

A.4. Families of SCIAROIDEA

Geir E. E. SØLI, J. R. VOCKEROTH and Loïc MATILE

Slender to moderately robust flies, 2.2–13.3 mm long (Figs 1–2). Thoracic and tibial bristles often strong. Coxae long; tibia usually with strong apical spurs (Fig. 26). Colour varied; body usually dull yellow, brown or black, rarely brightly marked; wings sometimes with conspicuous markings.

Adult. Head (Figs 3–15): with posterior surface usually more or less flattened, and in the majority of species inserted below level of upper margin of strongly arched thorax. Eyes usually densely haired, rarely bare or with a few short hairs, usually situated on lower part of head and widely separated above, with eye bridge incom-

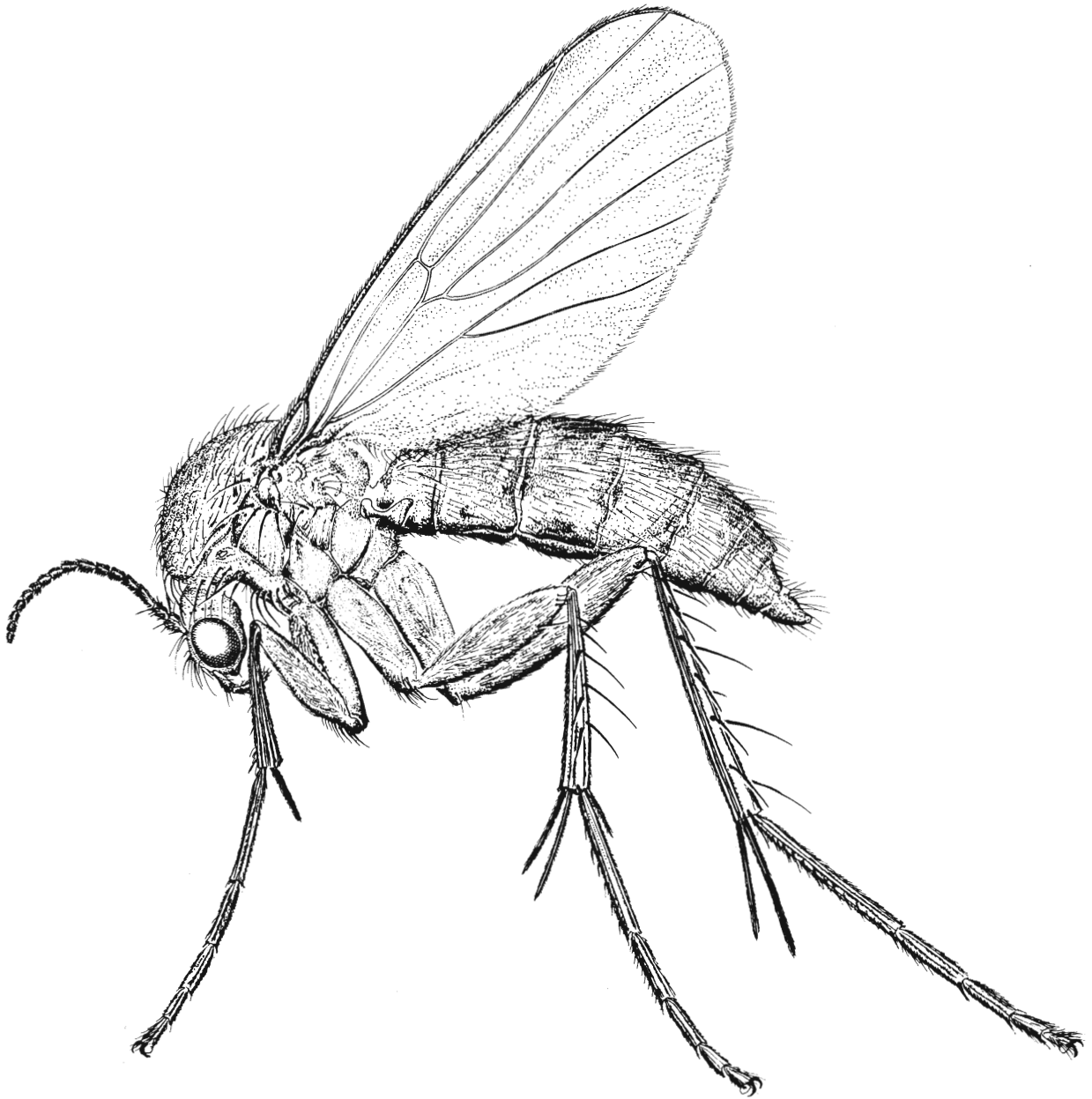


Fig. 4.1. *Mycetophila fungorum* (DeGeer).

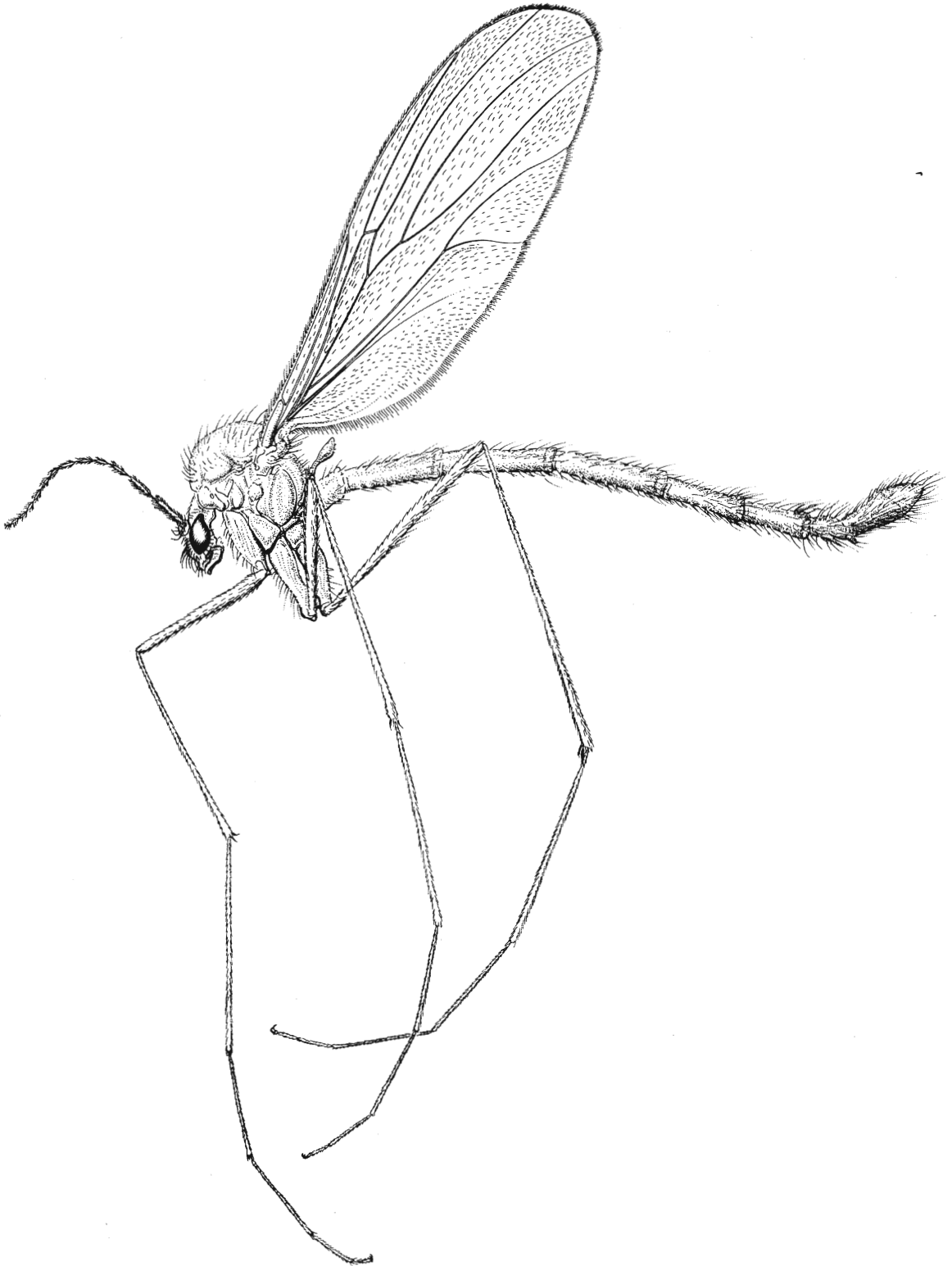


Fig. 4.2. *Phthiria winnertzi* Mik.

plete in some Ditomyiidae and complete cyc-bridge in *Paramanota* Tuomikoski (Oriental). Three ocelli usually present, variable in position; median ocellus sometimes very small or absent (Fig. 6); all ocelli absent only in *Hesperodes* Coquillett (Nearctic) and in *Syndocosia* Speiser (Afrotropical). Frons between ocelli and antennal bases bare or haired, sometimes with very strong setae along anterior border; anteriorly commonly produced into well demarcated frontal tubercle (Fig. 3). A frontal furrow runs between the median ocellus and the frontal tubercle, though sometimes partly or entirely reduced (Fig. 6).

Antenna (Figs 12–15) usually inserted at middle of head, sometimes well above middle e.g., in *Manota* Williston and in some Keroplatidae, varying in length from scarcely longer than head to several times as long as body; flagellum usually cylindrical, sometimes thickened basally and tapering towards apex, usually with 14 flagellomeres – but with additional very small terminal flagellomere in some Keroplatidae and with fewer than 14 flagellomeres in other Keroplatidae and with 9–13 in *Cordyla* Meigen; flagellomeres strongly compressed or pectinate or both in some Ditomyiidae and Keroplatidae (Fig. 13), and in one species of *Chalastonepsia* Söli from Japan (Kallweit 1998), usually clothed with short dense hairs, but sometimes with short bristles among the hairs, or with long hairs as in some species of *Bolitophila* Meigen, very long and hair-like in an Oriental species of *Chalastonepsia*.

Face usually broad and setose, but very narrow in some Keroplatidae. Clypeus sometimes completely fused with face or nearly so (Fig. 5); more commonly a rounded, setose sclerite below face, in latter case probably representing the lower part of a secondary divided clypeus, the upper part of which is fused with face (Crampton 1942; Matile 1990). A well-developed cibarial pump, attached to the lateral parts of clypeus, nearly always present. Labrum present or absent, bare or with some setae.

Mouthparts usually much shorter than half height of head, but about as long as height of head in *Asindulum* Latreille (Fig. 14), *Antlemon* Haliday and most *Macrorrhyncha* Winnertz; pro-

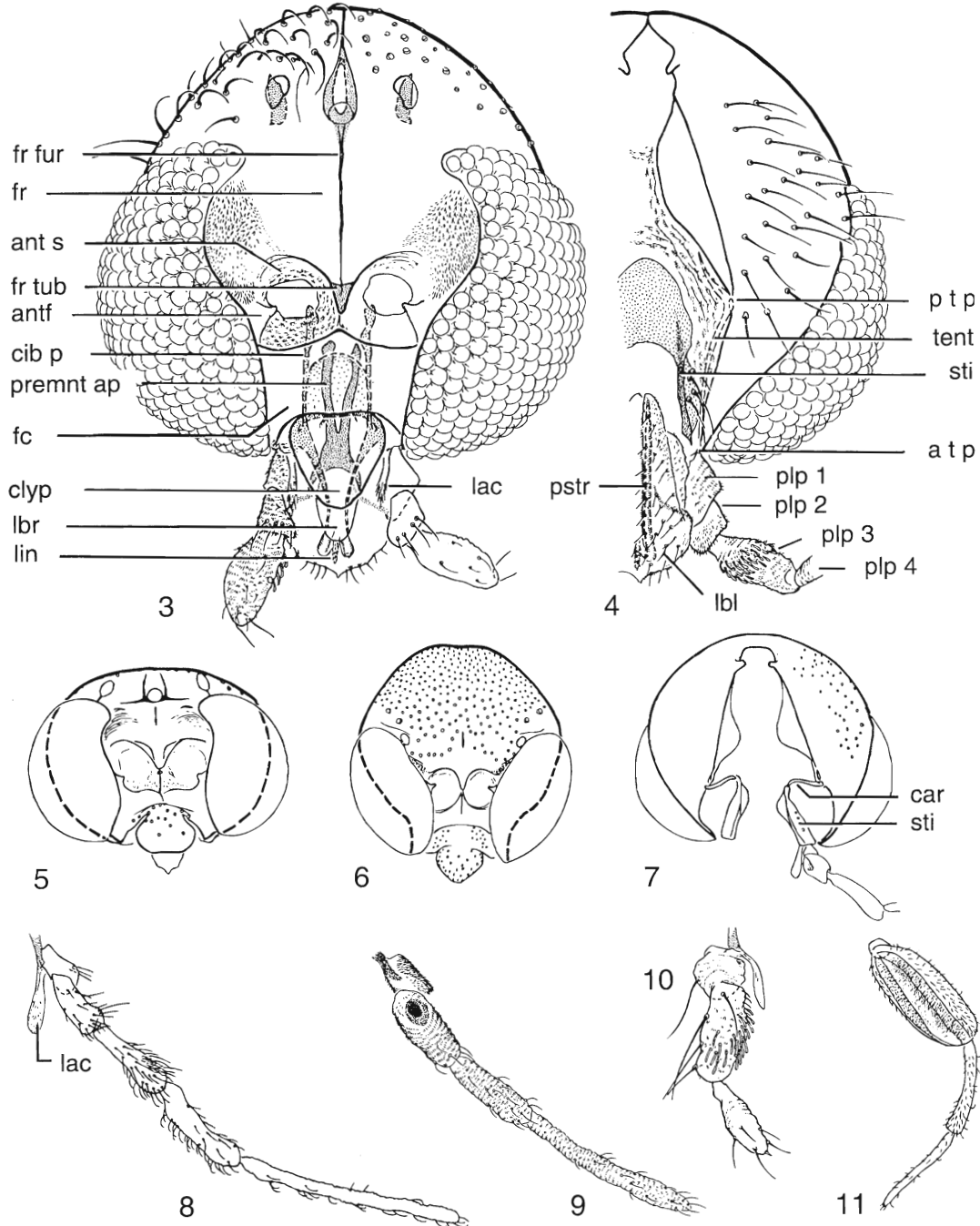
duced into a slender cylindrical proboscis several times as long as height of head in *Rhynchoplatyura* de Meijere (Oriental), *Gnoriste* Meigen (Fig. 15), and most Lygistorrhinidae (Fig. 12). Labella usually large and fleshy, pillow-like, with pseudotracheae (Fig. 4), but greatly reduced in several Keroplatidae, *Metanepsia* Edwards (Afrotropical, Oriental), *Chalastonepsia* and *Seguyola* Matile (Afrotropical); labella very long and slender in most Lygistorrhinidae, except in *Seguyola*.

Cardo reduced in most Mycetophilidae, though not in *Mycomya* Rondani (Fig. 7) and *Synapha* Meigen; stipes seemingly always present and with some strong setae, not rarely medially fused (Fig. 4). Prementum sometimes present as a pair of small rounded sclerites, but usually only the premental apodemes remain. The outline of these apodemes varies considerably, but in the common pattern the two apodemes are medially fused and articulate with the first segment of the labellum anteriorly; posteriorly produced into a pair of prolonged processes (Fig. 3). Lacinia large or minute (Fig. 8), entirely reduced in most Mycetophilinae. Palpus apparently prehensile in *Paramorganiella* Tonnoir (Australian), usually with five segments although first two are usually very short and not apparent in dry specimens, but sometimes with fewer than five segments – seemingly four in many Mycetophilinae due to reduction of second, and/or fusion of the first two (Figs 9, 11), three in *Keroplatus* Bosc and several related genera (loss of apical three palpal segments), two to four in some Neotropical species of *Dziedzickia* Johannsen, one short segment in *Metanepsia* and *Chalastonepsia*, and one very long filamentous segment in *Lygistorrhina* Skuse; segments variable in length and form, usually slender, but sometimes one or more broadened or swollen; specialised sensory structures presumably always present on segment 3, usually with modified (often slightly clubbed) setae, taking following forms – a median pit (Fig. 9), a median or lateral surface patch (Fig. 10), a dorsal and ventral pit (*Asindulum*), or a longitudinal groove with a highly modified surface and a deep internal invagination (Fig. 11).

Thorax (Figs 16–20) varying in form from compressed and deep to depressed and low. Tho-

racic sclerites varying considerably in size, shape, and distinctness; thoracic structure used to determine relationships among genera and subfamilies (Shaw 1948; Shaw and Shaw 1951), but not satisfactorily and therefore requiring more study.

Lateral cervical sclerite usually triangular, bare. Anteppronotum well-developed, usually setose, dorsally fused with postpronotum, forming a bare, collar-like structure above the neck, ventrally partly or entirely fused with proepisternum



Figs 4.3–11. Heads. 3–4: *Coelosia fusca* Bezzi: 3: frontal view, 4: lateral view; 5: *Paratinia sciarina* Mik, frontal view; 6: *Exechiopsis (Exechiopsis) clypeata* (Lundström), frontal view; 7: *Mycomya nitida* (Zetterstedt), posterior view. 8–11: palpi: 8: *Leptomorphus walkeri* Curtis; 9: *Phronia siebeckii* Dziedzicki; 10: *Paratinia sciarina* Mik; 11: *Cordyla fusca* (Meigen) (abbreviations: antf: antennifer, ant s: antennal socket, a t p: anterior tentorial pit, car: cardo, cib p: cibarial pump, clyp: clypeus, fc: face, fr: frons, fr fur: frontal furrow, fr tub: frontal tubercle, lac: lacinia, lbl: labellum, lbr: labrum, lin: lingua, plp: palpomere, premnt ap: premental apodeme, pstr: pseudotrachea, p t p: posterior tentorial pit, sti: stipes, tent: tentorium).

(episternum 1); suture between the two usually distinct, but in a few genera poorly developed, in particular posteriorly. Proepimeron (epimeron 1) less conspicuous, usually triangular. Prosternum usually strongly reduced; most distinct feature being the heavily sclerotized fore coxal furca (furca 1) appearing as a pair of stalked, rounded and flattened interior protuberances.

Shape of scutum varies from evenly to highly arched. In some genera, like in the Neotropical *Thoracotropis* Freeman, and in *Sceptonia* Winnertz and *Epicypta* Winnertz, strongly produced anteriorly, above the head, giving the gnat a somewhat stooping image. Scutum with two more or less distinct infrascutal sutures, an anterior parapsidal suture and a median transverse suture (Fig. 16). Scutal vestiture highly variable, usually made up of a mixture of discal setae and bristles, unevenly dispersed or arranged in definite lines. The two genera *Leiella* Enderlein, 1910 (Neotropical) and *Allactoneura* de Meijere are probably unique in having the discal setae distinctly flattened. Mediotergite usually bare, more rarely with medially and/or laterally arranged setae. Laterotergite prominent, ovate, bare or setose, varying from being evenly arched to strongly protruding, sometimes with a pronounced longitudinal keel. Anepisternum always well-developed, triangular, quadrate to subquadrate, in some genera greatly developed, usually at the expense of the preepisternum 2. Both anterior and posterior basalare usually recognizable; the former not rarely incompletely separated from anepisternum by an anepisternal cleft; the latter sometimes fairly large, ovate and heavily sclerotized. Preepisternum 2 separated from anepisternum by anapleural suture, possibly amalgamated with the mesosternum ventrally. (This combined structure is frequently, but erroneously, referred to as the katepisternum). Shape of preepisternum 2 fairly constant, usually larger than or about as large as the anepisternum, usually bare, but may have small setae on its lower part. Posterior portion of mesopleuron, mesepimeron (epimeron 2), usually bare, and strongly narrowed ventrally; distinction between an upper anepimeron and a lower katepimeron obliterated by a secondary fusion. Mid-coxal

fork (furca 2) in form of two heavily sclerotized, basally jointed funnels. An elongated triangular process, ventral process 2, extends laterally from the furcasternum and articulates with the inner coxal margin.

Metanotum narrow, bare, situated posterior to mediotergite, laterally fused with metapleuron by membranous area. Halter apparently with a fairly constant outline, but one or more setae may be situated just behind its base. A distinct pleural suture divides metapleuron into anterior metepisternum (episternum 3) and posterior metepimeron (epimeron 3). Metepisternum usually longitudinally divided, but in most genera the two parts can not be distinguished. Hind-coxal fork (furca 3) and ventral process 3 both well-developed.

Anterior thoracic spiracle located between anepisternum and anepisternum, commonly bordered by fine trichia; posterior spiracle located below laterotergite and above metapleuron (Fig. 16).

Wing (Figs 31–96) considerably reduced in size in female of one species of *Macrocera* Meigen (from Crozet Island), in *Baeopterygyna* Vockeroth, in some species of Keroplastinae from Nepal, in some specimens of both sexes of one (Nearctic) species of *Boletina* Staeger and in the Afrotropical *Moriniola* Matile. Species of *Allactoneura* are peculiar in having the wings folded in a vespid-like manner (Fig. 59). Veins often with setae; membrane usually densely clothed with microtrichia on both sides, and often also with few to many macrotrichia or true setae; if microtrichia absent, setae present on at least most of membrane. Microtrichia arranged in fine, regular lines in Mycetophilinae. Wing venation rather variable and much used in classification. Venation slightly reduced in e.g., *Acnemia* Winnertz and *Monoclona* Mik (Fig. 49), strongly reduced in *Lygistorrhina* (Fig. 41), *Manota* Williston (Fig. 42), and *Azana* Walker (Fig. 47).

Heavily sclerotized portion of costa, C, extends from wing base to apex of R₅, or somewhere between apices of R₅ and M₁, always clothed by setae. Subcosta, Sc, originating in the basal portion of the wing, always traceable and extends at most to the middle of the wing, often partly or greatly reduced, at least distally; hu-

meral crossvein, H, always present, running between the base of Sc and costa; a second crossvein, Sc-R, frequently present between base of H and tip of Sc.

Anterior branch of the radius, R_1 , usually extends to tip of the wing, but sometimes ends about halfway, or even closer to the base. Posterior branch of radius, the radial sector, R_s , radiates into four principal veins, of which R_2 and R_3 are absent in Sciaroidea (Matile 1990); R_5 is always present, while R_4 , when present, ends in C (e.g., Fig. 31) or in R_1 , in latter case enclosing a radial cell (e.g., Figs 38, 46). In some genera (e.g., *Sciophila* Meigen) presence of R_4 appears rather unstable, and may be present on one wing only.

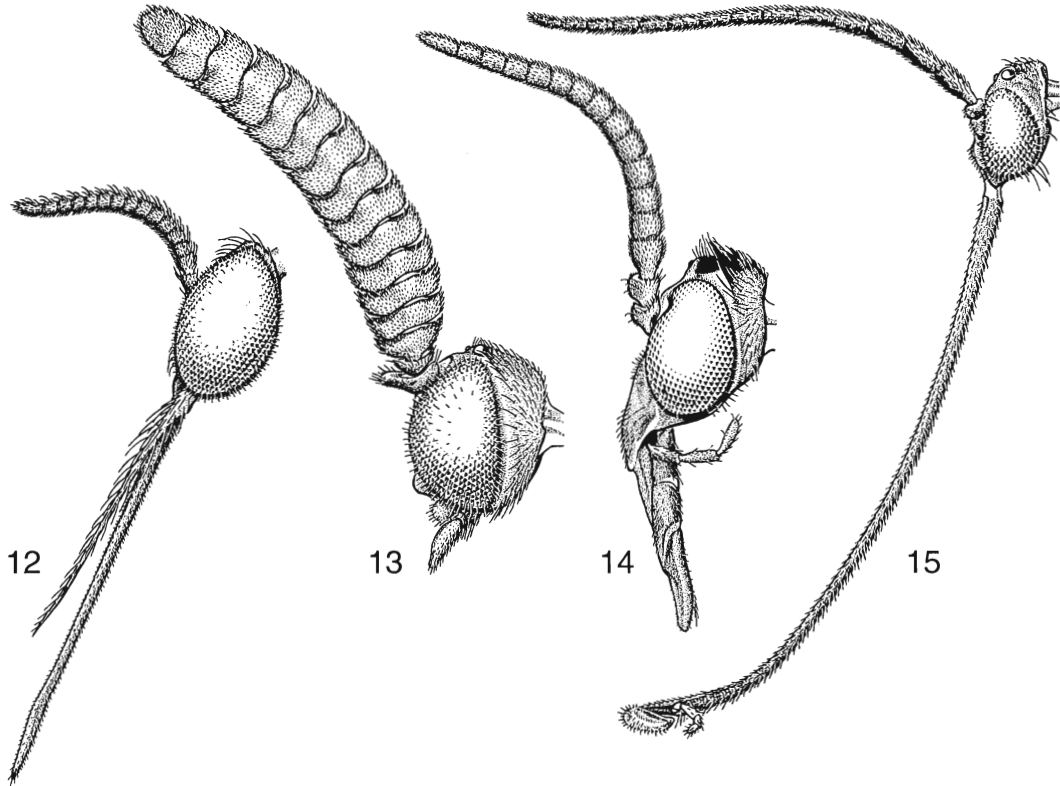
Anterior branch of media, arculus, usually small and vague, located between distal median plate and basal portion of radius. Of the 4 principal veins originating from posterior median branch, only M_1 and M_2 occur as free veins, of which M_2 is likely to represent a fusion of the principal M_2 and M_3 (Matile 1990). Basal portion of media usually weak or entirely reduced,

rarely well developed as in *Macrocera* (Fig. 36) and some other Keroplatidae. Stem of median fork and radial sector fused for a short distance in Keroplatidae (e.g., Fig. 37). Common stem of median fork (M_1 and M_2) shorter than its branches; rarely proximal portion of one or both branches atrophied, or entirely reduced.

Cubitus consists of two anterior branches, CuA_1 and CuA_2 , and one posterior branch, CuP , of which CuA_1 is likely to represent a fusion of M_4 and CuA_1 (Hennig 1954, 1973; Matile 1990). Commonly CuA_1 and CuA_2 with common stem, but both may run separate from wing base, or one of them (most likely CuA_1) reduced; CuP usually weak and fold-like, located between CuA_2 and the anal vein, never reaching wing margin.

Anal vein with an anterior, A_1 , and a posterior branch, A_2 , of which the former may reach wing margin; in most genera only A_1 distinct, but both sometimes reduced.

Crossvein R-M extends between posterior branch of radius and basal portion of median stem; crossvein bM-Cu connecting media and



Figs 4.12–15. Heads. 12: *Lygistorrhina sanctaecatharinae* Thompson (Nearctic); 13: *Keroplatus clausus* Coquillett (Nearctic); 14: *Asindulum montanum* Röder (Nearctic); 15: *Gnoriste megarrhina* Osten-Sacken (Nearctic) (after Vockeroth 1981).

cubitus, apparently replacing basal portion of media in Mycetophilidae (see Matile 1990; Søli 1997) (e.g., Fig. 43). In Mycetophilidae cross-vein bM-Cu has previously been interpreted as the basal portion of M (e.g., Vockeroth 1981). In literature on Sciaroidea either R-M or bM-Cu, or both, are frequently referred to as anterior transversal, *ta*, and basal transversal, *tb*, respectively (e.g., Matile 1990; Søli 1997; Chandler 1994).

Legs (Figs 21–30) with coxae elongated and stout; mid coxa of male of some species of *Mycomya* and all *Echinopodium* Freeman (Neotropical) with an anterior process (Fig. 24); arrangement and strength of bristles and hairs of coxa variable. Femora usually slender, sometimes swollen or laterally compressed, with vestiture variable; mid femur in male of some species of *Leptomorphus* Curtis with a subbasal spike. Tibiae usually slender, with vestiture variable, with short setae arranged irregularly or in regular rows, and usually with bristles varying in strength and arrangement (Figs 22–23). Fore tibia with an anteroapical depressed area bearing fine setae, arranged in one or more rows (Fig. 27), or more irregularly; in *Synapha* depressed area extending up to five-sevenths length of tibia, in *Anaclileia* Winnertz, *Metanepsia* and *Chalastonepsia* depressed area minute, or seemingly absent. Mid tibia of male, more rarely of female, sometimes with a specialised sensory area which is rounded or elongated, or a basal, oval swelling (Fig. 28); hind tibia sometimes with a posteroapical comb of stiff setae or with a dorsoapical cleft. One apical spur present on fore tibia; two apical spurs on each of mid and hind tibia, one of which may be very short; tibial spurs extremely short only in *Dolichodactyla* Freeman (Neotropical); mid and hind tibiae each with only one spur in *Fenderomyia* Shaw, *Monocentrotrota* Edwards and in the Neotropical *Micrapemon* Edwards. Tarsi usually slender, sometimes with modified hairs below or with some segments swollen below in female. Tarsal claws rarely simple, usually with one or more teeth below, in males of some genera of Keroplatidae thick, blunt, and serrated below; in males of some *Boletina* spp. and several related genera

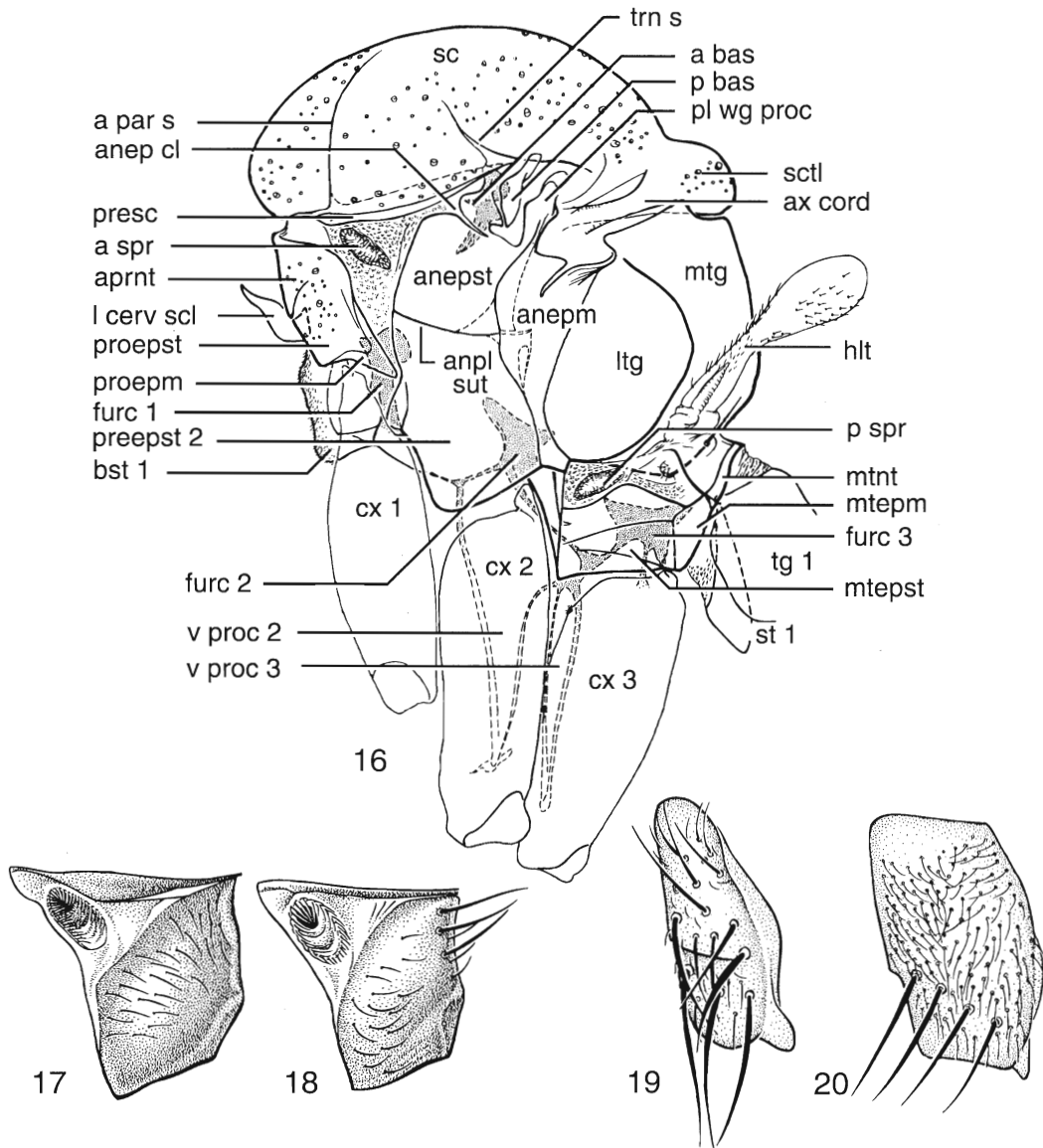
one or more claws greatly distorted; pulvilli absent; empodium, if present, variable in size.

Abdomen usually broadest at mid length, but in many Keroplatidae broadest near apex. Tergites and sternites of 1–6, 1–7, or 1–8 in male and 1–7 in female well-developed except for sternite 1 which is often reduced in size, V-shaped, sometimes lacking hairs; sternites 2–6 or 2–7 in many Mycetophilidae with a pair of submedian or sub-lateral weakly sclerotized lines and sometimes also with a similar median line (fold lines) so the sternites may be partially folded longitudinally. Spiracles present below margins of tergites 1–7, but sometimes apparently lacking in segment 1, or segments 1 and 2.

Male (Figs 97–108) often with sclerites of segments 7 and 8 (tergites especially) short and telescoped into segment 6; terminalia usually symmetrical, but sometimes asymmetrical (one undescribed Californian *Tetragoneura* Winnertz, and some *Mycetophila* spp.), usually directed caudally, sometimes rotated clockwise through 90° or more with segments 7 and 8 sharing in the rotation; in *Megophthalmidia crassicornis* (Curtis) even sternites 5 and 6 are reduced, so that the remaining part of the abdomen is situated more or less below tergite 6. The forward flexion of the terminalia below the abdomen in the Neotropical *Rhipidita* Edwards (Ditomyiidae) is probably unique among Nematocera. Segment 9 and associated structures, the terminalia, extremely varied in form but with an apparently constant basic pattern: tergite 9, sternite 9, a pair of lateral gonocoxites each with an articulated gonostylus, a pair of submedian parameres, each principally articulated laterally with gonocoxites and bearing aedeagus between them (structure of parameres and aedeagus often difficult to determine), and an anus-bearing proctiger; a partly reduced segment 10 sometimes present between tergite 9 and proctiger, free or more or less fused with the former. Tergite 9 and sternite 9 distinct or partly or entirely fused with gonocoxites, and sometimes bearing spines or processes; midventral line of one or both sometimes membranous. Gonocoxites separate or broadly or entirely fused ventromedially, in latter case probably by a fusion with sternite 9; sometimes with distinct

gonocoxal lobes distally (Fig. 100). Gonostylus particularly varied, sometimes slender and tapering, but more often with lobes or processes bearing a variety of hairs, spines, or striate areas (lamellae) (Fig. 97). Aedeagus sometimes with long anterior apodemes; in several Orfeliini (*Orfelia*

Costa, *Truplaya* Edwards, *Urytalpa* Edwards, *Macrorrhyncha* Winnertz) a well-sclerotized structure (probably sperm pump) attached to its anterior end in addition to strong anterior apodemes present. Parameres extremely varied, and usually accompanied by long parameral apodemes.



Figs 4.16–20. Details of thorax. 16: *Boletina basalis* (Meigen), lateral view. 17–18: left anepisternum: 17: *Tarnania tarnanii* (Dziedzicki); 18: *Phronia braueri* (Dziedzicki). 19–20: antepronotum and propleuron: 19: *Platurocypta fumipennis* (Bukowski); 20: *Epicypta aterrima* (Zetterstedt) (abbreviations: a bas: anterior basalare, anepm: anepimeron, anepst: anepisternum, anep cl: anepisternal cleft, anpl sut: anapleural suture, a par s: anterior parapsidal suture, aprnt: antepronotum, a spr: anterior spiracle, ax cord: axillary cord, bst: basisternum, l cerv scl: lateral cervical sclerite, cx: coxa, furc, furca, hlt: halter, ltg: laterotergite, mr: meron, mtepm: metepimeron, mtepst: metepisternum, mtg: mediotergite, mtnt: metanotum, p bas: posterior basalare, pl wg proc: pleural wing process, preepst: preepisternum, presc: prescutum, proepm: proepimeron, proepst: proepisternum, p spr: posterior spiracle, sc: scutum, sclt: scutellum, st: sternite, tg: tergite, trn s: transverse suture, v proc: ventral process) (17–18 after Vockeroth 1981).

Aedeagus and parameres suspended between the gonocoxites by gonocoxal apodemes. Hypoproct taking a variable position from immediately above the aedeagus and parameres to below the posterior end of tergite 9, and consisting of a pair of lateral unsegmented cerci and a ventral sclerite or hypoproct. Hypoproct commonly weak, sometimes divided medially or fused with cerci; cercus usually weak but variable in form, very large in Ditomyiidae, with one or more transverse rows of short spinose setae in most *Boletina* spp. and *Creaghubbia* Chandler (Chandler 1999).

Female (Figs 109–114) with both tergite and sternite 8 present, usually well-separated, tergite 8 rarely very short and medially divided, sometimes seemingly fused with tergite 9; sternite 8 short or long, posteriorly bearing a pair of rounded or tapered lobes, semiarticulated or more commonly completely fused, representing gonocoxites 8, each usually with posterior margin invaginated. Gonapophyses 8 present as a pair of flattened outgrowths above gonocoxites 8, being variable in shape and degree of sclerotization. Between and above the gonapophyses 8 is the labia, a membraneous, fringe-like structure (Sæther 1977). Tergite 9 usually distinct and well-developed, haired or bare, sometimes with a distinct median incision; posterolaterally is a pair of gonocoxites 9, distinct in some genera (e.g., *Bolitophila*), but commonly weakly developed. Sternite 9 usually fused laterally with tergite 9 and gonapophyses 9, commonly weakly sclerotized and with membranous areas; some outgrowths usually surrounding opening of spermathecal duct (gonopore). Tergite 10 short or absent, with or without setae; sternite 10 usually well-developed, rarely absent or strongly reduced, commonly with a median groove, probably serving as egg guide, with or without setae; lateral border frequently fused with hypoproct. Cercus articulated with last sclerotized tergite, usually weakly sclerotized and two-segmented with a larger basal and a smaller apical segment; sometimes one-segmented. Cercus varying in form, being elongate, slender, curved, and tapering; extremely elongate in females of the Nearctic species of *Drepanocercus* Vockeroth. Two spermathecae probably always present, with a conical

posterior projection in some Keroplatidae; each round to sac-like, well sclerotized in Bolitophilidae and Lygistorrhinidae, and in at least some species of *Diadocidia* Ruthe, some Neotropical species in the *Heterotricha*-group, and in Keroplatidae (e.g., *Urytalpa*); more weakly sclerotized in other Keroplatidae; highly membranous and not visible in macerated specimens in Ditomyiidae, some Keroplatidae, and all Mycetophilidae. Spermathecal ducts usually long, slender and tortuous, extremely long in *Neoplatyura flava* (Macquart), sometimes swollen over part of their length, opening separately medially on sternite 9 or fused a short distance before opening as in some species of *Sciophila*, *Manota* and *Saigusia* Vockeroth.

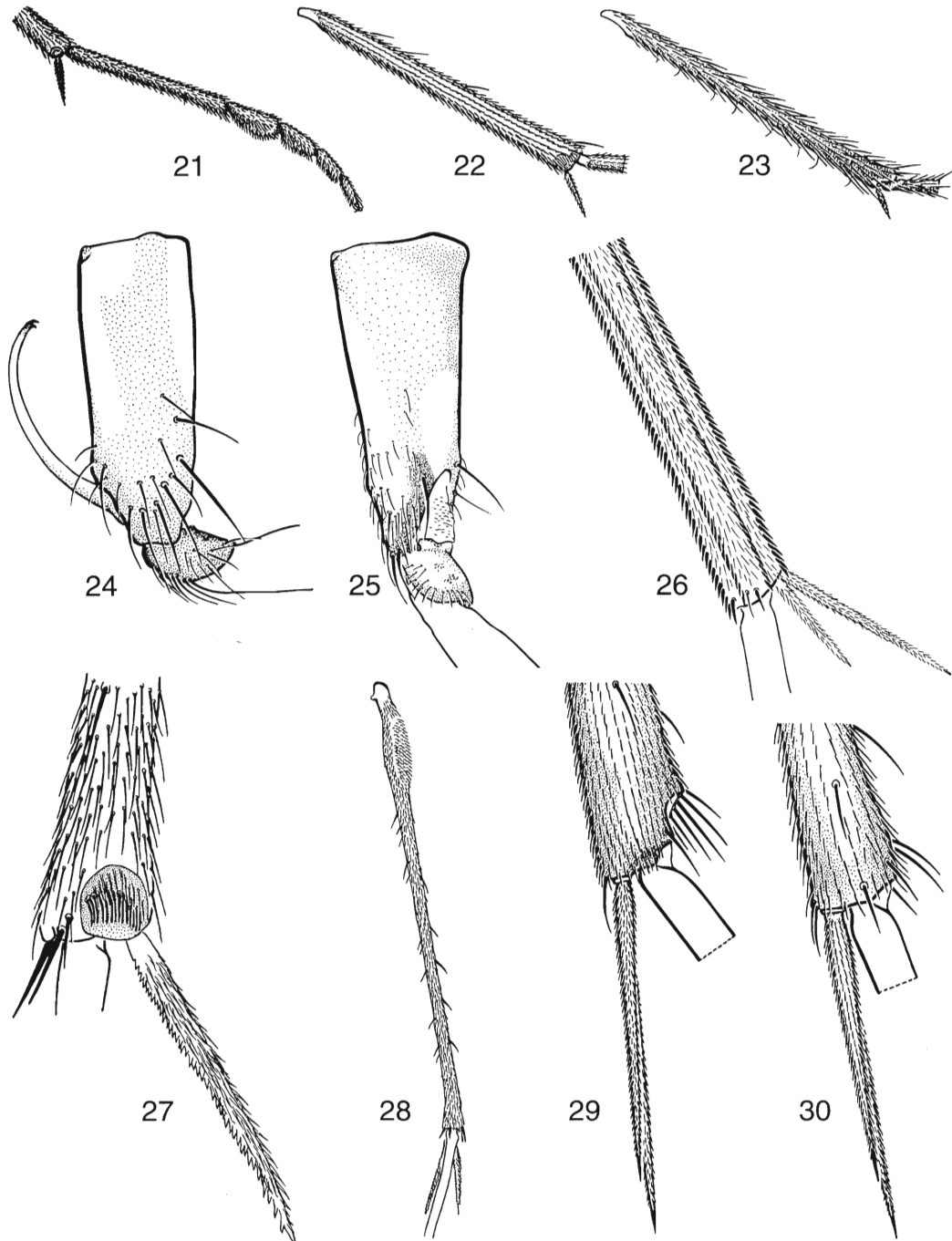
Comprehensive accounts of the adult morphology are those of Matile (1990) (Keroplatidae) and Sølvi (1997) (Mycetophilidae) from which most of the above description is taken.

Egg. Eggs ovate, elongate to slender and boat-shaped (e.g., *Metanepsia*). The chorionic structures of the eggshells of 15 species of fungus gnats have been studied by Plachter (1981). He distinguished between eggshells with a plastron and a stratified and complex chorion, and those without a plastron and with a simple, one-layered chorion; none of the studied eggshells had respiratory horns nor specialised areas of the chorion.

Larvae. The larvae of many genera and numerous species are still unknown. Larvae are usually cylindrical and slender, but extremely slender and oligochaete-like in some Keroplatidae, and flattened and slug-like in *Phronia* Winnertz; with a dark conical dorsal case formed from frass and from larval excrement in some *Phronia*; covered by slime droplets in *Epicypta* (Zaitzev 1984c); and occurring in mucous tubes or webs formed from salivary excretion in Diadocidiidae, Keroplatidae, and Sciophilinae (except *Docosia* Winnertz); possessing light-producing tissues in several species of Keroplatidae; peripneustic in Ditomyiidae and Bolitophilidae, hemipneustic in most other groups, propneustic in Diadocidiidae, in *Speolepta* Edwards and *Acomoptera* Vock-

eroth (Mycetophilidae) (see Zaitzev 1979), and apneustic in Keroplatidae, although non-functional spiracles apparently also present in these groups. The spiracular system may, however, change from one larval instar to another.

Head (Figs 116–120) important taxonomically, strongly sclerotized, free, well-developed, with slender tentorial arms, and a transverse tentorial bridge. Head capsule usually bare; with a few dorsal setae in Ditomyiidae. Antenna rather



Figs 4.21–30. Details of legs. 21: *Diadocidia (D.) ferruginosa* (Meigen), tarsus of fore leg. 22–23: anterior view of fore tibia: 22: *Mycomya vulgaris* Garrett (Nearctic); 23: *Paratinia recurva* Johannsen (Nearctic). 24–25: lateral view of mid coxa: 24: *Mycomya (Mycomya) flavicollis* (Zetterstedt); 25: *Stigmatomeria crassicornis* (Stannius). 26: *Orfelia tristis* (Lundström), distal part of mid tibia. 27: *Megalopelma nigroclavatum* (Strobl), apical depressed area, ventral view. 28: *Polylepta guttiventris* (Zetterstedt), mid tibia with sensory swelling, ventral view. 29–30: apex of left hind tibia, anterior view: 29: *Exechiopsis nugax* (Johannsen) (Nearctic); 30: *Exechia attrita* Johannsen (Nearctic). (21–23, 29–30 after Vockeroth 1981).

large, usually one-segmented and forming an elongated, convex plate; elongate and three-segmented in Bolitophilidae and Ditomyiidae (Plachter 1979a). Labrum poorly sclerotized and fleshy (not in Ditomyiidae), supported by sclerotized frame that articulates with two moveable arms, each of which carries a fan-shaped premandible; premandible particularly well-developed and differentiated in Keroplatidae. Mandible lamelliform, toothed along inner margin, with 5–6 to several protheca near inner basal angle, protheca long and pectinate to short and blunt. Maxilla consisting of an inner blade-like lobe and an outer oval lobe, blade-like lobe serrated along inner margin and ending in a sclerotized bar that lies dorsal to a basal plate-like cardo; oval lobe with a distal circular membranous area that carries several papillae, strongly prolonged and apically tapered in some genera, e.g., *Phthinia* and *Sciophila*. In Ditomyiidae the maxilla is reduced and rather weakly sclerotized, while the mandible is well-developed with large, blunt teeth. Hypopharynx consisting of two curved horizontal processes that join in midventral line and two vertical processes that join horizontal processes. Labium reduced to a small sclerotized plate at base of hypopharynx.

Body with three thoracic and nine abdominal segments; the stated number of segments in the various families varies between authors, see e.g., Hennig (1948) and Madwar (1937). Each thoracic segment bare, or nearly so, except for two ventral to ventrolateral groups of four minute setae (only two in *Ditomyia* Winnertz and *Asioditomyia* Saigusa; three in *Symmerus* Walker (Ditomyiidae) (see Krivosheina and Zaitzev 1980)) marking the position of imaginal leg discs; abdominal segments bare except for a few setae, mostly near the spiracles in Ditomyiidae and in one *Phronia* sp. Nine to eleven ventral creeping welts between segments of thorax and abdomen in *Bolitophila* and Mycetophilidae; each welt with an armature of spicules and hooks.

Comprehensive accounts of the larval stage are those of Madwar (1937), Plachter (1979a) and Matile (1990). Hennig (1948) gave a more extended summary, also based mainly on Mad-

war; he included keys to genera of Ditomyiidae and Sciophilinae.

Pupa. Probably distinguishable from that of other groups (except Sciaridae) by having the combination of distinct visible spurs and leg sheaths side by side rather than overlapping; partly overlapping in Macrocerinae and a few Sciophilinae (*Apolephthisa* Grzegorzek). Except in Bolitophilidae, Ditomyiidae and Sciaridae the pupae have a characteristic, strongly arched thorax, and a sessile undivided anterior thoracic spiracle. All pupae have six abdominal spiracles, except for Mycetophilinae with five. Pupae found in the soil or in solid tubes are typical in having spinulae covering the surface of the abdomen, and segmental rows of spines (Ditomyiidae and Bolitophilidae); pupae surrounded by a web or cocoon all have a very smooth cuticle. A study describing the pupae of 21 species, representing most families, is given by Plachter (1979b).

Biology and behaviour. Mycetophilidae are most abundant in humid areas, especially moist woodland; during the day adults of many species, especially Mycetophilinae, congregate in moist dark places such as overhanging stream banks and cavities under tree roots. Many species can be swept from undergrowth in woods. Lewis and Taylor (1965) showed that three species in England were most active at dusk and less active at dawn; this behaviour may be true of many species and is perhaps the reason why many specimens, even of apparently rare genera such as *Symmerus* and *Novakia* Strobl, are taken in Malaise traps. Some species, among others those with elongated mouthparts, visit flowers (e.g., Olesen and Warncke 1989), and one species of *Mycetophila* was found to be among the most important pollinators of one species each of Liliaceae and Orchidaceae (Messler et al. 1980); a number of genera have been observed to feed on honeydew on leaves (J. A. Downes, L. Papp, *pers. comm.* Several species are common in caves, mines, and in smaller subterranean cavities, like burrows of voles (Hackman 1963). In

the Holarctic *Speolepta* is a regular inhabitant of caves in all stages, but adults may occasionally be found outside caves. Most species found in these habitats take advantage of a stable temperature and humidity in periods of drought or cold (e.g., Kjaerandsen 1993, Kurina 1996). Some species are also known to overwinter as adults under bark or in hollow plant stems (Väisänen 1981).

Larvae of many species live in fleshy or woody fungi; both polyphagy and oligophagy have been reported. Most groups of fungi, including Myxomycetes, have been reported to be infested by fungus gnats (e.g., Buxton 1954, 1960; Stubbs and Chandler 1978; Hackman and Meinander 1979; Yakovlev and Zaitzev 1990; Kurina 1991; Chandler 1993b; Yakovlev 1994). One species of *Boletina* is known to feed on Hepaticae, and this may apply also to other species in the genus. Larvae of several species have been found in dead wood, under bark, or in nests of birds and squirrels (e.g., *Docosia* Winnertz and *Leia* Meigen), and wasps; most or all of the larvae are probably mycetophagous. The larva of an undescribed Nearctic species of *Greenomyia* Brunetti has been observed to feed on the surface of *Pedicularis* leaves (Scrophulariaceae). Larvae of some Keroplatidae spin webs and capture and feed on small arthropods (Mansbridge 1933); some of these larvae live mainly or entirely in caves and excrete small droplets of oxalic acid on their web which kill their prey (Matile 1993); three tropical species belonging to the genera *Platyzeridion* Tolle, *Proceroplatus* Edwards and *Truplaya* are reported as being myrmecophagous (Chandler and Matile 1998; Aiello and Jolivet 1998). Some Keroplatidae also have larvae that produce light (e.g., Baccetti et al. 1987); the most famous being those of the New Zealand glow worm *Arachnocampa* which uses the light to attract the prey to their webs. The larvae of the Tasmanian *Planarivora insignis* Hickman (Keroplatidae) is endoparasitic in land planarians (Hickman 1965). For numerous other species the larva and its biology are completely unknown.

Pupation usually takes place in the ground but some Mycetophilidae pupate in the host fungus (adults may remain quiescent in the pupal cocoon for some time and emerge very rapidly if

disturbed). Larvae of *Mycetophila cingulum* Meigen are reported to disperse from the host fungi by skipping, leaping distances up to 20-fold their body length (Camazine 1986). In Mycetophilidae a large number of genera have the pupa hanging in a sparse web of salivary threads. The pupa is free in Ditomyiidae and in *Bolitophila*, enclosed in a dense cocoon in some Mycetophilidae and in *Docosia*, and apparently enclosed in a weak cocoon, which may be reduced to a few threads, in other groups.

Several species of Hymenoptera (Ichneumonidae, Proctotrupidae, Braconidae) have been reported as parasites of fungus gnats (Bechev 1986; Kolarov and Bechev 1995); in North America a nematode has also been reported (Poinar 1992).

Classification. The Sciaroidea are generally considered a monophyletic group. There is, however, great divergence in the ranking of the subgroups by different authors. Edwards (1925), who laid the basis for subsequent classification, recognized one family with 10 subfamilies, one of which was the Sciarinae; subsequently Edwards (1941) included the Macrocerinae in the Keroplatidae. Hennig (1973) considered six of the nine subfamilies recognised by Edwards in his later papers as separate families: the Lygistorrhiniinae he included in the Keroplatidae, following Tuomikoski (1966c); the Manotinae (following Tuomikoski 1966a), and the Sciophilinae he placed in the Mycetophilidae, although Hennig (1948) had treated the Scophilinae as a separate family. Slightly modified Edwards' classification is still in use (Hutson et al. 1980; Vockeroth 1981), though today most authors treat Bolitophilidae, Ditomyiidae, Diadocidiidae, Keroplatidae (with or without the inclusion of Macrocerinae), Lygistorrhinidae, Manotidae, Mycetophilidae and Sciaridae as separate families in the superfamily Sciaroidea (e.g., Soós and Papp 1988; Matile 1989, 1990). Matile (1990) divides Keroplatidae into three subfamilies Arachnocampinae, Macrocerinae and Keroplatinae, of which the latter is divided into two tribes, Keroplatini and Orfeliini.

The two subfamilies Sciophilinae (couplets 37–94 in the present key) and Mycetophilinae (couplets 95–122) have commonly been divided

into tribes, mainly following Edwards (1925): Sciophilinae into Gnoristini, Leiini, Metanepsini (Afrotropical), Mycomyini and Sciophilini; Mycetophilinae into Exechiini and Mycetophilini. An additional tribe, Allactoneurini, was suggested by Shaw and Shaw (1951), but has been by most others included in the Leiini (see Sølvi 1996). The delimitation of these tribes has been, and is still, much discussed (e.g., Väisänen 1986; Sølvi 1997); some characters used in the delineation of the tribes, like the presence of setae on the wing membrane, undoubtedly represent plesiomorphic character states and thus result in paraphyletic groupings. This holds in particular for the tribes Gnoristini and Leiini, but also for the Sciophilini as diagnosed at present. The delineation of the three tribes Mycomyini (Väisänen 1984), Exechiini and Mycetophilini (Tuomikoski 1966b), however, appears more sound. Furthermore, we do also question the monophyly of the commonly recognised subfamilies in the Mycetophilidae, but for convenience both subfamilies are referred to in the text.

Following a classification originally proposed by Tuomikoski (1966b, c), several authors today treat the various tribes in the Sciophilinae at the level of subfamilies (e.g., Hennig 1973; Hackman et al. 1988; Matile 1989; Zaitzev 1994). Furthermore, Zaitzev (1994) raised the tribe Allactoneurini to the level of subfamily, and Väisänen (1984) proposed a subfamily Eudicraninae for *Eudicrana* Loew. Until the phylogenetic relationship among the various groups have been further elucidated, such a practice can not be recommended.

Some species are still undoubtedly incorrectly assigned to genus and, especially in the Exechiini, the correct assignment of many species of genera recently divided is uncertain. Therefore the information about distribution and number of species given in the key for each genus is subject to correction.

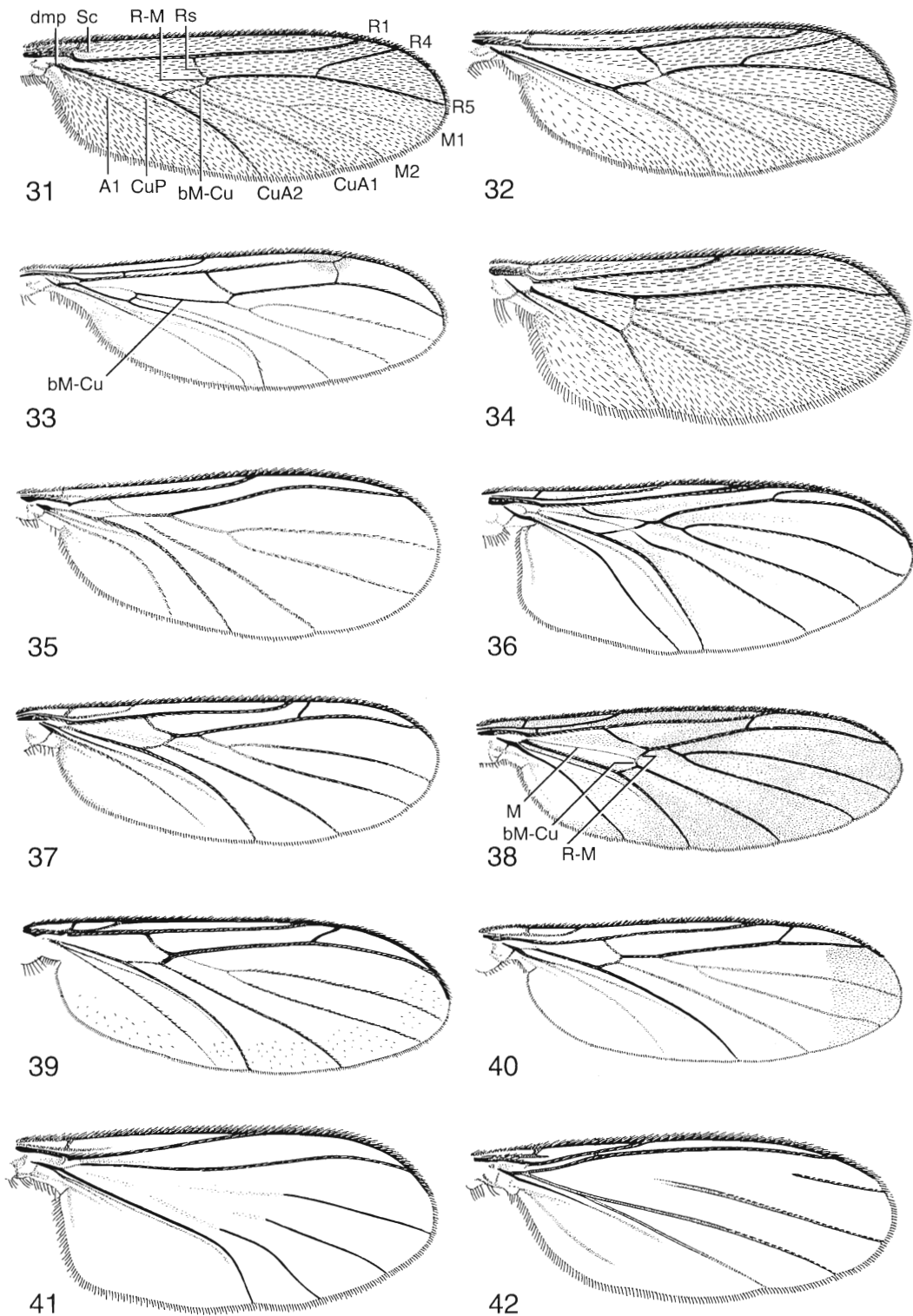
New statuses are proposed for two genera in the present work, *Notolopha* Tuomikoski, 1966 and *Myrosia* Tuomikoski, 1966. These were originally among the 4 subgenera proposed by Tuomikoski (1966b) for *Allodiopsis* Tuomikoski, 1966; the two other were *Gymnogonia* and the

nominotypical *Allodiopsis*. Later, the subgenus *Gymnogonia* proved to be synonymous with *Synplasta* Skuse, 1890, and was raised to generic rank (Matile 1987). As Tuomikoski (1966b) stated that *Allodiopsis* as a compound genus seemingly was paraphyletic, it thus appears justified to give generic rank to all his subgenera.

Recent contributions on the higher phylogeny of the Sciaroidea are those by Hennig (1973), Wood and Borkent (1989), Matile (1990, 1997). Matile (1997) supposed Cecidomyiidae to be the sister-group of the Sciaroidea; within the superfamily the phylogeny is as follows: (Ditomyiidae ((Keroplastidae, Diadocidiidae) (Bolitophilidae (Sciariidae (Mycetophilidae, Lygistorrhinidae)))). A preliminary phylogeny of the Mycetophilidae is presented in Sølvi (1997).

Rohdendorf (1974) and several later authors have referred fossils of various periods from Upper Triassic onwards to several extinct genera and families of Fungivoroidea (= Sciaroidea); the oldest fossil definitely referable to the Sciaroidea as we know it today, are those genera and species of Mycetophilidae described by Blagoderov (1995, 1997, 1998a, b) from Lower Cretaceous, among them ones species of the modern genus *Sytemna* Winnertz. The early Tertiary Baltic amber is very rich in Sciaroidea; all families recognized here (except Ditomyiidae), and a number of recent genera have been reported. More than 250 species have been described from Baltic amber.

Distribution. Fungus gnats occur on all continental areas except Antarctica, from northern Greenland south to Tierra del Fuego, and on most oceanic islands. About 4,500 species (Sciariidae excl.) have been described, more than 1,450 of them from the Palaearctic, but many more species await description. All families in the Sciaroidea have representatives in the Palaearctic; Bolitophilidae are exclusive to the Holarctic region, while most of the remaining families have a world wide distribution. Of the 103 Palaearctic genera included in this key, all except 21 have been recorded in the Nearctic (*Allactoneura*, *Asioditomyia*, *Chalastonepsia*, *Clastobasis* Skuse, *Creagdhubhia*, *Grzegorzekia* Edwards, *Heterotricha* Loew, *Isoneuromyia* Brunetti, *Laurypta*



Figs 4.31–42. Wings. 31: *Symmerus vockerothi* Munroe (Nearctic); 32: *Ditomyia potomaca* Fisher (Nearctic); 33: *Bolitophila cinerea* Meigen; 34: *Diadocidia (D.) ferruginosa* (Meigen); 35: *Robsonomyia reducta* Matile et Vockeroth (Nearctic); 36: *Macrocera variola* Garrett (Nearctic); 37: *Macrorrhyncha coxalis* (Loew) (Nearctic); 38: *Platyura nigriventris* (Johannsen) (Nearctic); 39: *Neoplatyura flava* (Macquart); 40: *Orfelia genualis* (Johannsen) (Nearctic); 41: *Lygistorrhina sanctaecatharinae* Thompson (Nearctic); 42: *Manota* sp. (Nearctic) (abbreviations: A1 and A2: branches of anal vein, bM-Cu: medio-cubital crossvein, CuA1 and CuA2: anterior branches of cubitus, CuP: posterior branch of cubitus, d m p: distal median plate, H: humeral, M1 and M2: branches of media, R1: anterior branch of radius, R4 and R5: posterior branches of radius, R-M: radio-medial crossvein, Rs: radial sector, Sc: subcosta, Sc-R: subcostal-radial crossvein, stem v: stem vein) (31–38, 40–42 after Vockeroth 1981).

Edwards, *Monocentrota*, *Myrosia*, *Neoclastobasis* Ostroverkhova, *Parempheriella* Matile, *Phoenikiella* Chandler, *Proceroplatus*, *Pseudorymosia* Tuomikoski, *Pyratula* Edwards, *Setostylus* Matile, *Truplaya*, *Urytalpa*, *Xenoplatelyura* Malloch); except for *Asioditomyia*, known from Japan and Russian Far East, and the five exclusively Palaearctic genera *Creagdhubbia*, *Myrosia*, *Neoclastobasis*, *Phoenikiella*, and *Pseudorymosia*, these genera are known also from the Oriental and/or the Afrotropical regions and a few of them from the Neotropical region. On the contrary, nine Nearctic genera have not been recorded in the Palaearctic (*Acomopterella* Zaitzev, *Adicroneura* Vockeroth, *Aphrastomyia* Coher and Lane, *Cluzobra* Edwards, *Euceroptatus* Edwards, *Garrettella* Vockeroth, *Hesperodes*, *Loicia* Vockeroth, and *Palaeoplatelyura* Meunier). With the exception of *Euceroptatus*, these genera are all rather poor in species and have not been recorded outside the Nearctic or Neotropical regions (see

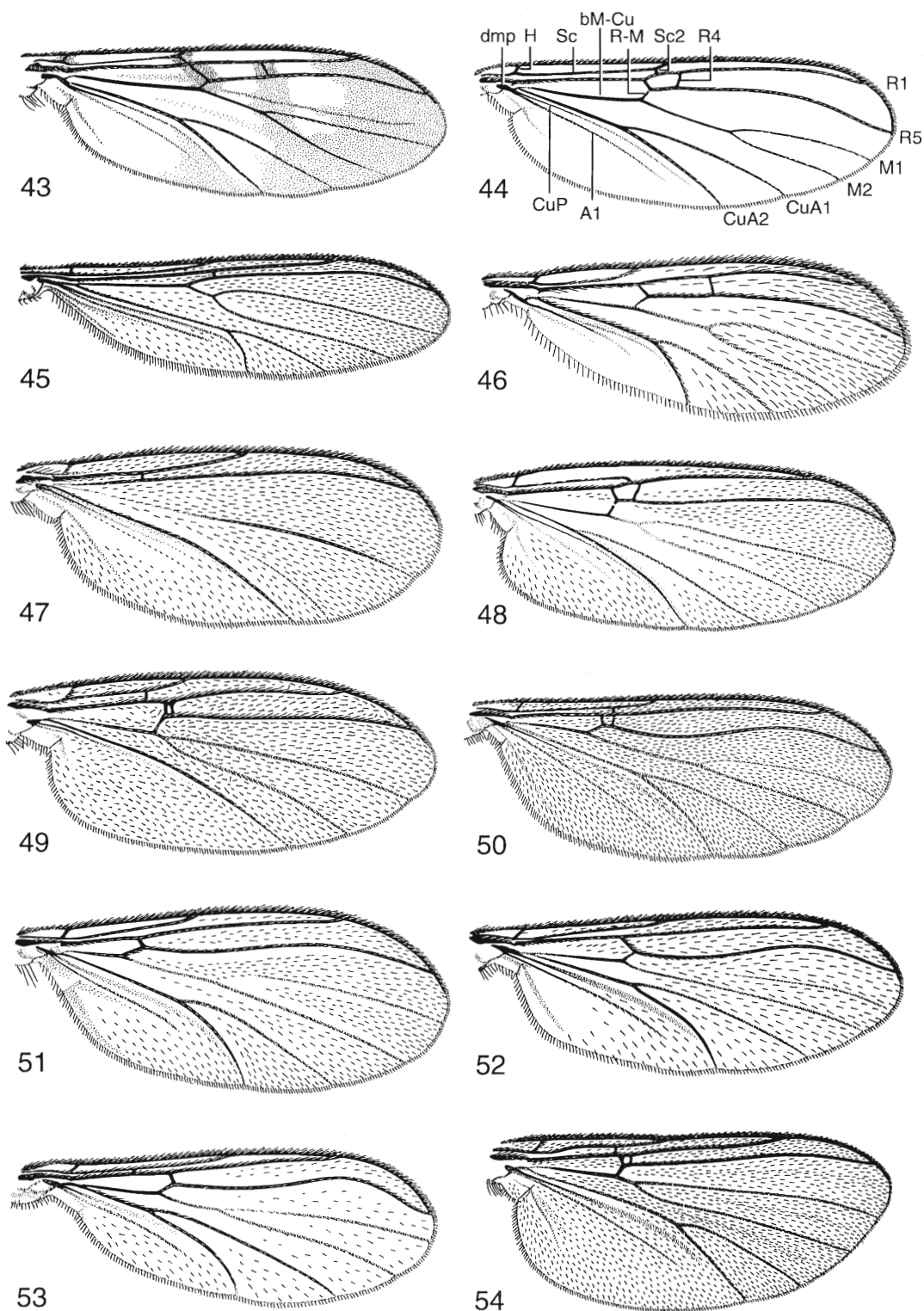
Vockeroth 1980, 1981); *Euceroptatus*, however, is known also from the Oriental and Australasian regions.

Identification. An easily available key, covering much of the western Palaearctic fauna (not the subfamily Mycetophilinae), is supplied by Hutson et al. (1980). Important keys, also covering Mycetophilinae, though somewhat outdated, are found in Edwards (1925), Landrock (1927, 1940) and Séguy (1940). Good keys are also found in Bei-Bienko (1969), Krivosheina et al. (1986) and Zaitzev (1994). Of these, the latter two are available only in Russian, but provide good drawings of the male genitalia. In addition to the above keys, papers dealing with a large proportion of the Palaearctic species of particular genera are referred to in the key. A catalogue of most Palaearctic Sciaroidea (Sciaridae excl.) described up to 1981 is found in Soós and Papp (1988).

Key to families and genera

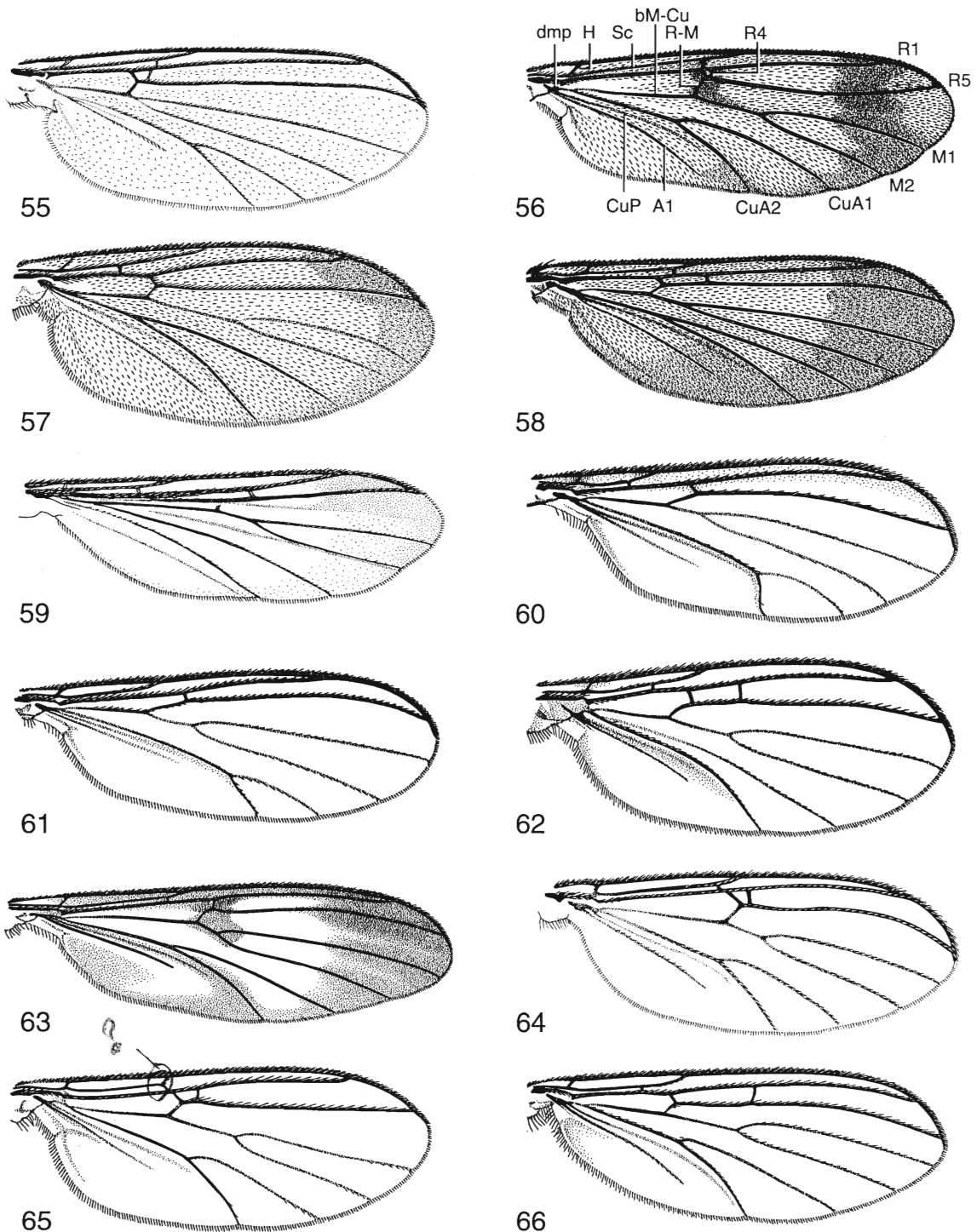
Adults

1. M and CuA₁ connected beyond level of crossvein H by a distinct oblique to transverse or horizontal crossvein bM-Cu (e.g., Fig. 31), or by a brief contact or fusion of M and CuA₁; basal portion of M (i.e., that basal to junction of M with bM-Cu or basal to fusion of R and M) distinct, weak or absent (e.g., Fig. 38) 2
 - M and Cu connected at most basally at or very near level of crossvein H by a long more or less horizontal crossvein bM-Cu, which meets Cu before base of posterior fork (Fig. 44); basal portion of M entirely reduced 34
2. R₄ present and at least 1/3 as long as R₅; Sc distinctly sclerotized for only a short distance, continuing as a weak fold that ends free (Fig. 31); wing membrane with macrotrichia. Postpronotum with one or more long fine setae DITOMYIIDAE 3
 - R₄ present and at most 1/5 as long as R₅ (Fig. 39), or absent (Fig. 35); Sc ending in C or in R or ending free; wing membrane with or without macrotrichia. Postpronotal setae very short or absent 6
3. Flagellomeres with only dense fine pubescence. Eye with deep rounded emargination opposite antennal base; eyes above separated by less than width of ocellar triangle. Anepisternum with erect hairs near upper margin Symmerus Walker 4
 - Flagellomeres with isolated suberect setae at least 1/2 as long as diameter of flagellomere. Eye with inner margin rounded or with shallow rounded emargination; eyes above separated by much more than width of ocellar triangle. Anepisternum bare 5



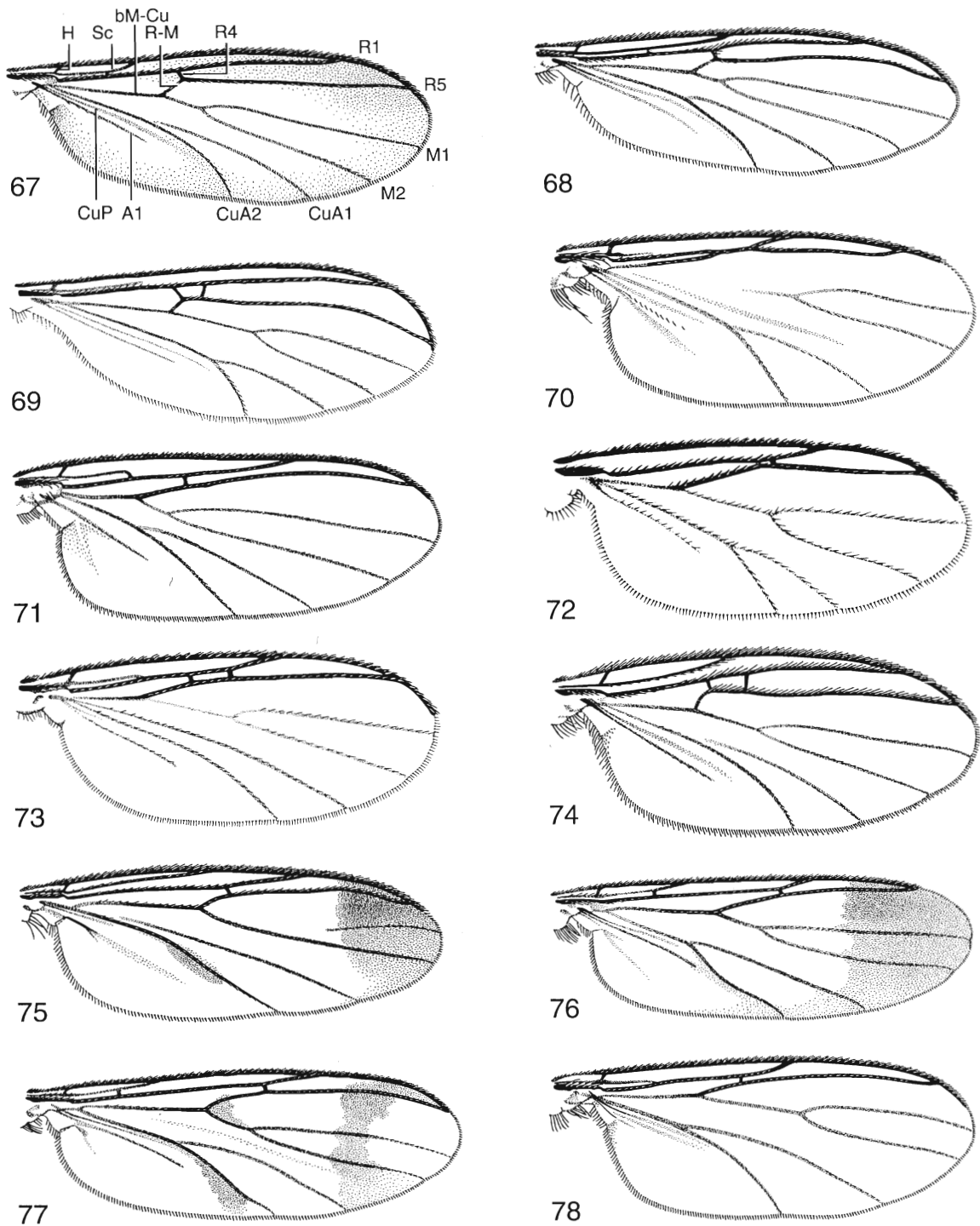
Figs 4.43–54. Wings. 43: *Neoempheria balioptera* (Loew) (Nearctic); 44: *Mycomya vulgaris* Garrett (Nearctic); 45: *Phthinia tanypus* Loew (Nearctic); 46: *Paratinia recurva* Johannsen (Nearctic); 47: *Azana* sp. (Nearctic); 48: *Sytemna vernalis* (Sherman) (Nearctic); 49: *Monoclona rufilatera* (Walker); 50: *Polylepta guttiventris* (Zetterstedt); 51: *Anaclileia* sp. (Nearctic); 52: *Neuratelia sayi* (Aldrich) (Nearctic); 53: *Baeopterogyna nudipes* (male) Vockeroth (Nearctic); 54: *Sciophila novata* Johannsen (Nearctic) (abbreviations as in Figs 31–42) (all after Vockeroth 1981).

4. Mediotergite with setae on posterior half **Symmerus (Symmerus Walker)**
4 spp.; Saigusa 1973, Munroe 1974, Zaitzev 1978.
- Mediotergite bare **Symmerus (Psilosymmerus Munroe)**
6 spp.; all Eastern Palaearctic; Saigusa 1973, Munroe 1974, Zaitzev 1978.
5. Veins Rs and M connected by a short but distinct crossvein bM-Cu. Palpus with at least two distinct segments, the ultimate more slender than the penultimate **Ditomyia Winnertz**
8 spp.; Zaitzev 1978, 1994.
- Veins Rs and M not connected by a crossvein, touching at a point or over a short distance (Fig. 32). Palpus with only one visible, stout segment **Asioditomyia Saigusa**
1 sp., *A. japonica* (Sasakawa), Japan, Russian Far East; Sasakawa 1963.
6. Crossvein bM-Cu, or point of contact of M and CuA₁, far before level of base of Rs; crossvein R-M distinct (Fig. 33) **BOLITOPHIIDAE Bolitophila Meigen** 7
- Crossvein bM-Cu beyond level of base of Rs, or Rs and M fused for a short distance; crossvein R-M distinct or obliterated by fusion of R and M 8
7. R₄ ending in C **Bolitophila (Cliopisa Enderlein)**
25 spp.; Stackelberg 1969a, Plassmann 1971.
- R₄ ending in R (Fig. 33) **Bolitophila (Bolitophila Meigen)**
13 spp.; Stackelberg 1969a, Plassmann 1975, Matile 1976.
8. Crossveins R-M and bM-Cu both distinct. R₄ absent (Fig. 34) 9
- Crossvein R-M absent because of contact or partial fusion of R and M; R₄ present **KEROPLATIDAE** 11
9. Crossveins R-M and bM-Cu forming a straight line, both being short and vertical. Vein Sc reaching costa (Fig. 34) **DIADOCIDIIDAE Diadocidia Ruthe** 10
- Crossvein R-M short but bM-Cu distinctly longer and oblique or horizontal. Vein Sc ending free **Heterotricha-group (unassigned to family)**
3 undescribed spp.: 1 sp. in *Heterotricha* Loew (southern Europe) and 1 sp. each in 2 undescribed genera (northern Europe and Japan respectively) (Chandler, in prep.).
10. Third flagellomere at least four times as long as broad. Anepisternum haired above. Segments of fore tarsus slender in female **Diadocidia (Adidocidia Laštovka et Matile)**
2 spp., *D. valida* Mik, widespread and common, and *D. trispinosa* Polevoi, Finland; Stackelberg 1969b, Laštovka and Matile 1972, Polevoi 1996.
- Third flagellomere at most 3.2 times as long as broad. Anepisternum bare above. Segments 2–4 of fore tarsus swollen below in female (Fig. 21) **Diadocidia (Diadocidia Ruthe)**
6 spp.; Stackelberg 1969b, Laštovka and Matile 1972.
11. Antennae strongly compressed. Palpus very short, often porrect, with three segments (Fig. 13). Prosternum haired at least laterally **KEROPLATINAE KEROPLATINI** 12
- Antennae cylindrical or only moderately compressed. Palpus drooping, with five segments. Prosternum bare 16
12. R₄ ending in R₁. Laterotergite haired **Keroplatus Bosc**
8 spp.; Zaitzev 1991, Matile 1986.
- R₄ ending in C. Laterotergite bare 13



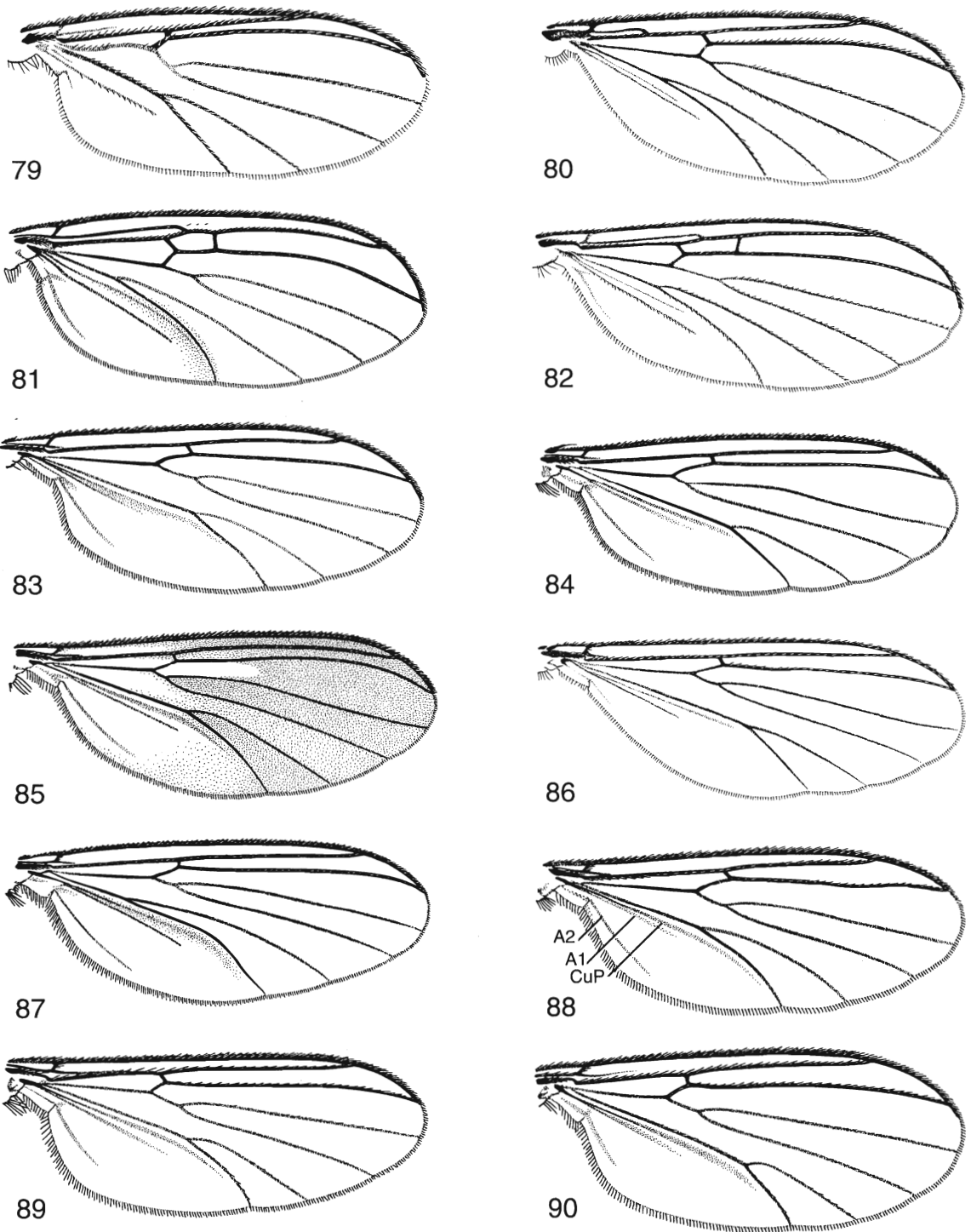
Figs 4.55–66. Wings. 55: *Megalopelma nigroclavatum* (Strobl); 56: *Leptomorphus nebulosus* (Walker) (Nearctic); 57: *Alloctocera pulchella* (Curtis); 58: *Eudicrana obumbrata* Loew (Nearctic); 59: *Allactoneura* sp. (Afrotropical); 60: *Coelophthinia curta* (Johannsen) (Nearctic); 61: *Coelosia tenella* (Zetterstedt); 62: *Drepanocercus ensifer* Vockeroth (Nearctic); 63: *Aglaomyia gatineau* Vockeroth (Nearctic); 64: *Grzegorzekia collaris* (Meigen); 65: *Synapha tibialis* (Coquillett) (Nearctic); 66: *Acomoptera plexipus* (Garrett) (Nearctic) (abbreviations as in Figs 31–42) (56–58, 60–63 and 65–66 after Vockeroth 1981).

13. Mediotergite with triangular membranous area at base
1 sp., *H. septentrionalis* (Okada), Japan. **Heteropterna** Skuse
- Mediotergite uniformly sclerotized 14
14. Tibial setae irregularly arranged except sometimes near apex
2 spp., *C. lineatum* (Fabricius), western Palaearctic, and *C. racovitzai* Matile et Burghel-Balacesco, Romania and Iran. **Cerotelion** Rondani
- Tibial setae in regular rows on at least apical 1/3 15
15. Hind tibial setae in regular rows only on apical 1/2 to 1/3. Scutellum with marginal hairs short, in several rows
1 sp., *R. humerale* (Zetterstedt), western Palaearctic; Matile 1988. **Rocetelion** Matile
- Hind tibia with setae in regular rows on almost entire tibial length. Scutellum with marginal hairs long, in one row
1 sp., *S. abdominalis* (Sasakawa et Tamu), Japan; Sasakawa and Tamu 1961. **Setostylus** Matile
16. Branches of CuA slightly convergent beyond their base, then divergent (Fig. 36); wing membrane with or without macrotrichia. Anepisternum with at least a few strong erect hairs on upper half **MACROCERINAE** 17
- Branches of CuA regularly divergent from their base (e.g., Fig. 40); wing membrane without macrotrichia. Anepisternum bare or with short hairs above **KEROPLATINAE ORFELIINI** 19
17. Cervical sclerite bordered by a membranous area; antennae not longer than head and thorax together. Hind tibia with a row of macrotrichia on distal half
ROBSONOMYIINI **Robsonomyia** Matile et Vockeroth
1 undescribed sp., Japan; T. Saigusa (*pers. comm.*)
- Head and cervical sclerite normal; antennae at most slightly shorter than body length, often longer. Tibiae without macrotrichia **MACROCERINI** 18
18. Anepimeron normal, reaching metapleuron; mediotergite high, at most projecting slightly backwards from scutellum; no setae below metathoracic spiracle. Stem of median fork short (Fig. 36). Mid and hind tibia both with two spurs
59 spp.; Stackelberg 1969c, Vockeroth 1976, Chandler 1990, Zaitzev 1994. **Macrocera** Meigen
- Anepimeron not reaching metapleuron; mediotergite low, strongly projecting backwards from scutellum; a row of strong setae below metathoracic spiracle. Stem of median fork long. Mid and hind tibia each with only one spur
1 undescribed sp., Japan; T. Saigusa (*pers. comm.*) **Fenderomyia** Shaw
19. Mouthparts at least as long as head (as in Fig. 14) 20
- Mouthparts much shorter than head 22
20. A₁ extending distinctly to wing margin. Anterior thoracic spiracle without setae on posterior margin
2 spp., *A. nigrum* Latreille, western Palaearctic, and *A. theodori* Matile, Israel; Matile 1975b. **Asindulum** Latreille
- A₁ incomplete, becoming faint well before wing margin (as in Fig. 37). Anterior thoracic spiracle with short erect black setae on posterior margin 21



Figs 4.67–78. Wings. 67: *Saigusaia cincta* (Johannsen) (Nearctic); 68: *Boletina* sp.; 69: *Speolepta leptogaster* (Winnertz); 70: *Novakia* sp. (Nearctic); 71: *Docosia dichroa* Loew (Nearctic); 72: *Tetragoneura sylvatica* (Curtis); 73: *Ectrepesthoneura colyeri* Chandler; 74: *Apolephthisa* sp. (Nearctic); 75: *Rondaniella dimidiata* (Meigen); 76: *Greenomyia jocular* (Laffoon) (Nearctic); 77: *Leia opima* (Loew) (Nearctic); 78: *Megophthalmidia occidentalis* Johannsen (Nearctic) (abbreviations as in Figs 31–42) (67–68, 70–71 and 74–78 after Vockeroth 1981).

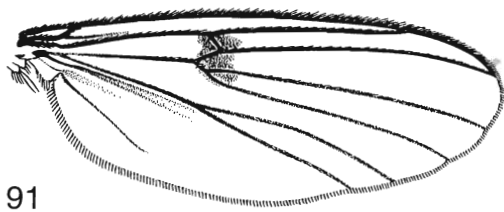
21. Labellum long, at least 1/3 of total length of proboscis; labrum distinctly pointed, usually reaching beyond labellum *Macrorrhyncha* Winnertz, part
17 spp., Matile 1975b.
- Labellum short, at most 1/6 of total length of proboscis; labrum often extremely long, not distinctly pointed and not reaching beyond labellum *Antlemon* Loew
3 spp., *A. halidayi* (Loew), *A. brevipanum* (Loew) and *A. servulum* (Walker), all western Palaearctic; Matile 1978a.
22. R₄ ending in R₁; base of M weak but distinct (Fig. 38). Empodia present, large *Platyura* Meigen
4 spp.; Zaitzev 1994.
- R₄ ending in C (as in Fig. 39); base of M absent. Empodia absent 23
23. Laterotergite haired 24
- Laterotergite bare 25
24. Antennae compressed; fine tibial setae regularly arranged along entire length. Wing tinted, especially along veins *Proceroplatus* Edwards
1 sp., *P. mikado* (Okada, 1938), n. comb. (originally *Zelmira*), Japan, South Korea; Okada 1938.
- Antennae cylindrical; fine tibial setae irregularly arranged on basal half. Wing clear *Monocentrotia* Edwards
5 spp.; Zaitzev 1994.
25. Branches of M and CuA setose above 26
- Branches of M and CuA bare above 30
26. Posterior margin of prothoracic spiracle with a row of erect black hairs 27
- Margin of spiracle without hairs 28
27. A₁ well developed and reaching wing margin (Fig. 39). Tibiae with fine setae arranged in regular rows on apical 1/3 or 1/4. Mouthparts short, labrum not distinctly pointed *Neoplatyura* Malloch
8 spp.; Zaitzev 1994.
- A₁ weak and not reaching wing margin. Tibiae with trichia irregularly arranged along entire length. Mouthparts long, labrum sharply pointed *Macrorrhyncha* Winnertz, part
See couplet 21.
28. Fine tibial setae in regular rows. Anepisternum bare *Isoneuromyia* Brunetti
3 spp., *I. ebriola* Plassmann, Germany, *I. semirufa* (Meigen), widespread, and *I. vitripennis* (Meigen), western Palaearctic.
- Fine tibial setae irregularly arranged except sometimes near tibial apex. Anepisternum bare or with short suberect hairs on upper half 29
29. A₁ reaching wing margin *Urytalpa* Edwards
7 spp.; Zaitzev 1994.
- A₁ extending at most 3/4 of distance from its base to wing margin *Pyratula* Edwards
5 spp.



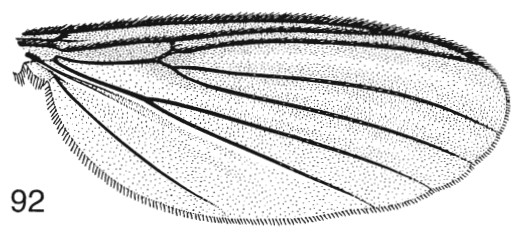
Figs 4.79–90. Wings. 79: *Impleta consorta* Plassmann; 80: *Palaeodocosia janickii* (Dziedzicki); 81: *Hadroneura rutila* (Sherman) (Nearctic); 82: *Dziedzickia marginata* (Dziedzicki); 83: *Anatella ciliata* Winnertz; 84: *Exechia attrita* Johannsen (Nearctic); 85: *Exechiopsis nugax* (Johannsen) (Nearctic); 86: *Exechiopsis* (X.) *membranacea* (Lundström); 87: *Rymosia triangularis* Shaw (Nearctic); 88: *Allodia* (A.) *ornaticollis* (Meigen); 89: *Trichonta vulgaris* (Dziedzicki); 90: *Phronia cordata* Lundström (abbreviations as in Figs 31–42) (81, 83–85 and 87–90 after Vockeroth 1981).

30. Tibia with about 6 rows of setae much more closely set than others, appearing as conspicuous black lines (Fig. 26); mediotergite with many short hairs **Orfelia** Costa
18 spp.; Zaitzev 1994. 31
- All rows of tibial setae alike; mediotergite bare 31
31. Tibial setae irregular on about basal half of tibia, in even rows on remainder. Posterior margin of anterior spiracle without hairs; metepisternum bare 32
- Tibial setae in even rows on entire length of tibia. Posterior margin of prothoracic spiracle with or without black hairs 33
32. Costa produced well beyond tip of vein R₅; a few short black frontal setae close to bases of antennae **Xenoplatyura** Malloch
4 spp., Israel; Chandler 1994b.
- Costa ending at tip of vein R₅; no such frontal setae **Truplaya** Edwards
1 sp., *T. fini* Chandler, Israel; Chandler 1994b.
33. Posterior margin of anterior spiracle with erect black hairs; metepisternum with dense cluster of short setae on posteroventral portion. Anal vein present **Rutylapa** Edwards
1 sp., *R. ruficornis* (Zetterstedt), western Palearctic.
- Posterior margin of anterior spiracle without such hairs; anal vein absent **Laurypta** Edwards
2 spp., *L. exserta* (Ostroverkhova), Russian Far East, and *L. tripotini* Matile, South Korea.
34. Rs and R₁ separated from level of crossvein H; stem of M₁ and M₂ absent; CuA₁ and branches of M present as detached veins on distal part of wing (Fig. 41). Mouthparts long and slender, several times as long as height of head (Fig. 12) **LYGISTORRHINIDAE** **Lygistorrhina** Skuse
1 sp., *L. pictipennis* Okada, Japan; Okada 1937.
- Rs arising from R well beyond crossvein H; stem of M₁ and M₂ present or absent. Mouth-parts usually much shorter than head; if mouthparts long and slender, both M and CuA entire and normally forked 35
35. Eyes meeting in a narrow eye bridge above antennae (except in *Pnyxia* in which eyes are reduced in both sexes and wings and halteres are lacking in female). Wings with stem and fork of M subequal in length, and with fork distinctly bell-shaped. Abdomen broadly inserted on thorax, covering a large proportion of the mediotergite **SCIARIDAE** Chapter 2.6
- Eyes not meeting above antennae. Wings usually with fork of M much longer than stem, and lanceolate rather than bell-shaped. Abdomen narrowly inserted on thorax, most of mediotergite left free **MYCETOPHILIDAE** 36
36. Wing membrane either with microtrichia irregularly arranged (Fig. 95) and with macrotrichia present or absent, or with microtrichia absent and macrotrichia abundant; Sc variable, ending in C or in R or ending free; R₄ present or absent. Laterotergite haired or bare. Ocelli variable in position, often far from eye margins 37
- Microtrichia always present and, especially near wing margin, arranged in more or less regular longitudinal lines (Fig. 96); macrotrichia usually absent, at most a few present in anal area; Sc ending free or in R; R₄ absent. Laterotergite haired. Lateral ocelli touching eye margins 95

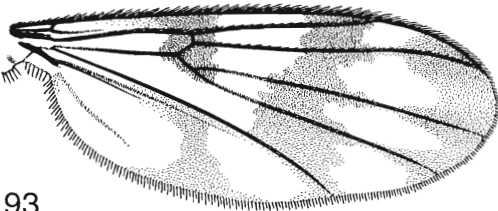
37. Fine tibial setae arranged in regular longitudinal rows (Fig. 22). Wing membrane without macrotrichia 38
 – Fine tibial setae irregularly arranged (Fig. 23). Wing membrane with or without macrotrichia 48
38. Stem of M absent; branches of M present as detached veins on distal part of wing; R₄ missing (Fig. 42). Head with a row of strong, straight, posteriorly directed bristles behind eye; three ocelli **Manota** Williston
 1 sp., *M. unifurcata* Lundström, widespread but rare.
- Stem of M present, branches of M complete; R₄ present or absent. Head without strong posteriorly directed bristles behind eye; two ocelli 39
39. Vein R₄ absent; C produced well beyond tip of R₅ **Parempheriella** Matile
 1 sp., South Korea (Matile, *in prep.*).
- Vein R₄ present; C ending in, or produced a short distance beyond tip of R₅ 40
40. C extending slightly beyond apex of R₅; R₅ reaching wing margin slightly before wing apex; wing membrane with a false vein between R₅ and M₁; wing with conspicuous dark markings (Fig. 43) **Neoempheria** Osten-Sacken
 18 spp.; Väisänen 1982.
- C ending at apex of R₅; R₅ reaching wing margin at wing apex; wing membrane without false vein between R₅ and M₁; wing unmarked or with obscure clouding (Fig. 44) **Mycomya** Rondani 41



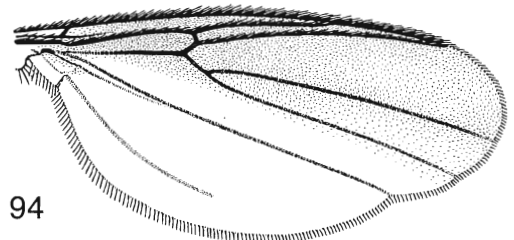
91



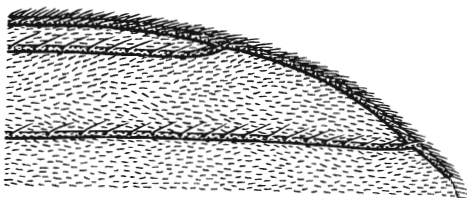
92



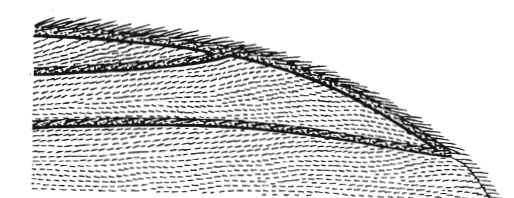
93



94



95

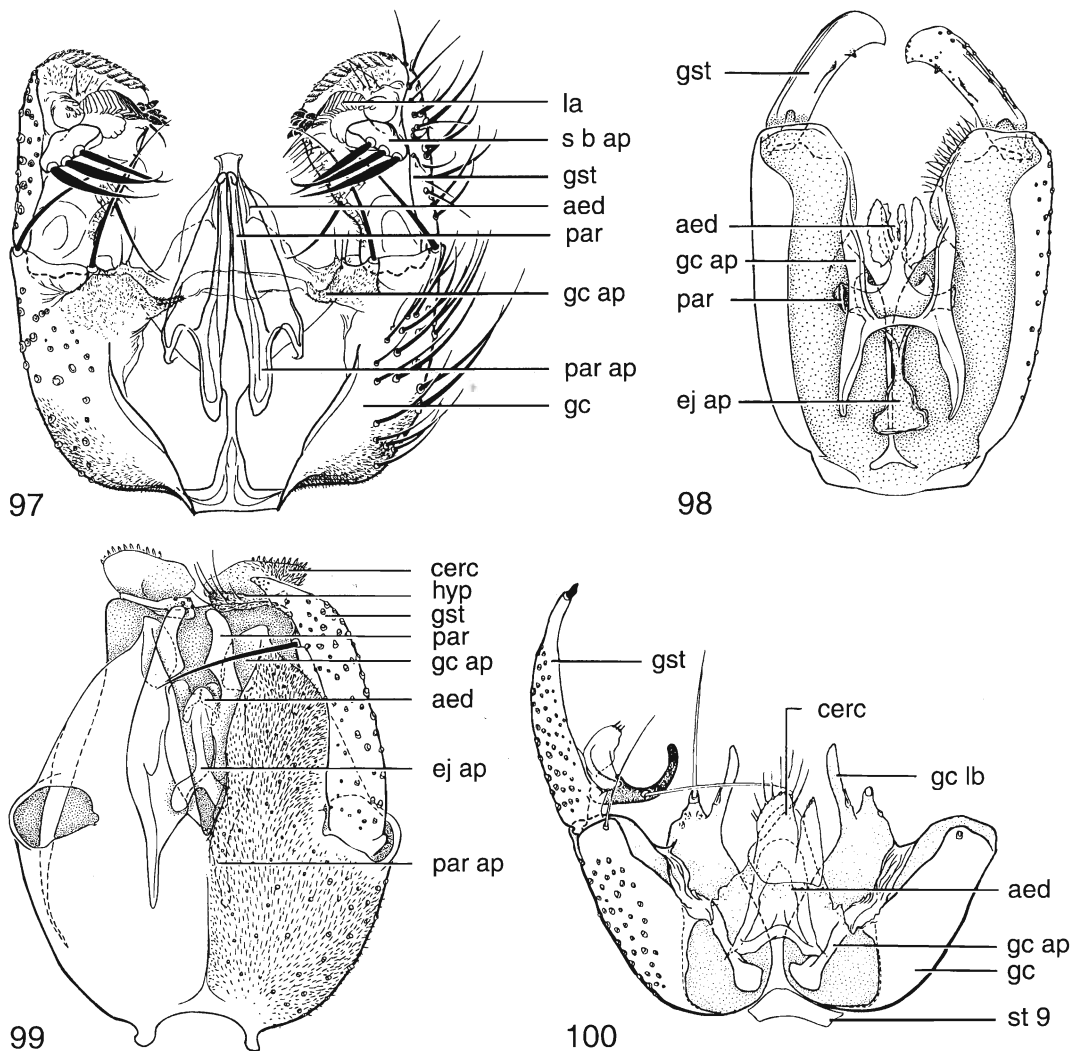


96

Figs 4.91–96. Wings. 91: *Mycetophila unipunctata* Meigen; 92: *Epicypta scatophora* (Perris); 93: *Zygomyia ornata* Loew (Nearctic); 94: *Sceptonia johannseni* Garrett (Nearctic). 95–96: anteroapical portion of wing; 95: *Synapha tibialis* (Coquillett) (Nearctic); 96: *Exechia attrita* Johannsen (Nearctic) (abbreviations as in Figs 31–42) (all after Vockeroth 1981).

41. Applies to males only: Mid coxa with spur (Fig. 24) 42
 – Applies to males only: Mid coxa without spur 43
42. Tergites pale with dark posterior margins. Tergite 8 bare; tergite 9 with a forked median structure (Fig. 105). Ocellar prominence usually darker than posterior part of head
Mycomya (Calcomycomya Väisänen)
 5 spp.; Väisänen 1984.
- Tergites entirely pale or dark, or dark with paler posterior margin. Tergite 8 with setae posteriorly; tergite 9 without a forked median structure (as in Fig. 106). Ocellar prominence not darker than posterior part of head
Mycomya (Mycomya Rondani), part
 109 spp.; Väisänen 1984.
43. Gonocoxites not widely separated ventrally, each with small, rounded gonocoxal lobes submedially (Fig. 107); tergite 9 usually with 2 groups of dark cones, often with lateral sabre-like spines
Mycomya (Mycomya Rondani), part
 See couplet 42.
- Gonocoxites widely or completely separated ventrally, without such submedian gonocoxal lobes, or gonocoxal lobes strongly modified; tergite 9 without cones or sabre-like spines 44
44. Tergite 9 without lateral appendages 45
 – Tergite 9 with lateral appendages (e.g., Figs 105–106) 46
45. Tergite 9 without a comb, with groups of strong lateral and submedian spines; sternal lateral appendages with strong spines
Mycomya (Coheromyia Väisänen)
 1 sp., *M. (C.) branderi* Väisänen, western Palaearctic; Väisänen 1984.
- Tergite 9 with an apicomedian comb of setae, without groups of strong spines; sternal lateral appendages without strong spines
Mycomya (Cymomyia Väisänen)
 1 sp., *M. (C.) circumdata* Staeger, widespread; Väisänen 1984.
46. Tergite 9 without comb or combs of spines
Mycomya (Neomycomya Väisänen)
 1 sp., *M. (N.) fimbriata* (Meigen), Holarctic; Väisänen 1984.
- Tergite 9 with at least one comb of short spines apically 47
47. Tergite 9 with one wide apical comb
Mycomya (Lycomya Väisänen)
 2 spp., *M. (L.) amurensis* Väisänen, eastern Palaearctic, and *M. (L.) pectinifera* Edwards, western Palaearctic; Väisänen 1984.
- Tergite 9 with two narrow submedian apical combs
Mycomya (Mycomyopsis Väisänen)
 11 spp.; Väisänen 1984.
48. Wing membrane with many distinct macrotrichia and usually also microtrichia 49
 – Wing membrane without macrotrichia or with at most a few near posterior margin, always with dense microtrichia 64
49. Legs extremely long and slender; first tarsomere of fore leg more than twice as long as fore tibia. Mediotergite with several strong setae laterally. Stem of posterior fork very long; CuA₁ strongly arched (Fig. 45)
Phthinia Winnertz
 14 spp.; Zaitzev 1984b.
- Legs normal; first tarsomere of fore leg subequal to or shorter than fore tibia. Mediotergite with or without setae. Stem of posterior fork, if present, not particularly long; CuA₁ straight or slightly curved (e.g., Fig. 46) 50

50. Laterotergite and mediotergite bare. Tibiae without distinct bristles (Fig. 23) **Paratinia** Mik
2 spp., *P. montana* Plassmann, western Palaearctic (Caucasus), and *P. sciarina* Mik, western Palaearctic.
- Laterotergite with strong erect hairs; mediotergite usually haired at least posteriorly. Tibiae with or without distinct bristles 51
51. M and CuA not clearly branched but a detached branch of one of them (probably CuA₁) present near wing margin; Sc short, ending free (Fig. 47) **Azana** Walker
5 spp.; Coher 1995.
- M or CuA, or both, clearly branched; Sc long, ending in C or in R 52
52. Sc ending in R₁ (Fig. 48). Mediotergite bare **Syntemma** Winnertz
12 spp.; Hutson 1979.
- Sc ending in C. Mediotergite haired; hairs usually long and erect but sometimes very short 53



Figs 4.97–100. Male terminalia. 97: *Coelosia fusca* Bezzi, dorsal view, tergal parts removed. 98: *Synapha vitripennis* (Meigen), dorsal view, tergal parts removed. 99: *Boletina trivittata* (Meigen), ventral view. 100: *Monoclona rufilatera* (Walker), dorsal view, tergal parts removed (abbreviations: aed: aedeagus, cerc: cercus, ej ap: ejaculatory apodeme, gc: gonocoxite, gc ap: gonocoxal apodeme, gc lb: gonocoxal lobe, gst: gonostylus, hyp: hypoproct, la: lamellae, par: paramere, par ap: parameral apodeme, proct: proctiger, s b ap: setae bearing appendage (of the gonostylus), st 9: sternite 9).

53. CuA unbranched 54
 – CuA branched, with anterior branch sometimes obsolete basally 55
54. Macrotrichia of wing membrane reflexed, directed toward wing base; R₄ present or absent (Fig. 49). Posteroventral part of metepisternum with fine hairs **Monoclona** Mik
 6 spp.; Zaitzev 1983b.
 – Macrotrichia decumbent, directed toward wing apex; R₄ absent. Metepisternum bare **Acnemia** Winnertz
 15 spp.; Zaitzev 1982a, b.
55. Base of M₁ obsolete or very weak (e.g., Fig. 52) 56
 – Base of M₁ entire and distinct 59
56. Crossvein Sc-R beyond base of R_s; R₄ usually present (Fig. 50) **Polylepta** Winnertz, part
 4 spp.; Bechev 1990b.
 – Crossvein Sc-R, if present, before base of R_s; R₄ absent 57
57. C produced at least one-third of the distance between apex of R₅ and apex of M₁; R₅ moderately sinuate; crossvein R-M about twice as long as R_s (Fig. 51) **Anaclileia** Winnertz
 5 spp.; Bechev 1990a; Zaitzev 1994.
 – C produced at most one-fifth of the distance between apex of R₅ and apex of M₁; R₅ strongly sinuate; crossvein R-M about as long as R_s (Figs 52–53) 58
58. Tibiae with distinct setae about as long as tibial diameter. Anepisternum and metepisternum bare **Neuratelia** Rondani
 10 spp.; Matile 1974.
 – Tibiae without distinct setae. Upper part of anepisternum, and metepisternum, with fine hairs. Only male known; female possibly stenopterous **Baeoptero-gyna** Vockeroth
 1 sp., *B. mihalyii* Matile, Hungary; Matile 1975a.
59. Point of furcation of CuA beyond point of furcation of M (Figs 54–55); CuA₁ sometimes obsolete basally 60
 – Point of furcation of CuA before point of furcation of M (Figs 50, 56–58); CuA₁ entire 61
60. Macrotrichia decumbent, directed toward wing apex; macrotrichia abundant, each more than ten times as long as one microtrichium (Fig. 54). Anepisternum haired above **Sciophila** Meigen
 48 spp.; Zaitzev 1982c, 1994.
 – Macrotrichia of wing membrane erect or slightly reflexed, directed toward wing base; macrotrichia sparsely distributed, each about three times as long as one microtrichium (Fig. 55). Anepisternum bare **Megalopelma** Enderlein
 1 sp., *M. nigroclavatum* (Strobl), western Palaearctic.
61. C not produced beyond apex of R₅ (Fig. 56) **Leptomorphus** Curtis
 4 spp.
 – C produced well beyond apex of R₅ 62

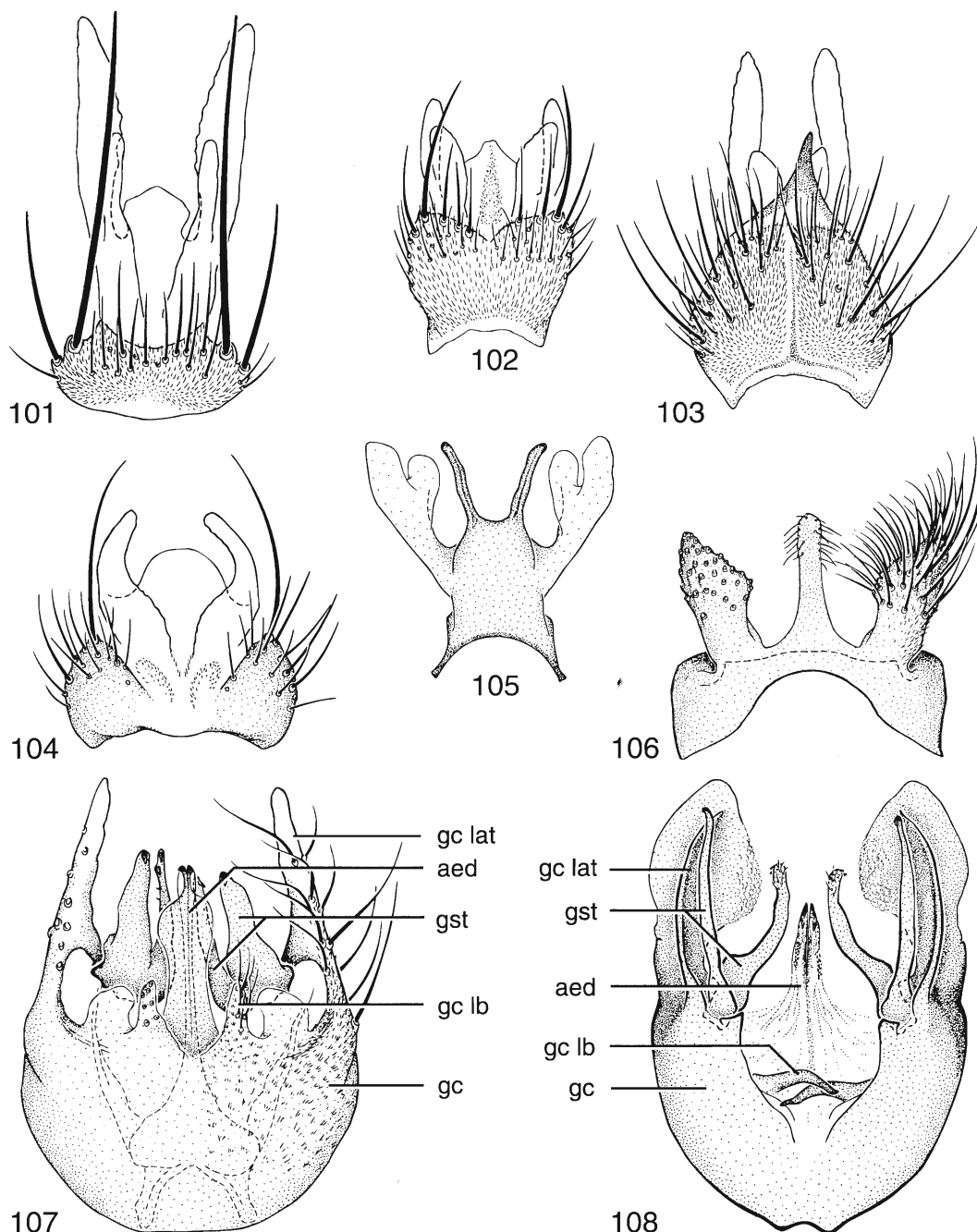
62. Crossvein Sc-R well before base of Rs (Fig. 57). Anepisternum with many long hairs

Allocotocera Mik

1 sp., *A. pulchella* (Curtis), widespread.

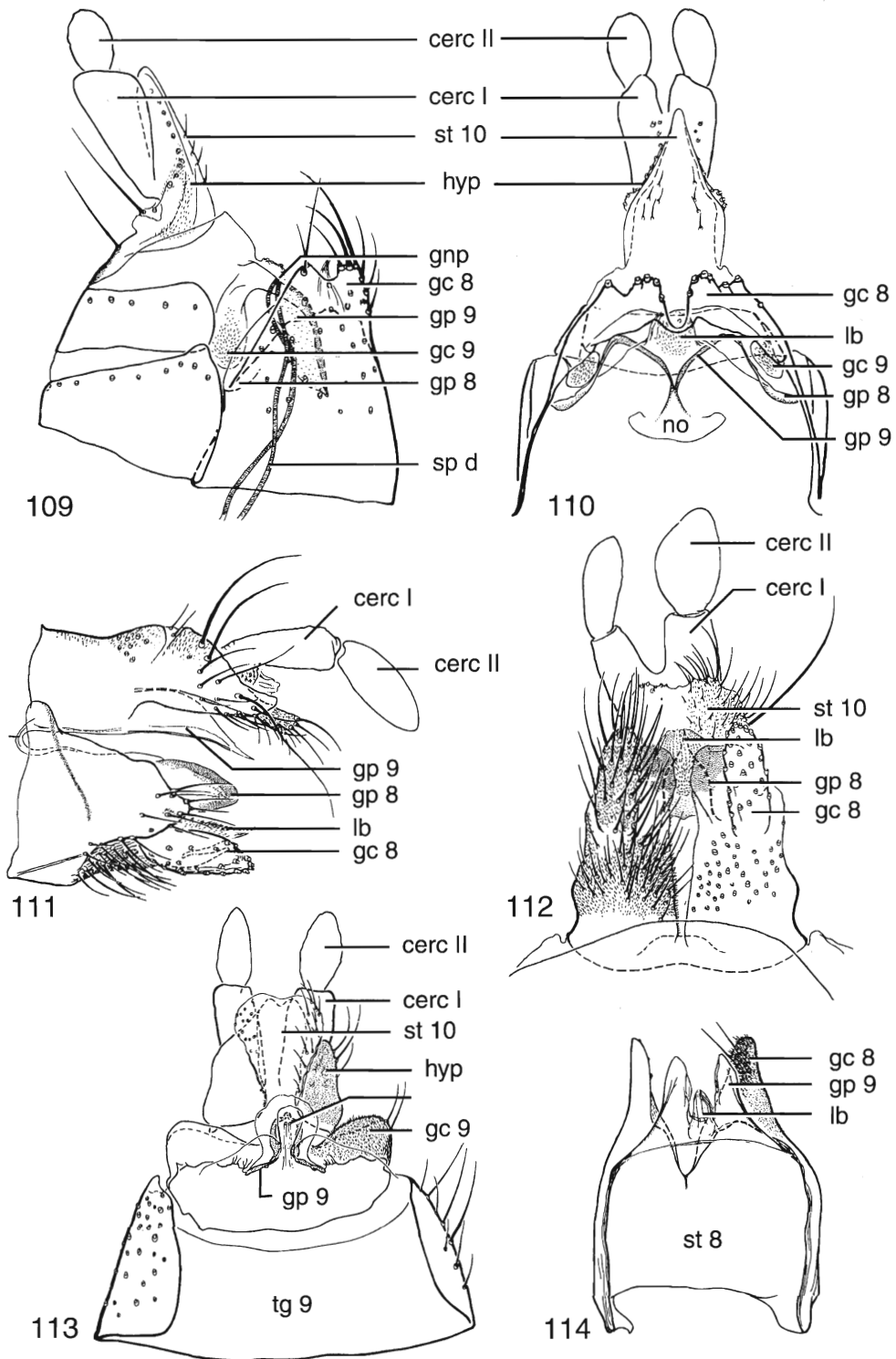
– Crossvein Sc-R beyond base of Rs. Anepisternum bare or with a few short hairs near upper margin

63



Figs 4.101–108. Details of male terminalia. 101–106: tergite 9 and proctiger: 101: *Allodiopsis domestica* (Meigen); 102: *Notolopha cristata* (Staeger) n. stat.; 103: *Pseudexechia aurivernica* Chandler; 104: *Exechiopsis (E.) indecisa* (Walker); 105: *Mycomya (Calcomycomya) pulchella* (Dziedzicki); 106: *Mycomya (Mycomya) flavicollis* (Zetterstedt). 107–108: male terminalia, ventral view: 107: *M. (M.) flavicollis* (Zetterstedt); 108: *M. (C.) pulchella* (Dziedzicki) (abbreviations: aed: aedeagus, gc: gonocoxite, gc lat: gonocoxite, lateral prolongation, gc lb: gonocoxal lobe, gst: gonostylus).

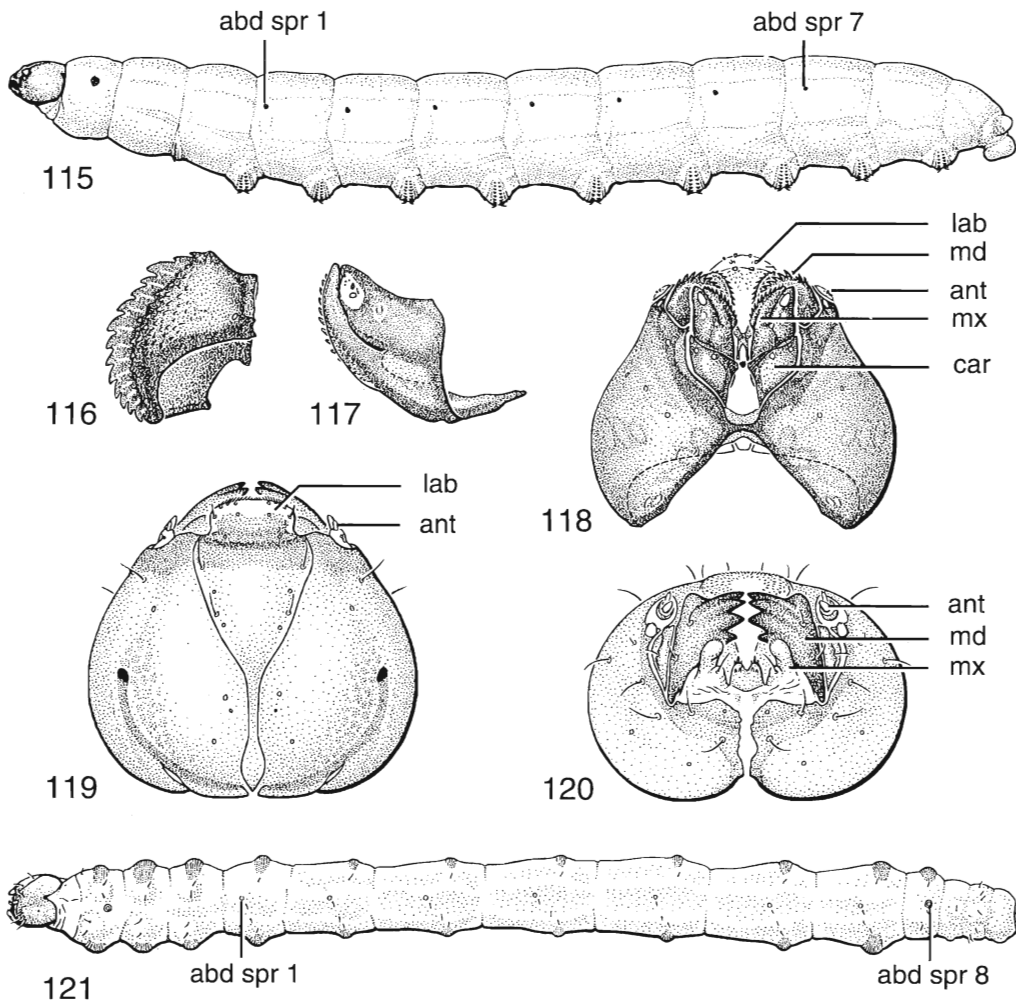
63. R₅ sinuate; R₄ usually present, demarcating a small cell, about as long as wide (Fig. 50). Three ocelli present; lateral ocelli far from eye margin **Polylepta** Winnertz, part
See couplet 56.
- R₅ nearly straight; R₄ present, demarcating a small cell distinctly longer than wide (Fig. 58). Two ocelli present, touching eye margins **Eudicrana** Loew
2 spp., *E. affinis* Okada, Japan, and *E. nigriceps* (Lundström), western Palaearctic.
64. Wings longitudinally folded; radial veins densely setose (Fig. 59). Head with a row of strong, recurved, posteriorly directed bristles behind eyes. Scutum and abdomen covered by narrow but distinctly flattened scale-like setae **Allactoneura** de Meijere
1 sp., *A. ussuriensis* Zaitzev, Russian Far East; Zaitzev 1981.
- Wing flat; radial veins with a single row of setae. Head with at most a few posteriorly directed bristles. Scutum and abdomen with normal setae 65
65. Mediotergite with long erect hairs near posterior end. CuA₂ widely divergent from CuA₁ (Fig. 60) **Coelophthinia** Edwards
1 sp., *C. thoracica* (Winnertz), western Palaearctic.
- Mediotergite bare. CuA₂ only slightly divergent from CuA₁ 66
66. Laterotergite bare 67
- Laterotergite haired; hairs 1 usually long and abundant but sometimes short and few in number and confined to posterior declivity of laterotergite 83
67. Sc ending in C 68
- Sc ending free or in R₁ 78
68. Point of furcation of CuA distinctly beyond level of point of furcation of M; crossvein Sc-R absent (Fig. 61) **Coelosia** Winnertz
11 spp.; Söli 1997.
- Point of furcation of CuA before, below or very slightly beyond point of furcation of M; crossvein Sc-R present or absent 69
69. Mouthparts forming a long slender proboscis that is several times as long as height of head (Fig. 15) **Gnoriste** Meigen
7 spp.; Zaitzev 1994.
- Mouthparts shorter than height of head 70
70. Point of furcation of CuA very near wing base; R₄ present (Fig. 62) **Drepanocercus** Vockeroth
1 sp., *D. spinistylus* Söli, Norway, Sweden; Söli 1993.
- Point of furcation of CuA well beyond wing base; R₄ present or absent. Female cercus usually short, weakly sclerotized 71
71. Crossvein Sc-R present, at apical fourth of Sc 72
- Crossvein Sc-R near middle of Sc, or absent 76



Figs 4.109–114. Female terminalia. 109–110: *Coelosia tenella* (Zetterstedt): 109: lateral view, 110: ventral view. 111–112: *Phthinia winnertzi* Mik: 111: lateral view, 112: ventral view. 113–114: *Paratinia sciarina* Mik: 113: ventral view, sternal parts removed, 114: dorsal view, sternal parts (abbreviations: cerc: cercus, gc: gonocoxite, gnp: gonopore, gp: gonapophysis, hyp: hypoproct, lb: labia, no: notum, sp d: spermathecal duct, st: sternite, tg: tergite).

72. Stem of median fork shorter than or subequal to crossvein R-M; point of furcation of CuA before base of crossvein R-M (Fig. 63) **Aglaomyia** Vockeroth
 1 sp., *A. ingrca* (Stackelberg), widespread but rare; Stackelberg 1948.
- Stem of median fork at least twice as long as crossvein R-M; point of furcation of CuA beyond base of crossvein R-M (Figs 64–65) 73
73. Base of posterior fork well beyond base of stem of median fork. Lateral ocelli less than their diameter from the eye margin. Empodia well-developed. R₄ present or absent (Fig. 65) **Synapha** Meigen
 2 spp., *S. fasciata* Meigen and *S. vitripennis* (Meigen), both western Palaearctic.
- Base of posterior fork close to or before base of stem of median fork. Lateral ocelli at about their diameter distant from the eye margin. Empodia not developed. R₄ always present 74
74. Sc setose above. R₄ closely approximated to Rs and radial cell narrow or almost obliterated (Fig. 64). Setae present on stem of posterior fork **Grzegorzekia** Edwards
 1 sp., *G. collaris* (Meigen), western Palaearctic.
- Sc bare. R₄ further removed from Rs, forming a larger radial cell. Setae present or absent on stem of posterior fork 75
75. Stem of posterior fork setose. Rs and R₄ forming a rectangular radial cell. Male with sensory area on mid tibia and spinose setae on cerci **Creaghubhia** Chandler
 1 sp., *C. mallochorum* Chandler, Scotland; Chandler 1999.
- Stem of posterior fork bare. Rs and R₄ forming a smaller trapezoidal radial cell. Male without sensory area on mid tibia and cerci without spines **Phoenikiella** Chandler
 1 sp., *P. phoenix* (Väisänen), Tunisia, Israel and Malta; Chandler 1999.
76. R₄ present (Fig. 66) **Acomoptera** Vockeroth
 2 spp., *A. difficilis* (Dziedzicki), western Palaearctic (rare) and *A. sinica* Wu et Yang, Mongolia; Wu and Yang 1990.
- R₄ absent 77
77. Sc ending before level of base of crossvein R-M (Fig. 67). Metepisternum with very short hairs that are dark in female but pale and inconspicuous in male **Saigusaia** Vockeroth
 1 sp., *S. flaviventris* (Strobl), widespread.
- Sc ending beyond level of base of crossvein R-M (Fig. 68). Metepisternum bare **Boletina** Staeger, part
 82 spp; Zaitzev 1994.
78. Crossvein R-M oblique; R₁ more than six times as long as crossvein R-M (Fig. 69); R₄ present. Apical spur of fore tibia, and longer spur of mid tibia, not longer than apical tibial diameter **Speolepta** Edwards
 1 sp., *S. leptogaster* (Winnertz), Holarctic.
- Crossvein R-M nearly horizontal, R₁ less than four times as long as crossvein R-M (Figs 70–73). Apical spur of fore tibia, and longer spur of mid tibia, at least twice as long as apical tibial diameter 79
79. Basal section of Rs indistinguishable because of crowding of radial veins towards C (Fig. 70) **Novakia** Strobl
 2 spp., *N. scatopsiformis* Strobl, Balkan and Tunisia and *N. simillima* Strobl, Austria; Zaitzev 1994.
- Basal section of Rs distinct 80

80. Flagellum pectinate, at least in males. Palpus with one visible segment. Anteroapical depressed area very weakly developed
Chalastonepsia Søli
 1 sp., *C. hokkaidensis* Kallweit, Japan; Kallweit 1998.
- Flagellum normal, tread-like. Palpus normal, 5-segmented. Anteroapical depressed area well-developed 81
81. Hind coxa with many posterolateral hairs near base, then bare almost to apex. R₄ absent; point of furcation of CuA well beyond wing base (Fig. 71). Lateral ocelli very near eye margins
Docosia Winnertz, part
 23 spp.
- Hind coxa with a row of rather long setose posterolateral hairs on at least apical three-quarters. R₄ present; point of furcation of CuA very near or well beyond wing base (Figs 72–73). Lateral ocelli far from eye margins 82



Figs 4.115–121. Larvae. 115: *Mycetophila* sp., general view. 116–118: *Mycetophila fisherae* (Laffoon): 116: mandible, 117: maxilla, 118: head capsule, ventral view. 119–121: *Symmerus coqulus* Garrett: 119: head capsule, dorsal view, 120: head capsule, anterior view, 121: general view (abbreviations: abd spr: abdominal spiracle, ant: antenna, car: cardo, lab: labium, md: mandible, mx: maxilla) (after Vockeroth 1981).

82. Sc very short and ending free. CuA with a long stem, point of furcation well beyond level of crossvein R-M (Fig. 72) **Tetragoneura** Winnertz
7 spp.
- Sc long and ending in R. CuA with a very short stem, or point of furcation at wing base (Fig. 73) **Ectrepesthoneura** Enderlein
12 spp.; Chandler 1980, Plassmann 1980.
- 83. Sc ending in C or, if weak apically, with apex turned toward C 84
- Sc straight and ending free, or ending in R₁ 90
84. R₁ at least four times as long as crossvein R-M (e.g., Fig. 74) 85
- R₁ at most three times as long as crossvein R-M (e.g., Fig. 78) 86
85. R₄ present; crossvein Sc-R absent; Sc densely setose above (Fig. 74) **Apolephthisa** Grzegorzek
1 sp., *A. subincana* (Curtis), western Palearctic.
- R₄ absent; crossvein Sc-R usually present; Sc usually bare above, rarely with a few setae (Fig. 68) **Boletina** Staeger, part
See couplet 77.
86. R₁ at least twice as long as crossvein R-M; M₁ detached at base, not longer than stem of median fork; crossvein R-M oblique (Fig. 75) **Rondaniella** Johannsen
2 spp., *R. dimidiata* (Meigen), Holarctic, and *R. japonica* (Matsumura), Japan.
- R₁ about as long as crossvein R-M usually shorter; M₁ not or only slightly detached at base, much longer than stem of median fork; crossvein R-M nearly horizontal (Figs 76–77) 87
87. Lateral ocelli separated from eye margins by more than twice their own diameter 88
- Lateral ocelli separated from eye margins by less than their own diameter 89
88. Both M₂ and CuA₁ continue to wing margin (Fig. 76) **Greenomyia** Brunetti
6 spp.; Zaitzev 1982d.
- Both M₂ and CuA₁ end slightly before wing margin **Neoclastobasis** Ostroverkhova
3 spp., *N. draskovitsae* Matile, Hungary, *N. kamijoi* (Sasakawa), Japan and *N. sibirica* Ostroverkhova, western Siberia; Matile 1978b, Zaitzev 1982d.
89. Lateral ocelli touching eye margins. Fork of CuA slightly before level of apex of Sc **Clastobasis** Skuse
2 spp., *C. alternans* (Winnertz), widespread, and *C. gussakovskii* Zaitzev, Russian Far East; Zaitzev 1994.
- Lateral ocelli not touching eye margins. Fork of CuA beyond level of apex of Sc (Fig. 77) **Leia** Meigen
28 spp.; Plassmann 1973, Zaitzev 1994.
90. R₁ at most twice as long as crossvein R-M; crossvein R-M nearly horizontal (Figs 71, 78) 91
- R₁ longer, usually at least four times as long as crossvein R-M; crossvein R-M oblique (Figs 79–82) 92
91. Sc long, meeting R₁ in a right angle; stem of median fork usually weakly sclerotized, shorter than or subequal in length to crossvein R-M (Fig. 71). Lateral ocelli very near eye margins **Docosia** Winnertz, part
See couplet 81.

- Sc short, meeting R₁ in an acute angle; stem of median fork well-sclerotized, distinctly longer than crossvein R-M (Fig. 78). Lateral ocelli separated from eye margins by more than their own diameter
Megophthalmidia Dziedzicki
4 spp.
- 92. Sc ending free; point of furcation of CuA below or slightly beyond base of crossvein R-M; R₄ absent. Hairs of laterotergite short and weak (Fig. 79) **Impleta** Plassmann
1 sp., *I. consorta* Plassmann, Sweden; Plassmann 1978; see also Matile 1983.
- Sc ending in R₁; point of furcation of CuA well before base of crossvein R-M; R₄ present or absent. Hairs of laterotergite long and strong 93
- 93. R₄ absent; Sc ending at or before base of Rs (Fig. 80) **Palaeodocosia** Meunier
3 spp., *P. alpicola* (Strobl), western Palaearctic, *P. flava* (Edwards), England and *P. janickii* (Dziedzicki), western Palaearctic.
- R₄ present; Sc ending beyond base of Rs (Figs 81–82) 94
- 94. C extending beyond apex of R₅ for 1/5 distance to M₁ (Fig. 81) **Hadroneura** Lundström
2 spp., *H. kamtschatica* Stackelberg, Russian Far East and *H. palmeni* Lundström, western Palaearctic (rare); Zaitzev 1994.
- C extending beyond apex of R₅ for 1/3 distance to M₁ (Fig. 82) **Dziedzickia** Johannsen
3 spp., *D. bilobata* Ostroverkhova, Siberia, *D. macrura* Shinji, Japan and *D. marginata* (Dziedzicki), western Palaearctic.
- 95. Anepisternum bare or with short fine hairs 96
- Anepisternum with strong bristles at least near upper margin (Fig. 18) 114
- 96. C ending well beyond apex of R₅ (Fig. 83) **Anatella** Winnertz
42 spp.; Chandler 1977, Zaitzev 1989a.
- C ending at apex of R₅ 97
- 97. Point of furcation of CuA beyond level of point of furcation of M (Figs 84–86) 98
- Point of furcation of CuA before or opposite level of point of furcation of M (Figs 87–88) 101
- 98. Sc ending free; crossvein R-M at least twice as long as stem of median fork, usually longer; apical half of R₅ straight, and divergent from M₁ (Fig. 84). Pale abdominal markings, when present, usually situated towards bases of tergites **Exechia** Winnertz
65 spp.; Ostroverkhova and Stackelberg 1969, Krivosheina et al. 1986.
- Sc more or less distinctly ending in R₁; crossvein R-M at most twice as long as stem of median fork; apical half of R₅ curved or straight (Figs 85–86). Pale abdominal markings broadest along posterior margins of tergites 99
- 99. Scutum without discal bristles. Crossvein R-M never more than twice as long as stem of median fork. Male tergite 9 entire (Fig. 103) **Pseudexechia** Tuomikoski
9 spp.; Chandler 1978.
- Scutum with discal bristles well-developed. Crossvein R-M short or at least twice as long as stem of median fork (Figs 85, 86). Male tergite 9 divided (Fig. 104) **Exechiopsis** Tuomikoski 100

100. Apex of hind tibia distinctly oblique in lateral view, dorsal surface with large triangular shining depression at apex (Fig. 29). Apical half of R₅ distinctly downturned and convergent with M₁ (Fig. 85) **Exechiopsis** (**Exechiopsis** Tuomikoski)
45 spp.; Ostroverkhova and Stackelberg 1969, Krivosheina et al. 1986.
- Apex of hind tibia nearly truncate in lateral view, dorsal surface at most with small shining depression (as in Fig. 30). Apical half of R₅ straight, and divergent from or subparallel with M₁ (Fig. 86) **Exechiopsis** (**Xenexechia** Tuomikoski)
11 spp.; Ostroverkhova and Stackelberg 1969, Krivosheina et al. 1986.
101. Branches of M, and usually also of CuA, setulose above, especially near apex 102
- Branches of M and of CuA without setulae above 110
102. Sc ending free (as in Figs 87, 92) 103
- Sc ending in R₁ (as in Fig. 88) 104
103. Mid and hind coxa each with a vertical blackish mark near apex (Fig. 25); hind tibia with posterior bristles on no more than apical third. Flagellum of female antenna strongly swollen basally **Stigmatomeria** Tuomikoski
1 sp., *S. crassicornis* (Stannius), western Palaearctic; see Vockeroth 1980.
- Mid and hind coxa without dark mark near apex; hind tibia with posterior bristles on most of its length. Flagellum slender in both sexes **Pseudobrachypeza** Tuomikoski
2 spp., *P. helvetica* (Walker), western Palaearctic; and *P. pseudohelvetica* Plassmann, Austria; Plassmann 1984.
104. Most flagellomeres shorter than wide and anepisternum haired on upper half. Male terminalia small **Brachypeza** Winnertz 105
- Either flagellomeres longer than wide or anepisternum bare 106
105. Fore coxa with strong black bristles on apical 1/2 to 1/3 of outer margin. A₁ strong to weak, but always visible and extending almost to fork of CuA **Brachypeza** (**Brachypeza** Winnertz)
6 spp.; Zaitzev 1981, 1987b.
- Fore coxa with strong black bristles only at extreme apex. A₁ absent **Brachypeza** (**Paracordyla** Tuomikoski)
1 sp., *B. (P.) obscura* Winnertz, western Palaearctic.
106. Pale markings on the abdomen situated towards the bases of the tergites **Pseudorymosia** Tuomikoski
2 spp., *P. fovea* (Dziedzicki) and *P. optiva* (Dziedzicki), both western Palaearctic.
- Pale markings of abdomen most extensive towards apices of tergites 107
107. Two proepisternal bristles and two stronger scutellar bristles present. Scutum without discal bristles **Synplasta** Skuse
14 spp.
- Three or four proepisternal bristles and four subequal scutellar bristles present. Scutum with or without discal bristles 108
108. Anepisternum with short fine setulae on upper part. Scutum covered with fine dark setulae **Myrosia** Tuomikoski, n. stat.
2 spp., *M. maculosa* (Meigen, western Palaearctic and *M. orientalis* (Zaitzev), Russian Far East.
- Anepisternum bare. Scutum covered with fine pale setulae 109

109. Flagellomeres with short stiff macrotrichia. Scutum with short and strong discal bristles. Tergite 9 of male with one pair of long bristles (Fig. 102) **Notolopha** Tuomikoski, n. stat.
1 sp., *N. cristata* (Staeger), western Palearctic.
- Flagellomeres without distinct macrotrichia. Scutum with discal bristles well-developed or reduced. Tergite 9 of male with two pairs of long bristles, of which one pair is very strong (Fig. 101) **Allodiopsis** Tuomikoski
7 (?) spp.; Krivosheina et al. 1986.
110. Sc ending free; A₁ strong, extending beyond point of furcation of CuA (Fig. 87). Mediotergite often with short subappressed hairs at upper end of posterior declivity **Rymosia** Winnertz
48 spp.; Dziedzicki, 1910, Ostroverkhova and Stackelberg 1969, Chandler 1994a.
- Sc ending in R₁; A₁ variable in length and strength. Mediotergite bare 111
111. Anepisternum with short hairs (Fig. 17). Basal portion of M and crossvein R-M setulose above; A₁ strong, extending beyond point of furcation of CuA **Tarnania** Tuomikoski
5 spp.
- Anepisternum bare. Basal portion of M and crossvein R-M without setulae; A₁ weak, not extending to point of furcation of CuA (Fig. 88) 112
112. Hind tibia with one or more short fine posterior bristles on apical third. Scutum with subappressed bristles on most of disc **Brevicornu** Marshall
36 spp.; Krivosheina et al. 1986, Zaitzev 1985, 1988b.
- Hind tibia without posterior bristles. Scutum either with discal bristles arranged in two sublateral stripes and sometimes also a median stripe, or without discal bristles **Allodia** Winnertz 113
113. Discal bristles minute or absent on at least anterior half of scutum. Abdomen with pale colour, when present, more extensive towards hind margins of tergites **Allodia** (**Allodia** Winnertz)
10 spp.; Zaitzev 1983a, Krivosheina et al. 1986.
- Discal bristles distinct on anterior half of scutum. Abdomen with pale colour, when present, more extensive towards fore margins of tergites **Allodia** (**Brachycampta** Winnertz)
25 spp.; Zaitzev 1984a, Krivosheina et al. 1986.
114. Third segment of palpus very large and swollen, much thicker than subsequent segments (Fig. 11). Antennae short and stout, with 9–13 flagellomeres. Anepimeron with a sharply delimited black mark near anterior margin **Cordyla** Meigen
19 spp.; Krivosheina et al. 1986.
- Third segment of palpus slender, not much thicker than subsequent segments. Antenna slender, with 14 flagellomeres. Anepimeron without black mark anteriorly 115
115. Anepimeron bare 116
- Anepimeron with hairs and bristles 119
116. Longest tibial bristles about three times as long as tibial diameter. Sc ending in R **Dynatosoma** Winnertz
19 spp.; Zaitzev 1986, 1988a.
- Tibial bristles subequal in length to tibial diameter. Sc ending free or in R (Figs 89–90) 117

117. Point of furcation of CuA before, opposite, or very slightly beyond point of furcation of M (if beyond, as in *vulcani*, cubital fork more than half as long as median fork); Sc usually ending in R (Fig. 89) Zaitzev
Trichonta Winnertz
63 spp.; Ostroverkhova and Stackelberg 1969, Gagné 1981, Chandler 1992.
- Point of furcation of CuA well beyond point of furcation of M; Sc ending free (Fig. 90) 118
118. C extending more than halfway between apex of R₅ and apex of M₁ Zaitzev
Macrobrachius Dziedzicki
1 sp., *M. kowarzi* Dziedzicki, western Palaearctic.
- C extending at most very slightly beyond apex of R₅ (Fig. 90) Zaitzev
Phronia Winnertz
97 spp.; Ostroverkhova and Stackelberg 1969, Hackman 1970, Gagné 1975, Chandler 1992.
119. CuA forked (Figs 91–92) 120
- CuA simple (Figs 93–94) 122
120. CuA₁ slightly divergent from M₂ but parallel with or convergent toward CuA₂ (Fig. 91) Zaitzev
Mycetophila Meigen
153 spp.; Laštovka 1963, 1972, Laštovka and Kidd 1974, Krivosheina et al. 1986, Chandler 1988, 1993a.
- CuA₁ parallel with M₂ but slightly divergent from CuA₂ (Fig. 92) 121
121. Pronotum only indistinctly separated from proepisternum, with uniform short setulae (Fig. 20). Fork of CuA very slightly before fork of M; crossvein bM-Cu without setae; C not produced beyond apex of R₅ (Fig. 92). Abdominal sternite 2 with a pair of long setae Zaitzev
Epicypa Winnertz
10 spp.; Chandler 1981, Zaitzev 1987a.
- Pronotum distinctly separated from proepisternum and with four or five distinct bristles (Fig. 19). Fork of CuA below or beyond fork of M; crossvein bM-Cu with setae; C sometimes produced beyond apex of R₅ for about 1/3 of distance to apex of M₁. Abdominal sternite 2 without such setae Zaitzev
Platurocypta Enderlein
3 spp., *P. fumipennis* (Bukowski), *P. punctum* (Stannius), and *P. testata* (Edwards), all western Palaearctic.
122. CuA₁ slightly divergent from M₂ (Fig. 93). Mid tibia with one or more short to long ventral bristles Zaitzev
Zygomyia Winnertz
15 spp.; Chandler 1991, Zaitzev 1989b.
- CuA₁ parallel with M₂ (Fig. 94). Mid tibia without ventral bristles Zaitzev
Sceptonia Winnertz
15 spp.; Chandler 1991, Bechev 1995.

Economic importance. As the ecological role of fungus gnats is little known, their economic importance can at present hardly be assessed. However, in areas where mushrooms are extensively used as human food, the larvae of fungus gnats are looked upon as a pest. Several of the most popular species of edible mushrooms (e.g., those of *Boletus*, *Suillus*, *Leccinum* and *Russula*) may be heavily infected by fungus gnats (Dely-Draskovits 1974; Hackman and Meinander 1979; Krivosheina et al. 1986; Yakovlev 1988). Occa-

sionally, fungus gnats have also infected mushroom farms (Sasakawa 1992). Larvae of one species, *Leia arsona* Hutson, have been recorded as feeding on stored root-ginger (Hutson 1977).

The importance of fungus gnat larvae in decomposition of organic matter is nearly completely unknown (for a review, see Binns 1981). Numerous species, however, are thought to feed on fungal mycelium penetrating dead organic material such as rotting trunks and branches. If

so, their role in the process of decomposition may be much more important than is commonly recognized, e.g., by carrying putrefactive microorganisms into the decaying material (Stubbs and Chandler 1978; Irmeler et al. 1996). Adults of some species are important in the pollination of certain flowers (Messler et al. 1980). More re-

cently the fungus gnat fauna has proved to be a good bioindicator of undisturbed forests (Økland 1994, 1996). Lastly, mass occurrence of the New Zealand glowe worm *Arachnocampa* in certain caves is a popular tourist attraction, and is thus likely to play a significant economic role on a local scale.

REFERENCES

- Aiello, A. and Jolivet, P. 1996. Myrmecophily in Keroplatidae (Diptera: Sciaroidea). *Jl N.Y. ent. Soc.* 104(3/4): 226–230.
- Baccetti, B., Crovetto, A. and Santini, L. 1987. Light-producing organs in *Keroplatus tipuloides* Bosc and *K. reaumuri pentophthalmus* Giglio-Tos (Diptera: Mycetophilidae). *Int. J. Insect Morphol. Embryol.* 16: 169–176.
- Bechev, D. N. 1986. *Sciophila rufa* Meigen (Diptera, Mycetophiloidea) as a host for *Orthocentrus stigmaticus* Holmgren (Hymenoptera, Ichneumonidae). *Acta zool. bulg.* 32: 60–61.
- Bechev, D. 1990a. Recent Holarctic species of the genus *Anaclileia* Meunier (Insecta, Diptera: Mycetophilidae). *Reichenbachia* 28: 67–71.
- Bechev, D. 1990b. Review of the Holarctic species of genus *Polylepta* Winnertz. *Ent. Abh.* 53: 179–184.
- Bechev, D. 1995. The Palaearctic species of the genus *Sceptonia* Winnertz (Diptera: Mycetophilidae). *Trav. sc. Univ. Ploudiv, Animalia* 31: 7–21.
- Bei-Bienko, G. Y. (ed.). 1969 (1988). *Keys to the insects of the European part of USSR. Volume 5, Part I.* Smithsonian Institution Libraries and The National Science Foundation. Washington D.C. 1234 pp. [translation of the Russian edition]
- Bernhardt, P. 1995. Notes on the anthecology of *Pterostylis curta* (Orchidaceae). *Cunninghamia* 4(1): 1–8.
- Binns, E. S. 1981. Fungus gnats (Diptera, Mycetophilidae/Sciaridae) and the role of mycophagy in soil: a review. *Revue Ecol. Biol. Sol* 18: 77–90.
- Blagoderov, V. A. 1995. [Fungus-gnats of the tribe Sciophilini (Diptera, Mycetophilidae) from Lower Cretaceous of Transbaikalia.] *Paleont. Zh.* 1995 (1): 55–63. [in Russian]
- Blagoderov, V. A. 1997. Fungus gnats of the tribe Gnoristini (Diptera, Mycetophilidae) from the Lower Cretaceous of Transbaikalia. *Paleont. J.* 31(6): 609–615. [*Paleontologicheskij Zhurnal* 1997(6): 44–49]
- Blagoderov, V. A. 1998a. Fungus gnats (Diptera, Mycetophilidae) from the Lower Cretaceous of Mongolia. *Paleont. J.* 32(6): 598–604. [*Paleontologicheskij Zhurnal* 1998(6): 53–59]
- Blagoderov, V. A. 1998b. Fungus gnats of the tribes Gnoristini and Leiini (Diptera, Mycetophilidae) from the Early Cretaceous of Transbaikalia. *Paleont. J.* 32(1), 54–59. [*Paleontologicheskij Zhurnal* 1998(1): 58–62]
- Buxton, P. A. 1954. British Diptera associated with fungi. 2. – Diptera bred from Myxomycetes. *Proc. R. ent. Soc. Lond. A* 29: 10–12.
- Buxton, P. A. 1960. British Diptera associated with fungi. 3. – Flies of all families reared from about 150 species of fungi. *Entomologist's mon. Mag.* 96: 61–94.
- Camazine, S. 1986. Leaping locomotion in *Mycetophila cingulum* (Diptera: Mycetophilidae): prepupation dispersal mechanism. *Ann. ent. Soc. Am.* 79: 140–145.
- Chandler, J. P. 1977. Studies of some fungus gnats (Diptera: Mycetophilidae) including nine additions to the British list. *Syst. ent.* 2: 67–93.
- Chandler, J. P. 1978. Notes on the Holarctic species of *Pseudexechia* Tuomikoski (Diptera, Mycetophilidae) with description of a new British species. *Entomologist's Rec.* 90: 44–51.
- Chandler, J. P. 1980. The European and eastern Nearctic fungus gnats in the genus *Ectrepesthoneura* (Mycetophilidae). *Syst. ent.* 5: 27–41.

- Chandler, J. P. 1981. The European and North American species of *Epicyptha* Winnertz (Diptera: Mycetophilidae). *Ent. scand.* 12: 199–212.
- Chandler, J. P. 1988. Thirteen species of *Mycetophila* Meigen (Diptera, Mycetophilidae) new to the British list. *Br. J. ent. nat. hist.* 1: 139–145.
- Chandler, J. P. 1990. Notes on *Macrocera* Meigen (Mycetophiloidea, Keroplatidae) including *M. nigropicea* new to Britain. *Dipterists Digest* 3: 27–31.
- Chandler, J. P. 1991. New species and additions to the British list of the fungus gnat genera *Zygomia* Winnertz and *Sceptonia* Winnertz (Diptera, Mycetophilidae). *Br. J. ent. nat. hist.* 4: 143–155.
- Chandler, J. P. 1992. A review of the British *Phronia* Winnertz and *Trichonta* Winnertz (Diptera, Mycetophilidae). *Entomologist's mon. Mag.* 128: 237–254.
- Chandler, J. P. 1993a. The Holarctic species of the *Mycetophila fungorum* (DeGeer) group (Diptera: Mycetophilidae). *Br. J. ent. nat. hist.* 6: 5–11.
- Chandler, J. P. 1993b. New rearing records of fungus gnats (Diptera: Mycetophilidae) and allied families. *Dipterists Digest* 13: 29–35.
- Chandler, J. P. 1994a. *Rymosia* Winnertz (Diptera, Mycetophilidae), a newly recognised element of wetland faunas, with five species new to Britain and a key to species. *Entomologist's Gaz.* 45: 199–220.
- Chandler, J. P. 1994b. The fungus gnats of Israel (Diptera: Sciaroidea, excluding Sciaridae). *Israel J. Ent.* 28: 1–100.
- Chandler, P. J. 1999. *Creaghubhia mallochorum* gen. and sp. n. (Diptera, Mycetophilidae), a remarkable new Scottish gnat with a discussion of its relationships. *Br. J. ent. nat. hist.* 12: [in press]
- Chandler, P. and Matile, L. 1989. A new species of *Platyceridion* Tollet (Diptera, Keroplatidae) with a larva predatory in ant infested internodes of *Humboldtia laurifolia* Vahl. *Studia dipterologica* 5: 163–173.
- Coher, E. I. 1995. A contribution to a revision of the genus *Azana* Walker, 1856 (Insecta: Diptera: Mycetophilidae: Sciophilinae). *Reichenbachia* 31: 83–91.
- Crampton, G. C. 1942. The external morphology of the Diptera. Pages 10–165, in: Guide to the Insects of Connecticut. First fascicle. External morphology, keys to families, Tanyderidae, Ptychopteridae, Trichoceridae, Anisopodidae, Tipulidae. *State Geological and Natural History Survey of Connecticut. Bulletin* 64: 1–509.
- Dely-Draskovits, A. 1974. Systematische und ökologische Untersuchungen an den in Ungarn als Schädliche der Hutpilze auftretenden Fliegen. IV. Mycetophilidae. *Folia ent. hung. (S. N.)* 27: 29–41.
- Dziedzicki, H. 1910. Zur Monographie der Gattung *Rymosia* Winn. *Horae Soc. ent. ross.* 77: 89–104.
- Edwards, F. W. 1925. British fungus-gnats (Diptera, Mycetophilidae). With a revised generic classification of the family. *Trans. R. ent. Soc. Lond.* 1924: 505–670.
- Edwards, F. W. 1941. Notes on British fungus-gnats (Dipt., Mycetophilidae). *Entomologist's mon. Mag.* 77: 21–32; 67–82.
- Gagné, R. J. 1975. A revision of the Nearctic species of the genus *Phronia* (Diptera: Mycetophilidae). *Trans. Am. ent. Soc.* 101: 227–318.
- Gagné, R. J. 1981. A monograph of *Trichonta* with a model for the distribution of Holarctic Mycetophilidae (Diptera). *Tech. Bull. U. S. Dep. Agric.* 1638: 1–64.
- Hackman, W. 1963. Studies on the dipterous fauna in burrows of voles (*Microtus*, *Clethrionomys*) in Finland. *Acta zool fenn.* 102: 1–64.
- Hackman, W. 1970. New species of the genus *Phronia* Winnertz (Diptera, Mycetophilidae) from eastern Fennoscandia and notes on the synonymies in this genus. *Not. ent.* 50: 41–60.
- Hackman, W. and Meinander, M. 1979. Diptera feeding as larvae on macrofungi in Finland. *Annls zool. fenn.* 16: 50–83.
- Hackman, W., Laštovka, P., Matile, L. and Väisänen, R. 1988. Family Mycetophilidae. Vol. 3, pages 220–327, in Soós, Á. and Papp, L. (eds): *Catalogue of the Palaearctic Diptera:*

- Ceratopogonidae* – *Mycetophilidae*. Akadémiai Kiadó, Budapest, 448 pp.
- Hennig, W. 1948. *Die Larvenformen der Dipteren. Eine Übersicht über die bisher bekannten Jugendstadien der zweiflügeligen Insekten. 1. Teil*. Akademie-Verlag, Berlin. 185 pp. (Unveränderte Nachdruck der 1. Auflage. 1968.)
- Hennig, W. 1954. Flügelgeäder und System der Dipteren unter Berücksichtigung des aus dem Mesozoikum beschriebenen Fossilien. *Beitr. Ent.* 4: 245–388.
- Hennig, W. 1973. Diptera (Zweiflügler). Pages 1–337, in Helmcke, J. G., Starck, D. and Wermuth, H. (eds): *Handbuch der Zoologie. Eine Naturgeschichte der Stämme des Tierreiches* 4(2) 2/31. Walter de Gruyter, Berlin.
- Hickman, V. V. 1965. On *Planarivora insignis* gen. et sp. n. (Diptera: Mycetophilidae), whose larval stages are parasitic in land Planarians. *Pap. Proc. R. Soc. Tasmania, Hobart* 99: 1–8.
- Hutson, A. M. 1977. An undescribed African species of *Leia* (Dipt., Mycetophilidae) infesting root- ginger in London. *Entomologist's mon. Mag.* 113: 121–124.
- Hutson, A. M. 1979. Notes on Sciophilinae (Dipt., Mycetophilidae) with a revision of Palearctic *Syntemna* Winnertz. *Entomologist's mon. Mag.* 114: 131–145.
- Hutson, A. M., Ackland, D. M. and Kidd, L. N. 1980. Mycetophilidae (Bolitophilinae, Ditomiyiinae, Diadocidiinae, Keroplatinae, Sciophilinae and Manotinae). In: *Handbooks for the Identification of British Insects* 9 (3): 1–112.
- Irmeler, U., Heller, K. and Warning, J. 1996. Age and tree species as factors influencing the populations of insects living in dead wood (Coleoptera, Diptera: Sciaridae, Mycetophilidae). *Pedobiologia* 40: 134–148.
- Kallweit, U. 1998. Notes on the genus *Metanepsia* Edwards and its relatives from East Asia (Insecta: Diptera: Mycetophilidae). *Reichenbachia* 32 (2): 341–353.
- Kjærandsen, J. 1993. Diptera in mines and other cave systems in southern Norway. *Entomologica fenn.* 4: 151–160.
- Kolarov, J. and Bechev, D. 1995. Hymenopterenparasiten (Hymenoptera) auf Pilzmücken (Mycetophiloidea, Diptera). *Acta ent. bulg.* 1995 (2): 18–19.
- Krivosheina, N. P. and Zaitzev, A. I. 1980. Larvae of the family Ditomiyiinae (Diptera, Nematocera) of the fauna of the USSR. *Zool. Zh.* 59: 546–557. [in Russian]
- Krivosheina, N. P., Zaitzev, A. I. and Yakovlev, E. B. 1986. *Nasekomye razrushiteli gribov v lesakh evropejskoj chasti SSSR* ('Insect pests of mushrooms in forests of the European USSR'). "Nauka", Moscow. 312 pp. [in Russian]
- Kurina, O. 1991. Mycetophilidae (Diptera) reared from macrofungi in Estonia. *Proc. Estonian Acad. Sci., Biol.* 40: 84–90.
- Kurina, O. 1996. Hibernation of fungus gnats (Diptera, Mycetophilidae) in Estonian caves. *Studia dipterol.* 3: 221–229.
- Landrock, K. 1927. Fungivoridae (Mycetophilidae). Vol. 2, pages 1–196, in Lindner, E. (ed.): *Die Fliegen der palaearktischen Region*. Schweizerbart, Stuttgart.
- Landrock, K. 1940. Zweiflüger oder Diptera. VI: Pilzmücken oder Fungivoridae. Pages 1–166, in Dahl, F. (ed.): *Die Tierwelt Deutschlands* 38.
- Laštovka, P. 1963. Beitrag zur Kenntnis der europäischen Fungivora-Arten aus der Gruppe *vittipes* (Zett.) (Dipt., Fungivoridae). *Acta Soc. ent. cech.* 60: 312–327.
- Laštovka, P. 1972. Holarctic species of *Mycetophila ruficollis*-group (Diptera, Mycetophilidae). *Acta ent. bohemoslov.* 69: 275–294.
- Laštovka, P. and Kidd, L. N. 1974. Review of the British and notes on other species of the *Mycetophila ruficollis*-group, with the description of a new species (Diptera, Mycetophilidae). *Entomologist's mon. Mag.* 110: 203–214.
- Laštovka, P. and Matile, L. 1972. Revision des Diadocidia holarctiques (Dipt., Mycetophilidae). *Annls Soc. ent. Fr. (n.s.)* 8: 205–223.
- Lewis, T. and Taylor, L. R. 1965. Diurnal periodicity of flight by insects. *Trans. R. ent. Soc. Lond.* 116: 393–479.

- Madwar, S. 1937. Biology and morphology of the immature stages of Mycetophilidae (Diptera, Nematocera). *Phil. Trans. R. Soc., Ser. B* 227: 1–110.
- Mansbridge, G. H. 1933. On the biology of some Ceroplatinae and Macrocerinae (Diptera, Mycetophilidae), with an appendix on the chemical nature of the web fluid in larvae of Ceroplatinae by H. W. Buxton. *Trans. R. ent. Soc. Lond.* 81: 75–92.
- Matile, L. 1974. Notes sur les Mycetophilidae (Diptera) de la faune de France. III. Le genre *Neuratelia*. *L'Entomologiste* 30: 26–33.
- Matile, L. 1975a. Découverte du genre *Baeopterogyna* en région paléarctique; description d'une espèce nouvelle de Hongrie (Diptera, Mycetophilidae). *Cah. Nat. Bull. N. P.* 29 (1973): 87–88.
- Matile, L. 1975b. Révision des *Asindulum* et des *Macrorrhyncha* de la région paléarctique (Diptera, Mycetophiloidea). *Annls Soc. ent. Fr. (n. s.)* 11: 491–515.
- Matile, L. 1976. Notes sur les Mycetophilidae (Diptera) de la faune de France. IV. Le genre *Bolitophila* 1: sous-genre *Bolitophila* s. str. (1er partie). *L'Entomologiste* 32: 235–244.
- Matile, L. 1978a. Révision des Keroplatinae du genre *Antlemon*. *Annls Soc. ent. Fr.* 18: 639–649.
- Matile, L. 1978b. Description d'un *Neoclastobasis* nouveau de Hongrie et remarques sur divers *Leiini* (Diptera: Mycetophilidae). *Folia ent. hung., S. N.* 31: 167–172.
- Matile, L. 1983. Notes taxonomiques et chorologiques sur les *Gnoristini* paléarctiques (Diptera, Mycetophiloidea). *Annls Soc. ent. Fr. (n. s.)* 19: 426–432.
- Matile, L. 1986. L'identité du *Ver* de la *Tipule* de l'agaric de Réaumur, et notes taxonomiques sur les *Keroplatus* Paléarctiques (Diptera, Mycetophiloidea, Keroplatidae). *Annls Soc. ent. Fr. (n. s.)* 22: 353–367.
- Matile, L. 1987. Note synonymique sur le genre *Synplasta* (Diptera, Mycetophilidae). *Bull. Soc. ent. Fr.* 92 (1–2): 18.
- Matile, L. 1988. *Rocetelion*, a new Holarctic genus of the Keroplatidae (Diptera, Mycetophiloidea): Description, phylogenetic and biogeographic notes. *Annls ent. fenn.* 54: 107–113.
- Matile, L. 1989. Superfamily Sciaroidea. Pages 123–145, in Evenhuis, N. L. (ed.): *Catalog of the Diptera of the Australasian and Oceanic Regions*. Bishop Museum Press & E. J. Brill. 1155 pp.
- Matile, L. 1990. Recherches sur la systématique et l'évolution des Keroplatidae (Diptera, Mycetophiloidea). *Mém. Mus. natn. Hist. nat. paris (A)* 148: 1–682.
- Matile, L. 1993. *Diptères d'Europe occidentale. Tome I*. Société nouvelles des éditions Boubee. Paris. 440 pp.
- Matile, L. 1997. Phylogeny and evolution of the larval diet in the Sciaroidea (Diptera, Bibionomorpha) since the Mesozoic. Pages 273–303, in P. Grandcolas (ed.): *The origin of biodiversity in insects: phylogenetic tests of evolutionary scenarios*. *Mém. Mus. natn. Hist. nat. (Zool.)* 173.
- Messler, M. R., Ackerman, J. D. and Lu, K. L. 1980. The effectiveness of fungus gnats as pollinators. *Am. J. Bot.* 67: 564–567.
- Munroe, D. D. 1974. The systematics, phylogeny, and zoogeography of *Symmerus* Walker and *Australosymmerus* Freeman (Diptera: Mycetophilidae: Ditomyiinae). *Mem. ent. Soc. Can.* 92: 1–183.
- Okada, T. 1937. Beitrag zur Kenntnis der Fungivoriden-Fauna Japans V: *Lygistorrhiniinae* (Dipt.) *Insecta matsum.* 12 (1): 45–48.
- Okada, T. 1938. Beitrag zur Kenntnis der Ceroplatinen-Fauna Japans (Dipt., Fungivoridae). *Insecta matsum.* 13 (1): 17–31.
- Olesen, J. M. and Warncke, E. 1989. Temporal changes in pollen flow and neighbourhood structure in a population of *Saxifraga hirculus* L. *Oecologia* 79: 205–211.
- Økland, B. 1994. Mycetophilidae (Diptera), an insect group vulnerable to forestry practices? A comparison of clearcut, managed and semi-natural spruce forests in southern Norway. *Biodiversity and Conservation* 3: 68–85.
- Økland, B. 1996. Unlogged forests: important sites for preserving the diversity of mycetophilids (Diptera: Sciaroidea). *Biological Conservation* 76: 297–310.

- Ostroverkhova, G. P. and Stackelberg, A. A. 1969 (1988). 24. Family Mycetophilidae (Fungivoridae). Pages 404–487, in Bei-Bienko, G. Y. (ed.): *Keys to the insects of the European part of USSR. Volume 5, Part I*. Smithsonian Institution Libraries and The National Science Foundation. Washington D.C. [translation of the Russian edition]
- Plachter, H. 1979a. Zur Kenntnis der Präimaginalstadien der Pilzmücken (Diptera, Mycetophiloidea). Teil II: Eidonomie der Larven. *Zool. Jb. Anat. Ontogen. Tiere* 101: 271–392.
- Plachter, H. 1979b. Zur Kenntnis der Präimaginalstadien der Pilzmücken (Diptera, Mycetophiloidea). Teil III: Pupae. *Zool. Jb. Anat. Ontogen. Tiere* 101: 427–455.
- Plachter, H. 1981. Chorionic structures of the eggshells of 15 fungus- and root- gnat species (Diptera: Mycetophiloidea). *Int. J. Insect Morph. Embryol.* 10: 43–63.
- Plassmann, E. 1971. Die Pilzmückengattung *Messala* (Diptera, Fungivoridae). *Ent. Z.* 81: 164–173.
- Plassmann, E. 1973. Die Pilzmückengattung *Leia* (Diptera: Mycetophilidae). *Senckenberg. biol.* 54: 131–140.
- Plassmann, E. 1975. Revision der europäischen Arten der Pilzmückengattung *Bolitophila* Meigen (Diptera: Mycetophilidae). *Ent. scand.* 6: 145–157.
- Plassmann, E. 1978. Neue Pilzmücken aus Schweden und Bulgarien (Insecta: Diptera: Mycetophilidae). *Senckenberg. biol.* 59: 205–214.
- Plassmann, E. 1980. Revision der paläarktischen Arten der Pilzmückengattung *Ectrepesthoneura* (Diptera: Mycetophilidae). *Beitr. Ent.* 30: 3–7.
- Plassmann, E. 1984. Sechs neue Pilzmücken aus Schweden, Österreich, Griechenland und Brasilien (Diptera, Nematocera, Mycetophilidae). *NachrBl. bayer. Ent.* 33: 44–49.
- Poinar, Jr. G. O. 1992. *Steinernema feltiae* (Steinernematidae: Rhabditida) parasitizing adult fungus gnats (Mycetophilidae: Diptera) in California. *Fundamental and applied Nematology* 15: 427–430.
- Polevoi, A. V. 1996. New and poorly known fungus gnats of the families Bolitophilidae, Diadocidiidae and Keroplatidae from Eastern Fennoscandia (Diptera, Nematocera). *Zoosystematica Rossica* 4: 177–182.
- Rohdendorf, B. 1974. *The historical development of Diptera*. Hocking, B., Oldroyd, H. and Ball, G. E. (eds). University of Alberta Press, Edmonton, Alta. [translation from Russian]
- Sæther, O. A. 1977. Female genitalia in Chironomidae and other Nematocera: morphology, phylogenies, keys. *Bull. Fish. Res. Bd Can.* 197: 1–209.
- Saigusa, T. 1973. A systematic study of the Mycetophilidae of Japan (Diptera). Part 1. A revision of the subfamily Ditomyiinae. *Sieboldia* 4 (3): 167–216.
- Sasakawa, M. 1963. Japanese Mycetophilidae (Diptera). IV. Ditomyiinae. *Akitu* 9(2): 15–18.
- Sasakawa, M. 1992. Two new fungus gnats (Diptera: Mycetophilidae and Sciaridae) associated with cultivated Shiitake mushroom. *Appl. Ent. Zool.* 27: 571–574.
- Sasakawa, M. 1994. Fungus gnats associated with flowers of the genus *Arisaema* (Araceae). Part 2. Keroplatidae and Mycetophilidae (Diptera). *Trans. Shikoku ent. Soc.* 20(3/4): 293–306.
- Sasakawa, M. and Tamu, N. 1961 Japanese Fungivoridae (Diptera). III. New or little-known fungus gnats from the Tsushima Islands. *Sci. Rep. Kyoto prefect. Univ. Agric.* 13: 68–69.
- Séguy, E. 1940. Diptères Nématocères (Fungivoridae, Lycoriidae, Hesperinidae, Bibionidae, Scatopsidae, Phrynidae, Pachyneuridae, Blepharoceridae). *Faune de France* 36: 1–368.
- Shaw, F. R. 1948. A contribution to the phylogeny of the Mycetophilidae. *Ann. ent. Soc. Am.* 41: 189–199.
- Shaw, F. R. and Shaw, M. M. 1951. Relationship of certain genera of fungus gnats of the family Mycetophilidae. *Smithsonian Miscellaneous Collections* 117: 1–23.
- Soós, Á. and Papp, L. (eds) 1988. *Catalogue of Palaearctic Diptera. Vol. 3: Ceratopogonidae – Mycetophilidae*. Akadémiai Kiadó, Budapest, 448 pp.

- Søli, G. E. E. 1993. The first Palaearctic record of the mycetophilid genus *Drepanocercus* Vockeroth (Diptera: Mycetophilidae). *Ent. scand.* 24: 73–77.
- Søli, G. E. E. 1996. *Sticholeia* – a new genus of Leiini, with comments on the systematical position of *Allactoneura* de Meijere. *Ent. scand.* 27: 1–10.
- Søli, G. E. E. 1997. On the morphology and phylogeny of Mycetophilidae, with a revision of *Coelosia* Winnertz (Diptera, Sciaroidea). *Ent. scand. Suppl.* 50: 1–140.
- Stackelberg, A. A. 1948. (New and little known Fungivoridae (Diptera) from the Leningrad area.). *Ent. Obozr.* 1948 (1–2): 94–102. [in Russian]
- Stackelberg, A. A. 1969a (1988). 17. Family Bolitophilidae. Pages 374–385, in Bei-Bienko, G. Y. (ed.): *Keys to the insects of the European part of USSR. Volume 5, Part I.* Smithsonian Institution Libraries and The National Science Foundation. Washington D.C. [translation of the Russian edition]
- Stackelberg, A. A. 1969b (1988). 20. Family Diadocidiidae. Page 395, in Bei-Bienko, G. Y. (ed.): *Keys to the insects of the European part of USSR. Volume 5, Part I.* Smithsonian Institution Libraries and The National Science Foundation. Washington D.C. [translation of the Russian edition]
- Stackelberg, A. A. 1969c (1988). 21. Family Macroceridae. Pages 396–400, in Bei-Bienko, G. Y. (ed.): *Keys to the insects of the European part of USSR. Volume 5, Part I.* Smithsonian Institution Libraries and The National Science Foundation. Washington D.C. [translation of the Russian edition]
- Stubbs, A. and Chandler, P. (eds). 1978. A dipterist's handbook. *The amateur entomologist* 15: 1–256.
- Tuomikoski, R. 1966a. On the subfamily Manotinae Edw. (Dipt., Mycetophilidae). *Annls ent. fenn.* 32: 211–223.
- Tuomikoski, R. 1966b. Generic taxonomy of the Exechiini (Dipt., Mycetophilidae). *Annls ent. fenn.* 32: 159–194.
- Tuomikoski, R. 1966c. Systematic position of *Lygistorrhina* Skuse (Diptera, Mycetophilidae). *Annls ent. fenn.* 32: 254–260.
- Väisänen, R. 1981. Umbelliferous stems as overwintering sites for Mycetophilidae (Diptera) and other invertebrates. *Notul. ent.* 61: 165–170.
- Väisänen, R. 1982. Genus *Neoempheria* (Diptera, Mycetophilidae) in Finland, with a description of a new species. *Notul. ent.* 62: 1–7.
- Väisänen, R. 1984. A monograph of the genus *Mycomya* Rondani in the Holarctic region (Diptera, Mycetophilidae). *Acta zool. fenn.* 177: 1–346.
- Väisänen, R. 1986. The delimitation of the Gnoristinae: criteria for the classification of recent European genera (Diptera, Mycetophilidae). *Annls. zool. fenn.* 23: 197–206.
- Vockeroth, J. R. 1976. The species of the *Macrocera nobilis* group in the Holarctic region (Diptera, Mycetophilidae). *Can. Ent.* 108: 1229–1233.
- Vockeroth, J. R. 1980. New genera and species of Mycetophilidae (Diptera) from the Holarctic Region, with notes on other species. *Can. Ent.* 112: 529–544.
- Vockeroth, J. R. 1981. 14. Mycetophilidae. Vol. 1, pages 223–246, in McAlpine, J. F. et al. (eds): *Manual of Nearctic Diptera.* Research Branch, Agriculture Canada, Ottawa. Agric. Can. Monograph No. 27, vi+674 pp.
- Waterhouse, M. 1998. Fungus gnats and other flies (Diptera, Mycetophilidae, Sciaridae, Heleomyzidae and Sphaeroceridae) attracted to sapping sycamore stems. *Dipterist Digest* 5 (1), 18.
- Wood, D. M. and Borkent, A. 1989. 114. Phylogeny and classification of the Nematocera. Pages 1333–1370, in McAlpine, J. F. et al. (eds): *Manual of Nearctic Diptera.* Research Branch, Agricultural Canada, Ottawa. Agric. Can. Monograph No. 32, vi + 1333–1581 pp.
- Wu, H. and Yang, C. 1990. Two new species of mycetophilids (Diptera: Mycetophilidae) from Nei Mongol. *Entomotaxon.* 12: 275–278.
- Yakovlev, E. B. 1988. Insect infestation of edible mushrooms in Soviet South Karelia and bioecological characteristics of the pests. *Acta bot. fenn.* 136: 99–103.
- Yakovlev, E. B. 1994. *Palaearctic Diptera associated with fungi and myxomycetes.* Karelian

- Research Center, Russian Academy of Sciences, Forest Research Institute. Petrozavodsk, 125 pp. [in Russian]
- Yakovlev, E. B. and Zaitzev, A. I. 1990. On the ecology of fungus gnats (Diptera, Mycetophilidae) in woodlands of Southern Karelia. *Zool. Zh.* 10: 60–69. [in Russian]
- Zaitzev, A. I. 1978. Flies of the family Ditomyiidae (Diptera) from the USSR. *Ent. Obozr.* 57: 668–676. [in Russian]
- Zaitzev, A. I. 1979. Xylophilous larvae of the subfamily Sciophilinae (Diptera, Mycetophilidae). *Ent. Obozr.* 58: 861–869. [in Russian]
- Zaitzev, A. I. 1981. Composition and systematic position of the genus *Allactoneura* de Meijere (Diptera, Mycetophilidae). *Ent. Obozr.* 60: 901–913. [In Russian]
- Zaitzev, A. I. 1982a. Dipterans of the genus *Acnemia* Winn. (Mycetophilidae) of the Holarctic fauna 1. *Zool. Zh.* 61: 707–715. [in Russian]
- Zaitzev, A. I. 1982b. Dipterans of the genus *Acnemia* Winn. (Mycetophilidae) in the fauna of Holarctic 2. *Zool. Zh.* 61: 867–874. [in Russian]
- Zaitzev, A. I. 1982c. Fungus gnats of the genus *Sciophila* Meig. of the Holarctic. *Akademia Nauk USSR*. Moscow. 76 pp. [in Russian]
- Zaitzev, A. I. 1982d. Fungus gnats of the genera *Greenomyia* and *Neoclastobasis* (Diptera, Mycetophilidae) of the USSR fauna. *Vest. Zool.* 1982: 25–32. [in Russian]
- Zaitzev, A. I. 1983a. A review of Holarctic species of the subgenus *Allodia* s.str. (Diptera, Mycetophilidae). *Zool. Zh.* 62: 1915–1920. [in Russian]
- Zaitzev, A. I. 1983b. A review of Holarctic species of the genus *Monoclona* Mik (Diptera, Mycetophilidae). *Ent. Obozr.* 62: 620–627. [in Russian]
- Zaitzev, A. I. 1984a. A review of species of the subgenus *Brachycampta* (Diptera, Mycetophilidae) of the Holarctic fauna. *Zool. Zh.* 63: 1504–1515. [in Russian]
- Zaitzev, A. I. 1984b. Holarctic species of the genus *Phthinia* (Diptera, Mycetophilidae). *Ent. Obozr.* 63: 830–839. [in Russian]
- Zaitzev, A. I. 1984c. The trends of the morphological specialization of the larval digestive system of the higher fungus gnats (Diptera, Mycetophiloidea). *Biol. nauki* 1: 38–44. [in Russian]
- Zaitzev, A. I. 1985. Holarctic species of fungus gnats of the genus *Brevicornu*, groups *fissicauda* and *proximum* (Diptera, Mycetophilidae). *Vest. Zool.* 1985: 40–47. [in Russian]
- Zaitzev, A. I. 1986. Fungus gnats of the genus *Dynatosoma* (Diptera, Mycetophilidae) of the USSR fauna. *Vest. Zool.* 1986: 34–41. [in Russian]
- Zaitzev, A. I. 1987a. [New and little-known species of fungi eaters of the genus *Epicrypta* Winn. (Diptera, Mycetophilidae) from Primorsky Krai.]. Pages 89–93, 131 in Kapustina, O. G. (ed.): *Taksonomiya nasekomykh Sibiri i Dal'nego Vostoka SSSR. (Taxonomy of the insects of Siberia and Soviet Far East.)* 'AN SSSR', Vladivostok, 132 pp. [in Russian]
- Zaitzev, A. I. 1987b. [A review of the species of the genus *Brachypeza* Winn. (Diptera, Mycetophilidae) of Palaearctic fauna]. Pages 38–46, in: *Ekologiya i morfologiya nasekomykh – obitatelej gribnykh substratov (Ecology and morphology of insects inhabiting fungal substrates.)* Moscow, Nauka. [in Russian]
- Zaitzev, A. I. 1988a. The Nearctic fungus gnat species of the genus *Dynatosoma* (Diptera, Mycetophilidae). *Vest. Zool.* 1988: 30–37. [in Russian]
- Zaitzev, A. I. 1988b. Holarctic species of *Brevicornu* Marshall, groups *sericoma*, *griseicolle* and *ruficorne* (Diptera, Mycetophilidae). *Ent. Obozr.* 1988: 391–404. [in Russian]
- Zaitzev, A. I. 1989a. A review of fungus gnats of the genus *Anatella* Winn. (Diptera, Mycetophilidae) of the fauna of the USSR. *Ent. Obozr.* 1989: 809–820. [in Russian]
- Zaitzev, A. I. 1989b. A review of the genus *Zygomomyia* (Diptera, Mycetophilidae) species of the USSR fauna, with description of two new species. *Vest. Zool.* 1989: 19–25. [in Russian]
- Zaitzev, A. I. 1991. Mycetophiloid dipterans of the genus *Keroplatus* Bosc (Diptera, Keroplatidae) of the USSR fauna. *Byull. mosk. Obshch. ispyt. Prir. Biol.* 96: 39–47. [in Russian]
- Zaitzev, A. I. 1994. *Fungus gnats of the fauna of Russia and adjacent regions. Part. 1. (Ditomyiidae, Bolitophilidae, Diadocidiidae, Keroplatidae, Mycetophilidae.)*. "Nauka", Moscow, 288 pp. [in Russian]