltic)–*Holo.*

Macroteleia WESTWOOD, 1835, p. 70. COCKERELL, 1921a. *Oligo.,* England–*Holo.*

Microtelenomus DODD, 1913, p. 173. BRUES, 1940b. *Oligo.,* Europe (Baltic)–*Holo.*

Palaeogron MASNER, 1969, p. 398. *Oligo./Mio.,* Mexico (Chiapas)–*Holo.*

Palaeoteleia COCKERELL, 1914f, p. 637 [**P. oxyura*; OD]. Similar to *Chromoteleia,* but SC well developed; antennae inserted very close to middle line of frons; gaster broader. *Oligo.,* USA (Colorado).

Parabaeus KIEFFER, 1910, p. 294. BRUES, 1940b. *Oligo.,* Europe (Baltic)–*Holo.*

Proplatyscelio BRUES, 1940b, p. 85 [**P. depressus*; OD]. Female: similar to those of *Platyscelio* (recent), but fore wing with SC submarginal and extending beyond midwing; pterostigma reduced to a thickening beyond end of SC. *Oligo.,* Europe (Baltic).——FIG. 255,*3*. **P. depressus,* female; wings and body, ×13 (Brues, 1940b).

Proteroscelio BRUES, 1937, p. 39 [**P. antennalis*; OD]. Apparently a scelionine genus, but antennae with 14 segments, scape reaching vertex of head; scape and flagellum flattened. *Cret.,* Canada (Manitoba).

Pseudobaeus PERKINS, 1910, p. 620. BRUES, 1940b. *Oligo.,* Europe (Baltic)–*Holo.*

Sembilanocera BRUES, 1940b, p. 70 [**S. clavata*; OD]. Related to *Baeus* (recent), but antennae of female with 9 segments and strongly clubbed. Wing veins present but reduced. *Oligo.,* Europe

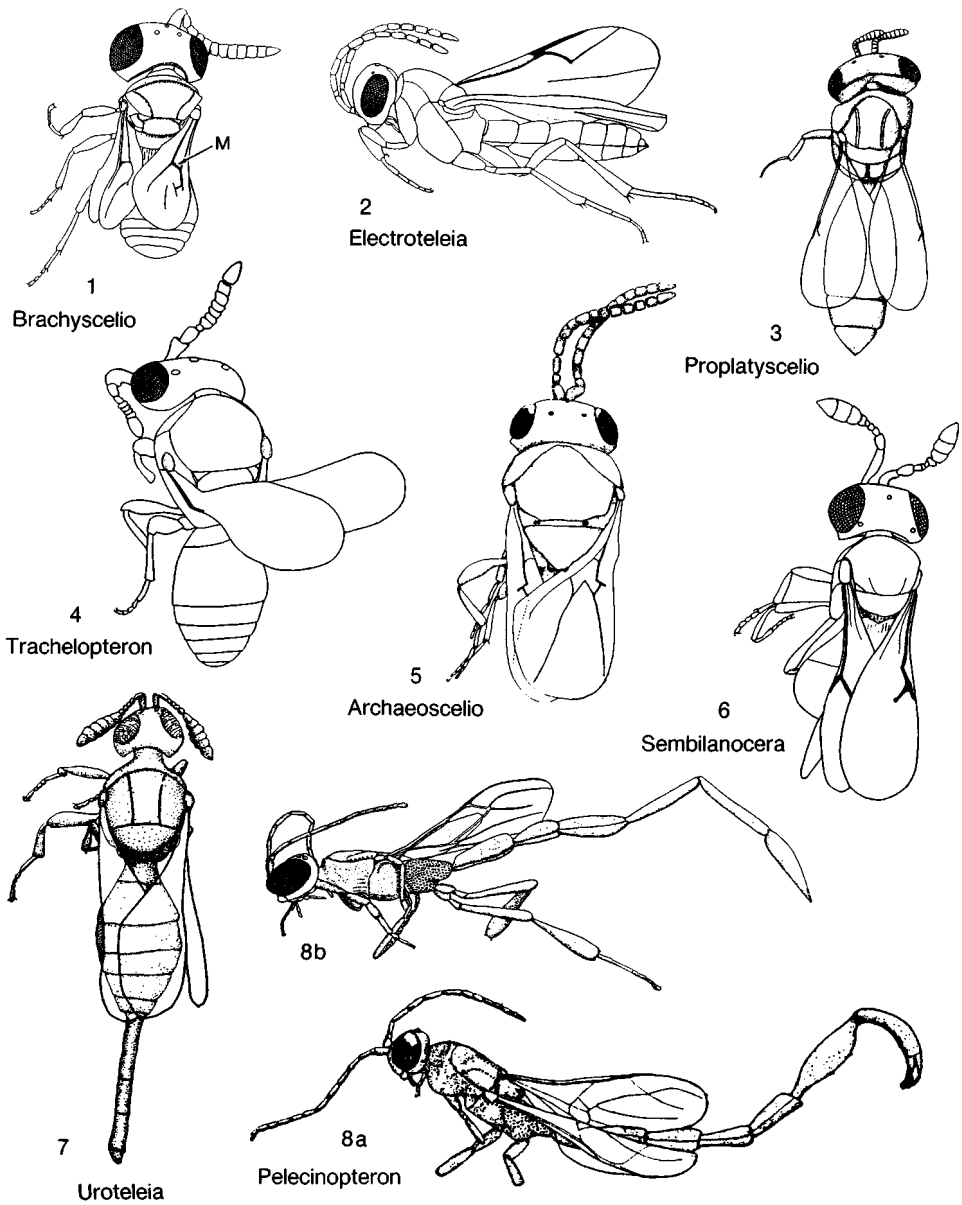


FIG. 255. Pelecinopteridae and Scelionidae (p. 471–473).

(Baltic). —— FIG. 255,6. **S. clavata*; female, wings and body, ×40 (Brues, 1940b).

Sparasion LATREILLE, 1802, p. 316. BRUES, 1940b. *Oligo.,* Europe (Baltic)–*Holo.*

Trachelopteron BRUES, 1940b, p. 86 [**T. angulipenne*; OD]. Male: fore wing apparently bent sharply upward near base, basal part narrow and strap-shaped. Head, thorax, and abdomen flattened; antennae with 10 segments; scape short. [Family assignment doubtful.] *Oligo.,* Europe (Baltic).—— FIG. 255,4. **T. angulipenne*; male, wings and body, ×57 (Brues, 1940b).

Uroteleia BRUES, 1940b, p. 87 [**U. synthetica*; OD]. Female: SC of fore wing extending beyond midwing; pterostigma reduced to a thickened marginal vein extending well beyond end of SC; part of basal section of RS apparently present. Antennae with 12 segments; scape long and slen-

der, 6 terminal segments forming a large club; prothorax long; gaster narrowed basally; apical segments also narrow, tip with a tubular process extending straight backward. [Family assignment doubtful.] *Oligo.*, Europe (Baltic).——FIG. 255,7. **U. synthetica*; wings and body, ×17 (Brues, 1940b).

Family PRAEAULACIDAE Rasnitsyn, 1972

[Praeaulacidae RASNITSYN, 1972, p. 70]

Related to Aulacidae but with fuller venation, especially of hind wing. Fore wing: basal section of vein RS long, about equal to basal section of M; crossvein 1r-rs obsolescent or absent; crossveins 2r-m, 3r-m, and 2m-cu always present; crossvein 1m-cu reaching cell 2rm. Hind wing: costa not developed but R strong, extending to level of end of RS as a distinct vein. Antennae with 14 to 27 segments; ovipositor long. *Jur.*

Praeaulacus RASNITSYN, 1972, p. 72 [**P. ramosus*; OD]. Fore wing with basal section of RS at least half its length from pterostigma; crossvein 2r-rs about as long as maximum width of cell 2rm. *Jur.*, USSR (Kazakh).——FIG. 256,*4*. **P. ramosus*; wings and body, ×5 (Rasnitsyn, 1972).

Aulacogastrinus RASNITSYN, 1983c, p. 103, *nom. subst. pro Aulacogaster* RASNITSYN, 1972, p. 85, *non* AGASSIZ, 1846 [**Aulacogaster ater* RASNITSYN, 1972, p. 85; OD]. Fore wing with basal section of RS separated from pterostigma by less than half its length; crossvein 2r-rs distinctly longer than width of cell 2rm; crossvein 3r-m not slanted. Distal part of first gastral segment dilated. *Jur.*, USSR (Kazakh).

Evanigaster RASNITSYN, 1972, p. 85 [**E. petiolatus*; OD]. Similar to *Aulacogastrinus*, but first gastral segment narrow, tubular. *Jur.*, USSR (Kazakh).

Evaniops RASNITSYN, 1972, p. 85 [**E. rostratus*; OD]. Fore wing with basal segment of RS separated from pterostigma by a distance greater than its length; crossvein 2r-rs much longer than width of cell 2rm; crossvein 3r-m not oblique; gaster broad; second segment of abdomen forming a cylindrical petiole. *Jur.*, USSR (Kazakh).

Praeaulacinus RASNITSYN, 1972, p. 77 [**P. parvus*; SD RASNITSYN, 1973, p. 122, *nom. subst. pro minus* RASNITSYN, 1972, p. 77, *non minor* RASNITSYN, 1972]. Similar to *Praeaulacus*, but crossvein 2r-rs longer than width of cell 2rm; base of gaster broadly rounded. *Jur.*, USSR (Kazakh).

Praeaulacites RASNITSYN, 1972, p. 83 [**P. pachygaster*; OD]. Similar to *Praeaulicops*, but crossvein 3r-m slightly oblique. *Jur.*, USSR (Kazakh).

Praeaulacon RASNITSYN, 1972, p. 79 [**P. elongatum*; OD]. Similar to *Praeaulacus*, but base of gaster broadly rounded, nearly sessile. *Jur.*, USSR (Kazakh).

Praeaulicops RASNITSYN, 1972, p. 83 [**P. lucidus*; OD]. Fore wing with basal section of RS separated from pterostigma by a distance less than its length; crossvein 3r-m strongly slanted. *Jur.*, USSR (Kazakh).

Family CRETEVANIIDAE Rasnitsyn, 1975

[Cretevaniidae RASNITSYN, 1975, p. 83]

Similar to Aulacidae and Evaniidae. Fore wing with costal area relatively broad; basal section of vein RS remote from pterostigma, very short and perpendicular to R; cell 3r very narrow. Hind wing very short, about half as long as fore wing. Antennae with 12 segments; hind tibiae thickened. *Cret.*

Cretevania RASNITSYN, 1975, p. 84 [**C. minor*; OD]. Head without sculpturing; mandibles with 4 teeth; maxillary palpi apparently with 5 segments; labial palpi with 3 segments. *Cret.*, USSR (Asian RSFSR).

Family ANOMOPTERELLIDAE Rasnitsyn, 1975

[Anomopterellidae RASNITSYN, 1975, p. 88]

Fore wing with costal area broad; basal section of vein RS directed toward base of wing; crossvein 2r-rs situated at apex of pterostigma; crossvein 2r-m present; cells 1mcu and 2mcu narrow. Antennae with at least 15 segments. *Jur.*

Anomopterella RASNITSYN, 1975, p. 90 [**A. mirabilis*; OD]. Fore wing with basal section of RS very close to pterostigma; cell 3r very broad; gaster widest beyond its middle; ovipositor short. *Jur.*, USSR (Kazakh). —— FIG. 256,*6*. **A. mirabilis*; wing and body, ×9 (Rasnitsyn, 1975).

Family EVANIIDAE Leach, 1815

[Evaniidae LEACH, 1815, p. 142]

Fore wing with pterostigma present, commonly small; costal space open and wide; crossveins 2r-m, 3r-m, and 1m-cu commonly present; crossvein 2m-cu absent; venation greatly reduced in some species. Antennae with 13 or 14 segments; gaster short, oval, with long petiole, arising abruptly just pos-

terior to scutellum. Larvae parasitic on eggs of Blattaria. *Oligo.–Holo.*

Evania Fabricius, 1775, p. 345. Brues, 1933. *Oligo.*, Europe (Baltic)–*Holo.*

Family AULACIDAE Shuckard, 1841

[Aulacidae Shuckard, 1841, p. 115] [=Gasteruptionidae Ashmead, 1901, p. 7; Kotujellidae Rasnitsyn, 1975, p. 87; Baissidae Rasnitsyn, 1975, p. 90]

Gaster attached very high on propodeum; first and second segments of gaster partially or completely fused; male with 13 antennal segments, female with 14. Venation of fore wing very diverse, relatively complete in some genera, apically reduced in others. Larvae mostly parasitic on wood-boring Coleoptera or bees and wasps nesting in wood. Townes, 1950; Rasnitsyn, 1980b. *Cret.–Holo.*

Aulacus Jurine, 1807, p. 89. *Holo.*

Aulacostethus Philippi, 1873, p. 302 [=*Aulacites* Cockerell, 1916c, p. 102 (type, *A. secundus*)]. Brues, 1910, 1923a, 1933. *Oligo.*, Europe (Baltic), USA (Colorado)–*Holo.*

Baissa Rasnitsyn, 1975, p. 91 [**B. anomala*; OD]. Fore wing with cell 1mcu small and narrow; cell 2cua with a small distal projection. Rasnitsyn, 1980b. *Cret.*, USSR (Asian RSFSR).

Electrofoenus Cockerell, 1917g, p. 364 [**E. gracilipes*; OD]. Similar to *Gasteruption* (recent). Fore wing with basal section of RS very long, directed toward wing base; cell 3r large, its face on cell 2rm about equal in length to crossvein 2r-rs. Head large and broad, with prominent eyes; legs very long and slender. *Mio.*, Burma. ——Fig. 256,*1*. **E. gracilipes*; fore wing, ×10 (Cockerell, 1917g).

Hyptiogastrites Cockerell, 1917c, p. 19 [**H. electrinus*; OD]. Similar to *Hyptiogaster* (recent), but crossvein 2r-rs in fore wing perpendicular to front margin of wing. Antennae long, filiform; hind tibiae thickened. *Mio.*, Burma.

Kotujella Rasnitsyn, 1975, p. 87 [**K. crucis*; OD]. Fore wing with pterostigma triangular; apex of cell 3r pointed; crossvein 3r-m absent; cell 2rm long. Rasnitsyn, 1980b. *Cret.*, USSR (Asian RSFSR).

Protofoenus Cockerell, 1917c, p. 19 [**P. swinhoei*; OD]. Similar to *Gasteruption* (recent). Gaster of female thick and short, with a long, slender ovipositor, directed obliquely upward. Fore wing with pterostigma shallow; cell 1r+2rm very broad. *Mio.*, Burma.

Vectevania Cockerell, 1922b, p. 33 [**V. vetula*; OD]. Similar to *Protofoenus*, but cell 1r+2rm of fore wing narrow; pterostigma broadly triangular. Brues, 1933. *Oligo.*, England.

Family PRAEICHNEUMONIDAE Rasnitsyn, 1983

[Praeichneumonidae Rasnitsyn, 1983d, p. 259]

Related to Ichneumonidae, but fore wing with vein RS+M present; crossveins 2r-m, 3r-m, and 2m-cu equally well developed; cells 2rm and 3rm large. *Cret.*

Praeichneumon Rasnitsyn, 1983d, p. 259 [**P. townesi*; OD]. Female with head transverse, eyes moderately large; pronotum short centrally; mesonotum transverse; legs apparently short. *Cret.*, Asia (Mongolia). —— Fig. 257. **P. townesi*; fore wing and body, ×9 (Rasnitsyn, 1983d).

Family ICHNEUMONIDAE Latreille, 1802

[Ichneumonidae Latreille, 1802b, p. 309]

Fore wing with pterostigma distinct, usually triangular; vein R marginal; costal space closed; RS+M typically absent; cell 2rm commonly very small or absent; cell 2mcu usually present. Body generally slender; antennae long, with at least 16 segments; trochanters with 2 segments; ovipositor long, often longer than body. Larvae parasitic on diverse groups of insects and a few other arthropods. *Cret.–Holo.*

Ichneumon Linné, 1758, p. 343. Brues, 1910; Cockerell, 1921a; Théobald, 1937a. *Oligo.*, USA (Colorado), England, Europe (France)–*Holo.*

Absyrtus Holmgren, 1858, p. 32. Brues, 1910. *Oligo.*, USA (Colorado)–*Holo.*

Acoenites Latreille, 1810, p. 300. Giebel, 1856; Brues, 1906; Meunier, 1923b. *Oligo.*, USA (Colorado), Europe (Germany); *Mio.*, Europe (Yugoslavia)–*Holo.*

Acourtia Cockerell, 1921a, p. 11 [**A. perplexa*; OD]. Little-known genus. Fore wing with pterostigma triangular; RS+M apparently absent; cell 2rm absent. [Family assignment doubtful.] *Oligo.*, England.——Fig. 256,*2*. **A. perplexa*; fore wing, ×8 (Cockerell, 1921a).

Amblyteles Wesmael, 1845, p. 114. Cockerell, 1927e. *Oligo.*, USA (Colorado)–*Holo.*

Anomalon Panzer, 1804, pl. 15. Brues, 1910; Cockerell, 1919b; Théobald, 1937a. *Oligo.*, USA (Colorado), Europe (France)–*Holo.*

Astiphromma Förster, 1868, p. 170. Brues, 1923a. *Oligo.*, Europe (Baltic)–*Holo.*

Barylypa Förster, 1868, p. 146. Brues, 1910. *Oligo.*, USA (Colorado)–*Holo.*

Campoplex Gravenhorst, 1829, p. 453. [Generic assignment of fossil doubtful.] Statz, 1938b. *Oligo.*, Europe (Germany)–*Holo.*

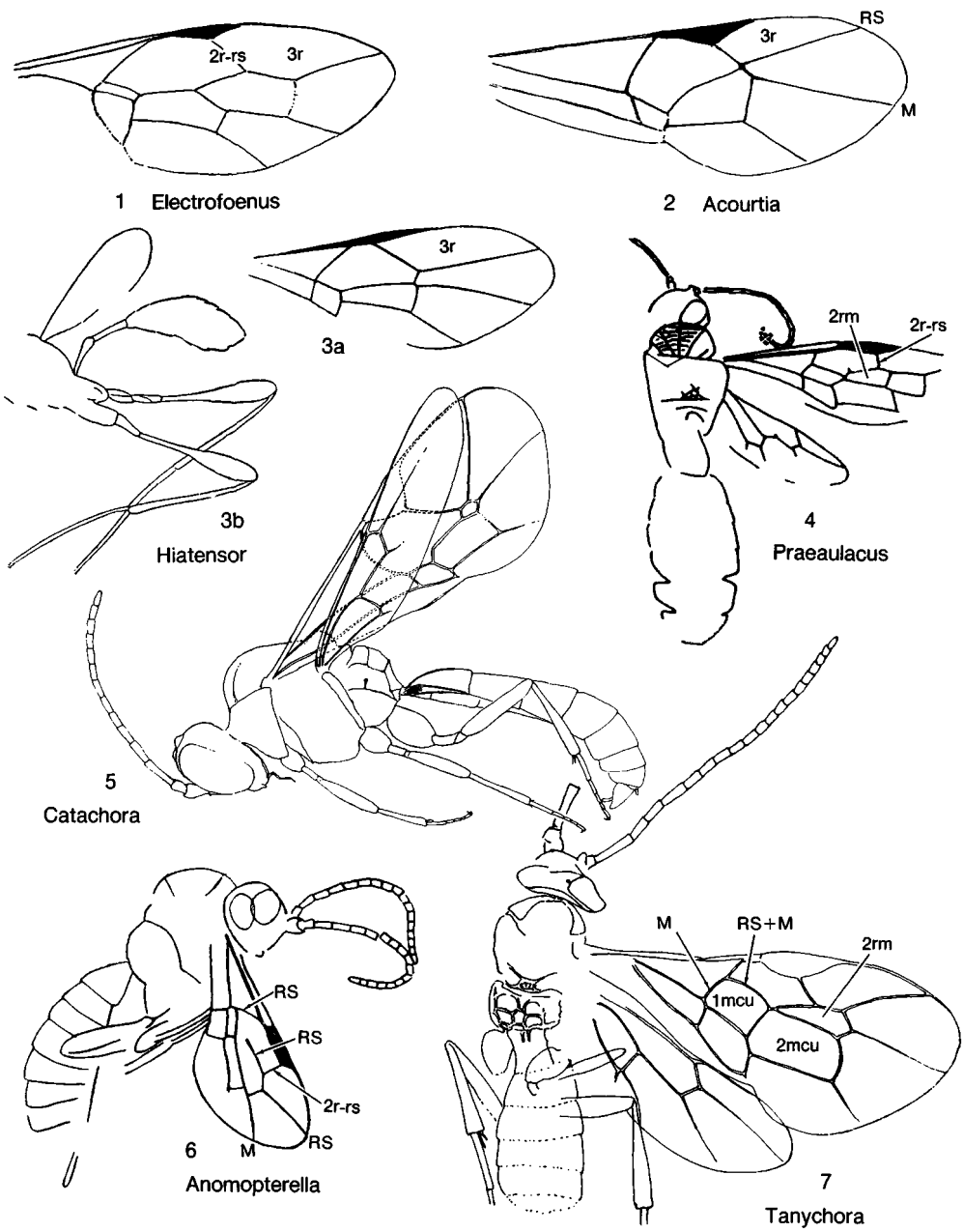


FIG. 256. Praeaulacidae, Anomopterellidae, Aulacidae, and Ichneumonidae (p. 473–477).

Catachora TOWNES, 1973b, p. 284 [**C. minor*; OD]. Related to *Grypocentrus* (recent), but cell 3r very broad. *Cret.*, USSR (Asian RSFSR). —— FIG. 256,*5*. **C. minor*; wings and body, ×28 (Townes, 1973b).

Coleocentrus GRAVENHORST, 1829, p. 437. COCKERELL, 1921a. *Oligo.*, England–*Holo.*

Cremastus GRAVENHORST, 1829, p. 730. [Generic assignment of fossils doubtful.] COCKERELL, 1921a; THÉOBALD, 1937a. *Oligo.*, England, Europe (France)–*Holo.*

Cubocephalus RATZEBURG, 1848, p. 121. STATZ, 1936b. *Oligo.*, Europe (Germany)–*Holo.*

Demophorus THOMSON, 1890, p. 1457. [Generic assignment of fossils uncertain.] BRUES, 1910; THÉOBALD, 1937a. *Oligo.*, USA (Colorado), Europe (France)–*Holo.*

Eopimpla COCKERELL, 1920c, p. 257 [**E. grandis*;

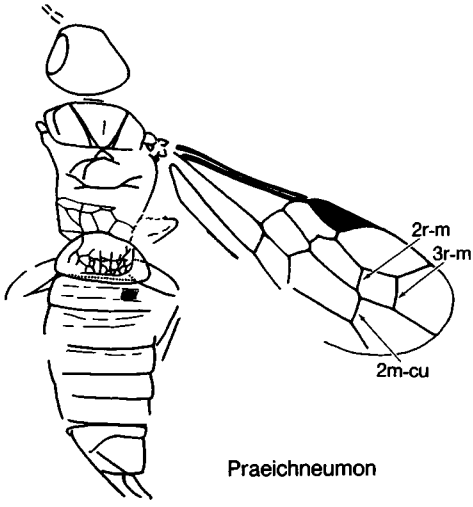


FIG. 257. Praeichneumonidae (p. 474).

OD]. Little-known genus, apparently related to *Pimpla*. Large species; fore wing with crossvein 2r-rs connected to middle of pterostigma; cells 1r+2r and 1mcu combined to form a large cell projecting distally well beyond pterostigma. *Eoc.*, USA (Colorado).

Eubaeus TOWNES, 1973b, p. 287 [**E. leiponeura*; OD]. Fore wing lacking crossvein 2m-cu; cell 2rm absent. *Cret.*, USSR (Asian RSFSR).

Exacrodus FÖRSTER, 1868, p. 210. THÉOBALD, 1937a. *Oligo.*, Europe (France)–*Holo.*

Exenterus HARTIG, 1837, p. 156. COCKERELL, 1924c. *Oligo.*, USA (Colorado)–*Holo.*

Exetastes GRAVENHORST, 1829, p. 395. BRUES, 1910; NAORA, 1933a; STATZ, 1936b. *Oligo.*, USA (Colorado), Europe (Germany); *Pleist.*, Asia (Mongolia)–*Holo.*

Exochus GRAVENHORST, 1829, p. 328. BRUES, 1910. *Oligo.*, USA (Colorado)–*Holo.*

Glypta GRAVENHORST, 1829, p. 3. BRUES, 1910. *Oligo.*, USA (Colorado)–*Holo.*

Hellwigia GRAVENHORST, 1823, p. 318 [=*Protohellwigia* BRUES, 1910, p. 66 (type, *P. obsoleta*)]. TOWNES, 1966. *Oligo.*, USA (Colorado)–*Holo.*

Hemiteles GRAVENHORST, 1829, p. 780. BRUES, 1910; STATZ, 1936b. *Oligo.*, USA (Colorado), Europe (Germany)–*Holo.*

Hiatensor BRUES, 1910, p. 73 [**H. semirutus*; ♂D]. Apparently related to *Campoplex* (recent). Fore wing with pterostigma elongate, nearly linear; cell 3r long. Hind legs elongate, tip of femora extending beyond end of abdomen. TOWNES, 1966. *Oligo.*, USA (Colorado).——FIG. 256,*3*. **H. semirutus*; *a*, fore wing, ×10; *b*, hind leg and abdomen, ×5 (Brues, 1910).

Holomeristus FÖRSTER, 1868, p. 171. COCKERELL, 1921a. *Oligo.*, England–*Holo.*

Horogenes FÖRSTER, 1868, p. 152. STATZ, 1936b. *Oligo.*, Europe (Germany)–*Holo.*

Hypsicera LATREILLE, 1829, p. 288. COCKERELL, 1921a. *Oligo.*, England–*Holo.*

Itoplectis FÖRSTER, 1868, p. 164. COCKERELL, 1921a. *Oligo.*, England–*Holo.*

Labrorychus FÖRSTER, 1868, p. 146. BRUES, 1910. *Oligo.*, USA (Colorado)–*Holo.*

Lampronota CURTIS, 1832, p. 407. BRUES, 1910; COCKERELL, 1921a. *Oligo.*, USA (Colorado)–*Holo.*

Lapton NEES, 1815, p. 46. BRUES, 1910. *Oligo.*, USA (Colorado)–*Holo.*

Lithotorus SCUDDER, 1890, p. 609 [**L. cressoni*; OD]. Little-known genus, possibly within the subfamily Diplazontinae. [Family assignment doubtful.] TOWNES, 1966. *Eoc.*, USA (Wyoming).

Megatryphon COCKERELL, 1924c, p. 9 [**M. mortiferus*; OD]. Little-known genus, apparently similar to *Tryphon*. Fore wing with pterostigma very long, narrowly lanceolate; cell 2rm very small, triangular. Metathorax truncate posteriorly, but dorsal surface straight in lateral view. *Oligo.*, USA (Colorado).

Melanichneumon THOMSON, 1893, p. 1954. [Generic assignment of fossil doubtful.] BRUES, 1910. *Oligo.*, USA (Colorado)–*Holo.*

Mesochorus GRAVENHORST, 1829, p. 960. BRUES, 1910. *Oligo.*, USA (Colorado)–*Holo.*

Mesoleptus GRAVENHORST, 1829, p. 3. BRUES, 1910. *Oligo.*, USA (Colorado)–*Holo.*

Mesopimpla COCKERELL, 1919b, p. 376 [**M. sequoiarum*; OD]. Little-known genus, apparently related to *Theronia* (recent). Fore wing with basal section of M slightly curved, joined to very base of pterostigma; pterostigma narrow, elongate. Hind femora very stout. *Oligo.*, USA (Colorado).

Mesostenus GRAVENHORST, 1829, p. 750. BRUES, 1906. *Oligo.*, USA (Colorado)–*Holo.*

Nemeritis HOLMGREN, 1858, p. 105. THÉOBALD, 1937a. *Oligo.*, Europe (France)–*Holo.*

Netelia GRAY, 1860, p. 341. BRUES, 1910. *Oligo.*, USA (Colorado)–*Holo.*

Olesicampe FÖRSTER, 1868, p. 153. BRUES, 1910. *Oligo.*, USA (Colorado)–*Holo.*

Ophion FABRICIUS, 1798, p. 210. PONGRÁCZ, 1928; THÉOBALD, 1937a. *Oligo.*, Europe (France); *Mio.*, Europe (Yugoslavia)–*Holo.*

Orthocentrus GRAVENHORST, 1829, p. 358. BRUES, 1906, 1910. *Oligo.*, USA (Colorado)–*Holo.*

Orthopelma TASCHENBERG, 1865, p. 137. STATZ, 1936b. *Oligo.*, Europe (Germany)–*Holo.*

Parapimpla THÉOBALD, 1937a, p. 191 [**P. rhenana*; OD]. Little-known genus. Similar to *Apechtis* (recent), but crossvein 1m-cu close to posterior margin of wing. *Oligo.*, Europe (France).

Phaenolobus FÖRSTER, 1868, p. 168. PITON, 1940a. *Eoc.*, Europe (France)–*Holo.*

Phygadeuon GRAVENHORST, 1829, p. 635.

Cockerell, 1920c; Statz, 1936b. *Eoc.,* USA (Colorado); *Oligo.,* Europe (Germany)–*Holo.*

Pimpla Fabricius, 1804, p. 112. Brues, 1906, 1910; Cockerell, 1919c; Henriksen, 1922b; Statz, 1936b; Théobald, 1937a. *Eoc.,* USA (Colorado), Europe (Denmark); *Oligo.,* USA (Colorado)–*Holo.*

Plectiscidea Viereck, 1914, p. 118. *Eoc.,* USA (Colorado)–*Holo.*

Polysphincta Gravenhorst, 1829, p. 112. Brues, 1910; Cockerell, 1921a; Statz, 1936b. *Oligo.,* USA (Colorado), England–*Holo.*

Porizon Fallén, 1813, p. 18. Brues, 1910. *Oligo.,* USA (Colorado)–*Holo.*

Promethes Förster, 1868, p. 162. Théobald, 1937a. *Oligo.,* Europe (France)–*Holo.*

Protarchus Förster, 1868, p. 201. Statz, 1936b. *Oligo.,* Europe (Germany)–*Holo.*

Rhyssa Gravenhorst, 1829, p. 260. Brues, 1906. *Oligo.,* USA (Colorado)–*Holo.*

Scambus Hartig, 1838, p. 267. Brues, 1910. *Oligo.,* USA (Colorado)–*Holo.*

Spudaeus Gistel, 1848, p. 11. Brues, 1910; Cockerell, 1941. *Oligo.,* USA (Colorado)–*Holo.*

Stenomacrus Förster, 1868, p. 160. Brues, 1910; Statz, 1936b. *Oligo.,* Europe (Baltic), USA (Colorado)–*Holo.*

Stilpnus Gravenhorst, 1829, p. 664. Cockerell, 1921a. *Oligo.,* England–*Holo.*

Tanychora Townes, 1973a, p. 216 [**T. petiolata*; OD]. Fore wing with RS+M present, separating cells 1r+2r from 1mcu; cell 2rm relatively large. *Cret.,* USSR (Asian RSFSR), Asia (Mongolia). ——Fig. 256,7. **T. petiolata*; wings and body, ×11 (Townes, 1973a).

Tanychorella Rasnitsyn, 1975, p. 91 [**T. parvula*; OD]. Similar to *Tanychora,* but cell 2rm of fore wing shorter. *Cret.,* USSR (Asian RSFSR).

Theronia Holmgren, 1859, p. 123. [Generic assignment of fossil doubtful.] Brues, 1910; Cockerell, 1919b. *Oligo.,* USA (Colorado)–*Holo.*

Tilgidopsis Cockerell, 1921e, p. 37 [**T. haestans*; OD]. Little-known genus. Fore wing with pterostigma lanceolate, narrow; cell 3r pointed posteriorly; crossvein 2r-rs slightly sigmoidal. *Eoc.,* USA (Colorado).

Trachysphyrus Haliday, 1836, p. 317. Brues, 1910; Meunier, 1920a; Statz, 1936b, 1938b. *Oligo.,* Europe (Baltic), USA (Colorado)–*Holo.*

Trogus Panzer, 1806, p. 80. Brues, 1910. *Oligo.,* USA (Colorado)–*Holo.*

Tryphon Fallén, 1813, p. 16. Brues, 1910; Grissell, 1976. *Eoc.,* USA (Colorado); *Oligo.,* USA (Colorado)–*Holo.*

Urotryphon Townes, 1973b, p. 286 [**U. pusillus*; OD]. Related to *Idiogramma* (recent), but propodeum nearly completely areate. *Cret.,* USSR (Asian RSFSR).

Xorides Latreille, 1809, p. 4. Brues, 1910; Handlirsch, 1910b. *Eoc.,* Canada (British Columbia); *Oligo.,* USA (Colorado)–*Holo.*

Family ICHNEUMONOMIMIDAE Rasnitsyn, 1975

[Ichneumonomimidae Rasnitsyn, 1975, p. 92]

Fore wing with costal space broad; vein R+M weak; crossveins 2r-m and 3r-m present; cell 2rm longer than 3rm; cell 3rm short and high. *Cret.*

Ichneumonomima Rasnitsyn, 1975, p. 92 [**I. paradoxa*; OD]. Fore wing with crossvein 2r-rs short; cell 3rm higher than its width. Antennae apparently with 13 to 14 segments. Schmidt, 1963. *Cret.,* USSR (Asian RSFSR). —— Fig. 258,2. **I. paradoxa*; wings and body, ×4.3 (Rasnitsyn, 1975).

Family BRACONIDAE Latreille, 1829

[Braconidae Latreille, 1829, p. 289]

Adults small. Fore wing with costal area obsolescent or closed; basal sections of vein RS and RS+M usually present; crossveins 2m-cu and sometimes 1m-cu absent; veins in distal part of wing often obsolescent. Body stout; antennae usually long. Larvae parasitic on diverse types of insects. *Cret.–Holo.*

Bracon Fabricius, 1805, p. 102. [Generic assignment of fossils doubtful.] Heyden, 1858; Förster, 1891; Brues, 1910; Meunier, 1915b; Cockerell, 1919b. *Oligo.,* USA (Colorado), Europe (Germany)–*Holo.*

Agathis Latreille, 1804, p. 173. Brues, 1910; Cockerell, 1927b. *Oligo.,* Europe (Baltic), USA (Colorado)–*Holo.*

Alysia Latreille, 1804, p. 173. Brues, 1910; Théobald, 1937a; Statz, 1938b. *Oligo.,* Europe (Germany, France), USA (Colorado)–*Holo.*

Anacanthobracon Brues, 1939b, p. 251 [**A. femorator*; OD]. Apparently related to *Doryctes.* Male with hind legs greatly thickened; coxae large; tibiae stout and thickened distally; gastral tergites forming a dorsal shield. *Oligo.,* USA (Colorado).

Apanteles Förster, 1862, p. 245. Statz, 1938b. *Oligo.,* Europe (Germany)–*Holo.*

Aphidius Nees, 1818, p. 302. Brues, 1933; Pérez, 1940. *Oligo.,* Europe (Baltic, France)–*Holo.*

Ascogaster Wesmael, 1835, p. 226. Brues, 1933. *Oligo.,* Europe (Baltic)–*Holo.*

Aspicolpus Wesmael, 1838, p. 155. Brues, 1933; Statz, 1936b. *Oligo.,* Europe (Baltic, Germany)–*Holo.*

Aspilota Förster, 1862, p. 268. Statz, 1938b. *Oligo.,* Europe (Germany)–*Holo.*

Austrohelcon Turner, 1918, p. 166. Brues, 1933. *Oligo.,* Europe (Baltic)–*Holo.*

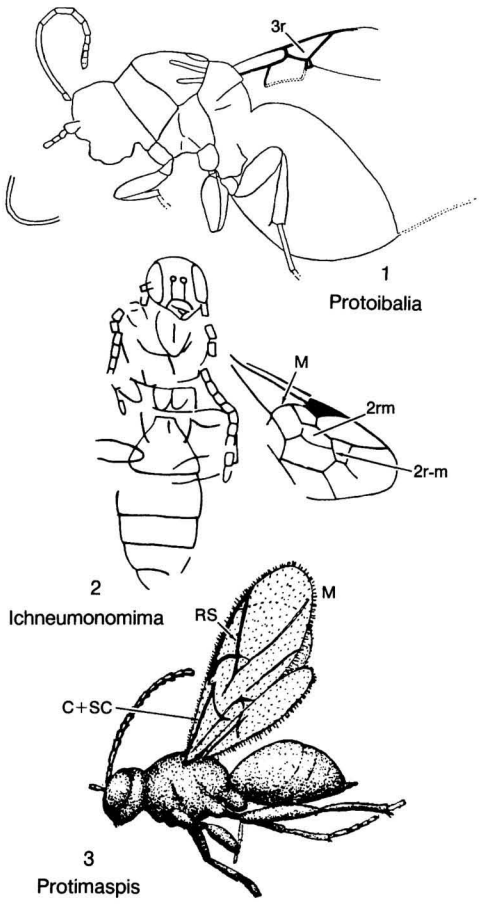


FIG. 258. Ichneumonomimidae, Cynipidae, Ibaliidae (p. 477–482).

Blacus NEES, 1818, p. 306 [=*Electroblacus* BRUES, 1933, p. 85 (type, *E. facialis*)]. BRUES, 1923a, 1939b; ACHTERBERG, 1982. *Oligo.,* Europe (Baltic)–*Holo.*

Calyptoides COCKERELL, 1921a, p. 13 [**C. veternus*; OD]. Little-known genus, apparently related to *Eubazus*. Fore wing with pterostigma large and triangular; gaster slender basally. *Oligo.,* England.

Cantharoctonus VIERECK, 1912, p. 617. BRUES, 1933; STATZ, 1936b. *Oligo.,* Europe (Baltic, Germany)–*Holo.*

Chelonohelcon BRUES, 1933, p. 61 [**C. mirabundus*; OD]. Fore wing with RS terminating on costa before wing apex; crossvein 2r-rs situated slightly distal of middle of pterostigma; basal section of RS less than half as long as basal section of M. Eyes large, extending nearly to base of mandibles; mandibles long, curved, and bidentate; antennae with 21 segments, as long as body; basal segment of flagellum enlarged; gaster narrow, elongate; tergites fused to form carapace; fore and hind femora stout. *Oligo.,* Europe (Baltic).——FIG. 259,6. **C. mirabundus*; wings and body, ×6.5 (Brues, 1933).

Chelonus PANZER, 1806, p. 99. BRUES, 1910. *Oligo.,* USA (Colorado)–*Holo.*

Clinocentrus HALIDAY, 1833, p. 266. BRUES, 1933; STATZ, 1938b. *Oligo.,* Europe (Baltic, Germany)–*Holo.*

Coeloreuteus ROMAN, 1910, p. 112. BRUES, 1933. *Oligo.,* Europe (Baltic)–*Holo.*

Colastes HALIDAY, 1833, p. 266. BRUES, 1910. *Oligo.,* USA (Colorado)–*Holo.*

Cremnops FÖRSTER, 1862, p. 246. COCKERELL, 1919b; BRUES, 1933. *Oligo.,* USA (Colorado)–*Holo.*

Dacnusites COCKERELL, 1921a, p. 19 [**D. sepultus*; OD]. Similar to *Polemon* (recent), but RS of fore wing bent posteriorly just beyond its contact with crossvein 2r-rs; cells 2rm and 3rm absent. *Oligo.,* England.——FIG. 260,1. **D. sepultus*; fore wing, ×17 (Cockerell, 1921a).

Diaeretus FÖRSTER, 1862, p. 249. PÉREZ, 1940. *Oligo.,* Europe (France)–*Holo.*

Digastrotheca BRUES, 1933, p. 39 [**D. mirabilis*; OD]. Related to the Rhogadininae (recent), but basal abdominal tergites fused into long plates, forming carapace over abdomen; basal plate with 2 pairs of longitudinal ridges, second pair widely separated. *Oligo.,* Europe (Baltic).——FIG. 260,6. **D. mirabilis*; body, ×9 (Brues, 1933).

Diodontogaster BRUES, 1933, p. 59 [**D. bidentata*; OD]. Related to *Chelonus*. Fore wing with cell 3r acute apically; cells 1r+2r and 1mcu present. Head large; eyes bare, oval; antennae with about 30 segments; abdomen elongate, with apex rounded above but ventrally projecting posteriorly to form a pair of prolongations. *Oligo.,* Europe (Baltic).——FIG. 259,4. **D. bidentata*; wings and body, ×6 (Brues, 1933).

Diospilites BRUES, 1933, p. 81 [**D. brevicornis*; OD]. Related to *Diospilus*. Small species, with stout body. Fore wing with pterostigma broad, triangular; crossvein 2r-rs at middle of pterostigma; RS terminating almost at wing apex. Antennae less than half length of body, with 11 segments; propodeum rugose; gaster short and broad, smooth above. *Oligo.,* Europe (Baltic).——FIG. 259,5. **D. brevicornis*; wings and body, ×15 (Brues, 1933).

Diospiloides COCKERELL, 1921a, p. 14 [**D. hooleyi*; OD]. Little-known genus, apparently related to *Diospilus*. Fore wing with pterostigma of moderate size, its posterior border smoothly curved; crossvein 2r-rs slightly distal of middle of pterostigma; basal section of M distinctly curved. *Oligo.,* England.

Diospilus HALIDAY, 1833, p. 262. BRUES, 1910; COCKERELL, 1921a; CARPENTER & others, 1937; MASON, 1976. *Cret.,* Canada (Manitoba); *Oligo.,* USA (Colorado), England–*Holo.*

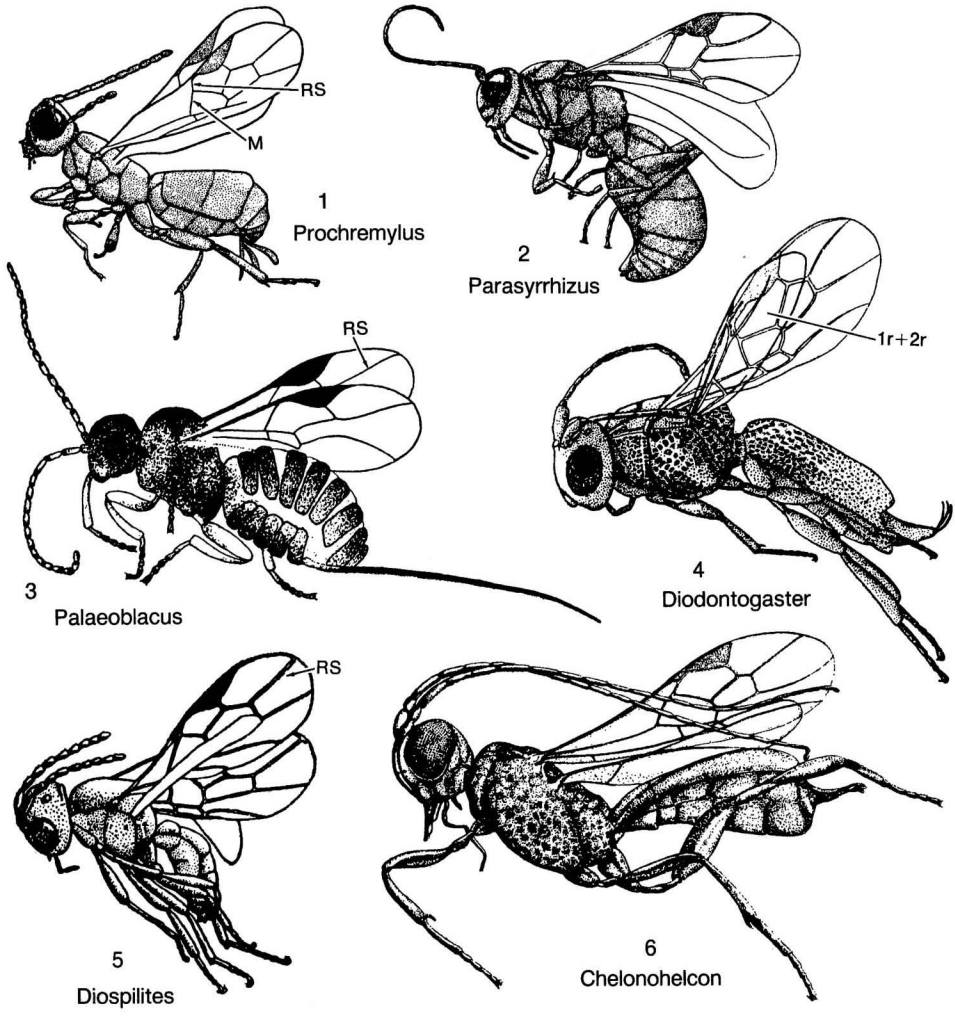


FIG. 259. Braconidae (p. 477–482).

Doryctes HALIDAY, 1836, p. 45. BRUES, 1933; STATZ, 1938b. *Oligo.,* Europe (Baltic, Germany)–*Holo.*

Doryctomorpha ASHMEAD, 1901, p. 144. BRUES, 1933. *Oligo.,* Europe (Baltic)–*Holo.*

Ecphylus FÖRSTER, 1862, p. 237. MUESEBECK, 1960. *?Mio.,* Mexico (Chiapas)–*Holo.*

Elasmosomites BRUES, 1933, p. 97 [**E. primordialis*; OD]. Related to *Elasmosoma* (recent). Female: antennae with 14 segments, as long as head and thorax; flagellum tapering, its first segment as long as scape; maxillary palpus with 4 segments; propodeum abruptly truncate, its posterior face nearly vertical; legs very stout; ovipositor short. *Oligo.,* Europe (Baltic).

Electrohelcon BRUES, 1933, p. 62 [**E. grandis*; OD]. Similar to *Chelonohelcon,* but gastral tergites separated and articulated. *Oligo.,* Europe (Baltic).

Eobracon COCKERELL, 1920c, p. 258 [**E. cladurus*; OD]. Fore wing as in *Diospilus,* but gaster as in *Chelonus*; wing base sessile but narrow, apex enlarged. *Eoc.,* USA (Colorado).

Eobraconus RASNITSYN, 1985, p. 163, *nom. subst. pro Eobracon* RASNITSYN, 1983d, p. 263, *non* COCKERELL, 1920c [**Eobracon inopinatus* RASNITSYN, 1983d; OD]. Fore wing with R extending only a short distance beyond pterostigma and without a distinct break at base of pterostigma; basal section of RS only slightly shorter than basal section of M; M and CU almost reaching wing margin; crossvein 1m-cu reduced apically; cell 3rm closed. Antennae with about 16 segments. *Cret.,* Mongolia.

Eocardiochiles BRUES, 1933, p. 92 [**E. fritschi*; OD]. Similar to *Cardiochiles* (recent), but antennae with only 18 segments, first 12 flagellar seg-

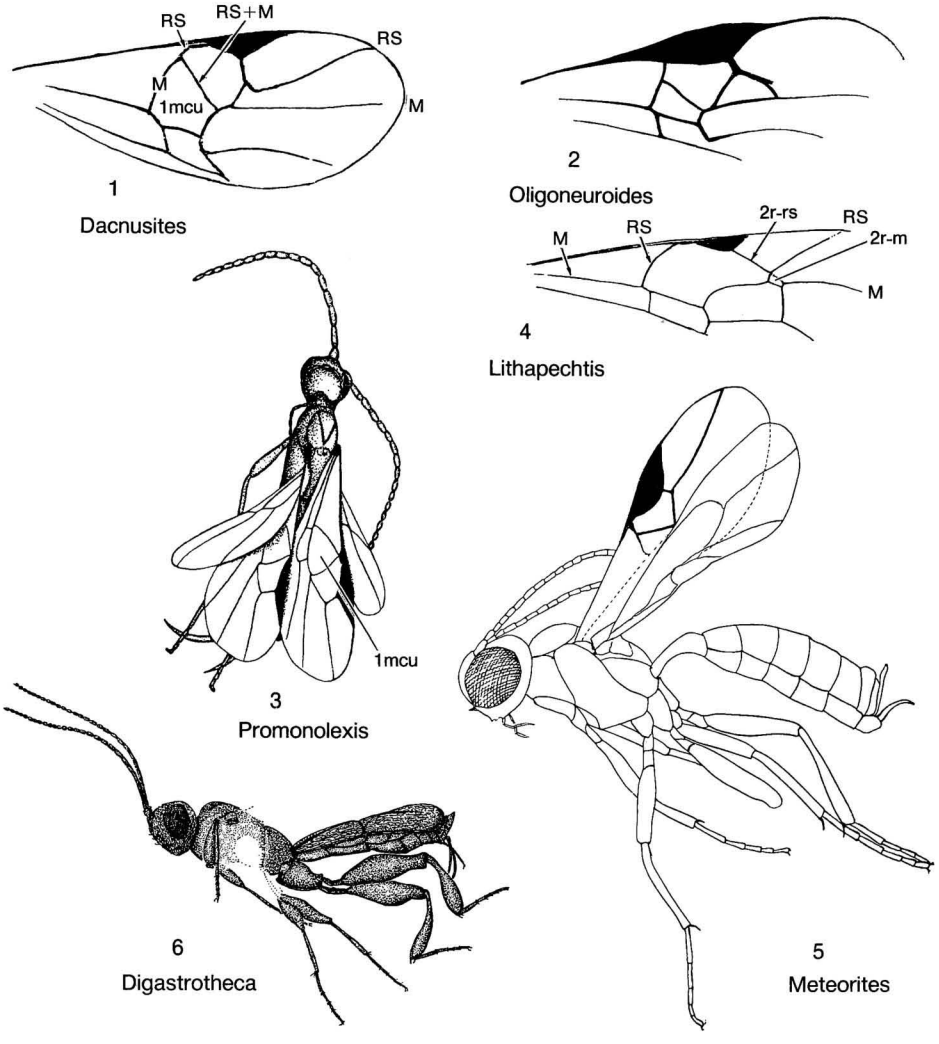


FIG. 260. Braconidae (p. 478–481).

ments at least twice as long as thick; cell 2rm very short. *Oligo.,* Europe (Baltic).

Ephedrus HALIDAY, 1833, p. 261. BRUES, 1933; TIMON-DAVID, 1944b. *Oligo.,* Europe (Baltic, France)–*Holo.*

Eubazus NEES, 1814, p. 214. BRUES, 1910, 1923a; BURKS, 1979; ACHTERBERG, 1982. *Oligo.,* Europe (Baltic), USA (Colorado)–*Holo.*

Eumacrocentrus ASHMEAD, 1901, p. 120. BRUES, 1933. *Oligo.,* Europe (Baltic)–*Holo.*

Euphorus NEES, 1834, p. 360. BRUES, 1910. *Oligo.,* USA (Colorado)–*Holo.*

Hecabolus HALIDAY, 1834, p. 127. STATZ, 1936b. *Oligo.,* Europe (France)–*Holo.*

Helcon NEES, 1814, p. 216. BRUES, 1933. *Oligo.,* Europe (Baltic)–*Holo.*

Holocnomus PÉREZ, 1940, p. 50 [**H. braconiformis*; OD]. Fore wing with RS extending to wing apex. Antennae with 13 or 14 segments, all almost equal in length and thickness. *Oligo.,* Europe (France).

Hormiellus ENDERLEIN, 1912, p. 20. BRUES, 1933. *Oligo.,* Europe (Baltic)–*Holo.*

Hormiopterus GIRAUD, 1869, p. 478. BRUES, 1910, 1933. *Eoc.,* USA (Colorado)–*Holo.*

Ichneutes NEES, 1816, p. 275. BRUES, 1933. *Oligo.,* Europe (Baltic)–*Holo.*

Iphiaulax FÖRSTER, 1862, p. 234. BRUES, 1910;

COCKERELL, 1919b, 1921a. *Oligo.,* USA (Colorado); England–*Holo.*

Lithapechtis COCKERELL, 1921a, p. 6 [**L. fumosus*; OD]. Little-known genus, apparently related to *Apechtis* (recent). Fore wing with basal section of M nearly straight; crossvein 2r-rs straight; crossvein 2r-m very short. *Oligo.,* England. —— FIG. 260,*4*. **L. fumosus*; fore wing, ×6 (Cockerell, 1921a).

Meteorites BRUES, 1939b, p. 258 [**M. inopinata*; OD]. Similar to *Meteorus,* but fore wing lacking crossveins 2r-m and 3r-m. *Oligo.,* Europe (Baltic).——FIG. 260,*5*. **M. inopinata*; wings and body, ×20 (Brues, 1939b).

Meteorus HALIDAY, 1835, p. 24. [Generic assignment of fossils doubtful.] BRUES, 1933; STATZ, 1936b. *Oligo.,* Europe (Baltic, Germany)–*Holo.*

Microctonus WESMAEL, 1835, p. 54. BRUES, 1933. *Oligo.,* Europe (Baltic)–*Holo.*

Microgaster LATREILLE, 1804, p. 175. BRUES, 1906, 1910. *Oligo.,* USA (Colorado)–*Holo.*

Microplitis FÖRSTER, 1862, p. 245. BRUES, 1910; TIMON-DAVID, 1944b. *Oligo.,* USA (Colorado), Europe (France)–*Holo.*

Microtypus RATZEBURG, 1848, p. 47. BRUES, 1933, 1939b. *Oligo.,* Europe (Baltic)–*Holo.*

Miracoides BRUES, 1933, p. 98 [**M. proteus*; OD]. Fore wing: cell 1rm slightly longer than cell 1cua; RS obsolescent beyond pterostigma and diverging posteriorly. Antennae with 16 or 17 segments, shorter than body; 6 basal segments of flagellum long; head large, twice as broad as thick; legs slender. *Oligo.,* Europe (Baltic).

Neoblacus ASHMEAD, 1901, p. 122. BRUES, 1933; CARPENTER & others, 1937; ACHTERBERG, 1982. *Cret.,* Canada (Manitoba); *Oligo.,* Europe (Baltic)–*Holo.*

Oligoaphidius PÉREZ, 1940, p. 52 [**O. sannoniensis*; OD]. Little-known genus. Fore wing with RS almost reaching wing margin. Funicula of antennae with 9 thick segments. *Oligo.,* Europe (France).

Oligoneuroides BRUES, 1910, p. 103 [**O. destructus*; OD]. Similar to *Oligoneurus* (recent), but cell 2rm nearly triangular, its posterior side about as long as RS+M. Antennae with about 25 segments. *Oligo.,* USA (Colorado).——FIG. 260,*2*. **O. destructus*; fore wing, ×17 (Brues, 1910).

Onychoura BRUES, 1933, p. 105 [**O. petiolata*; OD]. Fore wing with pterostigma triangular. Eyes large, extending to base of mandibles; antennae short, with oval segments; gaster petiolate, swollen; ovipositor short, stout, terminating in very slender hook. *Oligo.,* Europe (Baltic).

Opius WESMAEL, 1835, p. 115. COCKERELL, 1921a. *Oligo.,* England–*Holo.*

Orgilus HALIDAY, 1833, p. 262. BRUES, 1939b; ACHTERBERG, 1982. *Oligo.,* Europe (Baltic)–*Holo.*

Palaeoblacus STATZ, 1936b, p. 277 [**P. aculeatus*; OD]. Little-known genus. Fore wing with RS+M apparently absent; pterostigma broad; ovipositor about as long as body; antennae with 17 segments. *Oligo.,* Europe (Germany). —— FIG. 259,*3*. **P. aculeatus*; wings and body, ×18 (Statz, 1936b).

Palaeorhyssalus BRUES, 1933, p. 37 [**P. dubitosis*; OD]. Probably related to the Rhodadinae. First 4 gastral segments irregularly striated, second much longer than third and separated from it by a deep furrow. *Oligo.,* Europe (Baltic).

Parasyrrhizus BRUES, 1933, p. 91 [**P. ludens*; OD]. Similar to *Syrrhizus* (recent) but with deep grooves on lateral parts (parapsides) of scutum. *Oligo.,* Europe (Baltic). —— FIG. 259,*2*. **P. ludens*; wings and body, ×13 (Brues, 1933).

Pentapleura FÖRSTER, 1862, p. 264. [Generic assignment of fossil doubtful.] STATZ, 1938b. *Oligo.,* Europe (Germany)–*Holo.*

Phanerotoma WESMAEL, 1838, p. 165. BRUES, 1933. *Oligo.,* Europe (Baltic)–*Holo.*

Phanomeris FÖRSTER, 1862, p. 235. [Generic assignment of fossil doubtful.] COCKERELL, 1921a. *Oligo.,* USA (Colorado), England–*Holo.*

Polystenus FÖRSTER, 1862, p. 237. BRUES, 1933. *Oligo.,* Europe (Baltic)–*Holo.*

Praon HALIDAY, 1833, p. 261. PÉREZ, 1940. *Oligo.,* Europe (France)–*Holo.*

Prochremylus BRUES, 1933, p. 26 [**P. brevicornis*; OD]. Similar to *Chremylus* (recent). Fore wing with basal section of RS at least half as long as basal section of M. Antennae with 11 segments; legs stout, especially femora; ovipositor less than half length of gaster. *Oligo.,* Europe (Baltic). —— FIG. 259,*1*. **P. brevicornis*; wings and body, ×20 (Brues, 1933).

Promonolexis BRUES, 1933, p. 34 [**P. klebsi*; OD]. Similar to *Monolexis* (recent), but RS arising at very base of pterostigma; cell 1mcu triangular; ovipositor thick and strongly curved. *Oligo.,* Europe (Baltic).——FIG. 260,*3*. **P. klebsi*; wings and body, ×20 (Brues, 1933).

Propraon BRUES, 1933, p. 108 [**P. cellularis*; OD]. Fore wing: venation as in *Praon.* Antennae longer than body; eyes small; legs slender, hind coxae long; gaster lanceolate. *Oligo.,* Europe (Baltic).

Protephedrus PÉREZ, 1940, p. 55 [**P. tertiarius*; OD]. Fore wing as in *Ephedrus,* but RS obsolescent, not reaching wing apex. Antennal segments thick; 13 funicular segments. *Oligo.,* Europe (France).

Pygostolus HALIDAY, 1833, p. 263. BRUES, 1933; CARPENTER & others, 1937. *Cret.,* Canada (Manitoba); *Oligo.,* Europe (Baltic)–*Holo.*

Rhaconotus RUTHE, 1854, p. 349. [Generic assignment of fossil doubtful.] SCUDDER, 1890; BRUES, 1910. *Oligo.,* USA (Colorado)–*Holo.*

Rhysiopolis DALLA TORRE, 1898, p. 4. THÉOBALD, 1937a. *Oligo.,* Europe (France)–*Holo.*

Rhysipolis Förster, 1862, p. 235. Théobald, 1937a. *Oligo.,* Europe (France)–*Holo.*

Rhyssalus Haliday, 1833, p. 266. Brues, 1933. *Oligo.,* Europe (Baltic)–*Holo.*

Rogas Nees, 1818, p. 306. Brues, 1906, 1910, 1933; Statz, 1938b. *Oligo.,* Europe (Baltic, Germany), USA (Colorado)–*Holo.*

Semirhytus Szépligeti, 1902, p. 55. Brues, 1933. *Oligo.,* Europe (Baltic)–*Holo.*

Sigalphus Latreille, 1802, p. 327. [Generic assignment of fossil doubtful.] Cockerell, 1921a. *Oligo.,* England–*Holo.*

Sinobracon Hong, 1974, p. 135 [**S. speciosus*; OD]. Fore wing as in *Dacnusites,* but cell 1mcu much larger, and vein M ending well beyond wing apex. Antennae of female with 12 segments. *Eoc.,* China (Liaoning).

Snellenius Westwood, 1882, p. 19. Brues, 1933. *Oligo.,* Europe (Baltic)–*Holo.*

Spathius Nees, 1818, p. 301. Statz, 1938b. *Oligo.,* Europe (Germany)–*Holo.*

Tanycarpa Förster, 1862, p. 265. Statz, 1936b. *Oligo.,* Europe (Germany)–*Holo.*

Taphaeus Wesmael, 1835, p. 189. Brues, 1906. *Oligo.,* Europe (Baltic)–*Holo.*

Triaspis Haliday, 1835, p. 124. Cockerell, 1921a; Brues, 1933, 1939b. *Oligo.,* Europe (Baltic), England–*Holo.*

Trioxys Haliday, 1833, p. 261. Pérez, 1940. *Oligo.,* Europe (France)–*Holo.*

Urosigalphus Ashmead, 1889, p. 637. Brues, 1910. *Oligo.,* USA (Colorado)–*Holo.*

Xenarcha Förster, 1862, p. 235. [Generic assignment of fossil doubtful.] Cockerell, 1921a. *Oligo.,* England–*Holo.*

Family CYNIPIDAE Leach, 1815

[Cynipidae Leach, 1815, p. 142]

Fore wing (sometimes absent): pterostigma and basal part of costa absent; venation much reduced, but cell 2r + 3r usually present and closed. Antennae filiform, with from 13 to 19 segments; second gastral tergite usually at least half as long as entire gaster. Larvae mainly gall makers; a few parasitic on other Hymenoptera and Diptera. *Cret.–Holo.*

Cynips Linné, 1758, p. 553. *Holo.*

Andricus Hartig, 1840, p. 185. Cockerell, 1921a. *Oligo.,* England–*Holo.*

Aulacidea Ashmead, 1897, p. 68. Kinsey, 1919. *Oligo.,* Europe (Baltic), USA (Colorado)–*Holo.*

Diplolepis Geoffroy, 1762, p. 308. Cockerell, 1921a. *Oligo.,* England–*Holo.*

Protimaspis Kinsey, 1937, p. 22 [**P. costalis*; OD]. Similar to *Timaspis* (recent) and *Aulacidea* (recent), but abdomen more lenticulate in profile and its second segment larger; R and SC fused and submarginal, lacking a terminal process leading to C; costal margin much thickened near termination of RS; distal part of RS very straight. *Cret.,* Canada (Manitoba).——Fig. 258,*3*. **P. costalis*; wings and body, ×22 (Carpenter & others, 1937).

Family FIGITIDAE Förster, 1869

[Figitidae Förster, 1869, p. 329]

Similar to Cynipidae, but second gastral tergite less than half as long as gaster. Larvae parasitic on certain Diptera and Neuroptera. *Oligo.–Holo.*

Figites Latreille, 1802, p. 307. Brues, 1910; Statz, 1938b. *Oligo.,* USA (Colorado), Europe (Germany)–*Holo.*

Family IBALIIDAE Förster, 1869

[Ibaliidae Förster, 1869, p. 329]

Similar to Cynipidae, but cell 2r + 3r very narrow, at least 9 times as long as wide; sixth gastral tergite larger than others. *Oligo.–Holo.*

Ibalia Latreille, 1802, p. 306. *Holo.*

Protoibalia Brues, 1910, p. 15 [**P. convexa*; OD]. Similar to *Ibalia* (recent), but fore wing with cell 3r much shorter and broader. *Oligo.,* USA (Colorado).——Fig. 258,*1*. **P. convexa*; wings and body, ×10 (Brues, 1910).

Family AGAONTIDAE Walker, 1871

[Agaontidae Walker, 1871, p. 58]

Adults with marked sexual dimorphism. Males usually wingless; antennae with 3 to 9 segments. Females with fore wing broadened distally; venation much reduced; submarginal vein weak and very close to wing margin, or entirely absent; pterostigma and postmarginal vein absent. Females with 11 or 12 antennal segments; front and hind legs stout; fore tibiae short, without spurs; middle tibiae with a single spur. Larvae developing in figs. *Oligo.–Holo.*

Agaon Dalman, 1818, p. 69. *Holo.*

Tetrapus Mayr, 1885, p. 156. Brues, 1910. *Oligo.,* USA (Colorado)–*Holo.*

Family TORYMIDAE Walker, 1833

[Torymidae Walker, 1833a, p. 115]

Minute insects. Venation of fore wing much reduced; submarginal vein weakly developed

and commonly short; stigmal vein usually small; pterostigma obsolescent or absent. Mandibles well developed, with 3 or 4 teeth; hind coxae very large, at least 5 times length of fore coxae; tarsi with 5 segments; ovipositor usually long and exserted. Larvae mostly parasitic on gall-making Diptera and Hymenoptera. *Oligo.–Holo.*

Torymus DALMAN, 1820, p. 135. FÖRSTER, 1891; BRUES, 1910, 1923a; GRISSELL, 1976. *Oligo.,* Europe (Baltic, France), USA (Colorado)–*Holo.*

Monodontomerus WESTWOOD, 1833, p. 443. BRUES, 1923a. *Oligo.,* Europe (Baltic)–*Holo.*

Neopalachia BOUČEK, 1978, p. 104. GRISSELL, 1980. *Oligo./Mio.,* Dominican Republic–*Holo.*

Palaeotorymus BRUES, 1910, p. 18 [**P. typicus*; OD]. Similar to *Torymus,* but costa extending nearly to apex of wing. *Oligo.,* USA (Colorado).

Zophodetus GRISSELL, 1980, p. 253 [**Z. woodruffi*; OD]. Similar to *Microdontomerus* (recent), but propodeum carinate; metanotum more than half length of propodeum. *Oligo./Mio.,* Dominican Republic.

Family CHALCIDAE Leach, 1815

[Chalcidae LEACH, 1815, p. 144]

Similar to Torymidae, but ovipositor usually short and stout; hind coxae cylindrical in cross section; hind femora much swollen, denticulate. *Oligo.–Holo.*

Chalcis FABRICIUS, 1789, p. 272. COCKERELL, 1907c; BRUES, 1910. *Oligo.,* USA (Colorado)–*Holo.*

Eterochalcis BURKS, 1939, p. 184. *Oligo.,* USA (Colorado)–*Holo.*

Family EURYTOMIDAE Walker, 1833

[Eurytomidae WALKER, 1833a, p. 12]

Similar to Chalcidae, but hind coxae not enlarged and hind femora without teeth; thorax usually coarsely punctate. Larvae parasitic on diverse types of insects; some phytophagous, on grasses. *Oligo.–Holo.*

Eurytoma ILLIGER, 1807, p. 192. BRUES, 1910. *Oligo.,* USA (Colorado)–*Holo.*

Family PTEROMALIDAE Haliday, 1833

[Pteromalidae HALIDAY, 1833, p. 267]

Very small insects. Fore wing as in Chalcidae, with much diversity; thorax usually not coarsely punctate; hind coxae normal, not enlarged; hind femora without teeth; tarsi with 5 segments. Larvae parasitic on diverse types of insects. *Oligo.–Holo.*

Pteromalus SWEDERUS, 1795, p. 201. [Generic assignment of fossils doubtful.] BRUES, 1910; COCKERELL, 1921a; STATZ, 1938b. *Oligo.,* England, Europe (Germany), USA (Colorado)–*Holo.*

Bruesisca HEQUIST, 1961, p. 93 [**Cleonymus submersus* BRUES, 1910, p. 27; OD]. Little-known genus, resembling *Cleonymus* (recent), but head shape and venation of fore wing different. *Oligo.,* USA (Colorado).

Ferrierelus THÉOBALD, 1937a, p. 311 [**F. bernardi*; OD]. Similar to *Lamprotatus* (recent), but antennae much shorter. *Oligo.,* Europe (France).

Heydeniopsis HEQUIST, 1961, p. 94 [**H. cleonymoides*; OD]. Similar to *Heydenia* (recent). Wings unknown. Head subglobular; antennae with 12 segments, inserted near clypeus; ocelli in an equilateral triangle; propodeum long, with median carina. *Oligo.,* Europe (Baltic).

Ormyrodes BRUES, 1907, p. 46. BRUES, 1910. *Oligo.,* USA (Colorado)–*Holo.*

Family ENCYRTIDAE Förster, 1856

[Encyrtidae FÖRSTER, 1856, p. 18]

Very small insects. Fore wing with submarginal vein usually short; stigmal vein near midwing. Middle tibia modified for jumping, with enlarged spur and commonly with patch of modified setae on ventral surface; hind tibiae usually with 2 spurs, 1 often reduced. Larvae parasitic on diverse insects. *Oligo.–Holo.*

Encyrtus LATREILLE, 1809, p. 31. [Generic assignment of fossils doubtful.] STATZ, 1938b. *Oligo.,* Europe (Germany)–*Holo.*

Propelma TRJAPITZIN, 1963, p. 89 [**P. rohdendorfi*; OD]. Similar to *Metapelma* (recent), but hind tibiae normal, not flattened and broad. *Oligo.,* Europe (Baltic).

Family EULOPHIDAE Haliday, 1833

[Eulophidae HALIDAY, 1833, p. 268]

Fore wing with submarginal vein close to wing margin and commonly concurrent with it; stigmal vein present but often very short and situated well toward wing apex. Fore tibial spur short and straight; fore basitarsus with an oblique comb basally. Larvae parasitic on diverse types of insects. *Oligo.–Holo.*

Eulophus GEOFFROY, 1762, p. 312. [Generic assignment of fossils doubtful.] STATZ, 1938b. *Oligo.,* Europe (Germany)–*Holo.*

Family TRICHOGRAMMATIDAE Förster, 1856

[Trichogrammatidae FÖRSTER, 1856, p. 20]

Minute insects. Fore wing broad and fringed with hairs; venation greatly reduced, the veins not developed beyond midwing; proximal veins forming a short marginal compound vein; stigmal vein absent. Larvae parasitic on insect eggs. *Cret.–Holo.*

Trichogramma WESTWOOD, 1833, p. 444. *Holo.*

Enneagmus YOSHIMOTO, 1975, p. 512 [**E. pristinus*; OD]. Fore wing long and narrow, as long as body and hyaline; longest cilia at distal end of wing; cilia on anterior and posterior margins gradually shorter toward base of wing. Antennae with 9 segments, funicle with 4; tarsi with 3 segments; all tibiae with a single spur; gaster short, broadly sessile. *Cret.,* Canada (Manitoba).

Family MYMARIDAE Haliday, 1833

[Mymaridae HALIDAY, 1833, p. 269]

Minute insects. Fore wing usually with a long marginal fringe, venation commonly limited to basal third of wing; basal portion of wing often reduced to a single, thin vein, forming a stalk for the broader distal part. Hind wings linear, often threadlike. Larvae parasitic on eggs of insects. *Cret.–Holo.*

Mymar CURTIS, 1832, p. 411. *Holo.*

Alaptus WESTWOOD, 1839, p. 79. [Fossils are specimens of *A. globosicornis* and *A. psocidivorus,* both recent.] DOUTT, 1973b. *?Mio.,* Mexico–*Holo.*

Anaphes HALIDAY, 1833, p. 269. MEUNIER, 1901b. *Oligo.,* Europe (Baltic)–*Holo.*

Archaeromma YOSHIMOTO, 1975, p. 503 [**Ooctonus minutissimus* BRUES, 1937, p. 44; OD]. Similar to *Palaeomymar.* Fore wing not reticulate; antennal club with 4 segments in both sexes; scape short. CARPENTER & others, 1937. *Cret.,* Canada (Manitoba, Alberta).

Arescon WALKER, 1846, p. 50. MEUNIER, 1901b, 1905a; DOUTT, 1973b. *Oligo.,* Europe (Baltic)–*Holo.*

Carpenteriana YOSHIMOTO, 1975, p. 510 [**C. tumida*; OD]. Female as in *Ooctonus,* but antennae with 10 segments, funicle with 7 segments; gaster elongate-oval. Pterostigma of fore wing well defined. *Cret.,* Canada (Manitoba).

Galloromma SCHLÜTER, 1978a, p. 74 [**G. bezonnaisensis*; OD]. Little-known genus, similar to *Archaeromma.* Antennae with 14 segments, 4 terminal segments forming a club. [Probably a synonym of *Archaeromma.*] *Cret.,* Europe (Germany).

Gonatocerus NEES, 1834, p. 192. MEUNIER, 1905a; DOUTT, 1973b; BURKS, 1979. *Oligo.,* Europe (Baltic)–*Holo.*

Litus HALIDAY, 1833, p. 269. MEUNIER, 1901b; DOUTT, 1973b. *Oligo.,* Europe (Baltic); *Oligo./Mio.,* Mexico (Chiapas)–*Holo.*

Macalpinia YOSHIMOTO, 1975, p. 527 [**M. canadensis*; OD]. Fore wing elongate, about 3.5 times as long as broad; stigmal vein very large, subtriangular; anterior marginal setae about half as long as posterior ones; gaster conical at base, elongate-oval in dorsal view; antennae with 13 segments, pedicel enlarged, about twice as long as broad. *Cret.,* Canada (Alberta).

Malfattia MEUNIER, 1901b, p. 285 [**M. molitorae*; OD]. Little-known genus. Tarsi with 5 segments, antennae with 9 segments. DOUTT, 1973b; YOSHIMOTO, 1975. *Oligo.,* Europe (Baltic).

Ooctonus HALIDAY, 1833, p. 269. CARPENTER & others, 1937; DOUTT, 1973b; YOSHIMOTO, 1975. *Oligo.,* Europe (Baltic)–*Holo.*

Palaeomymar MEUNIER, 1901b, p. 289 [**Mymar duisburgi* STEIN, 1877, p. 30; OD] [=*Mymaromma* GIRAULT, 1920, p. 38 (type, *M. goethei,* recent); *Petiolaria* BLOOD & KRYGER, 1922, p. 229 (type, *P. anomala,* recent); *Mymaromella* GIRAULT, 1931, p. 4 (type, *M. mira,* recent)]. STEIN, 1877; BAKKENDORF, 1948; DOUTT, 1973b. *Oligo.,* Europe (Baltic)–*Holo.*

Polynemoidea GIRAULT, 1913, p. 116. DOUTT, 1973a, 1973b. *?Mio.,* Mexico–*Holo.*

Protooctonus YOSHIMOTO, 1975, p. 511 [**D. masneri*; OD]. Similar to *Carpenteriana,* but antennae of female with 13 segments; gaster subpetiolate. Antennae of male with 12 segments. *Cret.,* Canada (Manitoba).

Triadomerus YOSHIMOTO, 1975, p. 508 [**T. bulbosus*; OD]. Fore wing elongate-spatulate, about 3 times as long as broad. Antennae of female with 13 segments; scape not greatly elongate, unusually swollen and flattened; tarsi with 5 segments; gaster elongate-oval. *Cret.,* Canada (Manitoba, Alberta).

Family TETRACAMPIDAE Förster, 1856

[Tetracampidae FÖRSTER, 1856, p. 79]

Minute insects. Antennae with 11 or 12 segments, often clubbed; pronotum usually large, bell-shaped; anterior tibiae with a single furcate spur or with 2 small spurs. Legs slender and long. Larvae endoparasites of eggs or larvae of Coleoptera, Hymenoptera, or Diptera. *Cret.–Holo.*

Tetracampe FÖRSTER, 1841, p. 34. *Holo.*

Baeomorpha BRUES, 1937, p. 41 [**B. dubitata*; OD]. Antennae with 12 segments, scape broad

except at base; tarsi 5-segmented in female, 4-segmented in male. Fore wing broad and spatulate; submarginal and marginal veins nearly equal in length; stigmal vein large; postmarginal vein long, extending nearly to apical margin. YOSHIMOTO, 1975. *Cret.,* Canada (Manitoba, Alberta).

Bouceklytus YOSHIMOTO, 1975, p. 516 [**B. arcuodens*; OD]. Antennae with 12 segments; tarsi with 5 segments; petiole consisting of a single segment; mandibles concave, protruding downward. *Cret.,* Canada (Manitoba).

Distylopus YOSHIMOTO, 1975, p. 514 [**D. bisegmentus*; OD]. Antennae with 11 segments; scape short; tarsi with 5 segments; petiole 2-segmented, first segment very short. *Cret.,* Canada (Manitoba).

Family KARATAIDAE Rasnitsyn, 1977

[Karataidae RASNITSYN, 1977a, p. 103]

Fore wing as in Ephialtitidae, but vein 2A complete or nearly complete and reaching base of wing. *Jur.*

Karataus RASNITSYN, 1977a, p. 103 [**K. pedalis*; OD]. Fore wing with basal segment of RS long, directed toward wing base; crossvein 1r-rs absent; crossvein 2r-m closer to 2m-cu than to 2r-rs; cell 2rm very long. Antennae with many segments; hind femora very thick. *Jur.,* USSR (Kazakh). ——FIG. 261,*1*. **K. pedalis*; wings and body, ×5 (Rasnitsyn, 1977a).

Family BETHYLONYMIDAE Rasnitsyn, 1975

[Bethylonymidae RASNITSYN, 1975, p. 94]

Fore wing with costal area broad; basal section of vein RS directed slightly basally; antennae filiform, with 8 to 27 segments; legs short; abdomen spindle-shaped, segments nearly alike. *Jur.*

Bethylonymus RASNITSYN, 1975, p. 94 [**B. curtipes*; OD]. Fore wing with crossvein 2m-cu present; cell 2a absent. Antennae with 11 to 13 segments; pronotum short. *Jur.,* USSR (Kazakh, Asian RSFSR). —— FIG. 261,*5*. **B. curtipes,* Kazakh; body and base of wing, ×10 (Rasnitsyn, 1975).

Arthrogaster RASNITSYN, 1975, p. 103 [**A. seticornis*; OD]. Fore wing with pterostigma broad; basal section of RS short; cell 2a absent. Antennae setaceous, with more than 25 segments; pronotum short. *Jur.,* USSR (Kazakh). —— FIG. 261,6. **A. seticornis*; wing and body, ×5.5 (Rasnitsyn, 1975).

Bethylonymellus RASNITSYN, 1975, p. 98 [**B. cervicalis*; OD]. Fore wing with crossveins 2r-m and 2m-cu absent or obsolescent; cell 2a absent. Antennae with 8 to 12 segments; pronotum long. *Jur.,* USSR (Kazakh).——FIG. 261,*8*. **B. cervicalis*; wing and body, ×12 (Rasnitsyn, 1975).

Leptogastrella RASNITSYN, 1975, p. 103 [**L. leptogastra*; OD]. Fore wing with crossveins 1r-rs and 3r-m absent; crossveins 2r-m and 2m-cu and cell 2a present. Antennae with 17 to 19 segments. *Jur.,* USSR (Kazakh).

Family CHRYSIDIDAE Latreille, 1802

[Chrysididae LATREILLE, 1802b, p. 316]

Antennae elbowed, with 12 or 13 segments; pronotum short and broad; hind tibial spurs and basitarsus not modified for grooming; fore wing with reduced venation; hind wing without closed cells; gaster with 2 to 4 exposed tergites and with dorsal surface convex and ventral surface concave. Larvae parasitic on immature stages of certain aculeate Hymenoptera and occasionally on Lepidoptera and Phasmatodea. *Cret.–Holo.*

Chrysis LINNÉ, 1761, p. 414. COCKERELL, 1907c; ROHWER, 1909c. *Oligo.,* USA (Colorado)–*Holo.*

Hypocleptes EVANS, 1973, p. 175 [**H. rasnitsyni*; OD]. Female similar to those of *Procleptes,* but lacking dentiform processes on propodeum and apical processes on front coxae; scapes short. *Cret.,* USSR (Asian RSFSR).——FIG. 261,*3*. **H. rasnitsyni*; body, ×20 (Evans, 1973).

Omalus PANZER, 1801, no. 13. BRUES, 1933. *Oligo.,* Europe (Baltic)–*Holo.*

Procleptes EVANS, 1969, p. 257 [**P. carpenteri*; OD]. Similar to *Cleptes* (recent), but mandibles broad and with 3 or 4 teeth apically; scape long and slender. *Cret.,* Canada (Manitoba).——FIG. 261,*4*. **P. carpenteri*; dorsal view, ×15 (Evans, 1969).

Protamisega EVANS, 1973, p. 176 [**P. khatanga*; OD]. Female similar to those of *Hypocleptes,* but venation less reduced and scape longer. *Cret.,* USSR (Asian RSFSR).

Protochrysidis CARPENTER, 1986, p. 577, *nom. subst. pro Protochrysis* BISCHOFF, 1917, p. 139, *non* PASCHER, 1911 [**Protochrysis succinalis*; OD]. Little-known genus. Head flattened; postscutellum extending as a horizontal lamella as long as scutellum and mesonotum combined; 6 visible gastral tergites present; all legs very short; femora flattened and very broad; coxae excavated for femora. [Family assignment doubtful.] BRUES, 1933. *Oligo.,* Europe (Baltic).——FIG. 261,7. **P. succinalis* (BISCHOFF); body and wings, ×5.5 (Brues, 1933).

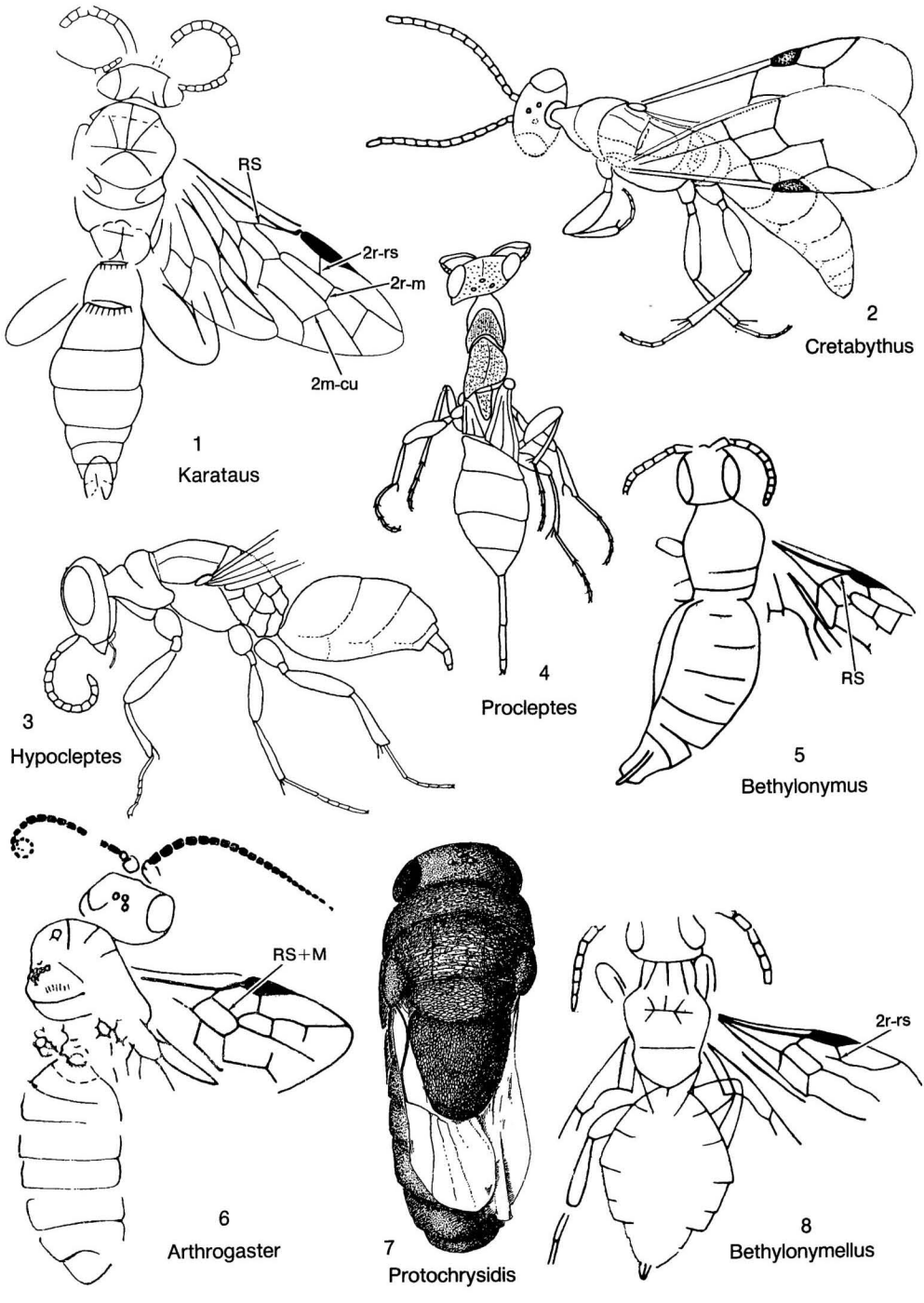


FIG. 261. Karataidae, Bethylonymidae, Chrysididae, and Scolebythidae (p. 485–487).

Family SCOLEBYTHIDAE Evans, 1963

[Scolebythidae H. E. Evans, 1963, p. 7]

Small wasps, without marked sexual dimorphism. Labial palpi short, with 4 segments; maxillary palpi with 6 segments; antennae with 13 segments, scape flattened; hind wing without closed cells; no constriction between first and second gastral segments. *Cret.–Holo.*

Scolebythus H. E. Evans, 1963, p. 9. *Holo.*

Cretabythus Evans, 1973, p. 171 [**C. sibiricus*; OD]. Male with fore wing similar to that of pemphredomines (Sphecidae), but mandibles broad and with 4 teeth; 2 midtibial spurs present. [Family position doubtful.] *Cret.,* USSR (Asian RSFSR).——Fig. 261,*2*. **C. sibiricus*; wings and body, ×16 (Evans, 1973).

Family BETHYLIDAE Förster, 1856

[Bethylidae Förster, 1856, p. 95]

Antennae with 11 to 13 segments; pronotum extending back to tegulae; gaster with 7 or 8 exposed segments; wings present in some species but reduced or absent in others, especially in females. Larvae parasitic on immature stages of Coleoptera and Lepidoptera. *Cret.–Holo.*

Bethylus Latreille, 1802, p. 315. *Holo.*

Apenesia Westwood, 1874, p. 170. Cockerell, 1917d. *Mio.,* Burma–*Holo.*

Archaepyris Evans, 1973, p. 174 [**A. minutus*; OD]. Male with antennae simple, with 13 segments; eyes large, protruding; mandibles short, broad, with apical teeth; legs not spinose. Fore wing with RS+M present only as short, basal stub. *Cret.,* USSR (Asian RSFSR). —— Fig. 262,*1*. **A. minutus*; fore wing, ×35 (Evans, 1973).

Artiepyris Kieffer, 1913, p. 108. Brues, 1933. *Oligo.,* Europe (Baltic)–*Holo.*

Bethylitella Cockerell, 1917g, p. 365 [**B. cylindrella*; OD]. Fore wing as in *Mesitius* (recent); head elongate; eyes very small; mandibles large, with 5 small teeth on apical margin; antennae with 13 segments, scape stout; petiole short. *Mio.,* Burma.

Bethylopteron Brues, 1933, p. 121 [**B. ambiguum*; OD]. Head large, globose; antennae with 13 segments; compound eyes large, ocelli very large; propodeum very short, truncate posteriorly; petiole lacking; legs stout. [Family position doubtful.] *Oligo.,* Europe (Baltic).

Calyoza Westwood, 1837, p. 56. Brues, 1923a. *Oligo.,* Europe (Baltic)–*Holo.*

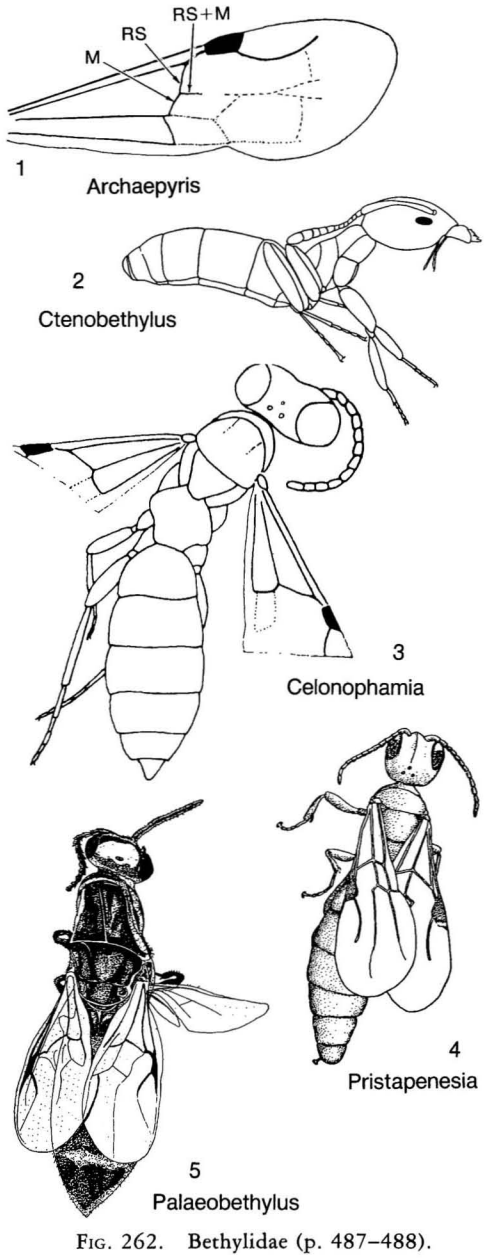


Fig. 262. Bethylidae (p. 487–488).

Celonophamia Evans, 1973, p. 175 [**C. taimyria*; OD]. Similar to *Cephalonomia* (recent), but female having broader wings with fuller venation. *Cret.,* USSR (Asian RSFSR).——Fig. 262,*3*. **C. taimyria*; wings and body, ×25 (Evans, 1973).

Ctenobethylus Brues, 1939b, p. 261 [**C. succinalis*; OD]. Female apterous; thorax nearly normal. Similar to *Apenesia,* but mandibles with at

least 7 teeth. *Oligo.*, Europe (Baltic).——Fig. 262,*2*. **C. succinalis*; body, ×14 (Brues, 1939b).

Epyris Westwood, 1832, p. 129. Brues, 1910, 1923a; Cockerell, 1920a, 1921a. *Oligo.*, Europe (Baltic), England, USA (Colorado); *Mio.*, Burma–*Holo.*

Eupsenella Westwood, 1874, p. 168. Brues, 1923a, 1933; Rasnitsyn, 1975. *Oligo.*, Europe (Baltic)–*Holo.*

Holepyris Kieffer, 1904, p. 390. Brues, 1933. *Oligo.*, Europe (Baltic)–*Holo.*

Homoglenus Kieffer, 1904, p. 388. Brues, 1939b. *Oligo.*, Europe (Baltic)–*Holo.*

Isobrachium Förster, 1856, p. 96. Brues, 1933. *Oligo.*, Europe (Baltic)–*Holo.*

Laelius Ashmead, 1893, p. 50. Brues, 1933. *Oligo.*, Europe (Baltic)–*Holo.*

Misepyris Kieffer, 1913, p. 108. Brues, 1933, 1939b. *Oligo.*, Europe (Baltic)–*Holo.*

Palaeobethyloides Brues, 1933, p. 119 [**P. longiceps*; OD]. Similar to *Palaeobethylus*, but head of female much longer and narrower. *Oligo.*, Europe (Baltic).

Palaeobethylus Brues, 1923a, p. 334 [**P. longicollis*; OD]. Body flattened; head width about 8 times dorsoventral thickness; thorax width about 4 times thickness; mandibles long and straight, with edentate margins; antennae with 13 segments, scape long; pterostigma lanceolate. Brues, 1933. *Oligo.*, Europe (Baltic).——Fig. 262,*5*. **P. longicollis*, male; wings and body, ×10 (Brues, 1923a).

Parapristocera Brues, 1933, p. 122 [**P. skwarrae*; OD]. Similar to *Pristocera* (recent), but integument of head and thorax smooth. *Oligo.*, Europe (Baltic).

Perisierola Kieffer, 1914, p. 533. Brues, 1933. *Oligo.*, Europe (Baltic)–*Holo.*

Pristapenesia Brues, 1933, p. 131 [**P. primaeva*; OD]. Related to *Apenesia*. Male with prothorax produced anteriorly, as in *Holepyris*; hind femora without a tooth; mandibles long, enlarged apically; antennae with 13 segments. Female with wings present; RS and M almost reaching wing margin; pterostigma present. *Oligo.*, Europe (Baltic).——Fig. 262,*4*. **E. primaeva*; wings and body, ×10 (Brues, 1933).

Prosierola Kieffer, 1905, p. 243. Brues, 1933. *Oligo.*, Europe (Baltic)–*Holo.*

Protopristocera Brues, 1923a, p. 337 [**P. succini*; OD]. Related to *Pristocera* (recent), but female with wings fully developed. Brues, 1933. *Oligo.*, Europe (Baltic).

Pseudisobrachium Kieffer, 1904, p. 368. Théobald, 1937a. *Oligo.*, Europe (France)–*Holo.*

Rhabdepyris Kieffer, 1904, p. 32. Brues, 1933. *Oligo.*, Europe (Baltic)–*Holo.*

Scleroderma Latreille, 1809, p. 118. Cockerell, 1917d. *Mio.*, Burma–*Holo.*

Uromesitius Brues, 1933, p. 116 [**U. caudatus*; OD]. Similar to *Mesitius* (recent), but female with gastral segments beyond fourth drawn out into long slender tube; gaster of male short, consisting of 5 visible segments; fore wing with cell 3r very short; RS terminating on front margin of wing before apex; antennae of female with 13 segments. *Oligo.*, Europe (Baltic).

Family DRYINIDAE Haliday, 1833

[Dryinidae Haliday, 1833, p. 272]

Antennae diverse in form, with 10 segments in both sexes and inserted on prominence near dorsal margin of clypeus; fore tarsi of female usually chelate; fore wing with reduced venation; females of some species apterous. Larvae endoparasites of Hemiptera (Homoptera). *Cret.–Holo.*

Dryinus Latreille, 1804, p. 176. Brues, 1923a. *Oligo.*, Europe (Baltic)–*Holo.*

Ampulicomorpha Ashmead, 1893, p. 79. Brues, 1933. *Oligo.*, Europe (Baltic)–*Holo.*

Avodryinus Ponomarenko, 1981, p. 139 [**A. canadensis*; OD]. Female with well-developed wings; pterostigma narrow; prothorax longer than broad, narrower than mesothorax; propodeum with distinct areolation. *Cret.*, Canada (Alberta).

Cretodryinus Ponomarenko, 1975c, p. 104 [**C. zherichini*; OD]. Similar to *Thaumatodryinus* but with well-developed parapsidal furrows, short trochanters, and coarse rugosity of propodeum; tibial spur formula 1,1,2. Wings well developed. *Cret.*, USSR (Asian RSFSR).—— Fig. 263,*4*. **C. zherichini*; thorax and abdomen, ×11 (Ponomarenko, 1975c).

Dicondylus Curtis, 1829, p. 110. Ponomarenko, 1981. *Cret.*, USSR (European RSFSR)–*Holo.*

Electrodryinus Ponomarenko, 1975a, p. 126 [**E. areolatus*; OD]. Similar to *Hesperodryinus* (recent), but enlarged claw of fore tarsus unarmed and pronotum short. *Oligo.*, Europe (Baltic).——Fig. 263,*6*. **E. areolatus*; wing and body, ×10 (Ponomarenko, 1975a).

Embolemus Westwood, 1833, p. 444. Brues, 1933. *Oligo.*, Europe (Baltic)–*Holo.*

Thaumatodryinus Perkins, 1905, p. 58. Brues, 1923a, 1933; Ponomarenko, 1975a. *Oligo.*, Europe (Baltic)–*Holo.*

Family BAISSODIDAE Rasnitsyn, 1975

[Baissodidae Rasnitsyn, 1975, p. 122]

Little-known family, possibly related to the Sphecidae. Female: antennae with 12 segments; mesonotum with prominent sutures; legs without special modifications, grooming structures absent from hind legs; abdomen short, weakly sclerotized; ovipos-

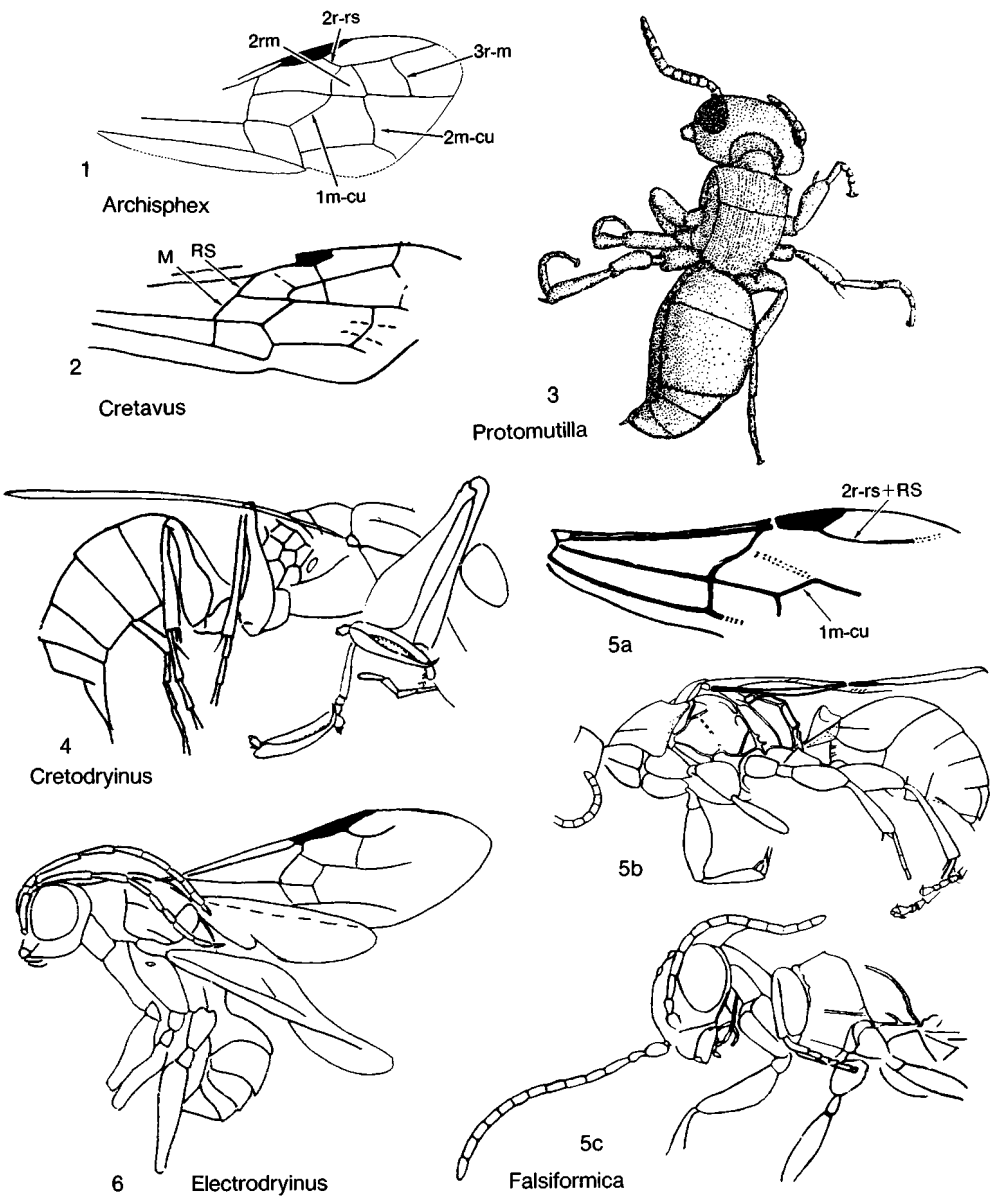


FIG. 263. Dryinidae, Baissodidae, Tiphiidae, Mutillidae, and Falsiformicidae (p. 488–490).

itor short. Fore wing venation relatively primitive; crossvein 1m-cu close to end of vein RS+M. *Cret.*

Baissodes RASNITSYN, 1975, p. 123 [**B. robustus*; OD]. Fore wing with cell 2rm longer than broad; cell 3r with pointed apex. *Cret.*, USSR (Asian RSFSR).

Archisphex EVANS, 1969, p. 252 [**A. crowsoni*; OD]. Similar to *Baissodes,* but crossvein 1m-cu close to base of cell 2rm; crossvein 2m-cu close to apex of cell 2rm; crossvein 3rm sigmoidal. RASNITSYN, 1975. *Cret.*, England.——FIG. 263,*1*. **A. crowsoni*; fore wing, ×9 (Evans, 1969).

Oryctobaissodes RASNITSYN, 1975, p. 125 [**O. armatus*; OD]. Fore wing with cell 3r truncate apically; femora thick. *Cret.*, USSR (Asian RSFSR).

Trichobaissodes RASNITSYN, 1975, p. 126 [**T. antennatus*; OD]. Similar to *Baissodes,* but cell

3r rounded apically; femora not thickened. *Cret.*, USSR (Asian RSFSR).

Family TIPHIIDAE Leach, 1815

[Tiphiidae Leach, 1815, p. 118]

Similar to Mutillidae but second gastral tergite without lateral bands of dense, appressed hairs; thorax and propodeum not fused into a single plate; females often apterous. Larvae ectoparasites of immature insects, usually Coleoptera, Orthoptera, or Hymenoptera. *Oligo.–Holo.*

Tiphia Fabricius, 1775, p. 353. *Holo.*

Anthobosca Guérin-Méneville, 1838, p. 236 [=*Geotiphia* Cockerell, 1906b, p. 49 (type, *G. foxiana*)]. Turner, 1912; Cockerell, 1926a; Illies, 1941. *Oligo.*, USA (Colorado)–*Holo.*

Myrmosa Latreille, 1796, p. 118. [Generic assignment of fossils doubtful.] Piton, 1940a. *Oligo.*, Europe (France)–*Holo.*

Myzinum Latreille, 1803, p. 326. Piton, 1940a. *Oligo.*, Europe (France)–*Holo.*

Protomutilla Bischoff, 1917, p. 142 [**P. succinalis*; OD]. Little-known genus, apparently related to *Myrmosa*. Thoracic dorsum with a single transverse suture; first gastral sternite with a median carina; front femora strongly thickened. All known specimens apterous. Brues, 1933. *Oligo.*, Europe (Baltic).——Fig. 263,*3*. **P. succinalis*; dorsal view, ×6.5 (Brues, 1933).

Family MUTILLIDAE Latreille, 1802

[Mutillidae Latreille, 1802b, p. 347] [=Cretavidae Sharov, 1957a, p. 943]

Second gastral tergite with lateral bands of dense, appressed hairs; thorax and propodeum usually fused to form a single plate; body with prominent pubescence; females apterous. Larvae mostly ectoparasites of larvae and pupae of other Hymenoptera. *Cret.–Holo.*

Mutilla Linné, 1802, p. 582. *Holo.*

Cretavus Sharov, 1957a, p. 943 [**C. sibiricus*; OD]. Little-known genus. Fore wing with basal sections of RS and of M forming a straight, oblique line. Rasnitsyn, 1975. *Cret.*, USSR (Asian RSFSR).——Fig. 263,*2*. **C. sibiricus*; fore wing, ×6 (Rasnitsyn, 1975).

Family FALSIFORMICIDAE Rasnitsyn, 1975

[Falsiformicidae Rasnitsyn, 1975, p. 111]

Female: fore wing venation reduced as in bethyloids; hind wing without veins, but apparently with jugal lobe. Head prognathous; pronotum very long, with several small humeral protuberances; metapleural gland apparently absent; abdomen apparently shorter than head and thorax combined; gaster shorter than head and thorax combined, second tergite forming a high triangle, resembling a formicid node. Male: head hypognathous; antennae with 13 segments, not elbowed; pronotum relatively short. *Cret.*

Falsiformica Rasnitsyn, 1975, p. 112 [**F. cretacea*; OD]. Fore wing (known in female only) with pterostigma relatively narrow; crossvein 2r-rs and distal section of RS forming a single, curved vein; basal section of RS about half as long as basal section of M; RS+M obsolescent; crossvein 1m-cu present. Male with antennae filiform, scape short; maxillary palpi apparently with 6 segments. *Cret.*, USSR (Asian RSFSR).——Fig. 263,*5*. **F. cretacea*; *a*, wing of female, ×20; *b*, thorax and abdomen of female, ×19; *c*, head and thorax of male, ×22 (all Rasnitsyn, 1975).

Family FORMICIDAE Latreille, 1802

[Formicidae Latreille, 1802b, p. 352] [=Armaniidae Dlussky, 1983, p. 65]

Antennae distinctly elbowed in females and workers, often less so in males; first gastral segment (and sometimes second) a nodiform or scalelike petiole (and postpetiole) separated from rest of gaster; males and females usually winged, but wings shed by females after nuptial flight; workers apterous. Social insects (ants); nests diverse, usually in ground. [The subfamily Sphecomyrminae is included in the Formicidae as originally proposed by Wilson, Carpenter, and Brown (1967a).] *Cret.–Holo.*

Formica Linné, 1758, p. 579. Wheeler, 1914; Meunier, 1915b, 1917c; Cockerell, 1920a, 1923c; Carpenter, 1930a; Piton & Théobald, 1935; Théobald, 1937a; Dlussky, 1981. *Eoc.*, USA (Texas), England; *Oligo.*, Europe (Baltic, France, Germany), USA (Colorado); *Mio.*, Europe (France), USSR (European RSFSR)–*Holo.*

Agroecomyrmex Wheeler, 1910a, p. 265 [**Myrmica duisburgi* Mayr, 1868; OD]. Worker and female: similar to those of *Lachnomyrmex* (recent), but funiculus of antennae without a 2-segmented club, eyes near posterior corners of head, and tip of gaster directed forward. Wheeler, 1914. *Oligo.*, Europe (Baltic).

Ameghinoia Viana & Haedo Rossi, 1957, p. 109 [**A. piatnitzkyi*; OD]. Little-known genus, pos-

sibly related to Myrmeciinae; tibiae apparently without spurs. *Oligo./Mio.*, Argentina.

Aphaenogaster MAYR, 1853, p. 107. WHEELER, 1914; CARPENTER, 1930a; THÉOBALD, 1937a. *Oligo.*, Europe (Baltic), USA (Colorado); *Mio.*, Europe (France)–*Holo.*

Archaeopone DLUSSKY, 1975, p. 120 [**A. kzylzharica*; OD]. Male: third antennal segment about 5 times as long as second; thorax distinctly segmented. [Family assignment doubtful.] DLUSSKY, 1983. *Cret.*, USSR (Kazakh).

Archimyrmex COCKERELL, 1923a, p. 51 [**A. rostratus*; OD]. Little-known genus, possibly a myrmicine. WHEELER, 1928; CARPENTER, 1930a. *Eoc.*, USA (Colorado).

Archiponera CARPENTER, 1930a, p. 27 [**A. wheeleri*; OD]. Closely related to *Gnamptogenys*. Worker: head large, with convex sides; mandibles linear; anterior margin of clypeus with a median incision, posterior margin with large median lobe; ocelli absent; antennae with 12 segments; petiole cuneiform. WHEELER, 1930; BROWN, 1958. *Oligo.*, USA (Colorado).——FIG. 264. **A. wheeleri*; worker, ×4.6 (Carpenter, 1930a).

Armania DLUSSKY, 1983, p 67 [**A. robusta*; OD]. Similar to *Sphecomyrma*. Female: petiole large, its width about equal to its length, its posterior part elevated and forming a node. *Cret.*, USSR (Asian RSFSR).

Armaniella DLUSSKY, 1983, p. 71 [**A. curiosa*; OD]. Similar to *Armania*, but petiole not forming a node. *Cret.*, USSR (Asian RSFSR).

Asymphylomyrmex WHEELER, 1914, p. 96 [**A. balticus*; OD]. A dolichoderine genus. Worker: head suborbicular, slightly flattened anteriorly; thorax short and compact; spurs absent on middle and hind tibiae. *Oligo.*, Europe (Baltic).

Brachyponera EMERY, 1901, p. 43. [Generic assignment of fossil doubtful.] THÉOBALD, 1937a. *Oligo.*, Europe (France)–*Holo.*

Bradoponera MAYR, 1868, p. 73 [**B. meieri*; OD]. A ponerine genus, closely related to *Discothrea* (recent). Worker: antennae with 9 segments; eyes minute. WHEELER, 1914. *Oligo.*, Europe (Baltic).

Camponotites DLUSSKY, 1981, p. 76 [collective group]. Little-known species; fore wing lacking cells 2rm and 3rm; cell 2r+3r closed. *Mio.*, USSR (European RSFSR).

Camponotus MAYR, 1861, p. 25. MAYR, 1868; WHEELER, 1914; DONISTHORPE, 1920; CARPENTER, 1930a; NAORA, 1933a; PITON & THÉOBALD, 1935; THÉOBALD, 1937a. *Oligo.*, Europe (Baltic, France), England, USA (Colorado); *Mio.*, Europe (France); *Paleoc.–Plio.*, China (Fushun)–*Holo.*

Cephalomyrmex CARPENTER, 1930a, p. 37 [**C. rotundatus*; OD]. Little-known genus, apparently a myrmicine. Female: head exceedingly large; thorax short; gaster small; funiculus of antennae apparently with only 5 or 6 segments; petiole pedunculate; venation unknown. *Oligo.*, USA (Colorado).

Archiponera

FIG. 264. Formicidae (p. 491).

Cerapachys SMITH, 1857, p. 74 [=*Procerapachys* WHEELER, 1914, p. 27 (type, *P. annosus*)]. BROWN, 1975. *Oligo.*, Europe (Baltic)–*Holo.*

Cretomyrma DLUSSKY, 1975, p. 115 [**C. arnoldii*; OD]. Worker: similar to that of *Sphecomyrma* but with a short, median epinotal spine and a short sting. *Cret.*, USSR (Asian RSFSR).

Dolichoderus LUND, 1831, p. 130. MAYR, 1868; COCKERELL, 1915; WHEELER, 1914; DONISTHORPE, 1920; CARPENTER, 1930a; THÉOBALD, 1937a. *Oligo.*, Europe (Baltic, France), England, USA (Colorado)–*Holo.*

Dolichomyrma DLUSSKY, 1975, p. 121 [**D. longiceps*; OD]. Little-known genus. Female: head elongate; thorax similar to that of *Sphecomyrma*; petiole short. [Family assignment doubtful.] DLUSSKY, 1983. *Cret.*, USSR (Kazakh).

Drymomyrmex WHEELER, 1914, p. 135 [**D. fuscipennis*; OD]. Related to *Aphomomyrmex* (recent), but female with 11-segmented antennae. THÉOBALD, 1937a. *Oligo.*, Europe (Baltic, France).

Elaeomyrmex CARPENTER, 1930a, p. 48 [**E. gracilis*; OD]. Related to *Iridomyrmex*. Female: head much longer than broad, lateral margins nearly straight; mandibles prominent; posterior margin of clypeus with a prominent median prolongation; clypeus striated. Worker: smaller but very similar. *Oligo.*, USA (Colorado).

Electromyrmex WHEELER, 1910b, p. 167 [**E. klebsi*; OD]. A myrmicine genus, close to *Podomyrma* (recent). Worker: mandibles very long, sublinear; antennae with 12 segments; thorax narrower than head; prothorax greatly elongated; petiole slender, cylindrical, with only a faint indication of a node. WHEELER, 1914. *Oligo.,* Europe (Baltic).

Electroponera WHEELER, 1914, p. 34 [**E. dubia*; OD]. A ponerine genus, apparently related to *Ectatomma* (recent). Worker: head subrectangular, with rounded sides, and weakly excised posterior border; antennae with 12 segments; thorax constricted in mesoepinotal region; petiole with a concave anterior face. *Oligo.,* Europe (Baltic).

Emplastus DONISTHORPE, 1920, p. 86 [**E. emeryi*; OD]. Little-known ponerine genus, apparently close to *Pachycondyla.* Female: eyes small, close to base of mandibles; mandibles without teeth. *Oligo.,* England.

Eoformica COCKERELL, 1921e, p. 38 [**E. eocenica*; OD; =*Liometopum pingue* SCUDDER, 1877a, p. 742]. Little-known genus of uncertain relationships. SCUDDER, 1890; WHEELER, 1928; CARPENTER, 1930a. *Eoc.,* USA (Colorado, Wyoming, Utah).

Eomyrmex HONG, 1974, p. 138 [**E. quchengziensis*; OD]. Worker (subfamily position uncertain): antennae with 13 segments; scape of moderate length; mandibles relatively small, with 3 denticles, the terminal one being longest; petiole slender; gaster with pronounced constriction between first and second segments; legs long; middle and hind tibiae with prominent spurs. *Eoc.,* China (Liaoning).

Eulithomyrmex CARPENTER, 1935b, p. 91, *nom. subst. pro Lithomyrmex* CARPENTER, 1930a, p. 34, *non* CLARK, 1928 [**Lithomyrmex rugosus* CARPENTER, 1930a, p. 35; OD]. A myrmicine genus, related to *Agroecomyrmex,* but all castes with smaller mandibles and a larger antennal club. *Oligo.,* USA (Colorado).

Gesomyrmex MAYR, 1868, p. 50. EMERY, 1905; WHEELER, 1914; THÉOBALD, 1937a. *Oligo.,* Europe (Baltic, France)–*Holo.*

Glaphyromyrmex WHEELER, 1914, p. 131 [**G. oligocenicus*; OD]. Close to *Formica* (recent), but worker with large, flat eyes; elliptical head; short, thickset thorax; and large, convex pronotum. THÉOBALD, 1937a. *Oligo.,* Europe (Baltic, France).

Gnamptogenys ROGER, 1863, p. 174. WHEELER, 1914; BROWN, 1958; BARONI URBANI, 1980d. *Oligo.,* Europe (Baltic); *Oligo./Mio.,* Dominican Republic–*Holo.*

Iridomyrmex MAYR, 1862, p. 702. WHEELER, 1914; CARPENTER, 1930a; THÉOBALD, 1937a. *Oligo.,* Europe (Baltic, France), USA (Colorado)–*Holo.*

Kotshkorkia DLUSSKY, 1981, p. 71 [**K. laticeps*; OD]. Similar to *Dolichoderus.* Female: head broad; front margin of clypeus convex; propodeum and petiole extended dorsally. *Mio.,* USSR (Kirghiz).

Lasius FABRICIUS, 1805, p. 415. WHEELER, 1914; COCKERELL, 1927b; PONGRÁCZ, 1928; CARPENTER, 1930a; POPOV, 1933; PITON & THÉOBALD, 1935; THÉOBALD, 1937a; ZALESSKY, 1949; WILSON, 1955; DLUSSKY, 1981. *Oligo.,* Europe (Baltic, France), USA (Colorado); *Mio.,* Europe (France, Croatia), USSR (European RSFSR)–*Holo.*

Leptomyrmex MAYR, 1862, p. 695. BARONI URBANI, 1980c. *Oligo./Mio.,* Dominican Republic–*Holo.*

Leptomyrmula EMERY, 1912, p. 16 [**Leptomyrmex maravignae* EMERY, 1891, p. 578; OD]. Similar to *Leptomyrmex,* but cell 3r of fore wing much larger. *Mio.,* Europe (Italy).

Leptothorax MAYR, 1855, p. 431. WHEELER, 1914. *Oligo.,* Europe (Baltic)–*Holo.*

Leucotaphus DONISTHORPE, 1920, p. 89 [**Leptothorax gurnetensis* COCKERELL, 1915, p. 485; OD]. Similar to *Formica* (recent), but cell 1mcu very small. *Oligo.,* England.

Liometopum MAYR, 1861, p. 25. WHEELER, 1914; PONGRÁCZ, 1928; CARPENTER, 1930a; DLUSSKY, 1981. *Oligo.,* Europe (Baltic), USA (Colorado); *Mio.,* Europe (Croatia), USSR (European RSFSR)–*Holo.*

Mianeuretus CARPENTER, 1930a, p. 38 [**M. mirabilis*; OD]. Close to *Paraneuretus.* Worker: eyes large, ocelli present; mandibles triangular, with blunt teeth; antennae slender, with 11 subequal segments; petiole much longer than broad, with a small node. *Oligo.,* USA (Colorado).

Miomyrmex CARPENTER, 1930a, p. 51 [**Formica impactus* COCKERELL, 1927b, p. 165; OD]. Apparently a dolichoderine. Female: antennae inserted close to clypeus, exceedingly short, but 12-segmented; scape not over half length of head; funiculus only a little longer than scape. *Oligo.,* USA (Colorado).

Monomorium MAYR, 1855, p. 452. WHEELER, 1914. *Oligo.,* Europe (Baltic)–*Holo.*

Myrmica LATREILLE, 1804, p. 179. WHEELER, 1914; MEUNIER, 1915b. *Oligo.,* Europe (Baltic, Germany)–*Holo.*

Nothomyrmica WHEELER, 1910b, p. 171 [**Macromischa rudis* MAYR, 1868, p. 85; OD]. Related to *Tetramorium* (recent). Worker: head and thorax coarsely rugose; antennae with 12 segments; middle and hind tibiae without spurs. *Oligo.,* Europe (Baltic).

Odontomachus LATREILLE, 1804, p. 179. BARONI URBANI, 1980b. *Oligo./Mio.,* Dominican Republic–*Holo.*

Oecophylla F. SMITH, 1860, p. 101. COCKERELL, 1915, 1920a; WHEELER, 1914; EMERY, 1921; THÉOBALD, 1937a. *Eoc.,* England; *Oligo.,* Europe (Baltic, France); *Mio.,* Europe (Italy)–*Holo.*

Oligomyrmex MAYR, 1867, p. 110. WHEELER, 1914; PITON & THÉOBALD, 1935; THÉOBALD, 1937a. *Oligo.,* Europe (Baltic, France); *Mio.,* Europe (France)–*Holo.*

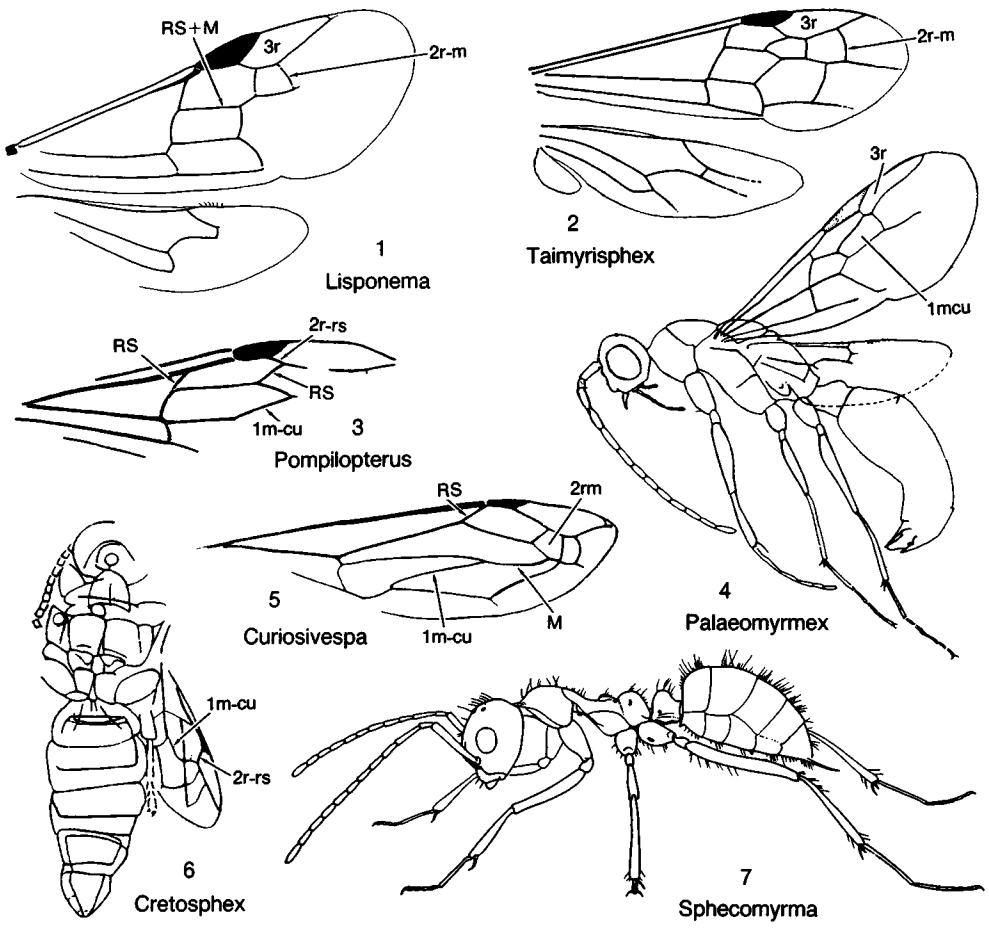


FIG. 265. Formicidae, Pompilidae, Sphecidae, and Uncertain (p. 493–498).

Pachycondyla F. SMITH, 1858, p. 105. MAYR, 1868; WHEELER, 1914; DONISTHORPE, 1920; THÉOBALD, 1937a; TAYLOR, 1964; DLUSSKY, 1981. *Oligo.,* Europe (Baltic, France), England; *Mio.,* USSR (European RSFSR)–*Holo.*

Palaeomyrmex DLUSSKY, 1975, p. 118 [**P. zherichini*; OD]. Apparently related to *Sphecomyrma.* Male: fore wing with cells 1r+2r, 3r, 2rm, and 1mcu closed; mandibles narrow, without teeth; antennae with 13 segments; scape very short; middle and hind tibiae with 2 spurs. *Cret.,* USSR (Asian RSFSR).——FIG. 265,*4*. **P. zherichini*; male, wing and body, ×12 (Dlussky, 1975).

Parameranoplus WHEELER, 1914, p. 69 [**P. primaevus*; OD]. Apparently similar to *Meranoplus* (recent), but worker with much shallower antennal scrobes. *Oligo.,* Europe (Baltic).

Paraneuretus WHEELER, 1914, p. 73 [**P. tornquisti*; OD]. Similar to *Aneuretus* (recent) but worker much more slender; petiole with peduncle very short and with anterior slope of node more gradual than posterior slope. *Oligo.,* Europe (Baltic).

Paraphaenogaster DLUSSKY, 1981, p. 68 [**P. microphthalmus*; OD]. Similar to *Aphaenogaster* but male with unusually small eyes. *Mio.,* USSR (European RSFSR).

Petraeomyrmex CARPENTER, 1930a, p. 55 [**P. minimus*; OD]. Little-known genus, probably a dolichoderine, possibly close to *Forelius* (recent). Female small, head quadrate, scape short and thick, petiole very small. *Oligo.,* USA (Colorado).

Petropone DLUSSKY, 1975, p. 119 [**P. petiolata*; OD]. Little-known genus. Mandibles large, curved; petiole narrow and long. [Family assignment doubtful.] DLUSSKY, 1983. *Cret.,* USSR (Kazakh).

Pheidole WESTWOOD, 1840, p. 87. CARPENTER, 1930a. *Oligo.,* USA (Colorado)–*Holo.*

Pityomyrmex WHEELER, 1914, p. 98 [**P. tornquisti*; OD]. Little-known genus, apparently a dolichoderine. Worker: body slender, with very

long legs and antennae; eyes large; mandibles inserted far apart, with numerous denticles; petiole much longer than broad, with a small node; middle and hind tibiae with pectinated spurs. *Oligo.,* Europe (Baltic).

Plagiolepis MAYR, 1861, p. 26. MAYR, 1868; WHEELER, 1914. *Oligo.,* Europe (Baltic)–*Holo.*

Platythyrea ROGER, 1863, p. 172. WHEELER, 1914; THÉOBALD, 1937a. *Oligo.,* Europe (Baltic, France)–*Holo.*

Pogonomyrmex MAYR, 1868, p. 169. CARPENTER, 1930a. *Oligo.,* USA (Colorado)–*Holo.*

Ponera LATREILLE, 1804, p. 179. MAYR, 1868; EMERY, 1891; WHEELER, 1914; OKE, 1956; TAYLOR, 1964. *Oligo.,* Europe (Baltic); *Mio.,* Europe (Italy); *Pleist.,* Australia (Victoria)–*Holo.*

Poneropsis HEER, 1867, p. 19 [collective group] [=*Ponerites* DLUSSKY, 1981, p. 67 (collective group)]. Little-known species, based mainly on fore wings. Cell 2r+3r open or closed; cells 2rm and 3rm always closed. [A diverse group of species probably belonging to the subfamily Ponerinae.] COCKERELL, 1915; MEUNIER, 1917c, 1923c; TAYLOR, 1964; DLUSSKY, 1981. *Oligo.,* England, Europe (Germany); *Mio.,* USSR (European RSFSR).

Poneropterus DLUSSKY, 1983, p. 73 [**P. sphecoides*; OD]. Male: second antennal segment elongate, third segment nearly 3 times as long as second; posterior part of petiole forming a distinct node. *Cret.,* USSR (Asian RSFSR).

Prenolepis MAYR, 1861, p. 26. WHEELER, 1914. *Oligo.,* Europe (Baltic)–*Holo.*

Prionomyrmex MAYR, 1868, p. 77 [**P. longiceps*; OD]. Closely related to *Myrmecia* (Myrmecinae). Mandibles of worker elongate and with a distinct, uniformly denticulate, masticatory border; clypeus triangular, well developed; petiole and gaster resembling those of the Ponerinae. WHEELER, 1914; TAYLOR, 1978. *Oligo.,* Europe (Baltic).

Prodimorphomyrmex WHEELER, 1914, p. 112 [**P. primigenius*; OD]. Related to *Aphomomyrmex* (recent), but antennae with 10 segments; eyes small. *Oligo.,* Europe (Baltic).

Protamblyopone DLUSSKY, 1981, p. 65 [**P. inversa*; OD]. Little-known genus, related to *Concoctio* (recent), but antennae longer, apparently with 12 segments. KUKALOVÁ-PECK & PECK, 1976. *Mio.,* USSR (Kirghiz).

Protaneuretus WHEELER, 1914, p. 71 [**P. succineus*; OD]. Related to *Aneuretus* (recent), but worker with less cordate head and with large eyes; antennae and legs much less slender. *Oligo.,* Europe (Baltic).

Protazteca CARPENTER, 1930a, p. 41 [**P. elongata*; OD]. Related to *Azteca* (recent), but worker with eyes small and more posteriorly situated; node of petiole less inclined. *Oligo.,* USA (Colorado).

Pseudoarmania DLUSSKY, 1983, p. 69 [**P. rasnitsyni*; OD]. Similar to *Armania,* but petiole small, somewhat broader than long, and not forming a node. *Cret.,* USSR (Asian RSFSR).

Pseudocamponotus CARPENTER, 1930a, p. 22 [**P. elcoanus*; OD]. Little-known genus, apparently related to *Camponotus,* but female with eyes and antennal insertions father forward on head and antennae with 12 segments. *Mio.,* USA (Nevada).

Pseudolasius EMERY, 1887, p. 244. WHEELER, 1914. *Oligo.,* Europe (Baltic)–*Holo.*

Pseudomyrmex LUND, 1831, p. 137. CARPENTER, 1930a. *Oligo.,* USA (Colorado)–*Holo.*

Rhopalomyrmex MAYR, 1868, p. 41 [**R. pygmaeus*; OD]. Similar to *Plagiolepis,* but worker with 10-segmented antennae, the 4 terminal segments forming a club. WHEELER, 1914. *Oligo.,* Europe (Baltic).

Sicilomyrmex WHEELER, 1914, p. 111 [**Gesomyrmex corniger* EMERY, 1891, p. 581; OD]. A formicine genus of uncertain affinities; worker with bicornuate head and 2-spined propodeum. WHEELER, 1926; BROWN & CARPENTER, 1978. *Mio.,* Europe (Italy).

Solenopsis WESTWOOD, 1840, p. 86. PONGRÁCZ, 1928; THÉOBALD, 1937a. *Oligo.,* Europe (France); *Mio.,* Europe (Croatia)–*Holo.*

Sphecomyrma WILSON & BROWN in WILSON, CARPENTER, & BROWN, 1967a, p. 8 [**S. freyi*; OD]. Worker: mandibles wasplike, short, narrow, bidentate; antennae 12-segmented; scape relatively short, funiculus long; eyes large, convex, near middle of sides of head; ocelli present; distinct sutures between thoracic segments; petiole with a distinct node; gaster without a constriction behind first segment; middle and hind tarsi with 2 spurs; sting exsertile. TAYLOR, 1978. *Cret.,* USA (New Jersey).——FIG. 265,7. **S. freyi*; worker, ×14 (Wilson, Carpenter, & Brown, 1967b).

Stenamma WESTWOOD, 1840, p. 83. WHEELER, 1914. *Oligo.,* Europe (Baltic)–*Holo.*

Stigmomyrmex MAYR, 1868, p. 95. WHEELER, 1914. *Oligo.,* Europe (Baltic)–*Holo.*

Stiphromyrmex WHEELER, 1914, p. 67 [**S. robustus*; OD]. Similar to *Pristomyrmex* (recent), but worker with 12-segmented antennae, terminal 3 segments forming a club; middle and hind tibiae with spurs; mandibles short and convex. MAYR, 1868. *Oligo.,* Europe (Baltic).

Syntaphus DONISTHORPE, 1920, p. 84 [**S. wheeleri*; OD]. Little-known genus. Female: apparently similar to that of *Ectatomma* (recent) but with epinotal spines. CARPENTER & others, 1937. *Oligo.,* England.

Tetraponera F. SMITH, 1852, p. 44. WHEELER, 1914; THÉOBALD, 1937a. *Oligo.,* Europe (Baltic, France)–*Holo.*

Trachymyrmex FOREL, 1893, p. 600. BARONI

URBANI, 1980a. *Oligo./Mio.,* Dominican Republic–*Holo.*

Vollenhovia MAYR, 1865, p. 21. WHEELER, 1914. *Oligo.,* Europe (Baltic)–*Holo.*

Family EUMENIDAE Leach, 1815

[Eumenidae LEACH, 1815, p. 153]

Similar to Vespidae, but tarsal claws bifid and middle tibiae with 1 apical spur. Solitary wasps, mostly fossorial or mud-daubers. Larvae predaceous on larvae of other insects. *Eoc.–Holo.*

Eumenes LATREILLE, 1802, p. 360. HANDLIRSCH, 1910c; PITON, 1940a. *Oligo.,* Europe (France, Germany)–*Holo.*

Alastor LEPELETIER, 1841, p. 668. [Generic assignment of fossils doubtful.] SCUDDER, 1890; MEUNIER, 1915b; STATZ, 1936b; EVANS, 1966. *Eoc.,* USA (Wyoming); *Oligo.,* Europe (Germany)–*Holo.*

Ancistrocerus WESMAEL, 1836, p. 45. PITON, 1940a. *Eoc.,* Europe (France)–*Holo.*

Eunortonia CARPENTER, 1986, p. 576, *nom. subst. pro Pseudonortonia* TIMON-DAVID, 1944b, p. 41, *non* SOIKA, 1936 [**Pseudonortonia sepulta* TIMON-DAVID, 1944b, p. 41; OD]. Similar to *Nortonia* (recent) but with very different abdominal markings. *Oligo.,* Europe (France).

Odynerus LATREILLE, 1802, p. 362. COCKERELL, 1909n, 1914f; THÉOBALD, 1937a; PITON, 1940a. *Oligo.,* USA (Colorado), Europe (France)–*Holo.*

Rygchium SPINOLA, 1806, p. 84. THÉOBALD, 1937a; PITON, 1940a. *Eoc.,* Europe (France)–*Holo.*

Family VESPIDAE Leach, 1815

[Vespidae LEACH, 1815, p. 153]

Pronotum extending back to tegulae; antennae with 11 to 13 segments; middle tibiae with 2 apical spurs; tarsal claws simple; mandibles short and broad; fore wing with cell 1mcu very long; hind wing with closed cells. Social wasps, with queens, workers, and males; larvae mostly predaceous on other insects. *Eoc.–Holo.*

Vespa LINNÉ, 1758, p. 343. BRUES, 1926. *Oligo.,* Europe (Germany)–*Holo.*

Palaeovespa COCKERELL, 1906b, p. 54 [**P. baltica*; OD]. Little-known genus, apparently related to *Vespa* but with differences in venational details. [Family assignment doubtful.] COCKERELL, 1907c, 1909o, 1911b, 1914f, 1923e; BEQUAERT, 1930a. *Oligo.,* Europe (Baltic), USA (Colorado).

Polistes LATREILLE, 1802, p. 363. [Generic assignment of fossils doubtful.] COCKERELL, 1914f; STATZ, 1936b; THÉOBALD, 1937a; PITON, 1940a. *Eoc.,* Europe (Germany); *Oligo.,* Europe (Germany, France); *Mio.,* Europe (Germany)–*Holo.*

Polybia LEPELETIER, 1836, p. 533. COCKERELL, 1921a, 1923e. *Oligo.,* England–*Holo.*

Family POMPILIDAE Leach, 1815

[Pompilidae LEACH, 1815, p. 149]

Pronotum produced back to tegulae, forming a lobe over anterior thoracic spiracle; mesopleuron with an oblique groove; legs long, especially posterior pair; fore wings not longitudinally folded; hind wing with at least 1 closed cell and with a small anal lobe; first segment of gaster not forming a node or scale. Solitary, fossorial wasps; larvae predaceous on spiders. *Cret.–Holo.*

Pompilus FABRICIUS, 1798, p. 212. MEUNIER, 1917b; THÉOBALD, 1937a. *Oligo.,* Europe (Baltic, France)–*Holo.*

Anoplius DUFOUR, 1834, p. 484. STATZ, 1936b. *Oligo.,* Europe (Germany)–*Holo.*

Cryptocheilus PANZER, 1806, p. 120. COCKERELL, 1906b, 1914d; ROHWER, 1909a; THÉOBALD, 1937a. *Oligo.,* USA (Colorado), Europe (France)–*Holo.*

Dipogon FOX, 1897, p. 241. COCKERELL, 1908e; ROHWER, 1909a. *Oligo.,* USA (Colorado)–*Holo.*

Pepsis FABRICIUS, 1805, p. 207. COCKERELL, 1941. *Oligo.,* USA (Colorado)–*Holo.*

Pompilopterus RASNITSYN, 1975, p. 106 [**P. ciliatus*; OD]. Fore wing thickly pubescent, especially in costal area; origin of RS remote from pterostigma; basal section of RS and M aligned to form a slightly curved oblique vein; crossvein 3r-m apparently present; crossvein 2r-rs slanted toward wing apex; crossvein 1m-cu strongly slanted; cell 3r narrow and long. [Family position doubtful.] *Cret.,* USSR (Asian RSFSR).——FIG. 265,*3*. **P. ciliatus*; fore wing, ×6 (Rasnitsyn, 1975).

Priocnemis SCHIÖDTE, 1837, p. 324. BRUES, 1926; STATZ, 1936b. *Oligo.,* Europe (Germany)–*Holo.*

Family SPHECIDAE Leach, 1815

[Sphecidae LEACH, 1815, p. 148] [=Angarosphecidae RASNITSYN, 1975, p. 109]

Pronotum not extending as far back as tegulae; males with 13 antennal segments, females with 12; hind wing with an anal lobe and closed cells. Solitary, fossorial wasps; larvae predaceous on various insect larvae and on spiders. *Cret.–Holo.*

Sphex LINNÉ, 1758, p. 569. PONGRÁCZ, 1928; ZEUNER, 1931; STATZ, 1936b. *Oligo.,* Europe (Germany); *Mio.,* Europe (Germany, Yugoslavia)–*Holo.*

Angarosphex RASNITSYN, 1975, p. 110 [**A. myrmicopterus*; OD]. Fore wing with vestiges of crossvein 1r-rs very short; crossvein 2r-rs shorter than width of pterostigma; cells 2rm and 3rm elongate. Head quadrangular; pronotum moderately long. RASNITSYN, 1980b. *Cret.,* USSR (Asian RSFSR).

Cerceris LATREILLE, 1802, p. 367. TIMON-DAVID, 1944b. *Oligo.,* Europe (France)–*Holo.*

Chalybion DAHLBOM, 1844, p. 21. HAGEN, 1858a. *Oligo.,* USA (Colorado)–*Holo.*

Ectemnius DAHLBOM, 1845, p. 389. MEUNIER, 1912e; COCKERELL, 1910a; BOHART & MENKE, 1976. *Oligo.,* Europe (Germany), USA (Colorado)–*Holo.*

Gallosphex SCHLÜTER, 1978a, p. 83 [**G. cretaceus*; OD]. Apparently an ampulicine. Fore wing with pterostigma very small, triangular; basal section of M slightly longer than basal section of RS; crossvein 2r-rs very short; crossveins 2r-m and 3r-m well developed; cell 2rm larger than cell 3rm. *Cret.,* Europe (Germany).

Gorytes LATREILLE, 1804, p. 180. [Generic assignment of fossil doubtful.] COCKERELL, 1922h, 1924a; EVANS, 1966; BOHART & MENKE, 1976. *Oligo.,* Europe (Germany)–*Holo.*

Harpactostigma ASHMEAD, 1899, p. 299. COCKERELL, 1922h, 1924a; EVANS, 1966; BOHART & MENKE, 1976. *Eoc.,* USA (Colorado)–*Holo.*

Larrophanes HANDLIRSCH, 1907, p. 888 [**L. opthalmicus*; OD]. Little-known genus, possibly belonging to the Larrinae. [Family assignment doubtful.] *Mio.,* Europe (Italy).

Lisponema EVANS, 1969, p. 255 [**L. singularis*; OD]. Similar to *Spilomena* (recent) but with pterostigma slightly longer and veins 3-rm and 2m-cu absent; tibial spur formula 1,1,2; legs very slender, smooth. *Cret.,* Canada (Manitoba). ——FIG. 265,*1*. **L. singularis*; fore and hind wings, ×3 (Evans, 1969).

Mellinus FABRICIUS, 1790, p. 226. ROHWER, 1908d. *Oligo.,* USA (Colorado)–*Holo.*

Passaloecus SHUCKARD, 1837, p. 188. ROHWER, 1909b. *Oligo.,* USA (Colorado)–*Holo.*

Philanthus FABRICIUS, 1790, p. 224. ROHWER, 1909c; THÉOBALD, 1937a. *Oligo.,* USA (Colorado), Europe (France)–*Holo.*

Philoponites COCKERELL, 1915, p. 482 [**P. clarus*; OD]. Little-known genus. Cells 1r+2r and 1mcu almost as wide as long; cell 2rm nearly triangular. *Oligo.,* England.

Pison JURINE, 1808, p. 255. ROHWER, 1908a; COCKERELL, 1909o. *Oligo.,* USA (Colorado), Europe (Baltic)–*Holo.*

Pittoecus EVANS, 1973, p. 170 [**P. pauper*; OD]. Male similar to *Passaloecus.* Head broad, with large eyes; antennae short, with 12 segments; mandibles straight, not dentate; tibial spur formula 1,1,2; claws dentate. *Cret.,* USSR (Asian RSFSR).

Prophilanthus COCKERELL, 1906b, p. 46 [**P. destructus*; OD]. Similar to *Philoponites,* but cells 1r+2r and 1mcu at least twice as long as wide. *Oligo.,* USA (Colorado).

Psammaecius LEPELETIER, 1832, p. 72. COCKERELL, 1906b; EVANS, 1966; PULAWSKI & RASNITSYN, 1980. *Oligo.,* USA (Colorado)–*Holo.*

Sceliphron KLUG, 1801, p. 561. [Generic assignment of fossils doubtful.] MEUNIER, 1915a; COCKERELL, 1921a. *Oligo.,* England; *Mio.,* Europe (France)–*Holo.*

Taimyrisphex EVANS, 1973, p. 167 [**T. pristinus*; OD]. Male: antennae short, with 13 segments; scape only slightly longer than thick; eyes and ocelli large; pronotum with small, rounded posterior lobes nearly reaching tegulae; venation more generalized than in *Archisphex* (recent). [Family position uncertain, possibly related to Falsiformicidae.] RASNITSYN, 1980b. *Cret.,* USSR (Asian RSFSR).——FIG. 265,*2*. **T. pristinus*; fore and hind wings, ×20 (Evans, 1973).

Tracheliodes MORAWITZ, 1866, p. 249. COCKERELL, 1909o, 1910a; BOHART & MENKE, 1976. *Oligo.,* Europe (Baltic), USA (Colorado)–*Holo.*

Family ANDRENIDAE Latreille, 1802

[Andrenidae LATREILLE, 1802b, p. 369]

Glossa pointed; labial palpi with all segments similar, or first segment elongate and flattened; 2 subantennal sutures below each antennal socket. Solitary bees, nests sometimes colonial. *Oligo.–Holo.*

Andrena FABRICIUS, 1775, p. 376. COCKERELL, 1906b, 1908n, 1911b, 1914f. *Oligo.,* Europe (Baltic), USA (Colorado); *Mio.,* Europe (Germany)–*Holo.*

Libellulapis COCKERELL, 1906b, p. 42 [**L. antiquorum*; OD]. Apparently close to *Panurgus* (recent), but eyes very prominent. COCKERELL, 1909c, 1913b; ZEUNER & MANNING, 1976. *Oligo.,* USA (Colorado).

Lithandrena COCKERELL, 1906b, p. 44 [**L. saxarum*; OD]. Close to *Andrena* but differing in shape of cells 1r and 2rm. ZEUNER & MANNING, 1976. *Oligo.,* USA (Colorado).

Pelandrena COCKERELL, 1909f, p. 159 [**P. reducta*; OD]. Close to *Andrena,* but fore wing with cell 3rm apparently absent. ZEUNER & MANNING, 1976. *Oligo.,* USA (Colorado).

Family HALICTIDAE Ashmead, 1899

[Halictidae ASHMEAD, 1899, p. 90]

Labial palpi with 4 equal segments; glossa pointed; mesepisternum with anterior-dorsal

groove; fore wing with basal section of vein M strongly arched and crossvein 2m-cu slightly arched. Mostly solitary, fossorial bees, some social. *Oligo.–Holo.*

Halictus LATREILLE, 1804, p. 182 [=*Prohalictus* ARMBRUSTER, 1938, p. 48 (type, *P. schemppi*)]. TIMON-DAVID, 1944b; ZEUNER & MANNING, 1976. *Oligo.,* Europe (France), USA (Colorado); *Mio.,* Europe (Germany)–*Holo.*

Cyrtapis COCKERELL, 1908f, p. 339 [**C. anomalus*; OD]. Crossvein 3r-m sigmoidal, anterior end closer to apex than posterior end. [Family assignment doubtful.] *Oligo.,* USA (Colorado).

Family MELITTIDAE Schenk, 1860

[Melittidae SCHENK, 1860, p. 136]

Segments of labial palpi similar and cylindrical; glossa acute, often elongate; dorsal mesoepisternal groove absent; fore wing with 2 or 3 submarginal cells. Solitary bees. *Oligo.–Holo.*

Melitta KIRBY, 1802, p. 130. COCKERELL, 1909k. *Oligo.,* USA (Colorado)–*Holo.*

Ctenoplectrella COCKERELL, 1909o, p. 13 [**C. viridiceps*; OD]. Similar to *Glyptapis* but eyes bare. KELNER-PILLAULT, 1970a. *Oligo.,* Europe (Baltic).

Glyptapis COCKERELL, 1909o, p. 13 [**G. mirabilis*; OD]. Apparently related to *Ctenoplectra* (recent); eyes hairy, thorax strongly sculptured; metathorax divided by ridges into large quadrangular areas. KELNER-PILLAULT, 1970a; ZEUNER & MANNING, 1976. *Oligo.,* Europe (Baltic).

Family MEGACHILIDAE Kirby, 1837

[Megachilidae KIRBY in RICHARDSON, SWAINSON, & KIRBY, 1837, p. 270]

Labrum longer than broad; labial palpi with segments 1 and 2 very elongate and flattened; a single suture below each antennal socket; pollen brush (scopa), when present, on gastral sternites. Solitary bees; nests small, diversely situated. *Oligo.–Holo.*

Megachile LATREILLE, 1802, p. 434. COCKERELL, 1908b, 1925g; SALT, 1931; ZEUNER & MANNING, 1976. *Oligo.,* USA (Colorado); *Mio.,* USSR (Asian RSFSR)–*Holo.*

Anthidium FABRICIUS, 1805, p. 364. [Generic assignment of fossils doubtful.] COCKERELL, 1906b; STATZ, 1936b; ZEUNER & MANNING, 1976. *Oligo.,* USA (Colorado), Europe (Germany)–*Holo.*

Dianthidium COCKERELL, 1900, p. 412. COCKERELL, 1906b. *Oligo.,* USA (Colorado)–*Holo.*

Heriades SPINOLA, 1808, p. 7. COCKERELL, 1906b, 1913f, 1917b, 1923e, 1925d; ZEUNER & MANNING, 1976. *Oligo.,* USA (Colorado)–*Holo.*

Lithanthidium COCKERELL, 1911a, p. 225 [**L. pertriste*; OD]. Apparently related to *Anthidium.* Fore wing with cells 1r and 2rm present; basal part of M strongly arched. *Oligo.,* USA (Colorado).

Lithurge LATREILLE, 1825, p. 463. HEER, 1865, 1867; COCKERELL, 1909m; ZEUNER & MANNING, 1976. *Mio.,* Europe (Germany)–*Holo.*

Osmia PANZER, 1806, p. 230. HEER, 1849; HEYDEN, 1862; STATZ, 1936b; ZEUNER & MANNING, 1976. *Oligo.,* Europe (Germany); *Mio.,* Europe (Germany)–*Holo.*

Family ANTHOPHORIDAE Kirby, 1837

[Anthophoridae KIRBY in RICHARDSON, SWAINSON, & KIRBY, 1837, p. 271]

Glossa long; labrum broader than long; clypeus protuberant; fore coxae slightly broader than long; hind tibia with a scopa and 2 apical spurs; pollen basket (corbicula) absent. Solitary bees, nesting in ground. *Eoc.–Holo.*

Anthophora LATREILLE, 1803, p. 167. COCKERELL, 1908m, 1908n; ZEUNER & MANNING, 1976. *Oligo.,* USA (Colorado)–*Holo.*

Anthophorites HEER, 1849, p. 97 [**A. mellona*; SD COCKERELL, 1909m, p. 315]. Little-known genus, apparently related to *Anthophora.* HEER, 1867; ZEUNER & MANNING, 1976. *Oligo.,* Europe (France); *Mio.,* Croatia.

Celliforma BROWN, 1934, p. 532 [**C. spirifer*; OD]. Little-known genus. Larval chambers, with spiral apex. BROWN, 1935. *Eoc.,* USA (Wyoming).

Protomelecta COCKERELL, 1908f, p. 341 [**P. brevipennis*; OD]. Apparently related to *Melecta* (recent). Fore wings short, not reaching tip of gaster; cell 2r+3r long; cells 1r, 2rm, and 3rm present. [Family assignment doubtful.] TILLYARD, 1926d; ZEUNER & MANNING, 1976. *Oligo.,* USA (Colorado).

Family APIDAE Leach, 1815

[Apidae LEACH, 1815, p. 160]

Similar to Anthophoridae, but workers and most females with a corbicula on hind tibiae; spurs absent (except in Bombicinae). Mostly social bees. *Eoc.–Holo.*

Apis LINNÉ, 1758, p. 343. COCKERELL, 1907e; STATZ, 1931; ZEUNER, 1931; THÉOBALD, 1937a; ROUSSY, 1960; KELNER-PILLAULT, 1969; ZEUNER & MANNING, 1976. *Oligo.,* Europe (Germany, France); *Mio.,* Europe (Germany, Sicily)–*Holo.*

Bombus LATREILLE, 1802, p. 437 [=*Calyptapis* COCKERELL, 1906b, p. 41 (type, *C. florissantensis*)]. HEER, 1867; NOVÁK, 1877; CARPENTER, 1931d; COCKERELL, 1931b; MILLIRON, 1971; ZEUNER & MANNING, 1976. *Oligo.,* USA (Colorado), Europe (Czechoslovakia); *Mio.,* Europe (Germany), USA (Washington)–*Holo.*

Ceratina LATREILLE, 1802, p. 380. COCKERELL, 1906b; DALY, 1973. *Oligo.,* USA (Colorado)–*Holo.*

Chalcobombus COCKERELL, 1909o, p. 11 [**C. humilis*; OD]. Small bees of uncertain relationships but probably close to the Bombini. Vertex usually with coarse, erect bristles, sparingly plumose; eyes not usually hairy; ocelli large, close together, forming a slight curve; antennal cleaner with exceptionally long hairs. ZEUNER & MANNING, 1976. *Oligo.,* Europe (Baltic).

Electrapis COCKERELL, 1909o, p. 7 [**Apis meliponoides* BUTTEL-REEPEN, 1906, p. 158; OD]. Similar in general appearance to *Apis*; hind basitarsus about twice as long as broad; posterior tibiae with a single short spur or none; eyes with little or no hair. COCKERELL, 1908n; MANNING, 1961; KELNER-PILLAULT, 1969, 1970a, 1974; ZEUNER & MANNING, 1976. *Oligo.,* Europe (Baltic).

Kelnermelia MOURE in MOURE & CAMARGO, 1978, p. 565 [**Trigona eocenica* KELNER-PILLAULT, 1970b, p. 437; OD]. Similar to *Trigona*. Scutellum strongly projected and swollen, with scutoscutellar suture deeply depressed. *Oligo.,* Europe (Baltic).

Plebeia SCHWARZ, 1938, p. 480. WILLE & CHANDLER, 1964; MOURE & CAMARGO, 1978. *Oligo.,* Dominican Republic–*Holo.*

Probombus PITON, 1940a, p. 218 [**P. hirsutus*; OD]. Little-known genus, apparently similar to *Bombus*. KELNER-PILLAULT, 1969. *Eoc.,* Europe (France).

Sophrobombus COCKERELL, 1909p, p. 21 [**S. fatalis*; OD]. Similar to *Chalcobombus*. Mandibles with a convex cutting edge; ocelli large and arranged in a curve; basitarsus flattened, short; inner hind tibial spur present. ZEUNER & MANNING, 1976. *Oligo.,* Europe (Baltic).

Tetralonia SPINOLA, 1839, p. 538. THÉOBALD, 1937a. *Oligo.,* Europe (France)–*Holo.*

Trigona JURINE, 1807, p. 245 [=*Meliponorytes* TOSI, 1896, p. 352 (type, *M. succini*)]. COCKERELL, 1922e; WILLE, 1959, 1977; KELNER-PILLAULT, 1970b; KERR & DA CUNHA, 1976; ZEUNER & MANNING, 1976; MOURE & CAMARGO, 1978; MICHENER, 1982. *Oligo.,* Europe (Baltic); *Oligo./Mio.,* Mexico (Chiapas); *Mio.,* Europe (Sicily), Burma–*Holo.*

Xylocopa LATREILLE, 1802, p. 379. HEER, 1849; COCKERELL, 1909m; STATZ, 1936b; ZEUNER, 1938; ZEUNER & MANNING, 1976. *Oligo.,* Europe (Germany); *Mio.,* Europe (Germany)–*Holo.*

Family UNCERTAIN

The following genera, apparently belonging to the order Hymenoptera, suborder Apocrita, are too poorly known to permit assignment to families.

Baissobius RASNITSYN, 1975, p. 128 [**B. parvus*; OD]. Fore wing with venation much reduced; no closed cells distal to level of basal sections of RS and M, except for cell 3r; pterostigma elongate. Head large and wide, with small eyes. *Cret.,* USSR (Asian RSFSR).

Cenomanscelio SCHLÜTER, 1978a, p. 78 [**C. pulcher*; OD]. Little-known genus, based on body; venation unknown. Antennae with 11 segments, apical 5 enlarged and forming a club; lateral ocelli relatively close to compound eyes. [Possibly related to Scelionidae.] *Cret.,* Europe (Germany).

Cretopone DLUSSKY, 1975, p. 119 [**C. magna*; OD]. Little-known genus, possibly a formicid. Female: middle and hind tarsi with single spurs; petiole apparently very large. *Cret.,* USSR (Kazakh).

Cretosphex RASNITSYN, 1975, p. 106 [**C. incertus*; OD]. Fore wing with basal sections of RS and M aligned to form straight, oblique line; crossvein 1r-rs obsolescent; crossvein 2r-rs directed toward wing apex; apex of cell 3r acute; crossvein 1m-cu at base of cell 2rm. Pronotum of moderate length, projecting at sides; legs short; femora very short and thick; first segment of hind tarsus not broadened; abdomen long, strongly sclerotized. [Possibly related to the Sphecoidea.] RASNITSYN, 1980a, 1980b. *Cret.,* USSR (Asian RSFSR).——FIG. 265,6. **C. incertus*; wings and body, ×25 (Rasnitsyn, 1975).

Curiosivespa RASNITSYN, 1975, p. 113 [**C. curiosa*; OD]. Fore wing with RS arising from R at base of pterostigma; pterostigma narrow; apex of cell 3r submarginal; crossvein 1m-cu far basad of cell 2rm. [Possibly related to Masaridae.] *Cret.,* USSR (Kazakh).—— FIG. 265,5. **C. curiosa*; fore wing, ×5.5 (Rasnitsyn, 1975).

Diapriites STATZ, 1938b, p. 104 [**D. insignicornis*; OD]. Little-known genus, possibly a proctotrupoid. Antennae with 12 segments. *Oligo.,* Europe (Germany).

Iscopinus KOZLOV, 1974, p. 145 [**I. baissicus*; OD]. Antennae with at least 15 segments; cell 3r closed; segments of gaster short, transverse. [Possibly related to Pelecinidae.] *Cret.,* USSR (Asian RSFSR).

Platygasterites CARPENTER, herein [**P. femoralis* STATZ, 1938b, p. 106; OD]. Little-known genus; wing venation apparently absent. [The original generic name, *Platygasterites,* was a *nomen nudum* (STATZ, 1938b).] *Oligo.,* Europe (Germany).

Proctotrypites MEUNIER, 1918, p. 145 [**P. rottensis*; OD]. Little-known genus. Antennae with 11 segments; venation much reduced. *Oligo.*, Europe (Germany).

Scelionites STATZ, 1938b, p. 107 [**S. capitatus*; OD]. Little-known genus, possibly a proctotrupoid. *Oligo.*, Europe (Germany).

Vitimosphex RASNITSYN, 1975, p. 127 [**V. incompletus*; OD]. Little-known genus, probably related to *Baissodes*. Fore wing with cell 3r narrowly rounded apically; RS extending beyond apex of cell 3r; cell 2rm short. *Cret.*, USSR (Asian RSFSR).

Suborder UNCERTAIN

The following genera, apparently belonging to the order Hymenoptera, are too poorly known to permit assignment to suborders.

Proapocritus RASNITSYN, 1975, p. 22 [**P. praecursor*; OD]. Little-known genus, based on fore wing fragment; SC absent; area between R and costal margin narrow; basal section of RS straight and shorter than basal section of M, with slight slope toward wing apex; crossvein 1r-rs weakly developed; crossvein 2r-rs situated at center of pterostigma; cell 1mcu long. [Possibly related to Karataviidae, suborder Symphyta.] *Jur.*, USSR (Kirghiz).

Protenthredo PONGRÁCZ, 1928, p. 156 [**P. transsylvanicus*; OD]. Little-known genus; venation unknown. *Mio.*, Europe (Croatia).

Infraclass NEOPTERA
Order UNCERTAIN

The following genera, apparently belonging to the infraclass Neoptera, are too poorly known to permit assignment to orders.

Aleuronympha RIEK, 1974b, p. 272 [**A. bibulla*; OD]. Little-known genus, based on small nymph with wing buds. [Originally placed in the Hemiptera (Homoptera, family Permaleurodidae) but probably belonging to the Blattaria. The supposed eyes are cuticular protuberances on pronotum; see ROTH, 1982, figs. 16–20. Also see note under *Permaleurodes*.] *Perm.*, South Africa.

Apheloneura CARPENTER, 1976, p. 365 [**A. minutissima*; OD]. Little-known genus, based on complete wings and parts of body. [Type of the family Apheloneuridae CARPENTER, 1976.] *Perm.*, USA (Kansas).

Aphryganoneura TILLYARD, 1926e, p. 276 [**A. anormala*; OD]. Little-known genus. [Placed in the Mecoptera by TILLYARD (1926e) and MARTYNOVA (1962e) but considered by HANDLIRSCH (1939) to belong to the Neuroptera.] RIEK, 1953; WILLMANN, 1978. *Perm.*, Australia (New South Wales).

Archipanorpa TILLYARD, 1917a, p. 191 [**A. magnifica*; OD]. Little-known genus, based on wing fragments. [Type of the family Archipanorpidae TILLYARD, 1917a; assigned by TILLYARD (1917a) to a new order, Protomecoptera.] RIEK, 1953; WILLMANN, 1978. *Trias.*, Australia (Queensland).

Austroidelia RIEK, 1954c, p. 161 [**A. perplexa*; OD]. Little-known genus, based on proximal fragment of wing. [Originally placed in the Protorthoptera (family Ideliidae).] *Trias.*, Australia (New South Wales).

Choristosialis TILLYARD, 1932a, p. 19 [**C. enigmatica*; OD]. Little-known genus, based on wing fragment. [Type of the family Choristosialidae TILLYARD, 1932a. Originally placed by TILLYARD in the Neuroptera, but transferred to the Mecoptera by CARPENTER (1943a); ordinal position considered by WILLMANN (1978) to be uncertain.] *Perm.*, USA (Kansas).

Climaconeura PRUVOST, 1912, p. 327 [**C. remauxi*; OD]. Little-known genus, based on fragment of wing. [Type of the family Climaconeuridae HANDLIRSCH, 1919b. Originally placed in the Protorthoptera by PRUVOST (1912, 1919); transferred by HANDLIRSCH (1919b, 1922) to the order Mixotermitoidea, by HAUPT (1952) to the Mecoptera, and by SHAROV (1962d) to the Protorthoptera (Paraplecoptera).] WILLMANN, 1978. *U. Carb.*, Europe (France).

Crosaphis EVANS, 1971, p. 146 [**C. anomala*; OD]. Little-known genus, based on wing. [Placed in the Hemiptera (Aphidoidea) by EVANS (1971) and in the Hemiptera (Coccoidea) by HEIE (1981); transferred to Diptera by KOVALEV (1983).] *Trias.*, Australia (Queensland).

Ctenostematopteryx HAUPT, 1952, p. 253 [**C. thuringiaca*; OD]. Little-known genus. [Originally placed in the Mecoptera, but transferred to Insecta, *incertae sedis* by HENNIG (1969c).] WILLMANN, 1978. *Perm.*, Europe (Germany).

Elmothone CARPENTER, 1976, p. 353 [**E. martynovae*; OD]. Little-known genus, based on incomplete fore wing. [Originally placed in the order Neuroptera.] *Perm.*, USA (Kansas).

Eopanorpella SCHMIDT, 1962, p. 849 [**E. ernsti*; OD]. Little-known genus, based on incomplete wing. [Originally placed in the Mecoptera (family Permochoristidae), but assignment to that order has been seriously questioned by HENNIG (1969c) and WILLMANN (1978).] *U. Carb.*, Europe (Germany).

Eukuloja ROHDENDORF, 1962a, p. 72 [**Kuloja cubitalis* MARTYNOV, 1932, p. 5; OD] [=*Parakuloja* ROHDENDORF, 1962a, p. 72 (type, *Kuloja paurovenosa* MARTYNOV, 1932, p. 3)]. Little-known genus, based on isolated wings. [Originally placed by ROHDENDORF (1962a) in the order Diaphanopterodea, but transferred to the order Hypoperlida (allied to the Psocoptera) by SINITSHENKOVA (1981b).] *Perm.,* USSR (European RSFSR).

Gelasopteron CARPENTER, 1976, p. 372 [**G. gracile*; OD]. Little-known genus, based on a very elongate wing. [Type of the family Gelasopteridae CARPENTER, 1976.] *Perm.,* USA (Kansas).

Geroneura MATTHEW, 1889, p. 57 [**G. wilsoni*; OD]. Little-known genus. [Originally placed in the order Uncertain; transferred to the new order Mixotermitoidea by HANDLIRSCH (1906a, 1919b).] PRUVOST, 1919. *U. Carb.,* Canada (New Brunswick).

Glessaria KOCH & BERENDT, 1854, p. 117 [**G. rostrata*; OD]. Little-known genus. [Originally placed in Thysanura, but considered by HANDLIRSCH (1906b) to be a coleopterous larva.] *Oligo.,* Europe (Baltic).

Hypoperla MARTYNOV, 1928b, p. 57 [**H. elegans*; OD]. Little-known genus, based on isolated wings. [Type of the family Hypoperlidae MARTYNOV, 1928b. Included in the Protorthoptera by MARTYNOV (1928b); transferred to the superorder Perloidea, *incertae sedis* by ROHDENDORF (1962a); and placed in a new order, Hypoperlida (allied to the Psocoptera), by RASNITSYN (1980f).] SINITSHENKOVA, 1981b. *Perm.,* USSR (European RSFSR).

Hypoperlopsis ZALESSKY, 1948b, p. 1042 [**H. splendens*; OD]. Little-known genus. [Originally placed in the order Perlaria; transferred to the superorder "Plecopteroidea," order Uncertain by SHAROV (1962d).] *Perm.,* USSR (Asian RSFSR).

Ignotala RIEK, 1973, p. 522 [**I. mirifica*; OD]. Little-known genus, based on wing fragment. [Type of the family Ignotalidae and the superfamily Ignotaloidea RIEK, 1973. Originally placed in the Hemiptera (Homoptera), although the genus is considered to be "intermediate in many attributes between the Protoblattodea and the Homoptera."] *Perm.,* South Africa.

Kamopanorpa MARTYNOV, 1928b, p. 101 [**K. lata*; OD]. Based on a series of well-preserved wings. [Originally placed in the Mecoptera by MARTYNOV (1928b) and MARTYNOVA (1962e); transferred to the Trichoptera by SUKATSHEVA (1976) and to the Trichoptera-Mecoptera complex by WILLMANN (1978).] *Perm.,* USSR (European and Asian RSFSR).

Kliveria HANDLIRSCH, 1906b, p. 325 [**Termes incertus* KLIVER, 1886, p. 104; OD]. Little-known genus, based on isolated wing. [Placed by KLIVER (1886) in the Isoptera; transferred by GÜTHORL (1939) to the order Mixotermitoidea, by HAUPT (1952) to the Mecoptera, and by SHAROV (1962d) to the Protorthoptera (Paraplecoptera).] WILLMANN, 1978. *U. Carb.,* Europe (Germany).

Lemmatophoropsis ZALESSKY, 1935, p. 691 [**L. sibirica*; OD]. Little-known genus, based on small fragment of wing. [Originally placed in the Protorthoptera.] *Trias.,* USSR (Asian RSFSR).

Marimerobius ZALESSKY, 1946b, p. 543 [**M. splendens*; OD]. Little-known genus, based on fore wing. [Placed in the Neuroptera by ZALESSKY (1946b) and MARTYNOV (1952b, 1962d), but transferred to the Mecoptera by WILLMANN (1978), in the new family Marimerobiidae.] *Perm.,* USSR (Asian RSFSR).

Megoniella RIEK, 1973, p. 526 [**M. multinerva*; OD]. Little-known genus, based on a wing fragment. [Originally placed in the Hemiptera (Homoptera), family Ignotalidae.] *Perm.,* South Africa.

Mesacridites RIEK, 1954c, p. 163 [**M. elongata*; OD]. Little-known genus, based on wing fragment. [Originally placed in the Protorthoptera, family Sthenaropodidae.] *Trias.,* Australia (New South Wales).

Metropatorites KELLER, 1934, p. 45 [**M. kassenbergensis*; OD]. Little-known genus, based on fragment of wing. [Considered by KELLER to be closely related to *Metropator* (Miomoptera, Metropatoridae), but placed by SCHMIDT (1962) and HENNIG (1969c) in *incertae sedis* at the ordinal level.] WILLMANN, 1978. *U. Carb.,* Europe (Germany).

Micropalentomum SCHMIDT, 1962, p. 833 [**M. minisculum*; OD]. Little-known genus, based on a very small, nymphal wing, probably from an orthopteroid species. [Type of the family Micropalentomidae SCHMIDT, 1962. Not assigned to an order.] *U. Carb.,* Europe (Germany).

Mixotermes STERZEL, 1881, p. 273 [**M. lagauensis*; OD]. Little-known genus. [Originally placed in the existing order Isoptera and considered to be a subgenus of *Termes*; transferred to the Orthoptera by BRONGNIART (1885a), to the new order Mixotermitoidea by HANDLIRSCH (1906a, 1919b, 1920), and to the extinct order Hapalopteroidea by PRUVOST (1919).] *U. Carb.,* Europe (Germany).

Mononeura BECKER-MIGDISOVA, 1951, p. 1208 [**M. angustipennis*; OD]. Little-known genus, based on incomplete wing. [Placed in the family Uninervidae, order Uncertain.] BECKER-MIGDISOVA, 1962b. *Trias.,* USSR (Kirghiz).

Nugonioneura TILLYARD, 1937a, p. 92 [**N. problematica*; OD]. Little-known genus, based on isolated wings. [Type of the family Nugonioneuridae CARPENTER, 1976. Originally placed

in the Psocoptera by TILLYARD (1937a); transferred to the Protorthoptera by CARPENTER (1976).] *Perm.,* USA (Kansas).

Ocellia OLFERS, 1907, p. 7 [**O. articulicornis*; OD]. Little-known genus. [Originally placed in order Zygentoma, but considered by SILVESTRI (1913a) to be based on an immature specimen of the order Dermaptera.] *Oligo.,* Europe (Baltic).

Palaeomantina RASNITSYN, 1977c, p. 75 [**P. pentamera*; OD]. Little-known genus. [Originally placed in the Miomoptera, family Palaeomantiscidae. See discussion under the order Miomoptera.] *Perm.,* USSR (Asian RSFSR).

Palaeomantisca MARTYNOV, 1940, p. 34 [**P. lata*; OD]. Little-known genus, based on wing fragment. [Placed in the order Miomoptera (family Palaeomanteidae) by MARTYNOV (1940) and MARTYNOVA (1962a); transferred to the new family Palaeomantiscidae by RASNITSYN (1977c). See discussion under the order Miomoptera.] *Perm.,* USSR (Asian RSFSR).

Paraulacus PING, 1928, p. 17 [**P. sinicus*; OD]. Little-known genus, based on fragments of body and wings. [Originally placed in the order Hymenoptera, family Aulacidae.] *Cret.,* China (Jehol).

Perielytron ZALESSKY, 1943, p. 70 [**P. mirabilis*; OD]. Little-known genus, based on incomplete specimen. [Type of family Perielytridae ZALESSKY and originally placed in a new order, Perielytrodea ZALESSKY (1943, 1948c). Possibly related to the Psocoptera.] SHAROV, 1962a; RASNITSYN, 1980f. *Perm.,* USSR (Asian RSFSR).

Permaleurodes BECKER-MIGDISOVA, 1959a, p. 108 [**P. rotundatus*; OD]. Little-known genus, based on small nymph with wing buds. [Type of family Permaleurodidae BECKER-MIGDISOVA, 1959a. Originally placed in Hemiptera (Homoptera), but transferred to Blattaria by MOUND and HALSEY (1978). See note under *Aleuronympha.*] *Perm.,* USSR (Asian RSFSR).

Permarrhaphus MARTYNOV, 1931c, p. 211 [**P. venosus*; OD]. Little-known genus, based on incomplete wing. [Type of the family Permarrhaphidae MARTYNOV, 1931c. Placed in the Coleoptera by MARTYNOV (1931c) and by ROHDENDORF and PONOMARENKO (in ROHDENDORF, 1962b); transferred to the order Paracoleoptera by LAURENTIAUX (1953), and to the order Hyoperlida by RASNITSYN (1980f).] ZALESSKY, 1947. *Perm.,* USSR (European RSFSR).

Permembia TILLYARD, 1928f, p. 479 [**P. delicatula*; OD]. Little-known genus, based on poorly preserved wing. [Type of the family Permembiidae TILLYARD, 1937a. Originally placed by TILLYARD (1928f, 1937a) in the family Delopteridae, then considered to belong to the order Psocoptera; subsequently transferred with some uncertainty by MARTYNOVA (1962a) to the Miomoptera. CARPENTER (1976), following study of the type specimen of *Permembia,* placed the genus in *incertae sedis* at the ordinal level.] CARPENTER, 1935a; RIEK, 1973, 1976a. *Perm.,* USA (Kansas).

Permomerope TILLYARD, 1926e, p. 275 [**P. australia*; OD]. Little-known genus. [Type of the family Permomeropidae HANDLIRSCH, 1937. Originally placed in the Mecoptera by TILLYARD (1926e); transferred to the Trichoptera by SUKATSHEVA (1976); and assigned by WILLMANN (1978) to the Mecoptera-Trichoptera complex, order Unknown.] *Perm.,* Australia (New South Wales); USSR (Kazakh).

Permonia KUKALOVÁ, 1963a, p. 43 [**P. permoni*; OD]. Little-known genus, based on several isolated wings. [Originally placed in the order Miomoptera (family Permembiidae); transferred to the order Uncertain by CARPENTER (1976).] *Perm.,* Europe (Czechoslovakia).

Permonikia KUKALOVÁ, 1963a, p. 41 [**P. permoniki*; OD]. Little-known genus, based on isolated wings. [Originally placed in the order Miomoptera, family Permembiidae. See discussion under *Permembia.*] CARPENTER, 1976; RASNITSYN, 1977c. *Perm.,* Europe (Czechoslovakia).

Permonka RIEK, 1973, p. 520 [**P. bifida*; OD]. Genus based on specimens of fore and hind wings. [Type of the family Permonkidae RASNITSYN, 1977c. Placed by RIEK (1973) and RASNITSYN (1977c) in the Miomoptera. See discussion under the order Miomoptera.] *Perm.,* South Africa (Natal); *Trias., Jur.,* USSR (Asian RSFSR).

Permonympha SHAROV, 1957b, p. 1107 [**P. gracilis*; OD]. Little-known genus, based on nymph with long antennae and legs, prominent cerci, and slender wing pads. [Originally placed in the order Miomoptera.] ROHDENDORF & RASNITSYN, 1980. *Perm.,* USSR (Asian RSFSR).

Permosialis MARTYNOV, 1928b, p. 94 [**P. paucinervis*; OD]. Little-known genus. [Type of the family Permosialidae MARTYNOV (1928b). Placed in the order Neuroptera by MARTYNOV (1928b) and MARTYNOVA (1962a), but transferred to the Miomoptera by RASNITSYN (1977c, and in ROHDENDORF & RASNITSYN, 1980).] *Perm.,* USSR (European RSFSR).

Platychorista TILLYARD, 1926c, p. 154 [**P. venosa*; OD] [=*Protomerope* TILLYARD, 1926c, p. 157 (type, *P. permiana*)]. Little-known genus. [Type of the family Protomeropidae TILLYARD, 1926c. Placed in the Mecoptera by TILLYARD (1926c), MARTYNOVA (1962e), and HENNIG (1969c). Transferred to the Trichoptera by SUKATSHEVA (1976) and to the Trichoptera-Lepidoptera complex by WILLMANN (1978).] CARPENTER, 1930b. *Perm.,* USA (Kansas).

Protoblattinopsis LAURENTIAUX, 1953, p. 447 [**P. stubblefieldi*; OD]. Little-known genus, based on

proximal fragment of wing. [Type of the family Protoblattinopsidae LAURENTIAUX, 1966. Originally placed in the order Protorthoptera, but transferred by RASNITSYN (1980f) to the order Blattinopseida, considered to be related to the order Caloneurodea.] KUKALOVÁ, 1959b; CARPENTER, 1966. *U. Carb.,* England.

Recula HANDLIRSCH, 1906b, p. 128 [**R. parva*; OD]. Little-known genus, based on incomplete wing. [Placed by HANDLIRSH (1906b) in a new order, Reculoidea.] SCHLECHTENDAL, 1913; HANDLIRSCH, 1919b, 1920, 1922. *U. Carb.,* Europe (Germany).

Redactineura RIEK, 1973, p. 529 [**R. acuminata*; OD]. Little-known genus, based on apical fragment of wing. [Not assigned to an order, but placed in the family Uninervidae, order Uncertain.] *Perm.,* South Africa.

Reprehensa BODE, 1953, p. 292 [**R. acuminata*; OD]. Little-known genus, based on poorly preserved wing. [Originally placed in the Mecoptera.] *Jur.,* Europe (Germany).

Saurophthirus PONOMARENKO, 1976, p. 103 [**S. longipes*; OD]. Little-known genus, based on wingless specimen, with long, slender legs. [Originally placed in the order Siphonaptera.] RASNITSYN, 1980c. *Cret.,* USSR (Asian RSFSR).

Scalaeoptera BOLTON, 1922, p. 88 [**S. recta*; OD]. Little-known genus, based on small fragment of wing. [Originally placed, with some doubt, in the Protorthoptera.] *U. Carb.,* England.

Sheimia MARTYNOVA, 1958, p. 69 [**S. sojanensis*; OD]. Little-known genus, based on wing fragment and part of body. [Type of the family Sheimiidae MARTYNOVA (1958). Placed in the Embioptera by MARTYNOVA (1958, 1962a) and RIEK (1970); transferred to the order Uncertain by CARPENTER (1976).] RASNITSYN in ROHDENDORF & RASNITSYN, 1980. *Perm.,* USSR (European RSFSR).

Sindomiomoptera RASNITSYN, 1977c, p. 71 [**S. sojanensis*; OD]. Little-known genus. [Originally placed in the family Permosialidae, order Miomoptera. See discussion under *Permosialis.*] *Perm.,* USSR (Asian RSFSR).

Sphalmatoblattina HANDLIRSCH, 1906b, p. 392 [**Blattina latinervis* HEER, 1864, p. 288; OD]. Little-known genus, based on isolated wing. [Considered by HANDLIRSCH to be orthopteroid, but placed by HAUPT (1952) in the Mecoptera; assigned by WILLMANN (1978) to the category of order Uncertain.] *Perm.,* Europe (Germany).

Stereochorista TILLYARD, 1919a, p. 196 [**S. frustrata*; OD]. Little-known genus, based on wing fragment. [Placed in the Mecoptera by TILLYARD (1919a) and LAURENTIAUX (1953), but considered by RIEK (1956) and WILLMANN (1978) to be more closely related to the Trichoptera.] *Trias.,* Australia (Queensland).

Sycopteron BOLTON, 1917a, p. 6 [**S. symmetricum*; OD]. Little-known genus. [Originally placed in the Mecoptera by BOLTON (1917a), but transferred to the Psocoptera by TILLYARD (1918f) and to the Caloneurodea by LAMEERE (1917c).] HANDLIRSCH, 1922; WILLMANN, 1978. *U. Carb.,* Europe (France).

Tillyardites HANDLIRSCH, 1937, p. 110 [**Archipanorpa bairdae* TILLYARD, 1922a, p. 284; OD]. Little-known genus, based on wing fragment. [Type of the family Tillyarditidae HANDLIRSCH, 1937. Placed in the Mecoptera by TILLYARD (1922a, 1926e), MARTYNOVA (1948a), and HANDLIRSCH (1937); ordinal position considered uncertain by CARPENTER (1954b) and WILLMANN (1978).] *Perm.,* Australia (New South Wales).

Trachopteryx CARPENTER, 1976, p. 356 [**T. martynovi*; OD]. Little-known genus, based on well-preserved wing. [Type of the family Trachopterygidae CARPENTER, 1976]. *Perm.,* USA (Kansas).

Trichorthophlebia HANDLIRSCH, 1939, p. 89 [**T. pilifera*; OD]. Little-known genus. [Placed by HANDLIRSCH (1939), with some doubt, in the Trichoptera and by BODE (1953) and WILLMANN (1978) in the Mecoptera.] *Jur.,* Europe (Germany).

Uninervus BECKER-MIGDISOVA, 1951, p. 1207 [**U. zorapteroides*; OD]. Little-known genus, based on incomplete wing. [Type of the family Uninervidae BECKER-MIGDISOVA, 1951; not assigned to an order, but probably belonging to the Neoptera]. BECKER-MIGDISOVA, 1962c. *Perm.,* USSR (Asian RSFSR).

Xeroptera BOLTON, 1922, p. 85 [*X. *obtusata*; OD]. Little-known genus, based on small fragment of a wing. [Originally placed in the Protorthoptera, with some doubt, but not assigned to any family.] *U. Carb.,* England.

Subclass PTERYGOTA
Order UNCERTAIN

The following genera, apparently belonging to the subclass Pterygota, are too poorly known to permit assignment to orders.

Merlebachia WATERLOT, 1934, p. 162 [**M. grimaldi*; OD]. Little-known genus, based on wing fragment. [Originally placed in the Megasecoptera (family Mecynopteridae), but transferred to order Uncertain by KUKALOVÁ-PECK (1975).] *U. Carb.,* Europe (France).

Pteronepionites BOLTON, 1921, p. 27 [collective group]. Includes nymphal wings that cannot be assigned to a known genus of Pterygota. *U. Carb.,* England.

Class INSECTA
Subclass UNCERTAIN

The genus described below, apparently belonging to the class Insecta, is too poorly known to permit assignment to subclasses.

Xiphenax COCKERELL, 1931a, p. 96 [**X. jurassicus*; OD]. Little-known genus, based on a very poorly preserved specimen; possibly an immature insect, but not assigned to any order. *Jur.*, USA (New Mexico).

Superclass HEXAPODA
Class UNCERTAIN

The genus described below, apparently belonging to the superclass Hexapoda, is too poorly known to allow assignment to classes.

Onycholepisma PIERCE, 1951, p. 45 [**O. arizonae*; OD]. Little-known genus, based on poorly preserved specimen. [Originally placed in the class Insecta (Zygentoma), but transferred to the class Diplura by PACLT (1967).] *Tert.*, USA (Arizona).

THE SUPERCLASS HEXAPODA

OUTLINE OF CLASSIFICATION

The following outline of the superclass Hexapoda summarizes taxonomic relationships, geologic occurrence, and numbers of recognized genera of fossils in each suprafamilial group.

Superclass Hexapoda, 5188, *Dev.–Holo.*
Class and Order Collembola, 14, *Dev.–Holo.*
Class and Order Protura, 0, *Holo.*
Class and Order Diplura, 4, *Paleoc.–Holo.*
Class Insecta, 5169, *U. Carb.–Holo.*
Subclass Apterygota, 8, *U. Carb.–Holo.*
Order Archaeognatha, 5, *U. Carb.–Holo.*
Order Zygentoma, 3, *Oligo.–Holo.*
Subclass Pterygota, 5160, *U. Carb.–Holo.*
Infraclass Palaeoptera, 502, *U. Carb.–Holo.*
Order Ephemeroptera, 59, *U. Carb.–Holo.*
Order Palaeodictyoptera, 125, *U. Carb.–Perm.*
Order Megasecoptera, 34, *U. Carb.–Perm.*
Order Diaphanopterodea, 20, *U. Carb.–Perm.*
Order Protodonata, 13, *U. Carb.–Perm.*
Order Odonata, 204, *Perm.–Holo.*
Infraclass Palaeoptera, Order Uncertain, 47
Infraclass Neoptera, 4656, *U. Carb.–Holo.*
Division Exopterygota, 1393, *U. Carb.–Holo.*
Order Perlaria, 28, *Perm.–Holo.*
Order Protorthoptera, 236, *U. Carb.–Trias.*
Order Blattaria, see p. 134, *U. Carb.–Holo.*
Order Isoptera, 33, *Cret.–Holo.*
Order Manteodea, 4, *Oligo.–Holo.*
Order Protelytroptera, 29, *Perm.–Cret.*
Order Dermaptera, 16, *Jur.–Holo.*
Order Orthoptera, 166, *U. Carb.–Holo.*
Order Grylloblattodea, 0, *Holo.*
Order Titanoptera, 8, *Trias.*
Order Phasmatodea, 13, *Trias.–Holo.*
Order Embioptera, 5, *Oligo.–Holo.*
Order Psocoptera, 58, *Perm.–Holo.*
Order Zoraptera, 0, *Holo.*
Order Mallophaga, 0, *Holo.*
Order Anoplura, 0, *Holo.*
Order Caloneurodea, 16, *U. Carb.–Perm.*
Order Miomoptera, 10, *U. Carb.–Perm.*
Order Thysanoptera, 43, *Perm.–Holo.*
Order Hemiptera, 728, *Perm.–Holo.*
Division Endopterygota, 3203, *Perm.–Holo.*
Order Coleoptera, 1397, *Perm.–Holo.*
Order Strepsiptera, 4, *Oligo.–Holo.*
Order Neuroptera, 125, *Perm.–Holo.*
Order Glosselytrodea, 11, *Perm.–Jur.*
Order Trichoptera, 112, *Perm.–Holo.*
Order Lepidoptera, 111, *Cret.–Holo.*
Order Mecoptera, 82, *Perm.–Holo.*
Order Siphonaptera, 1, *Oligo.–Holo.*
Order Diptera, 708, *Trias.–Holo.*
Order Hymenoptera, 652, *Trias.–Holo.*
Infraclass Neoptera, Order Uncertain, 60
Subclass Pterygota, Order Uncertain, 2
Class Insecta, Subclass Uncertain, 1
Superclass Hexapoda, Class Uncertain, 1

RANGES OF TAXA

The stratigraphic distribution of classes, orders, and families of Hexapoda recognized in this volume of the *Treatise* is shown graphically in Table 2, which follows (compiled by JACK D. KEIM, computer software by KENNETH C. HOOD and DAVID W. FOSTER).

TABLE 2. *Stratigraphic Distribution of the Hexapoda.*

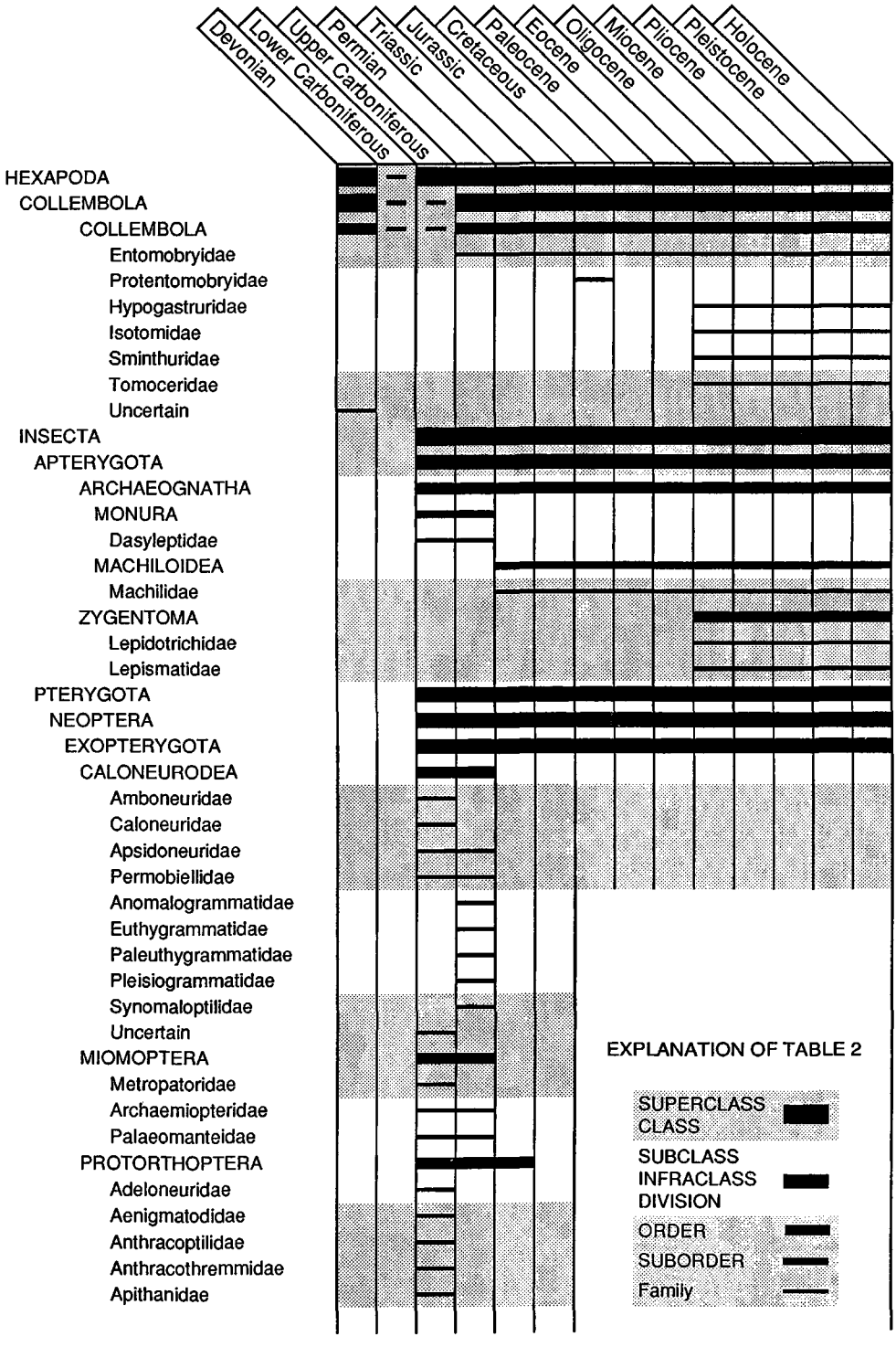


TABLE 2. (*Continued.*)

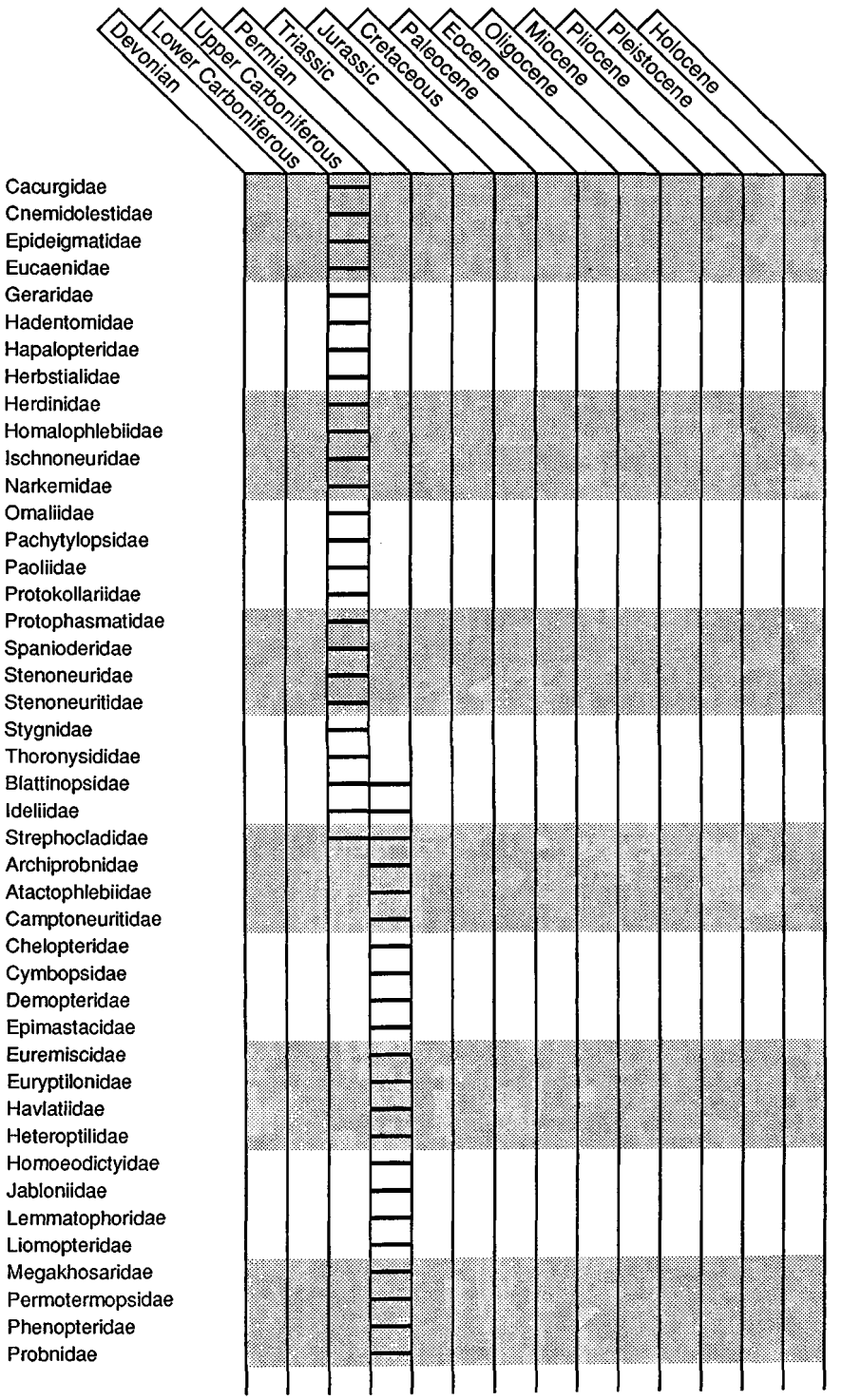


TABLE 2. (*Continued.*)

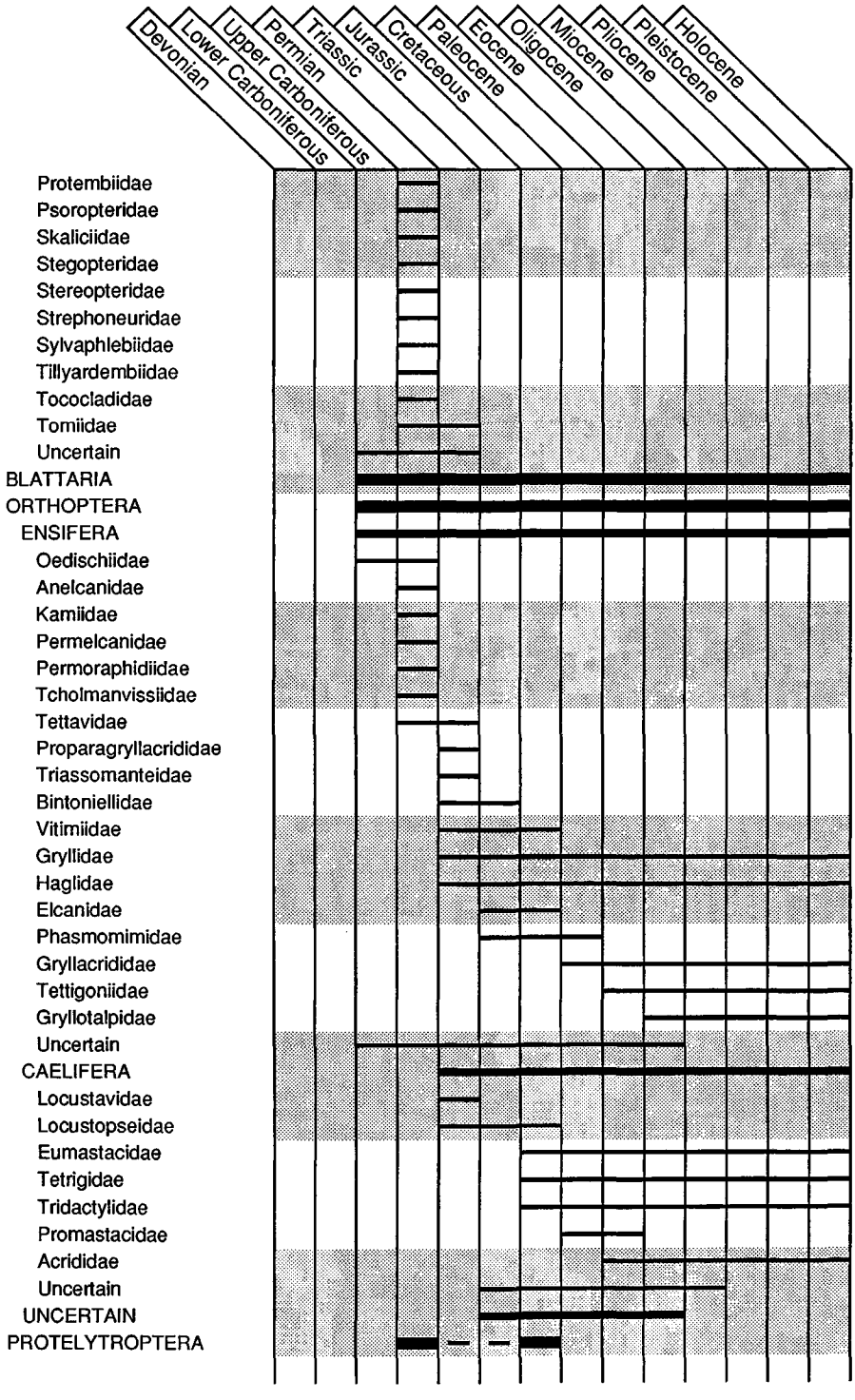


TABLE 2. (*Continued.*)

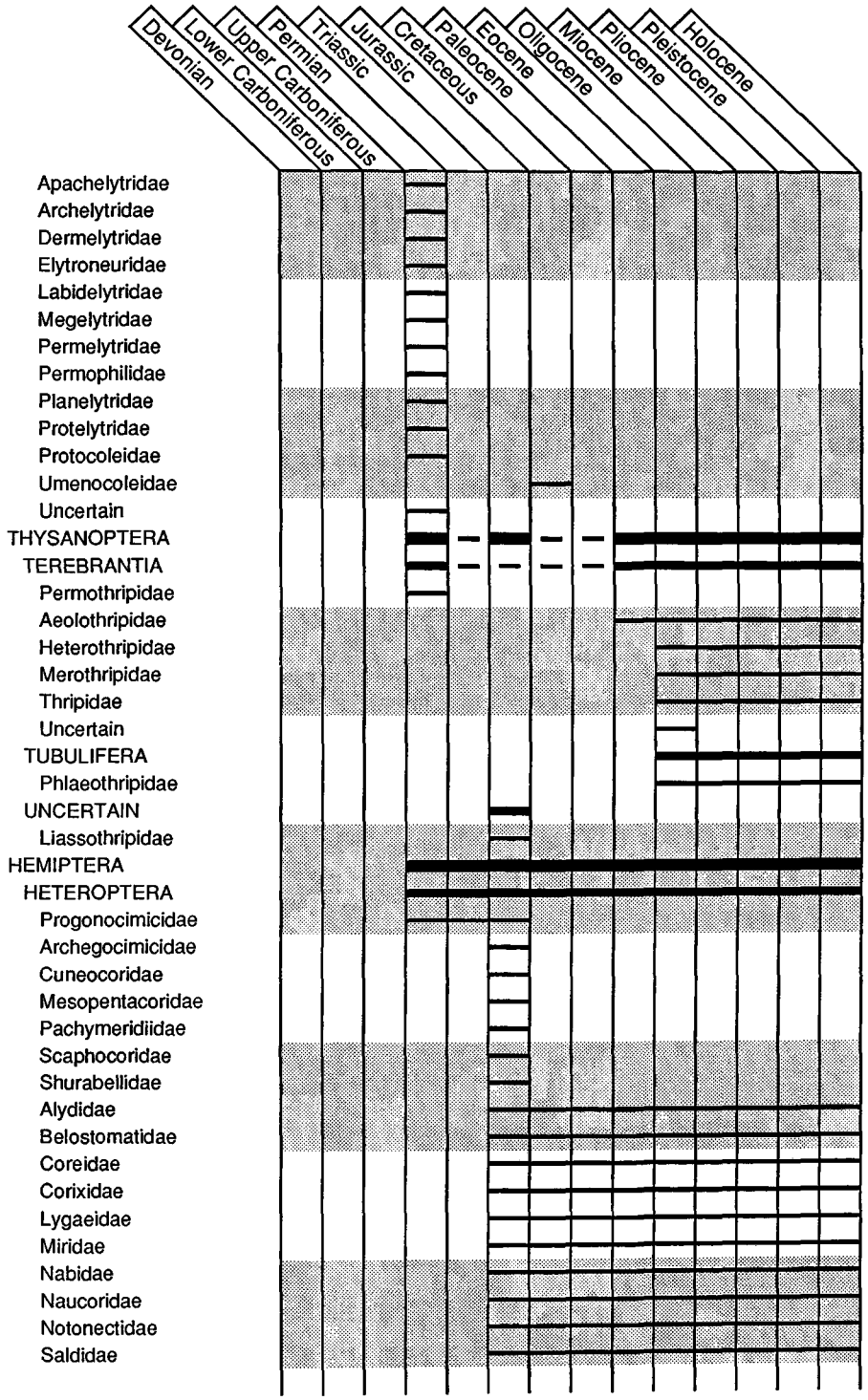


TABLE 2. (*Continued.*)

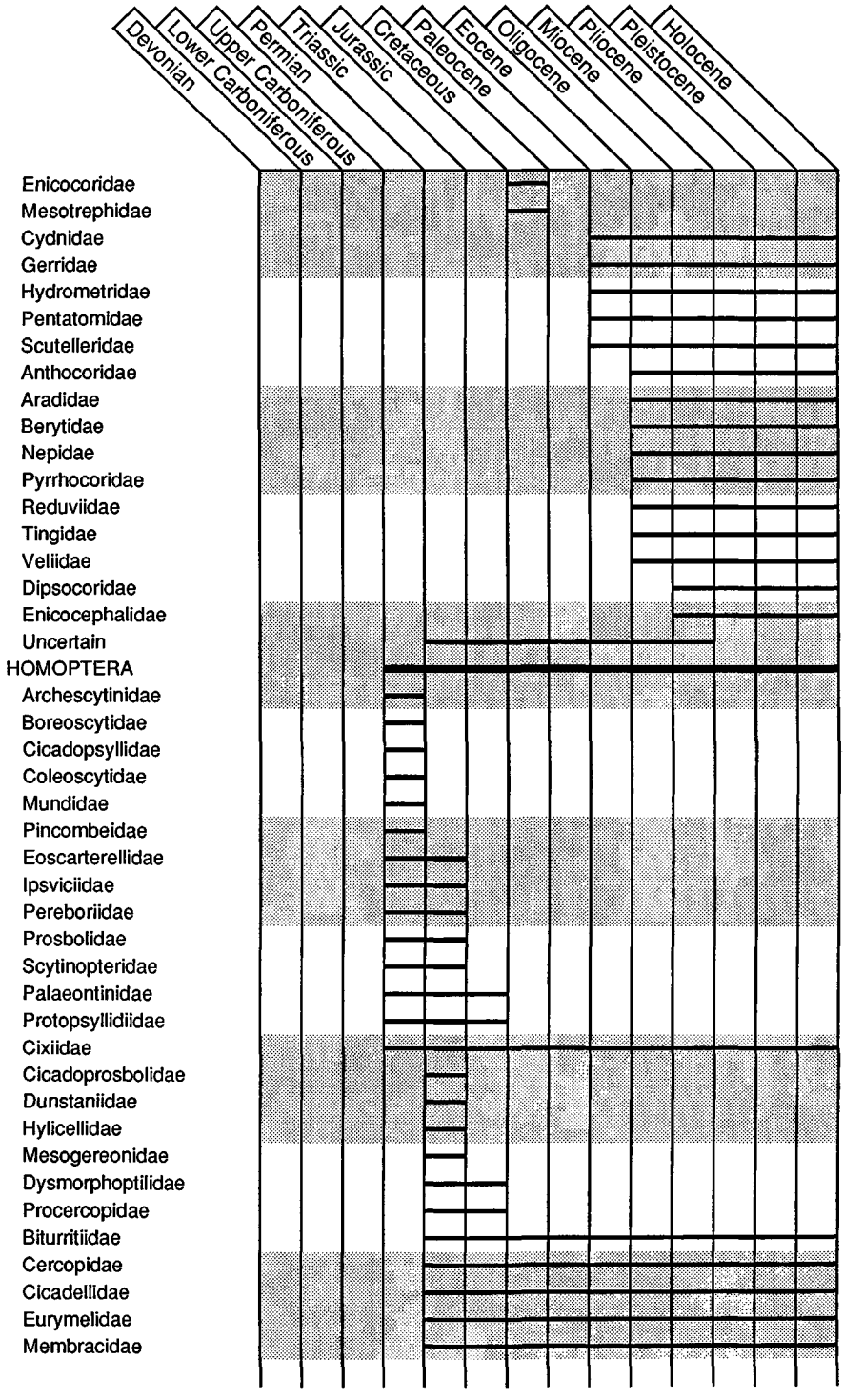


TABLE 2. (*Continued.*)

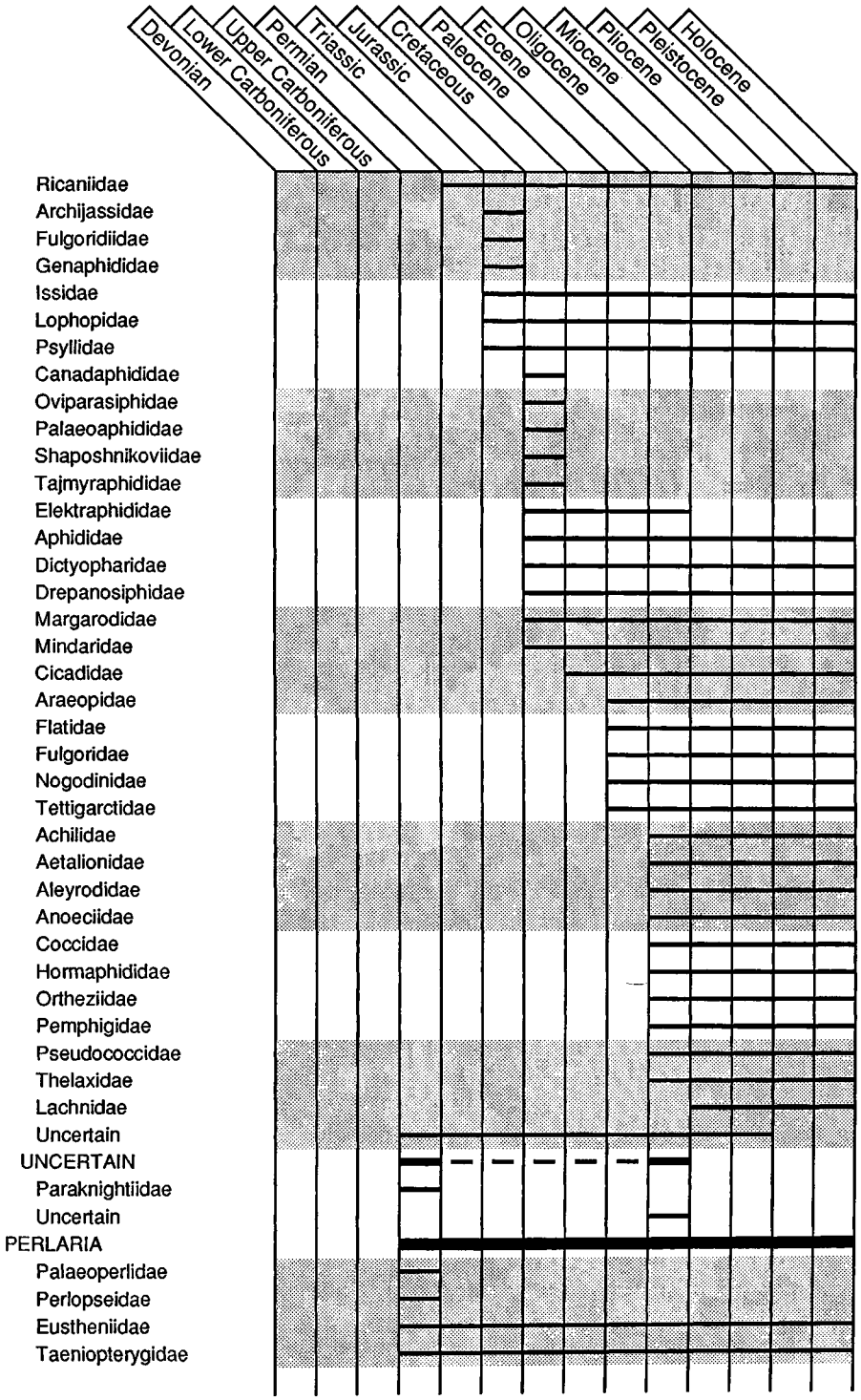
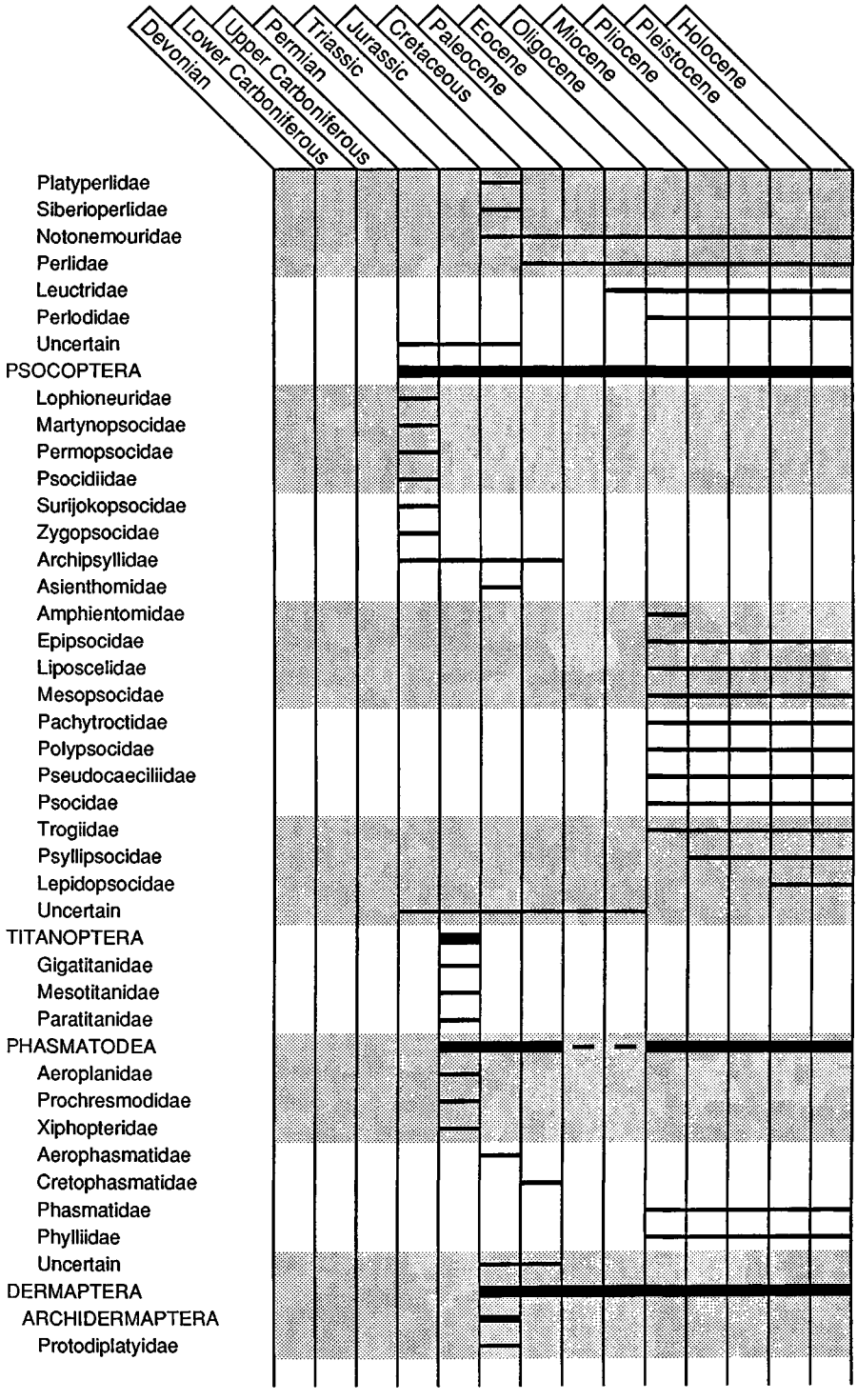


TABLE 2. (*Continued.*)



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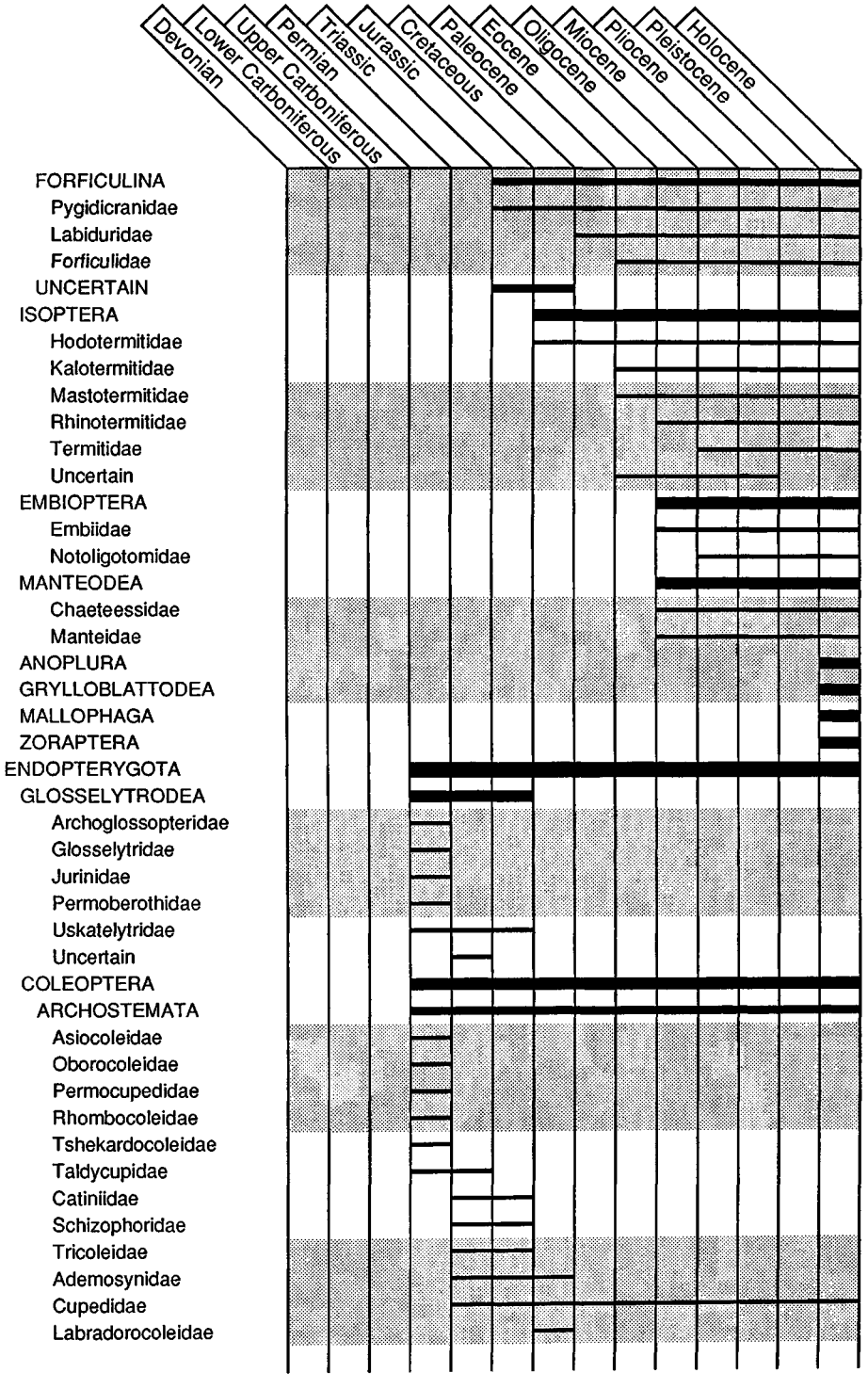
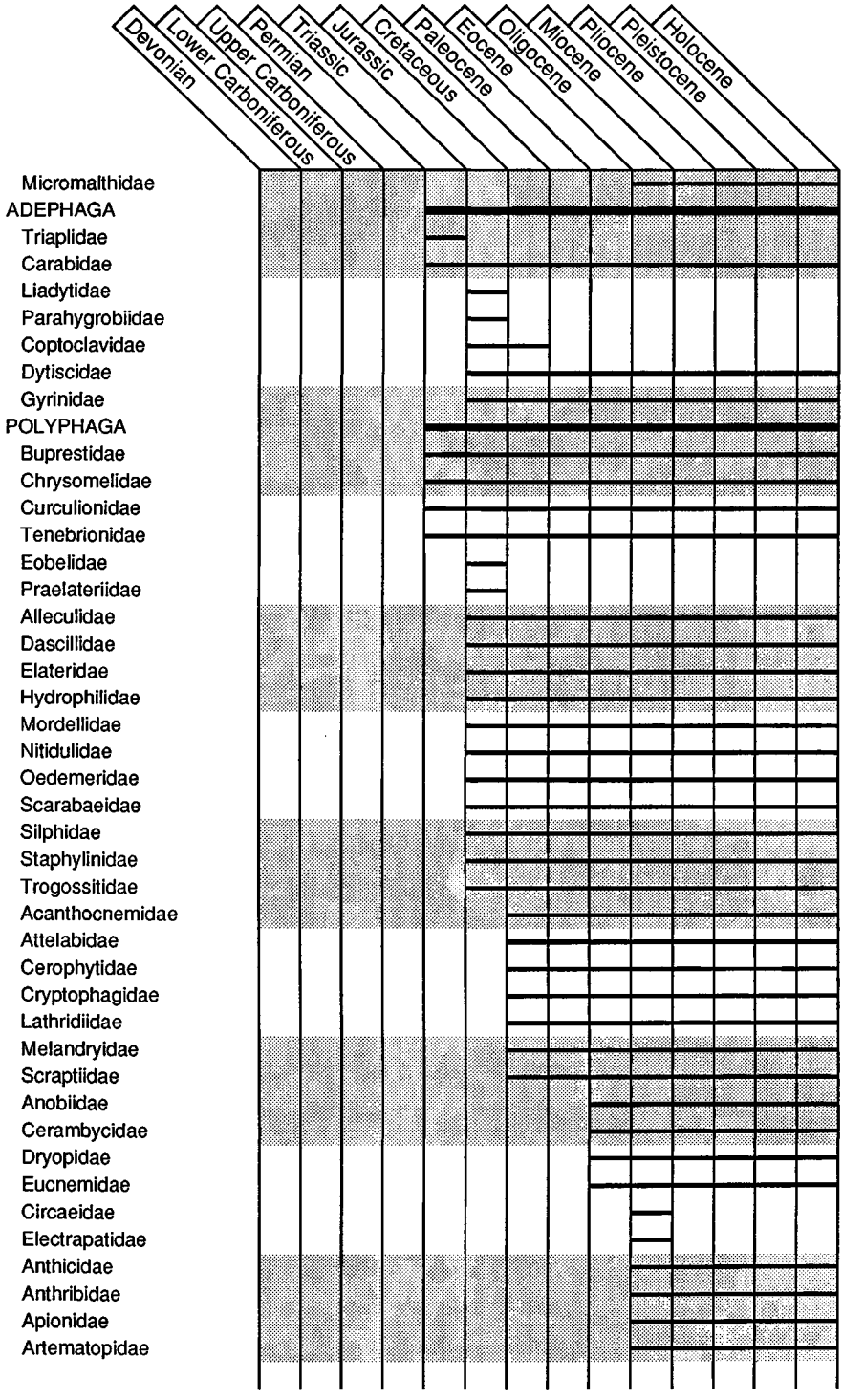


TABLE 2. (*Continued.*)



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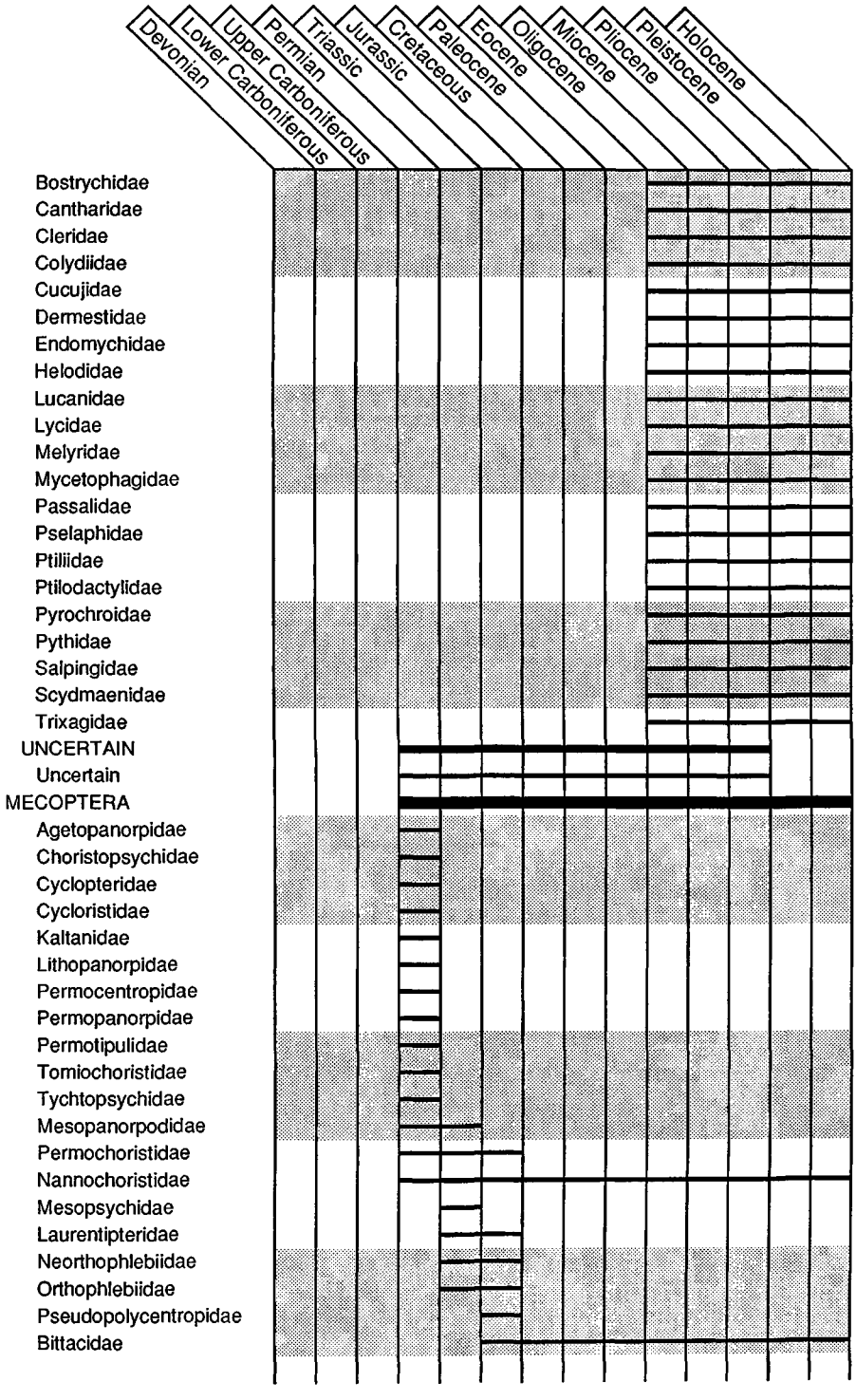

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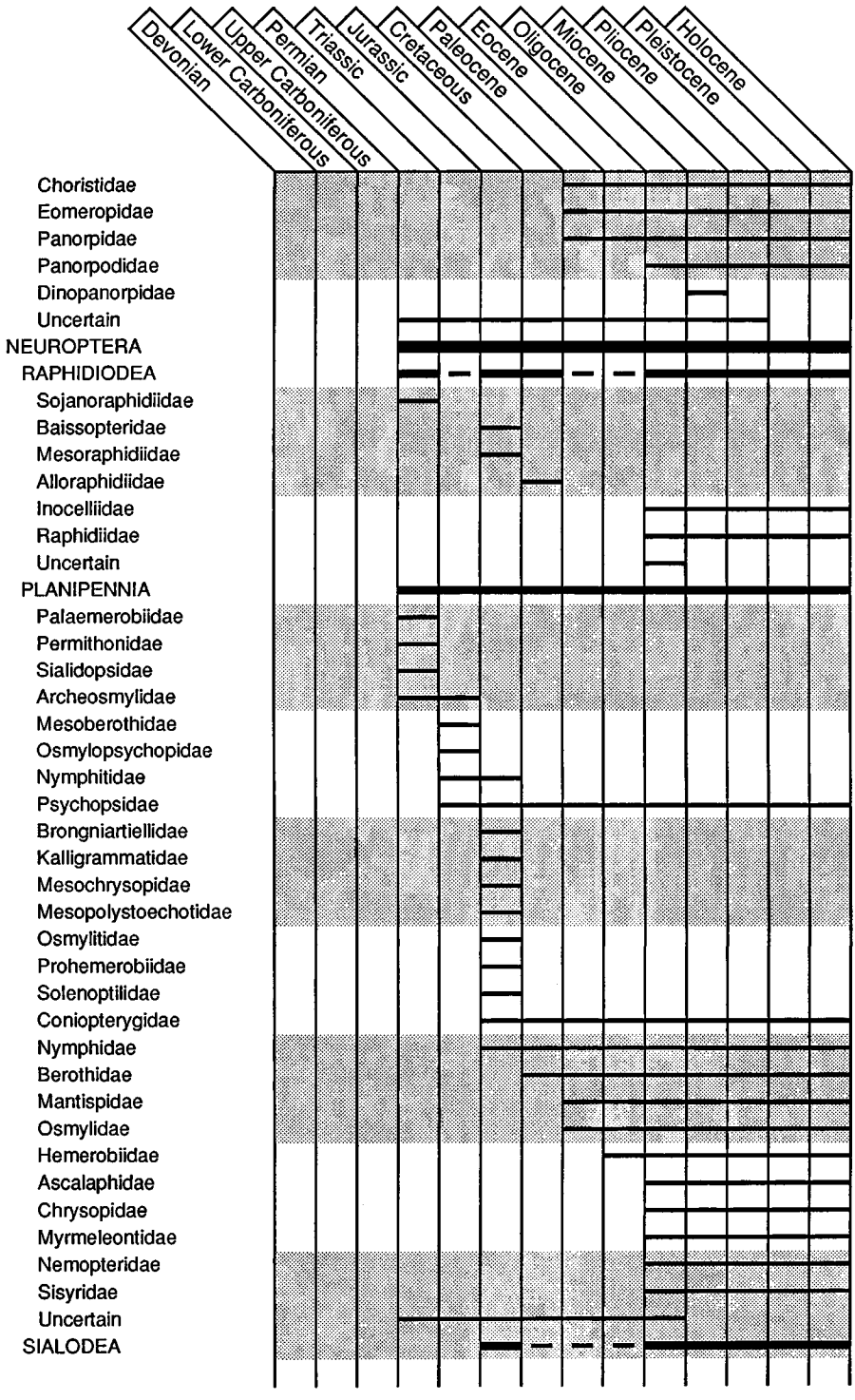

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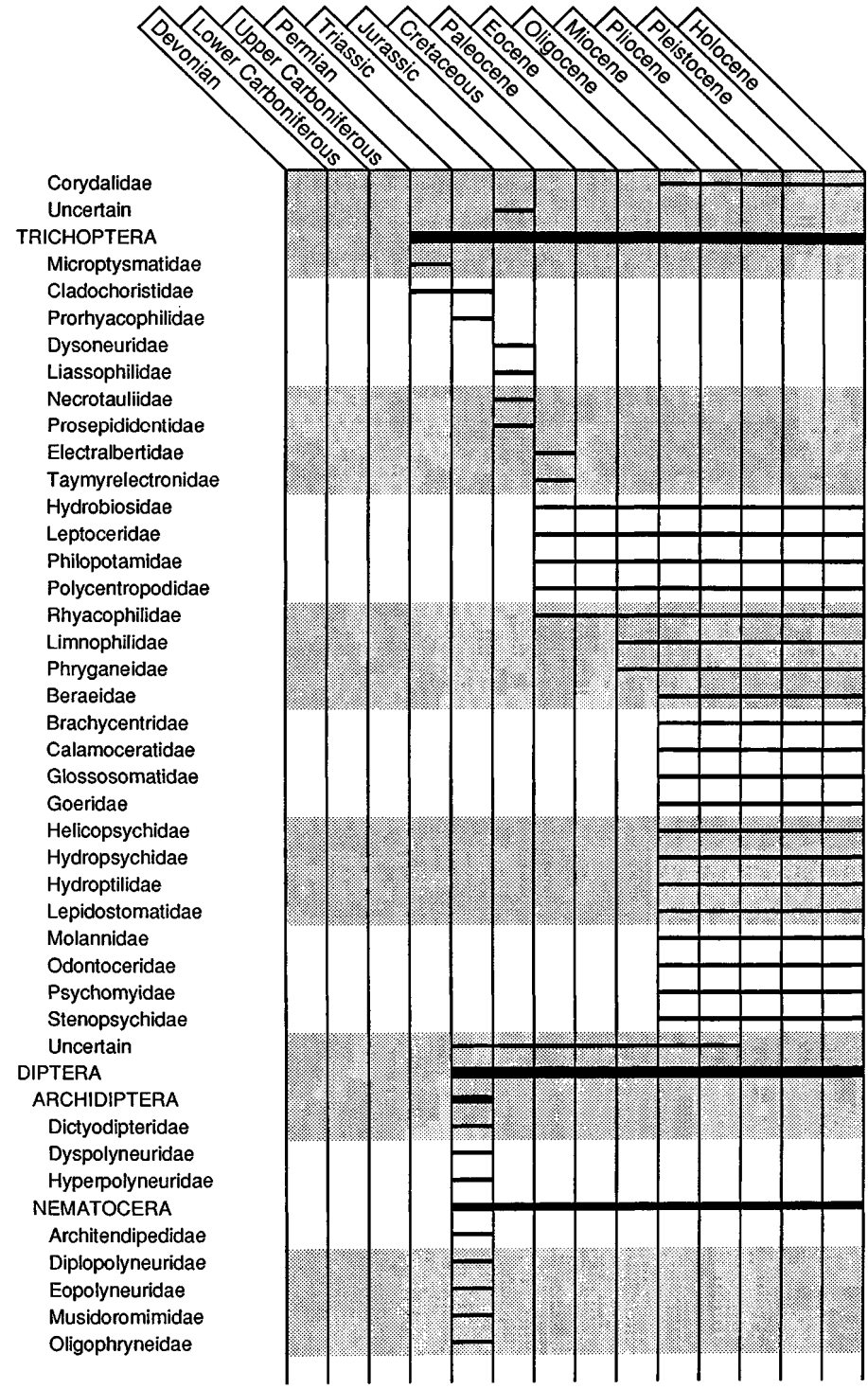

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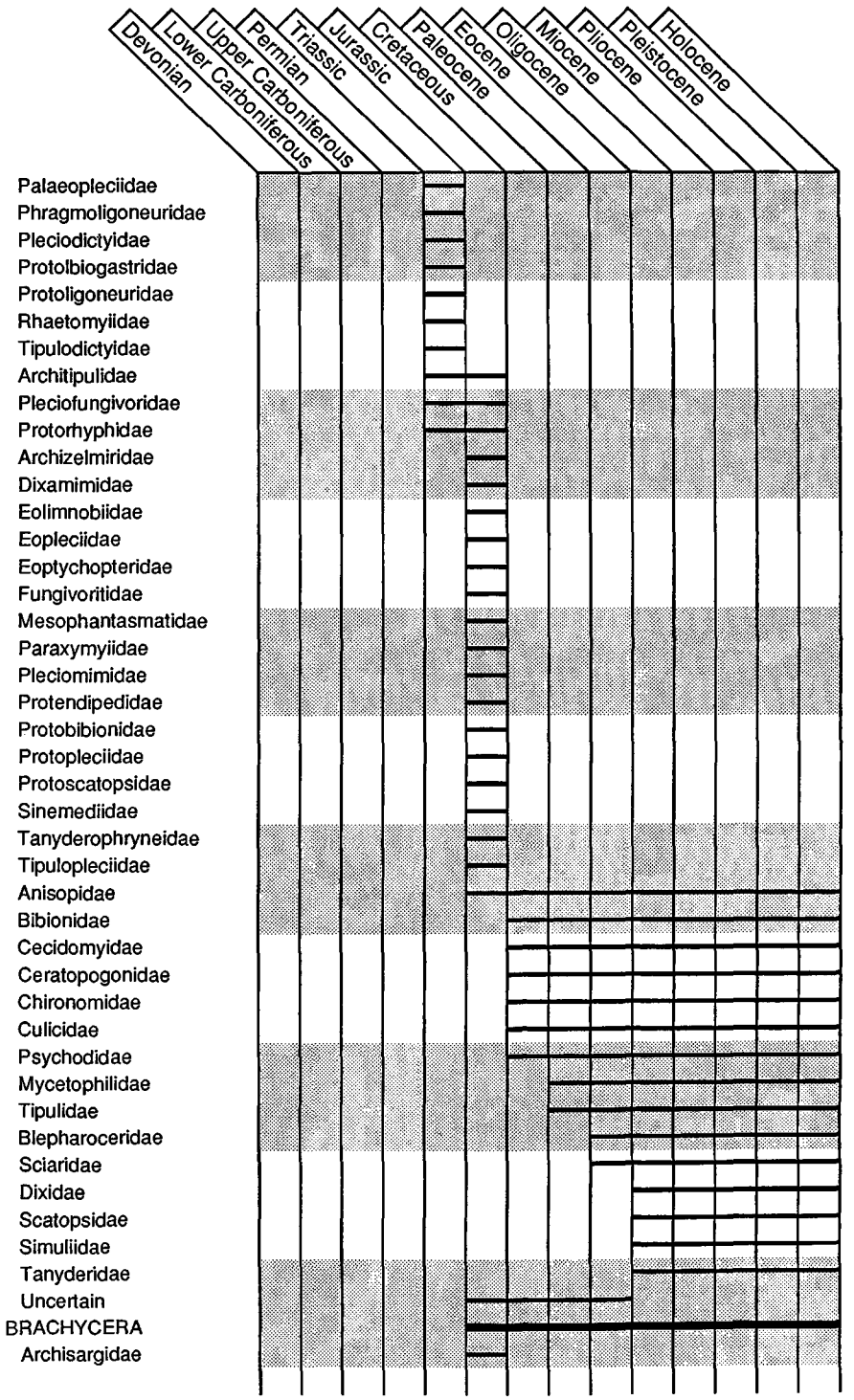

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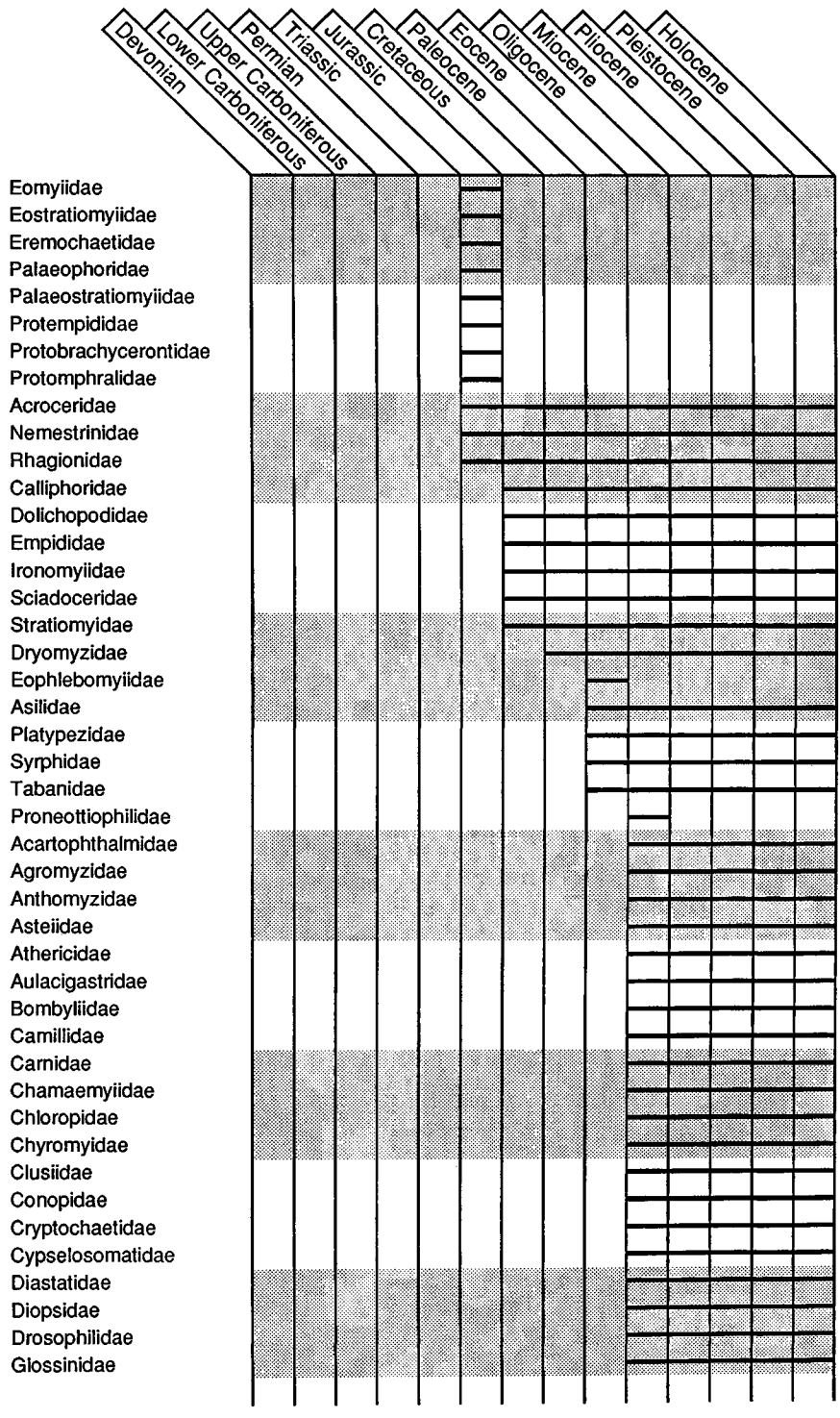

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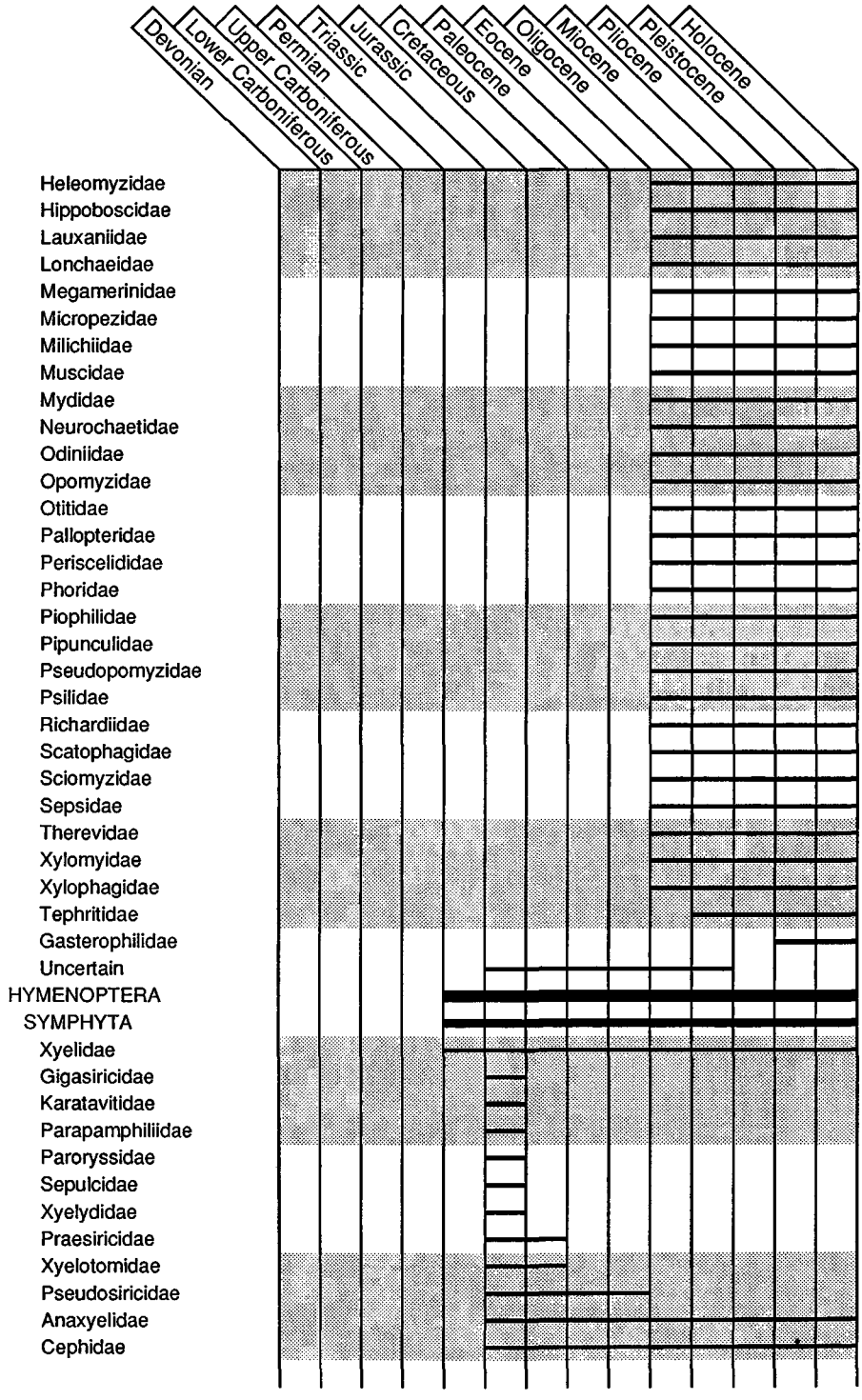

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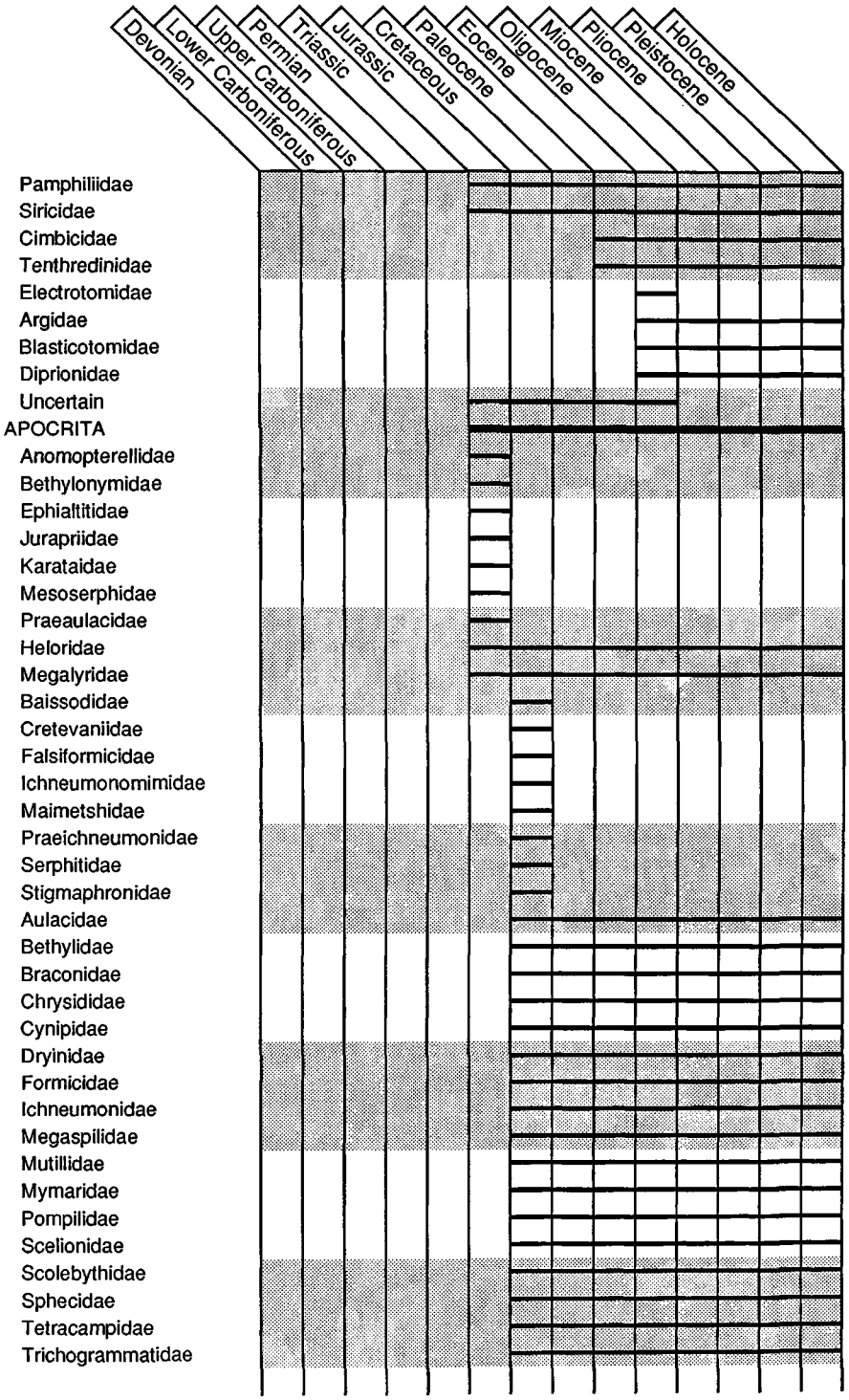

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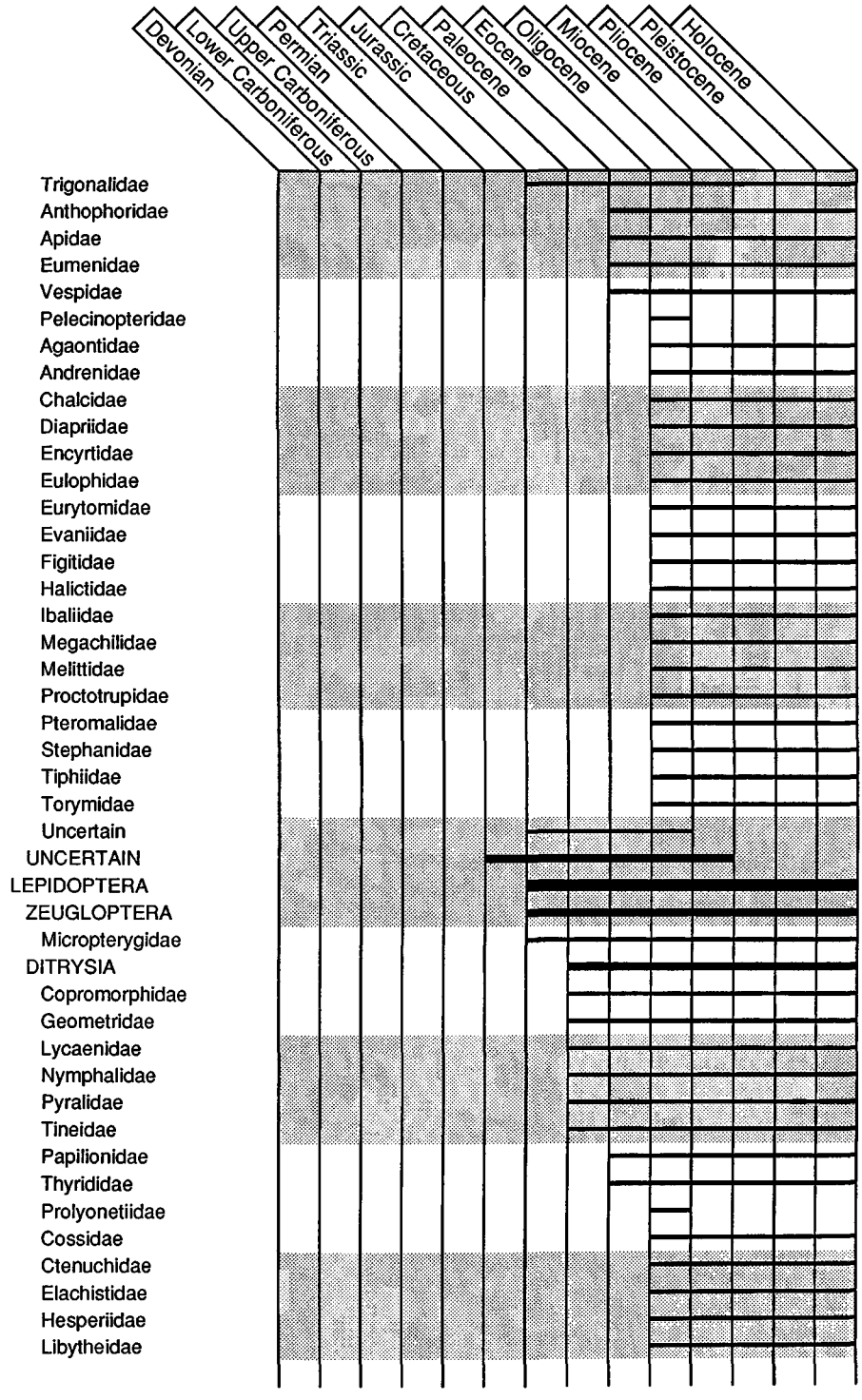

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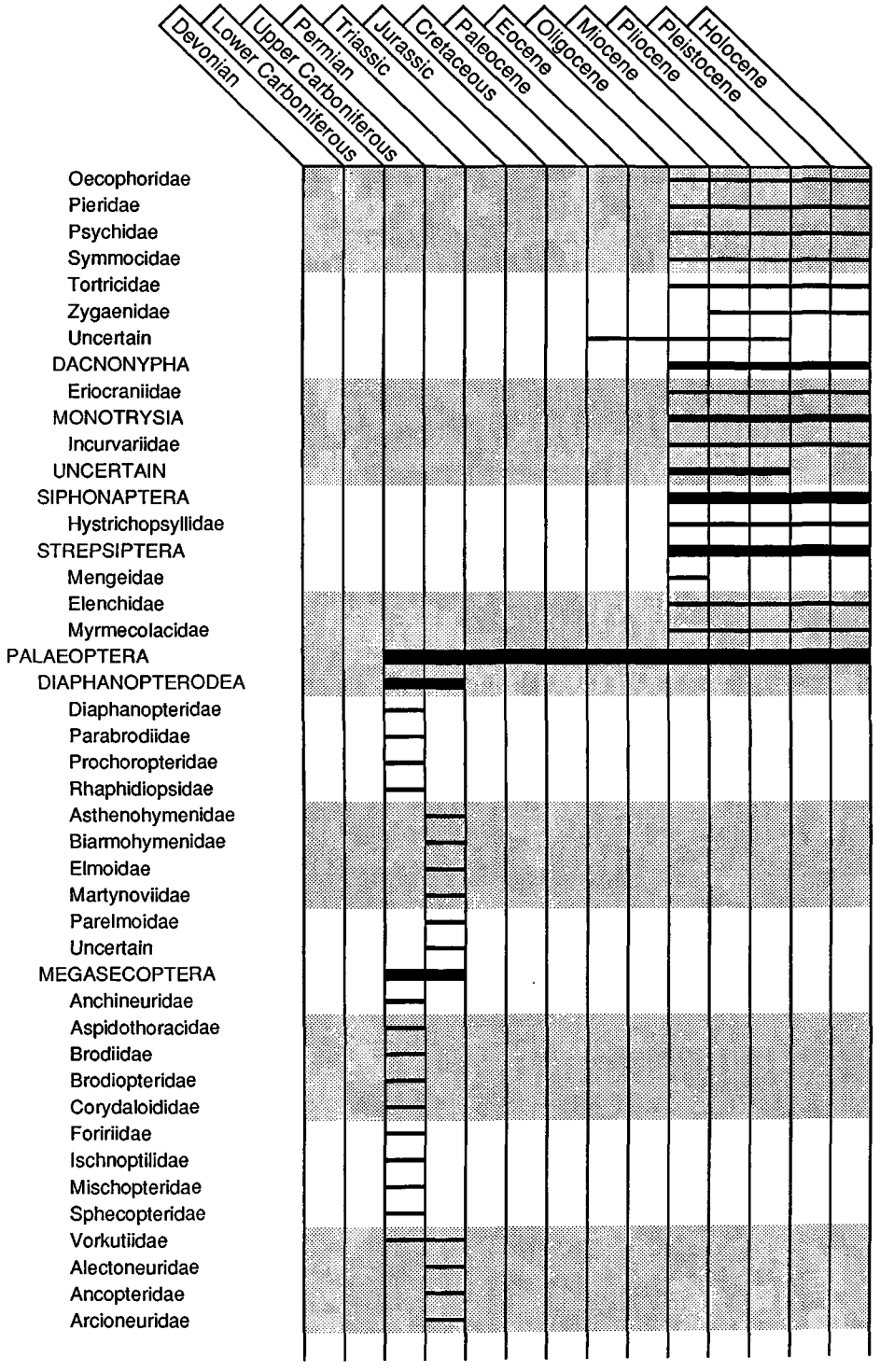

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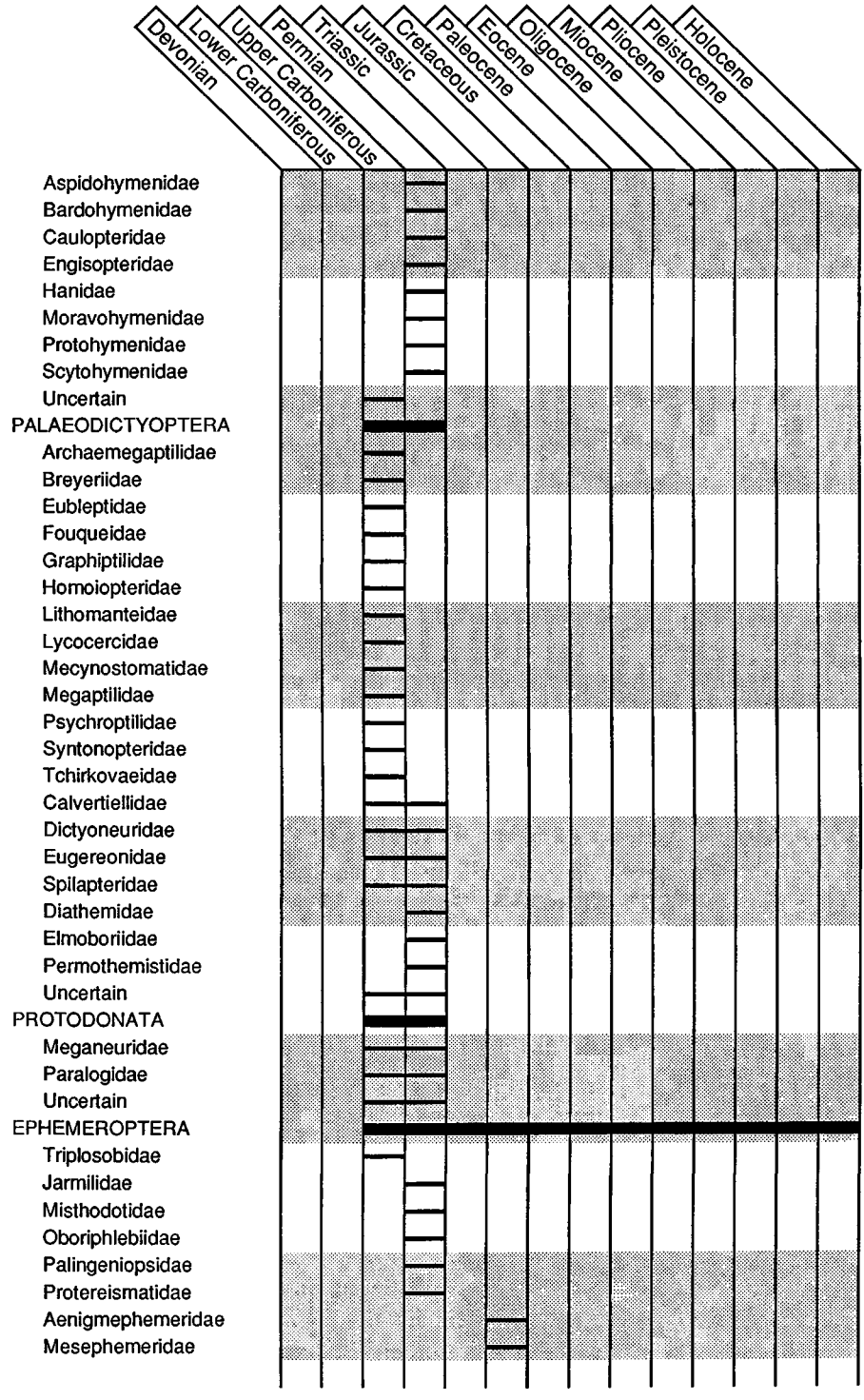

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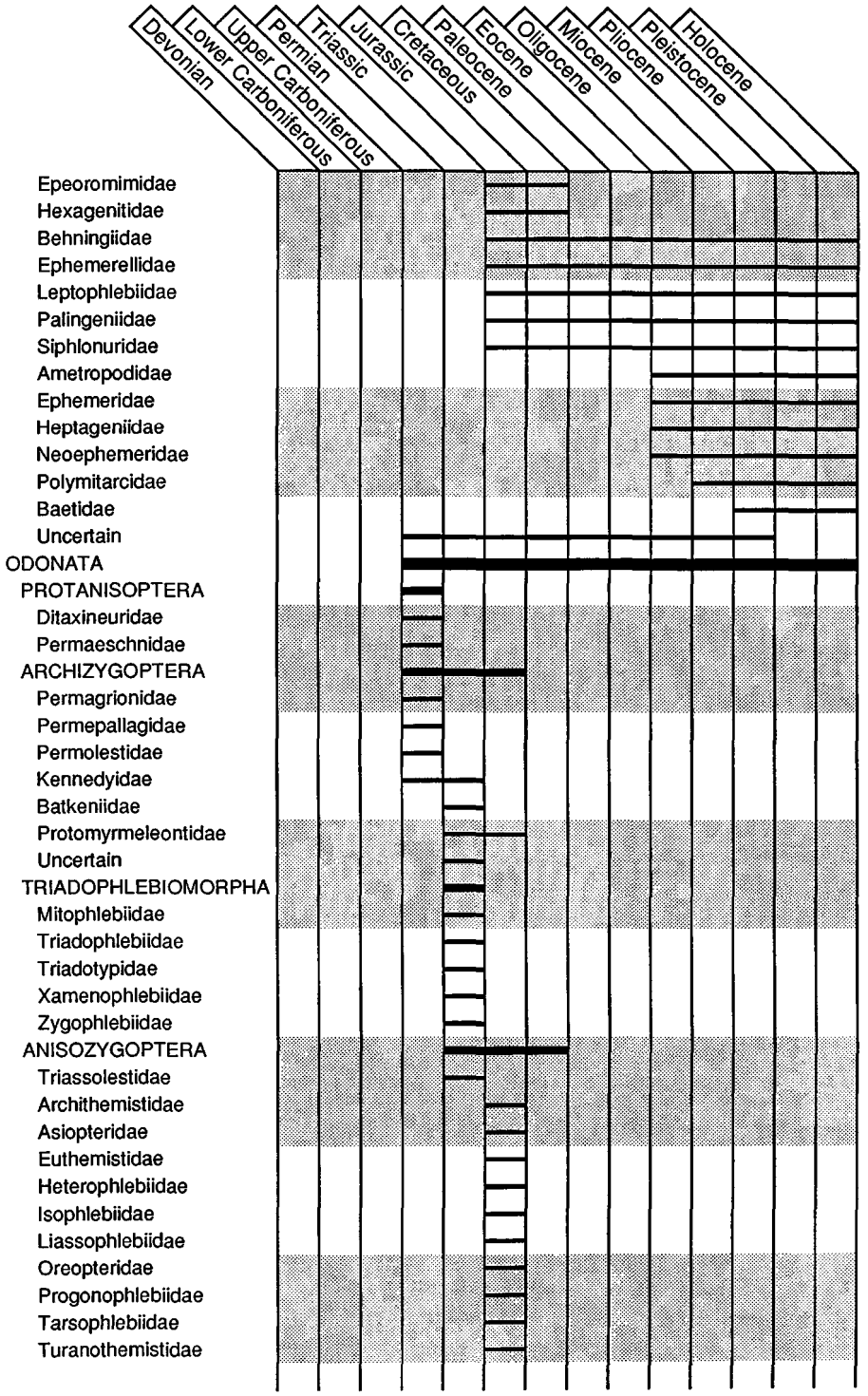

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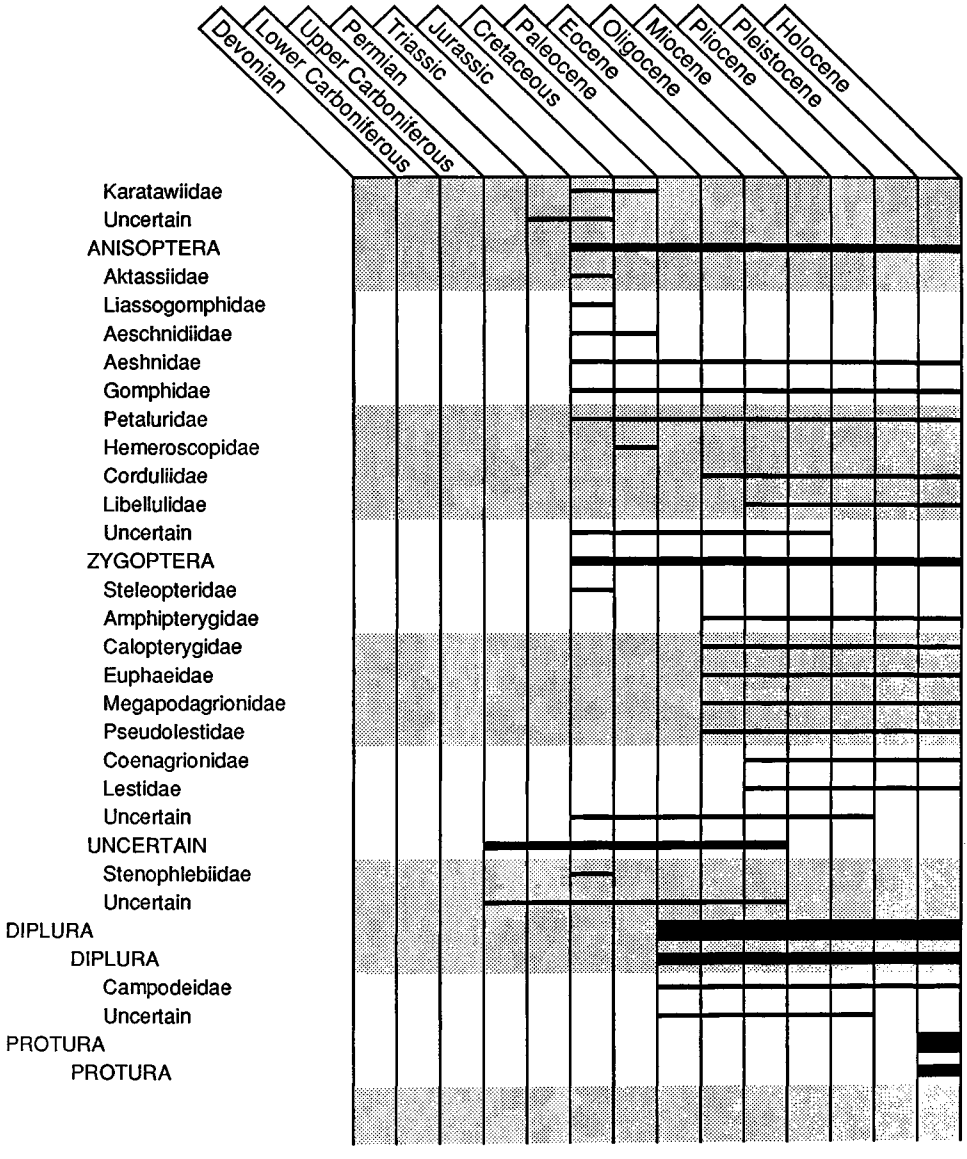

GLOSSARY OF ENTOMOLOGICAL TERMS

The editors of this volume of the *Treatise* have suggested that a glossary of entomological terms might be useful to readers who are not entomologists. I have accordingly included here a glossary of somewhat more than a hundred commonly used terms. If a more extensive glossary is needed, I recommend one of the following:

> *An Introduction to the Study of Insects,* 3rd edition, by Donald J. Borror and Dwight M. DeLong. 812 pages, 655 figures. Holt, Rinehart, & Winston. 1970. [The glossary is on pages 735–752. Many structures mentioned in the glossary are illustrated.]
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> *The Torre-Bueno Glossary of Entomology,* revised edition, by George S. Tulloch and Stephen W. Nichols. Managing editor, Randall T. Schuh. 840 pages. Published by the New York Entomological Society and the American Museum of Natural History. 1989.

Some of these terms have multiple definitions that are specific to the order in which they are used. For such terms, I indicate the name of the order in parentheses at the end of the definition.

alate: possessing wings.

alula: the basal membraneous portion of the wing.

anal crossing: where the anal veins branch posteriorly from vein CUA to vein A.

anal veins: longitudinal wing veins, posterior to vein CUP.

antenodals: crossveins on the costal margin of wings between C and SC from the base of the wing to the nodus (Odonata).

archedictyon: a primitive network of small wing veins.

arculus: the short, fused bases of RS+MA (Odonata).

areola postica: an open cell between the branches of CUA (Psocoptera).

arolium: a terminal pad between claws.

calipteres: pair of basal lobes on wings, proximal to alula (Diptera).

cerci: paired appendages of the 11th abdominal segment.

claval suture: a suture of the fore wing, between the clavus and the corium (Hemiptera).

clavus: the posterior, triangular area of the fore wing. (Hemiptera).

clypeus: the area of the head between the frons and the labium.

collophore: a ventral tube that projects from the first abdominal segment (Collembola).

corbicula: a concave area on the posterior tibia, used to hold collected pollen (Hymenoptera).

corium: a flexible membrane between segments of appendages and between body segments; or differentiated parts of the fore wing (Hemiptera).

costa: the most anterior of the longitudinal veins of insect wings, typically extending along costal margin.

costal area: the parts of the wing immediately behind the costal margin.

costal brace: a short crossvein extending from the costa at wing base to subcosta.

costal break: an area of the costa that is weak or lacking, the costa appearing to be broken (Diptera).

costal expansion: an area of unusual width in the costal margin, usually in the basal third of the fore wing.

costal fracture: a short transverse line of weakness in a fore wing, often separating the cuneus from the remainder of the corium (Hemiptera).

coxa: the basal segment of the insect leg.

coxal cavity: the area of space of the coxa that articulates to the thorax proper.

ctenidia: comblike structures on the body or appendages of insects.

cubitus: one of the main venational systems of the insect wings, herein treated as composed of CUA (convex) and CUP (concave).

cuneus: an area of the corium, separated from the rest of the corium by a small break in the costa (Hemiptera).

cursorial: legs adapted for running.

discoidal cell: any of three cells (1mcu, 3mcu, 2cua) near the middle of the fore wings (Hymenoptera).

discoidal vein: the part of vein CUA beyond its separation from vein M.

ectognathous mouthparts: exposed mouthparts, characteristic of all members of the class Insecta.

entognathous mouthparts: a facial integument covering all mouthparts, characteristic of the non-insect members of the Hexapoda.

elytron: a leathery fore wing, commonly used as a covering for the hind wing at rest (mostly Coleoptera).

embolium: several differentiated, submarginal parts of the corium in fore wing (Hemiptera).

endopterygotes: insects having complete metamorphosis.
exarate pupa: a pupa with free appendages, not united with the body.
exopterygotes: insects with incomplete metamorphosis, the immature stages resembling the adults.
femoralary organs: sound-producing structures, the hind legs being rubbed against the tegmina.
flagellum: the distal part of the antenna, beyond the pedicel.
forceps: pincers at the end of the abdomen.
frons: an unpaired sclerite of the insect head between the epicranial sutures and bearing the median ocellus.
furcula: a forked process on the fourth abdominal segment, used for jumping (Collembola).
galea: the outer lobe of the maxilla, usually segmented.
gaster: the rounded and posterior part of the abdomen, excluding the propodeum.
genal area: the area of the head on each side, below the eye.
gonopophyses: appendages surrounding the gonopore (external opening of the reproductive duct).
gonostyles: a pair of slender processes arising ventrally from the end of the abdomen, functioning as claspers in males.
gressorial: having legs adapted for walking.
halteres: modified and reduced hind wings, functioning as sense organs (Diptera).
haustellate: mouthparts adapted for sucking.
hemelytra: the anterior wing with the basal part thickened and the distal part membraneous.
humeral suture: a thoracic suture extending from near the base of the fore wing to the middle coxa.
hypandrium: the ninth abdominal segment of males.
hypognathous: head vertical, the mouth being ventral.
intercalary veins: supplementary veins inserted between the usual wing veins.
labella: a pair of lobes near end of the proboscis.
labial palpi: the segmented appendages of the labium.
labrum: the upper lip of the insect mouth, just below the clypeus.
laciniae: inner lobes of the maxillae.
mandibles: the anterior jaws of insects.
maxillae: the second pair of jaws of insects.
maxillary palpi: the secondary appendages of the maxillae.
media (M): one of the major venational systems of insect wings, herein treated as composed of MA (convex) and MP (concave).
mesoscutellum: the scutellum of the mesothorax.
mesothorax: the second thoracic segment.
metathorax: the third thoracic segment.
microtrichia: cuticular hairs on a hairy membrane.
moniliform: segments that are beaded, like a necklace, as in antennae.
neopterous: pertaining to insects of the infraclass Neoptera, i.e., those that possess wings that can be folded back along the body at rest.
nodal line: a transverse line separating basal half of fore wing from distal half (Hemiptera).
nodus: a stout crossvein near middle of costal margin of wing, joining costa, subcosta, and radius.
nygamata: spots on insect wings presumed to be associated with sense cells.
oblongum: a closed cell in a hind wing, formed by crossveins connecting M and CUA (Coleoptera).
ocelli: the simple eyes of insects, usually occurring singly.
ommatidia: the usual elements of the compound eyes.
ootheca: a cluster of insect eggs, enclosed in secretions.
opisthognathus: the mouthparts of insects arranged in a posterior position.
ovipositor: the organ in female insects used for depositing eggs.
palaeopterous: pertaining to insects of the infraclass Palaeoptera, i.e., those which are unuable to fold their wings back over the body at rest.
pedicel: the second segment of the antenna.
petiole: a stalk or stem, usually connecting the abdomen to the thorax (Hymenoptera).
posterior cubitus: see cubitus.
posterior media: see media.
posterior notal process: a posterior lobe of a wing-bearing plate of the meso- and metathorax.
postnodals: a series of crossveins along the front margin of wings distal to the nodus.
precostal area: area between the costa and the front margin of wing.
pretarsus: the terminal segment of the insect leg, usually consisting of a pair of claws.
prognathous: the head of an insect in horizontal position, the jaws projecting anteriorly.
propleura: the sides of the prothorax of pterygote insects.
propodeum: the apparent posterior part of the thorax although it is usually the first abdominal segment fused with the thorax (Hymenoptera).
prosternum: the sternum of the prothorax.
prothorax: the first segment of the thorax.
proventriculus: the posterior portion of the foregut of insects.
pteralia: small plates or sclerites at wing bases.
pterostigma: a pigmented spot on the anterior margin of fore and hind wings near the apex.
pterothorax: the wing-bearing parts of the thorax, the meso- and metathorax, which are fused in some insects.
puparium: a stiff case derived from the skin of the last nymphal instar in which the pupal stage is formed.

quadrilateral cell: an unusual form of a discoidal cell, undivided in both fore and hind wings (Odonata).
radius: one of the major venational systems of insect wings, herein treated as composed of radius (convex) and radial sector (concave).
radial sector: see radius.
rostrum: the extended portion of the head, bearing the mouthparts.
saltatorial: insects with legs modified for jumping, usually refers to the hind pair.
scape: the basal segment of the antenna.
sclerite: a hard, bodywall plate, bounded by membranes or sutures.
scopa: a thick hair covering on the hind tibiae of adults, primarily used for carrying pollen.
scutellum: a sclerite of a thoracic notum.
sensilla: sense organs, formed of the cuticular sense cells.
stridulatory organs: structures used to produce sounds, usually by scraping or rasping.
subcosta: a major longitudinal vein (concave) in the wing, next to the costa.
subquadrilateral cell: a concpicuous cell in the cubital area of a wing, just before the quadrilateral cell (or q cell) (Odonata).
suctorial: mouthparts adapted for sucking.
sutural margin: a conspicuous submarginal ridge nearly parallel with the hind margin of an elytron, formed by distal portions of the main veins.
tarsus: the segment of an insect leg beyond the tibia.
tegmen: a leathery fore wing.
tibia: the fourth segment of the insect leg.
trochanter: the second segment of an insect leg, between the coxa and the femur.
tubular probosis: extended beak-like mouthparts.
urugomphi: paired cercus-like processes on last segment of some larvae (Coleoptera).
vena dividens: weakly formed CUP in fore wing, usually visible as a conspicuous depression in the wing.