MYCETOPHILIDAE 20

(Fungus Gnats)

Geir Søli

Fig. 20.1. Female of *Clastobasis* sp. (South Africa) (photograph © S.A. Marshall).

Diagnosis

Small- to medium-sized, slender to moderately robust gnats (body length: 1.7–9.4 mm) (Figs 1–10). Colour varied; body commonly dull yellowish, brown, or black, rarely brightly marked. Wing sometimes infuscate or with markings. Legs with elongate coxae; tibia with strong apical spurs and, in most genera, well-developed setae (bristles). Eyes not meeting above antennae. Wing venation rather simple, commonly with distinct anterior (M_1+M_2) and posterior (M_4 and *CuA*) forks; basal median cell (*bm*) extends from level of humeral vein (*h*) to wing margin.

Head (Figs 11–16) with posterior surface commonly flat, to slightly concave, more deeply concave in, *e.g.*, *Parempheriella* Matile (Fig. 4); head inserted below level of upper margin of strongly arched thorax; eyes usually situated on more ventral part of head, widely-separated above; complete eye bridge present in the Oriental genus *Paramanota* Tuomikoski; occiput sometimes with row of strong setae just posterior to eye, connected across vertex, *e.g.*, *Allactoneura* de Meijere (Fig. 8) and *Manota* Williston (Figs 6, 13); vertex with 3 ocelli arranged in deep to very shallow triangular arrangement, median ocellus usually in front of lateral ocelli, sometimes reduced or absent (Mycomyinae); lateral ocelli commonly inserted close to eye

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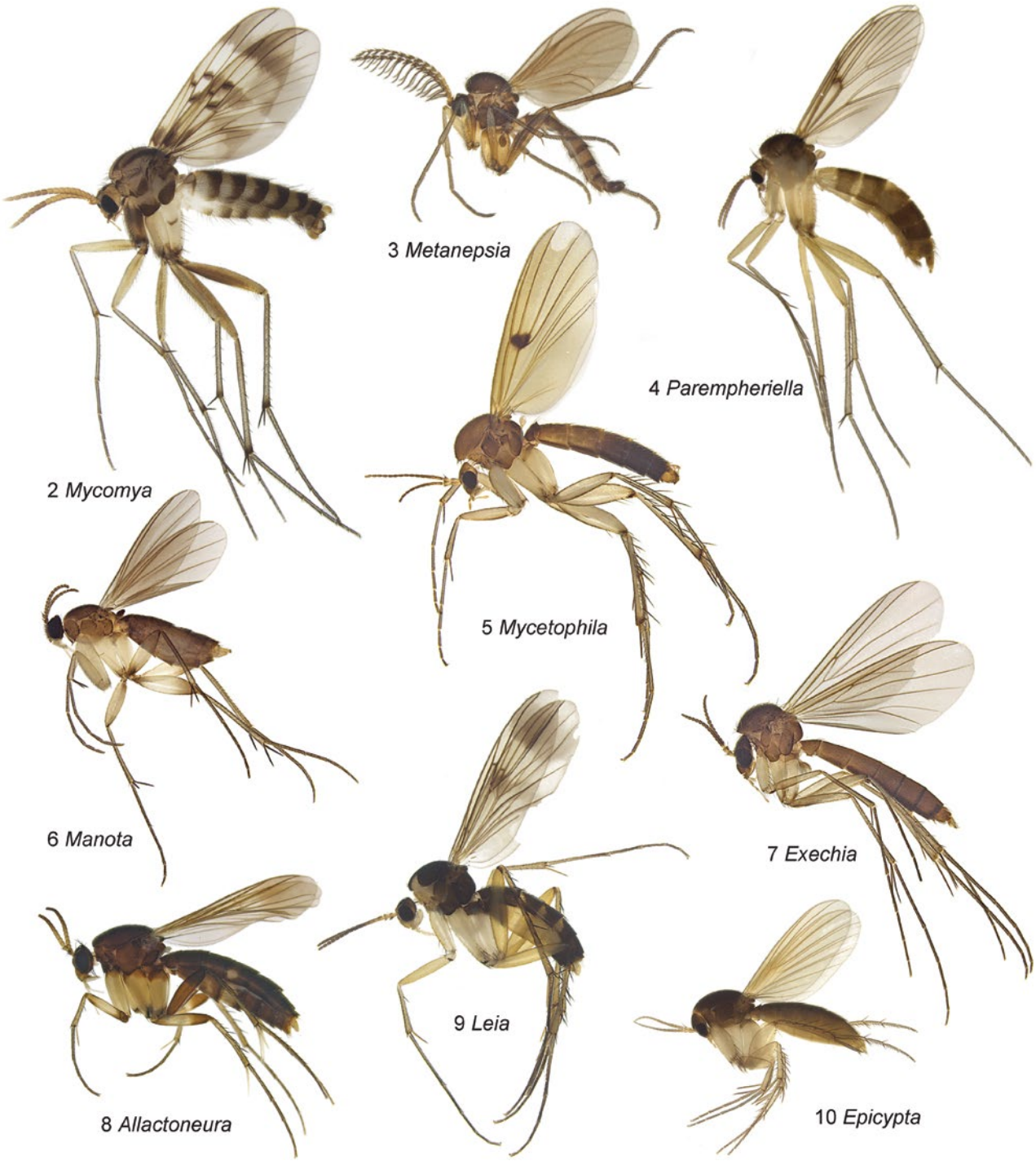
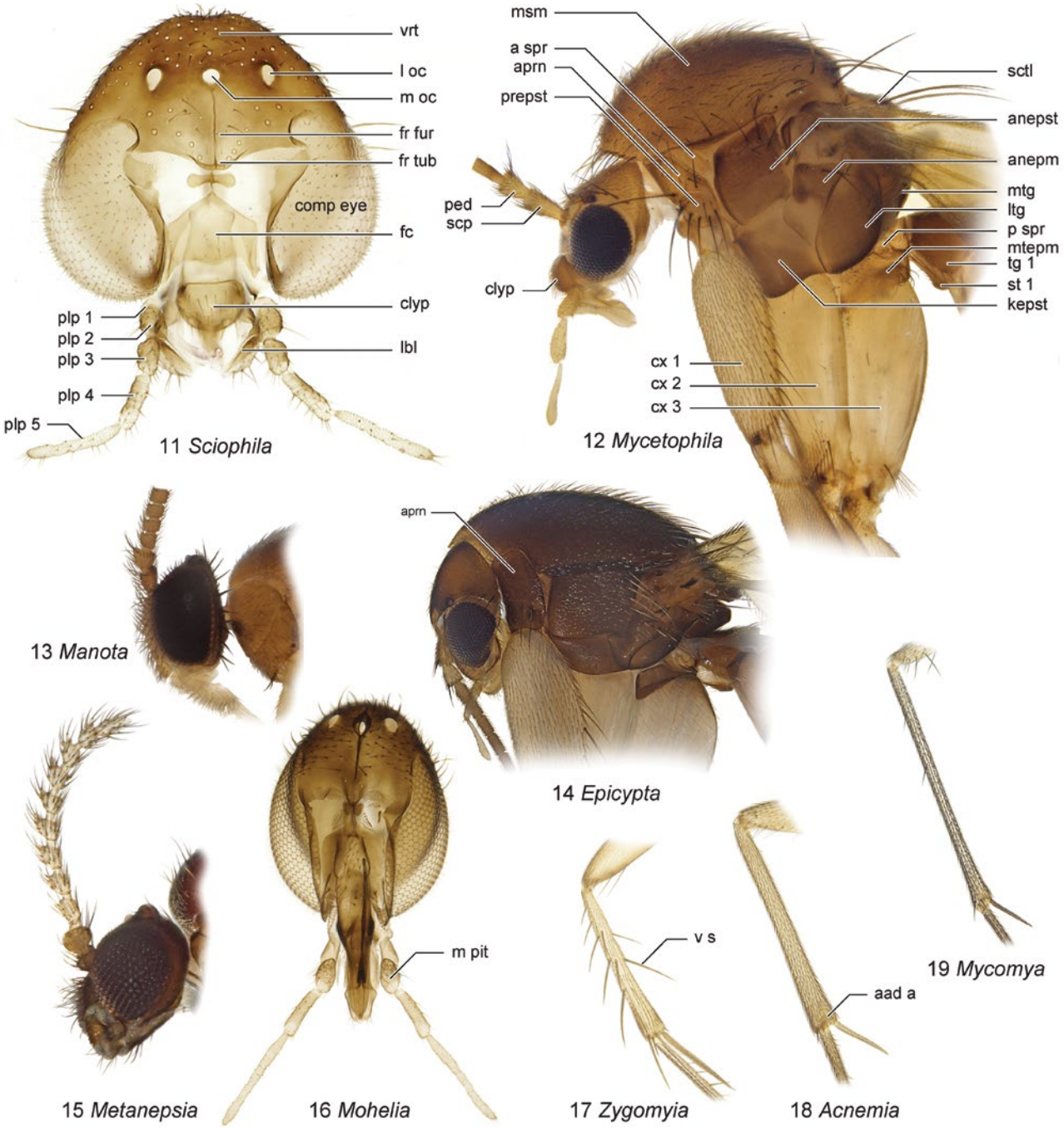


Figs 20.2–10. Habitus of Afrotropical Mycetophilidae (lateral views): (2) *Mycomya* sp.; (3) *Metanepsia* sp.; (4) *Parempheriella* sp.; (5) *Mycetophila* sp.; (6) *Manota* sp.; (7) *Exechia* sp.; (8) *Allactoneura* sp.; (9) *Leia* sp.; (10) *Epicypta* sp.

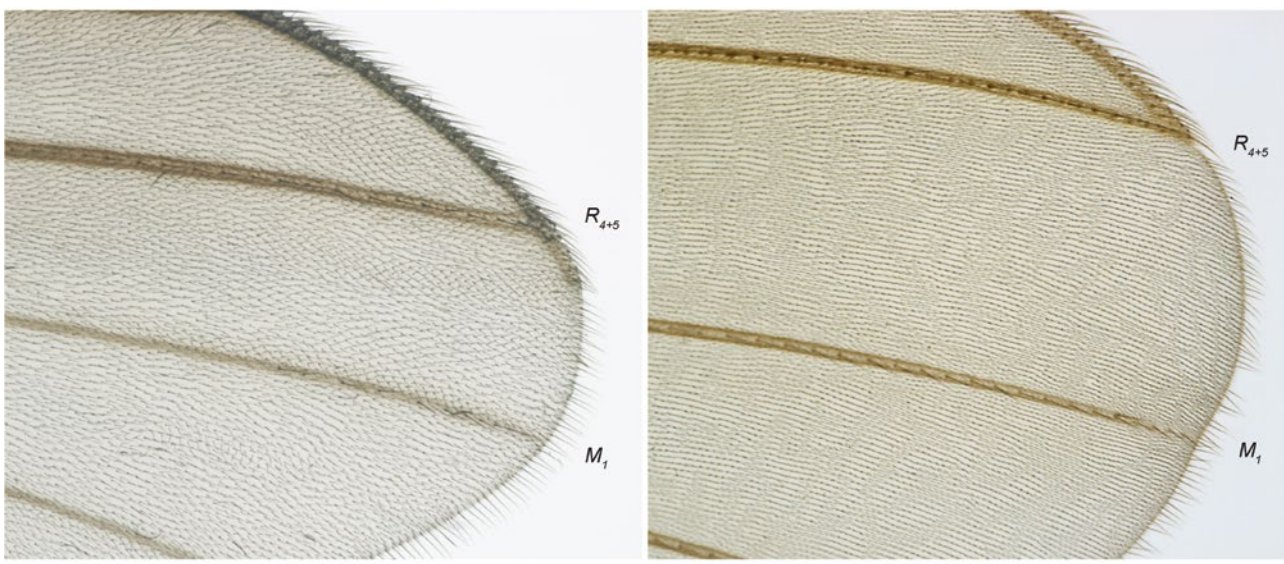


Figs 20.11–19. Heads, thoraces and legs of Mycetophilidae: (11) head of *Sciophila kakumensis* Søli, frontal view; (12) head and thorax of *Mycetophila* sp., lateral view; (13) head of *Manota* sp., lateral view; (14) head and thorax of *Epicypta* sp., lateral view; (15) head of *Metanepsia* sp., lateral view ♀; (16) head of *Mohelia* sp., frontal view; (17) mid tibia of *Zygomyia* sp., lateral view; (18) fore leg of *Acnemia* sp., lateral view; (19) same, *Mycomya* sp., lateral view.

Abbreviations: a spr – anterior spiracle; aad a – anteroapical depressed area; anepm – anepimeron; anepst – anepisternum; aprn – antepronotum; clyp – clypeus; comp eye – compound eye; cx – coxa; fc – face; fr fur – frontal furrow; fr tub – frontal tubercle; kepst – katepisternum; l oc – lateral ocellus; lbl – labellum; ltg – laterotergite; m oc – median ocellus; m pit – median pit; msm – mesonotum; mtepm – metepimeron; mtg – mediotergite; oc – ocellus; p spr – posterior spiracle; ped – pedicel; plp – palpal segment; prepst – proepisternum; scp – scape; sctl – scutellum; st – sternite; tg – tergite; v s – ventral seta (bristle); vrt – vertex.

margin; all ocelli absent only in *Syndocosia* Speiser; frons between ocelli and antennal bases bare, or setulose medially, often produced into distinct frontal tubercle (Fig. 11); frontal furrow sometimes present, running between median ocellus and frontal tubercle (Fig. 11); antenna usually inserted at, or slightly above middle of head; length varying from ½ to 2 × length of mesonotum; antenna with scape and pedicel sometimes with numerous strong setae (Fig. 12); flagellum usually thread-like, serrated to strongly pectinate in some species of *Dziedzickia* Johannsen and *Metanepsia* Edwards (Fig. 3); principally with 14 flagellomeres, but reduced to 8–9 in females of undescribed Afrotropical *Metanepsia* (Fig. 15) and 12–13 in both sexes of some undescribed Afrotropical *Exechia* Winnertz; each flagellomere usually cylindrical, longer than broad, sometimes compressed, or flattened (*Boletiniella* Matile, *Dziedzickia*, *Metanepsia*), clothed in short setulae, sometimes with interspersed short setae; face usually broad and setulose, very high in *Manota*; clypeus (Fig. 11) commonly rounded, setulose, forming sclerite below face, somewhat prolonged in *Dinempheria* Matile, sometimes virtually entirely fused with face; well-developed cibarial pump, attached to lateral parts of clypeus, nearly always present; labrum present, or absent, with or without setae; mouthparts normal, slightly prolonged in *Mohelia* Matile (Fig. 16); labella usually large and fleshy, pillow-like, with pseudotracheae, but greatly reduced in, *e.g.*, *Metanepsia* (Fig. 15); lacinia usually small, weakly-sclerotised; palpus principally 5-segmented, although first 2 segments usually very short, sometimes partly, or entirely, fused and barely visible in dry-mounted specimens; third segment, commonly referred to as antepenultimate segment, invariably well-developed, usually with modified, often club-shaped setae arranged in median pit (Fig. 16); terminal and penultimate segments both commonly longer than third, sometimes distinctly longer; rarely entirely reduced, as in *Metanepsia* (Fig. 15).

Thorax stout, about as high as long (Fig. 2), to more compressed and distinctly longer than high (Figs 8, 10); thoracic sclerites varying considerably in size, shape and distinctness; lateral cervical sclerite triangular, bare; antepronotum well-developed, usually setulose, dorsally fused with postpronotum, forming bare, collar-like structure above neck, ventrally partly, or entirely, fused with proepisternum, suture between latter usually distinct, but poorly-developed in, *e.g.*, *Epicypta* Winnertz (Fig. 14); proepimeron less conspicuous, usually triangular, but very prominent in, *e.g.*, *Allactoneura*; anterior thoracic spiracle located between antepronotum and anepisternum; shape of mesonotum varies from evenly to highly arched, with anterior parapsidal suture and median transverse suture; vestiture of mesonotum variable, usually comprising setulae and setae, either evenly dispersed, or arranged in clearly-defined lines; mediotergite usually bare, more rarely with medially and/or laterally, arranged setae; laterotergite prominent, ovate, bare or setulose, varying from evenly arched to strongly protruding, sometimes with pronounced longitudinal keel; anepisternum invariably well-developed, triangular, quadrate to subquadrate, in some genera greatly developed, usually at expense of katepisternum (*e.g.*, *Epicypta*, Fig. 14), with or without setulae and setae; anterior and posterior basal area usually recognisable; katepisternum (preepisternum 2) separated from anepisternum by anapleural suture, commonly about as large as anepisternum, but sometimes much narrower, *e.g.*, *Epicypta*, usually bare; anepimeron strongly narrowed ventrally, commonly bare, but in several Mycetophilini genera upper border with row of strong setae; metanotum narrow, bare, situated posterior to mediotergite, laterally fused with metapleuron by membranous area; distinct pleural suture dividing metapleuron into anterior metepisternum and posterior metepimeron; posterior spiracle located below laterotergite and above metapleuron (Fig. 12). Wing usually *ca* 2.7 × as long as wide, but



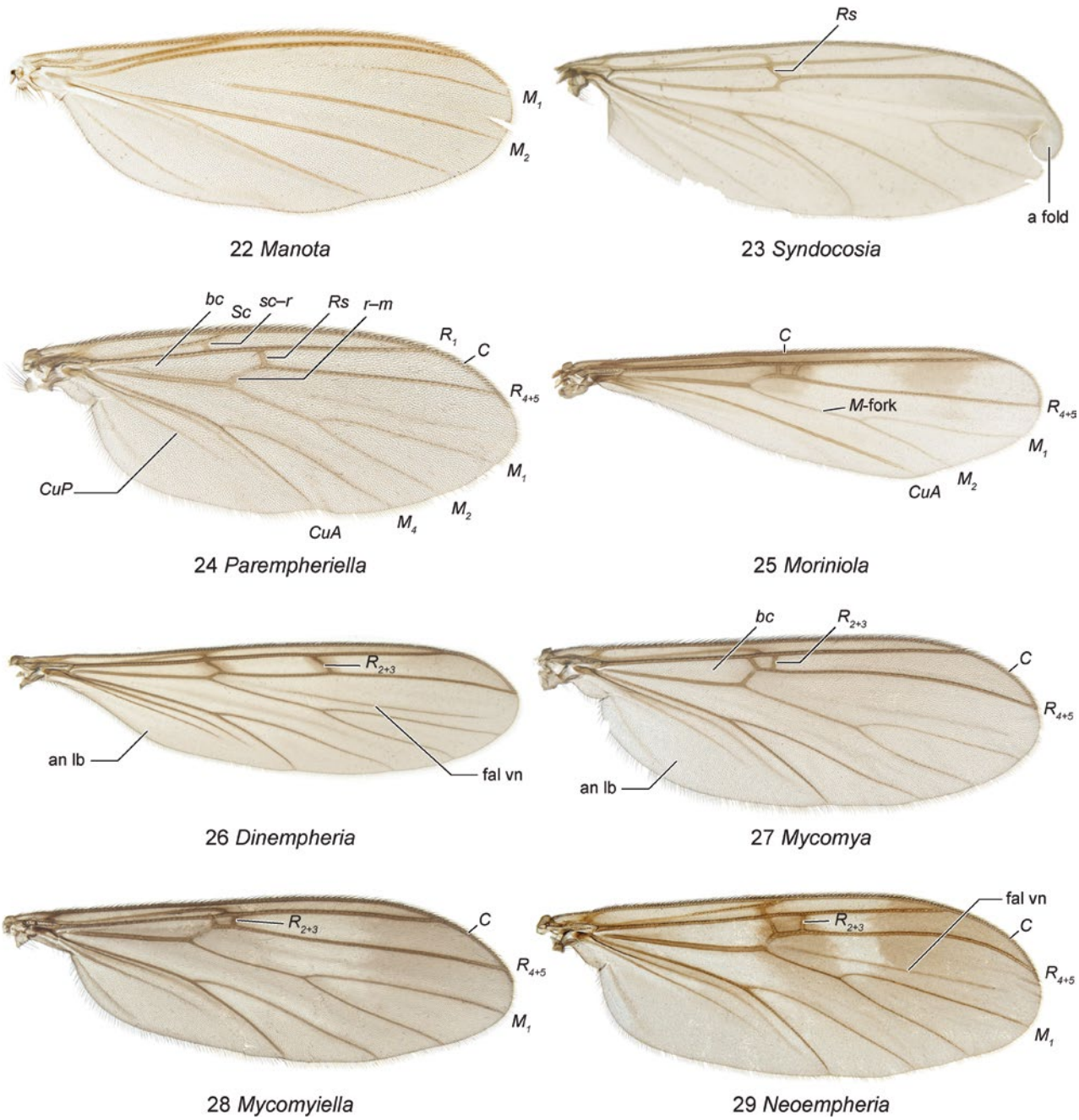
20 *Mycomyiella* 21 *Mycetophila*

Figs 20.20–21. Wing apex of Mycetophilidae (dorsal views): (20) *Mycomyiella* sp.; (21) *Mycetophila* sp.

Abbreviations: M_1 – first branch of media; R_{4+5} – third branch of radius.

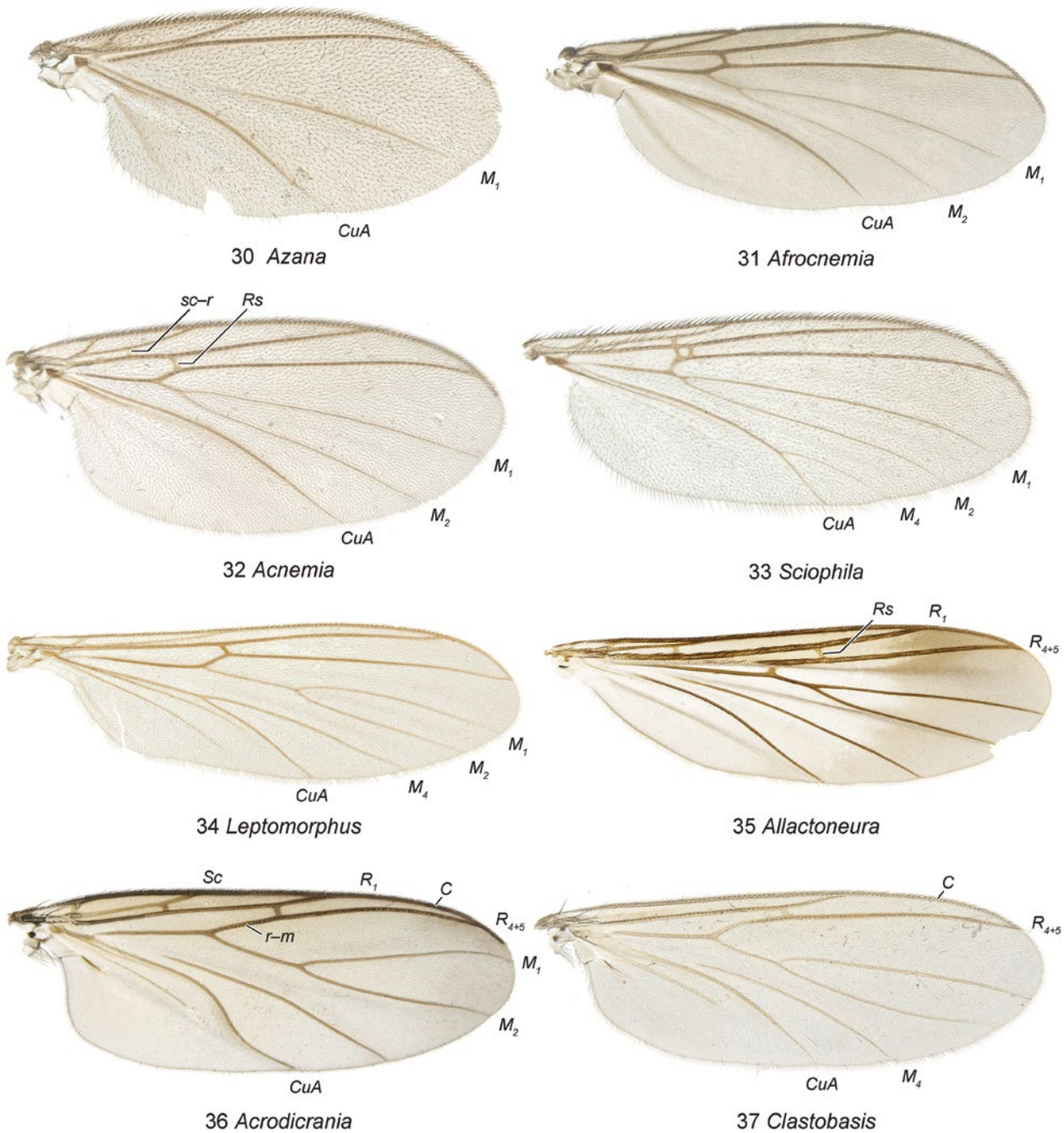
aspect ratio varies from 2–3.5; *Allactoneura* peculiar in ability to fold wings longitudinally at rest in vespid-like manner (Fig. 8); wing membrane commonly transparent (Figs 6, 7), sometimes with dark wing apex and/or additional transverse fascia, maculae, or with anterior border infuscate (Figs 2, 5, 9); usually densely clothed in microtrichia on both sides, often with few to numerous macrotrichia, or true setae; if microtrichia absent, setae present on greater part of membrane; microtrichia arranged in fine, regular lines in Mycetophilinae (Fig. 21), more irregularly so in other subfamilies (Fig. 20); wing venation rather variable, much used in classification; venation slightly reduced in, e.g., *Acnemia* Winnertz (Fig. 32) and *Moriniola* Matile (Fig. 25), more reduced still in *Azana* Walker (Fig. 30) and *Manota* (Fig. 22); radius (*R*) invariably with setae, not uncommonly both dorsally and ventrally; veins *M* and *CuA* with or without setae, usually on dorsal side only; costal vein (*C*) commonly ends at apex of vein R_{4+5}, but in numerous genera extending beyond this point, ending between apices of veins R_{4+5} and M_1 (Figs 41, 44); subcostal vein (*Sc*) always traceable, commonly well-developed, short and bent towards vein *R* in several genera of Mycetophilinae; humeral crossvein (*h*) invariably present; crossvein *sc–r* frequently present between base of humeral vein (*h*) and apex of vein *Sc*; vein *Sc* not uncommonly reduced beyond crossvein *sc–r*, thus apparently ending in vein *R*; vein R_1 usually extends close to apex of wing, considerably shorter in tribe Leiini (e.g., *Mohelia*, Fig. 40); radial sector (*Rs*) commonly located in basal ½ of wing; veins R_{2+3} and R_{4+5} branching out together, the latter continues towards apex of wing; vein R_{2+3} sometimes present as short, almost vertical vein ending in vein R_1, enclosing small radial cell, as in many Mycomyinae (Figs 26–29); within Gnoristinae presence of vein R_{2+3} appears rather unstable, even at specific level; crossvein *r–m* (often termed anterior transversal), short, vertical to virtually horizontal; veins M_1 and M_2 commonly forming anterior fork with long, or short, common stem, with single branch in *Azana* (Fig. 30) and *Moriniola* (Fig. 25), proximal portion of 1 or both branches sometimes atrophied, or entirely reduced (e.g., *Manota*, Fig. 22); distinct fold line between veins R_{4+5} and M_1 present in several Mycomyinae (e.g., *Dinempheria*, Fig. 26), sometimes also shorter and weaker fold line between veins M_2 and M_4; behind veins M_2 are M_4 and *CuA*, which in most genera form posterior fork with common stem; vein M_4 sometimes reduced, or proximally atrophied, vein *CuA* strongly sinuous in *Acrodicrania* Skuse (Fig. 36); rare genus *Paradoxa* Marshall (Fig. 39) displays unique pattern in which vein *CuP* meets vein *CuA*, forming closed cell *cua*; a false vein, usually weak and fold-like, is frequently present between veins *CuA* and *CuP*, vein *CuP* may be well-developed sometimes virtually reaching wing margin as in *Epicypta* (Fig. 53); anal vein, A_1, often present as short, slightly curved vein as in, e.g. *Allodia* (Fig. 49); halter with knob rounded or more elongate. Legs (Figs 17–19) long and slender in a few Afrotropical genera, e.g., *Afrocnemia* Matile, *Leptomorphus* Curtis and *Syndocosia*; coxae invariably elongated and stout; male mid coxa of some *Mycomya* Rondani with anterior hook-like process distally; femora usually slender; mid and hind femora sometimes markedly swollen, or laterally compressed, e.g., *Epicypta* (Fig. 10); tibiae usually slender, with vestiture variable, with short setae arranged irregularly (Fig. 18), or in regular rows (Fig. 19), usually with strong setae (bristles) varying in strength and arrangement; fore tibia with anteroapical depressed area, bearing fine setae, arranged in 1, or more, rows, or more irregularly (Fig. 18) in depressed area, minute, or seemingly absent (in some non-Afrotropical genera upper ½ of mid tibia in male, sometimes also female, sometimes with specialised sensory area); 1 apical spur present on fore tibia; 2 each on mid and hind tibiae, 1 of which may be very short; tarsi usually slender, very long in *Afrocnemia*; tarsal claws rarely simple, usually with 1 or more teeth ventrally; pulvilli absent; empodium, if present, variable in size.

Abdomen long and slender to more short and stout; tergites and sternites 1–6 in male and 1–7 in female usually well-developed, except sternite 1 often reduced in size, V-shaped, sometimes lacking setulae; some or all of sternites 2–7 often with pair of submedian, or sublateral, weakly-sclerotised lines, sometimes also with similar median line (fold lines), which allow sternites to be partially folded longitudinally; male (Figs 57–60) often with reduced segments 7 and 8, sometimes telescoped into segment 6, as in most Mycetophilini (e.g., Figs 5, 7); male terminalia, *i.e.*, segment 9 and associated structures, extremely varied in form, but with apparently constant basic pattern: tergite and sternite 9; pair of lateral gonocoxites, each with an articulated gonostylus; 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 anus-bearing proctiger; partly reduced segment 10 sometimes present between tergite 9 and proctiger free, or more or less fused with former; gonocoxites separate, or broadly, or entirely fused ventromedially, in latter case probably by fusion with sternite 9; sometimes with distinct gonocoxal lobes distally; gonostylus particularly varied, sometimes slender and tapering, but more often with lobes, or processes, bearing variety of setulae, spines, or striate areas (lamellae) (Figs 57, 60); aedeagus commonly rather simple; outline of parameres varied, usually accompanied by long parameral apodemes; aedeagus and parameres suspended between gonocoxites by gonocoxal apodemes; development of tergite 9 varies, sometimes as distinct sclerite above gonocoxites, not uncommonly bearing spines or processes; proctiger varies from positioned immediately above aedeagus and parameres, to below posterior end of tergite 9; proctiger consists of pair of lateral unsegmented cerci and ventral hypoproct, which is commonly weak, sometimes medially divided, or fused with cercus; female (Figs 61–63) with tergite and sternite 8 usually well-separated; tergite 8 sometimes seemingly fused with tergite 9; sternite 8 short, or long, with pair of rounded, or tapered lobes posteriorly, representing hypogynial valves (gonocoxites 8), often clothed in both strong and smaller setae; hypopygial valve commonly with pair of flattened outgrowths invaginated above (gonapophyses 8), being variable in shape and degree of sclerotisation; membranous, fringe-like structure between and above invaginated valves represents labia (*sensu* Søli 1997a); tergite 9 usually distinct and well-developed, setulose, or bare, sometimes with distinct median incision; sternite 9 usually fused laterally with tergite 9 and invaginated (gonapophyses 9) forming genital fork, commonly weakly sclerotised, with membranous areas; some outgrowths (genital fork) 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 median groove, probably serving as egg guide, with or without setae; lateral border frequently fused with



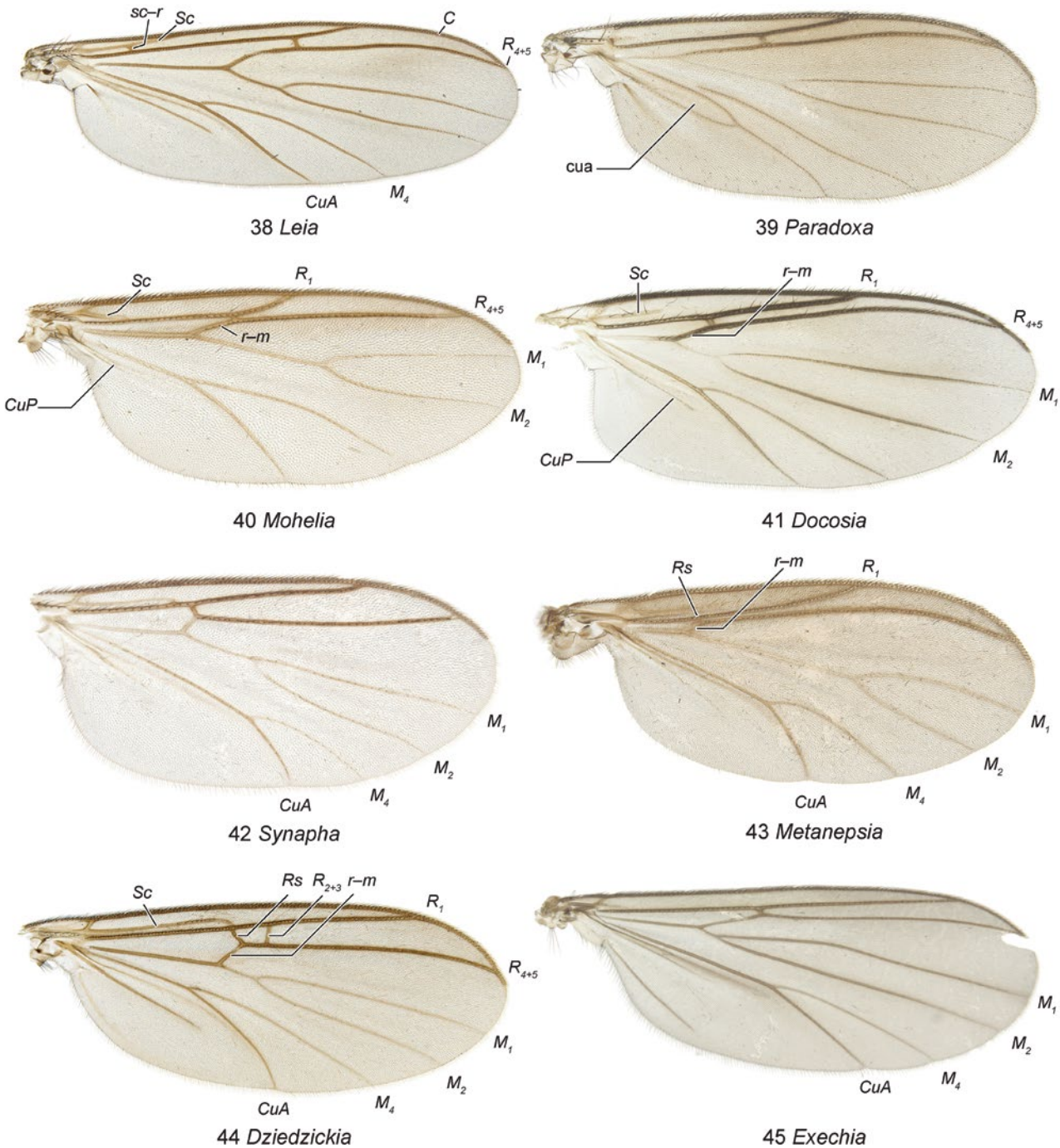
Figs 20.22–29. Wings of Mycetophilidae (dorsal views): (22) *Manota* sp.; (23) *Syndocosia* sp.; (24) *Parempheriella* sp.; (25) *Moriniola* sp.; (26) *Dinempheria* sp.; (27) *Mycomya* sp.; (28) *Mycomyiella* sp.; (29) *Neoempheria* sp.

Abbreviations: a fold – apical fold; an lb – anal lobe; *bc* – basal costal cell; *bm* – basal medial cell; *C* – costal vein; *CuA* – anterior branch of cubital vein; fal vn – false vein; M_1 – first branch of media; M_2 – second branch of media; M_4 – fourth branch of media; *M*-fork – medial vein fork; R_1 – anterior branch of radius; R_{2+3} – second branch of radius; R_{4+5} – third branch of radius; *r–m* – radial–medial crossvein; *Rs* – radial sector; *Sc* – subcostal vein; *sc–r* – subcostal–radial crossvein.



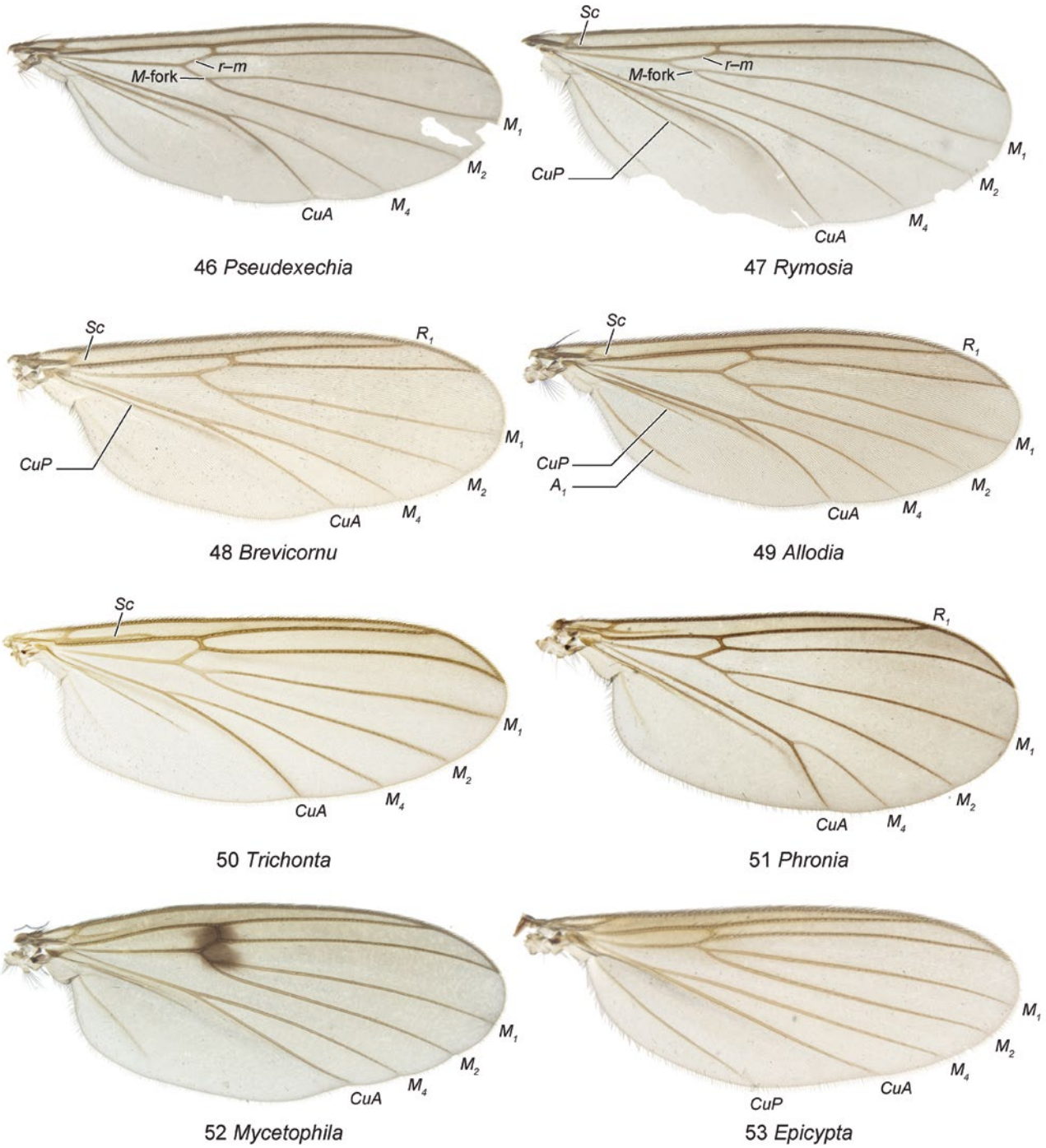
Figs 20.30–37. Wings of Mycetophilidae (dorsal views): (30) *Azana* sp.; (31) *Afrocnemia* sp.; (32) *Acnemia* sp.; (33) *Sciophila* sp.; (34) *Leptomorphus* sp.; (35) *Allactoneura* sp.; (36) *Acrodicrania* sp.; (37) *Clastobasis* sp.

Abbreviations: *C* – costal vein; *CuA* – anterior branch of cubital vein; M_1 – first branch of media; M_2 – second branch of media; M_4 – fourth branch of media; R_1 – anterior branch of radius; R_{4+5} – third branch of radius; *r–m* – radial–medial crossvein; *Rs* – radial sector; *Sc* – subcostal vein; *sc–r* – subcostal–radial crossvein.



Figs 20.38–45. Wings of Mycetophilidae (dorsal views): (38) *Leia* sp.; (39) *Paradoxa paradoxa* Jaschhof; (40) *Mohelia* sp.; (41) *Docosia* sp.; (42) *Synapha* sp.; (43) *Metanepsia* sp.; (44) *Dziedzickia* sp.; (45) *Exechia* sp.

Abbreviations: *C* – costal vein; *cua* – anterior cubital cell; *CuA* – anterior branch of cubital vein; *CuP* – posterior branch of cubital vein; M_1 – first branch of media; M_2 – second branch of media; M_4 – fourth branch of media; R_1 – anterior branch of radius; R_{2+3} – second branch of radius; R_{4+5} – third branch of radius; *r–m* – radial–medial crossvein; *Rs* – radial sector; *Sc* – subcostal vein; *sc–r* – subcostal–radial crossvein.



Figs 20.46–53. Wings of Mycetophilidae (dorsal views): (46) *Pseudexechia* sp.; (47) *Rymosia* sp.; (48) *Brevicornu* sp.; (49) *Allodia* sp.; (50) *Trichonta* sp.; (51) *Phronia* sp.; (52) *Mycetophila* sp.; (53) *Epicypta* sp.

Abbreviations: A_1 – first branch of anal vein; *CuA* – anterior branch of cubital vein; *CuP* – posterior branch of cubital vein; M_1 – first branch of media; M_2 – second branch of media; M_4 – fourth branch of media; *M*-fork – medial vein fork; R_1 – anterior branch of radius; *r–m* – radial–medial crossvein; *Sc* – subcostal vein.

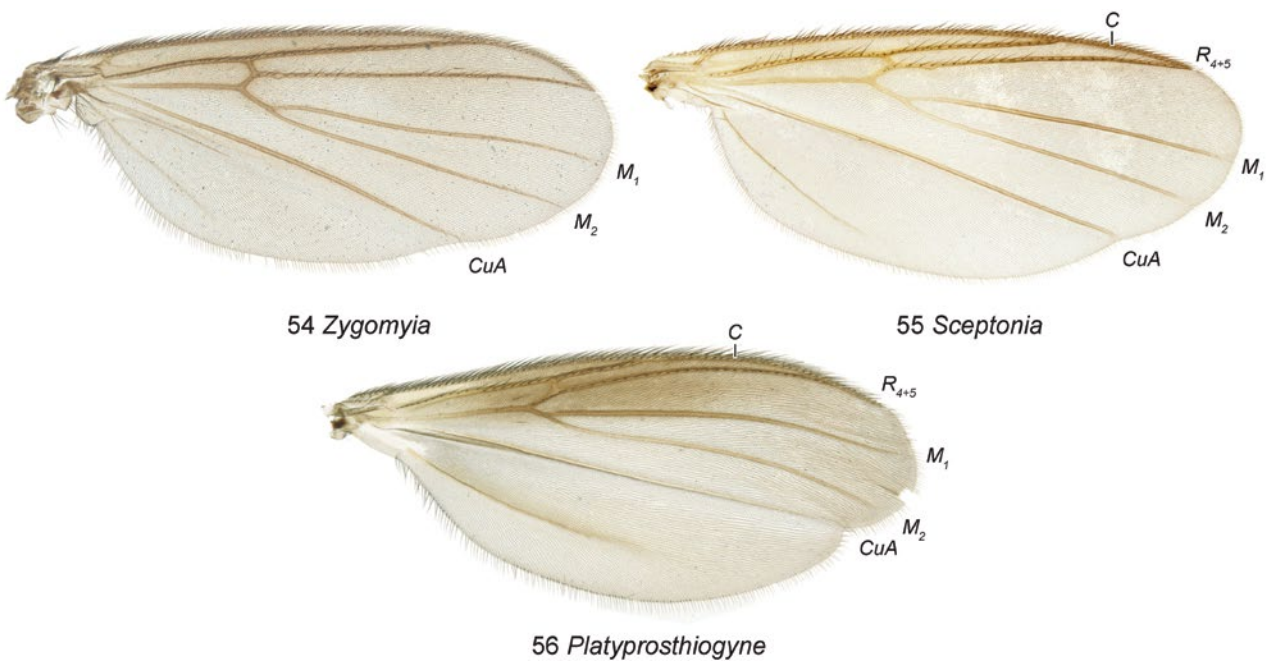
hypoproct; 1 or 2-segmented cercus articulates with last sclerotised tergite; cercus varying in form, being elongate, slender, curved and tapering; 2 membranous spermathecae present (not visible in macerated specimens).

Mycetophilidae superficially resemble representatives of other families in the superfamily Sciaroidea, in particular Sciaridae (see Chapter 21) and some Keroplatidae (see Chapter 18). The missing eye bridge helps to distinguish them from the Sciaridae and unlike Keroplatidae, Mycetophilidae have the veins of the anterior and posterior forks separate from the wing base. A more comprehensive account of the adult morphology can be found in Søli (1997*a*).

Egg ovate, often pear-shaped, to slender, or boat-shaped; external surface often with longitudinal ridges, or complex network of forked interconnecting ridges; chorionic structures of egg shell of five species of Mycetophilidae were studied by Plachter (1981), who found egg shells both with, and without, plastron and chorion that was uniform, 1-layered, or complex and multi-layered. The egg structures in species of *Mycomya* and *Neoempheria* Osten Sacken were studied by Mazzini *et al*. (1990, 1992*a*, *b*).

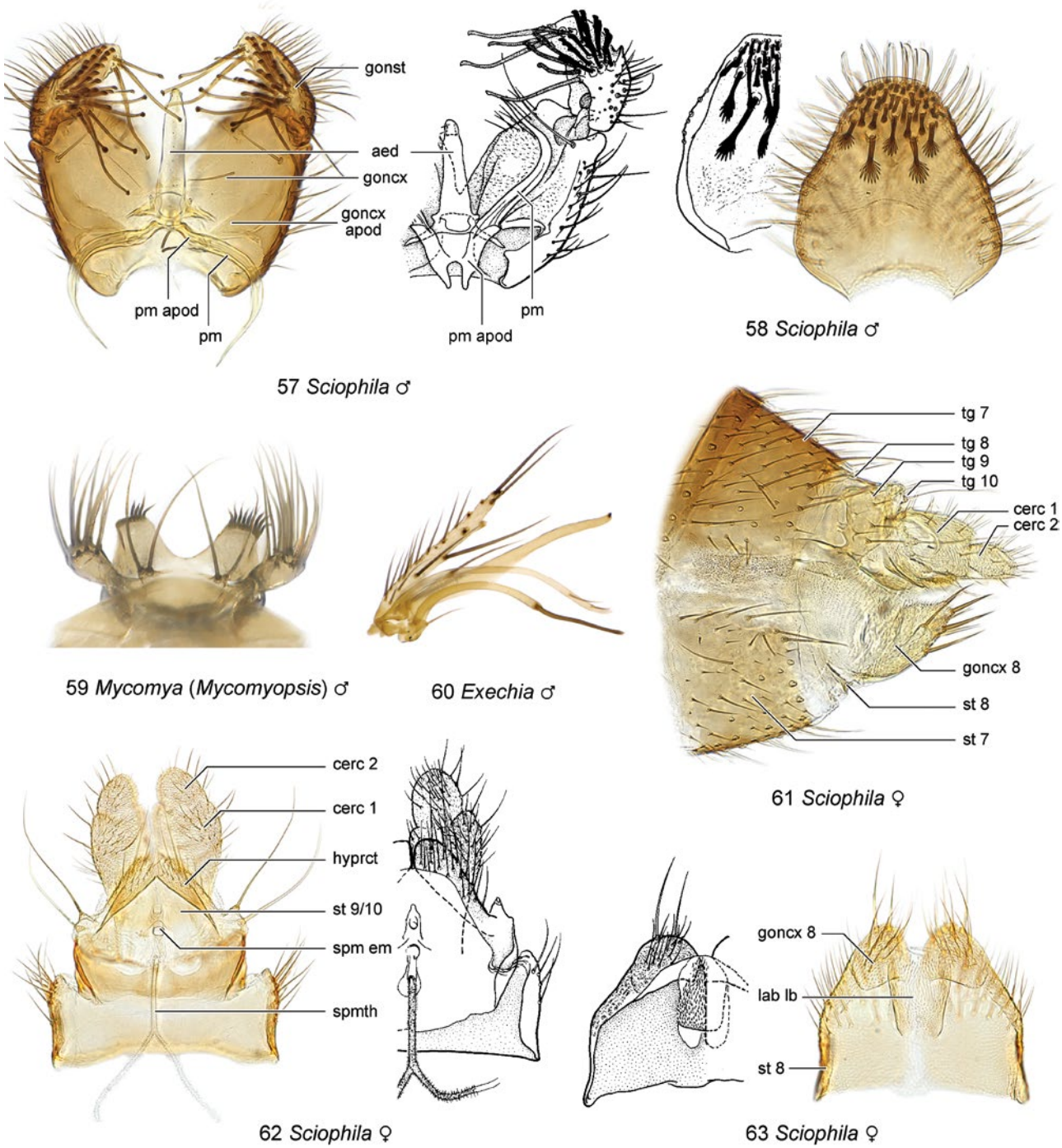
Larvae usually whitish, cylindrical and slender (Fig. 64); ventral part of head capsule typical, with epicranial plates meeting only at single point, so that posterior tentorial bridge is absent (Fig. 66); reduced, 1-segmented antenna also typical (Fig. 65); labrum (Figs 65, 66) poorly sclerotised and fleshy, supported by sclerotised frame that articulates with 2 moveable arms, each of which carries fan-shaped premandible; mandible (Fig. 68) lamelliform, toothed along inner margin, with 5–8 prostheca near inner basal angle, prostheca long and pectinate to short and blunt; maxilla (Fig. 67) consisting of an inner blade-like lobe (galea) and an outer oval lobe (palpifer), blade-like lobe serrated along inner margin and ending in sclerotised bar that lies dorsal to basal plate-like cardo; oval lobe with distal circular membranous area (maxillary palpus) carrying several papillae, strongly prolonged and apically tapered in *Sciophila* Meigen; body with 3 thoracic and 9 abdominal segments; each thoracic segment bare, or virtually so; 9–11 ventral creeping welts between segments of thorax and abdomen; each welt with armature of spicules and hooks; larva with 1 pair of thoracic, and at most, 7 pairs of abdominal spiracles; respiratory system hemipneustic in most groups, very rarely propneustic as in the Holarctic genus *Speolepta* Edwards; most larvae in the subfamily Mycetophilinae free of creeping welts; rarely ovate and flattened, covered in a sticky layer of mucus (*Epicypta*), or with hard, dark conical case formed from frass and larval excrement (some *Phronia* Winnertz); larvae in several Sciophilinae and Mycomyinae often occurring in mucous tubes, or in silky webs formed from salivary excretion and without creeping welts. Comprehensive accounts of the larval stages are provided by Madwar (1937) and Plachter (1979*a*, *b*).

Pupae with leg sheaths side by side, rarely partly overlapping distinct visible tibial spurs; thorax characteristic, strongly arched with sessile undivided prothoracic spiracle; all species with 6 abdominal spiracles, except for Mycetophilinae, with 5; pupae found in soil, or in solid tubes, are typical in having spicules covering surface of abdomen, by contrast all pupae surrounded by webs or cocoons have very smooth cuticle.



Figs 20.54–56. Wings of Mycetophilidae (dorsal views): (54) *Zygomyia* sp.; (55) *Sceptonia* sp.; (56) *Platyprosthiogyne* sp.

Abbreviations: *C* – costal vein; *CuA* – anterior branch of cubital vein; M_1 – first branch of media; M_2 – second branch of media; R_{4+5} – third branch of radius.



Figs 20.57–63. Male and female terminalia of Mycetophilidae: (57) male terminalia of *Sciophila kakumensis* Søli, ventral view (tergite 9 removed); (58) same, tergite 9, ventral view; (59) *Mycomya* (*Mycomyopsis*) sp., tergites 9 and 10, dorsal view; (60) gonostylus of *Exechia* sp., lateral view (from inside); (61) female terminalia of *S. kakumensis*, lateral view; (62) same, tergal parts, ventral view; (63) female terminalia, sternite 8 and appendages of *S. kjaerandseni* Søli, dorsal view. Figs 57, 58, 62, 63 (Søli 1997, figs 57, 58, 22, 23, respectively).

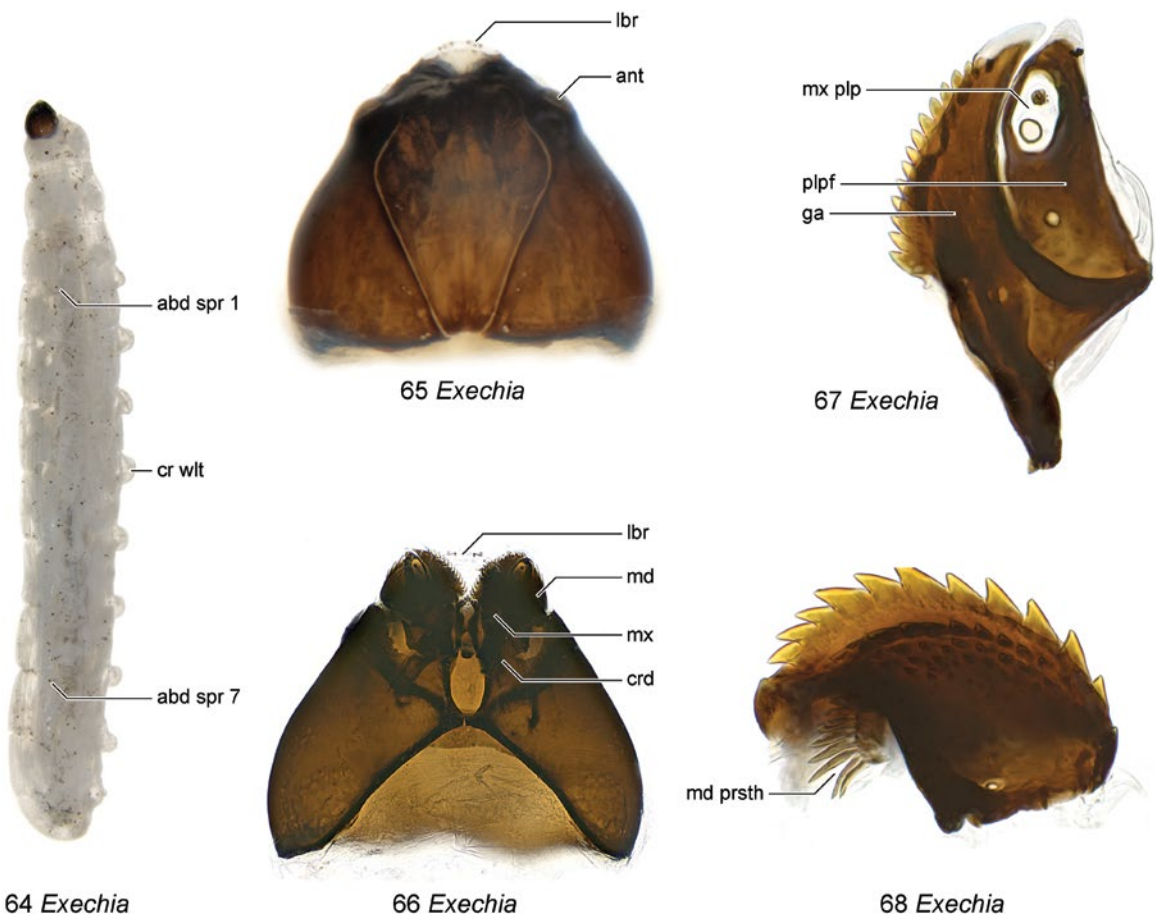
Abbreviations: aed – aedeagus; cerc – cercus; goncx – gonocoxite; goncx apod – gonocoxal apodeme; gonst – gonostylus; hyprct – hypoproct; hyp vlv – hypogynial valve; pm – paramere; pm apod – parameral apodeme; spm em – spermathecal eminence; spmth – spermatheca; st – sternite; tg –tergite.

A study describing the pupae of 21 species, representing most families of Sciaroidea, including most subfamilies of Mycetophilidae, is provided by Plachter (1979c).

Biology and immature stages

Despite being common in both temperate and tropical regions, our knowledge of the biology of fungus gnats remains poor, especially for the tropics. Adults are most abundant in humid areas, especially moist woodlands. During the day adults, especially the subfamily Mycetophilinae, congregate in damp, dark places, such as overhanging stream banks and cavities under tree roots. Several species are common in caves, mines and in smaller subterranean cavities (e.g., Kjærandsen 1993; Kurina 1996). Species of the Holarctic genus *Speolepta* are regular inhabitant of caves in all life stages, even if adults are regularly encountered outside. Many species of fungus gnats can be swept from undergrowth in woods. Little is known regarding their nocturnal activity, but some species appear to rest in secluded spots during the day, as they are almost exclusively sampled in traps deployed during the night. Although the majority of temperate species occur in woodlands, some species appear to prefer grassland, or open habitats (Ševčík & Roháček 2008), but little is known regarding the biology of fungus gnats in such environments, or in dry forests, both in temperate and tropical regions.

Fungus gnats in more than 10 genera are documented as being important and effective pollinators of the botanical families Araceae, Liliaceae, Orchidaceae (possibly including pseudocopulation) and Saxifragaceae (Barriault *et al*. 2010; Gaskett 2011; Goldblatt *et al*. 2004; Mesler *et al*. 1980; Okuyama *et al*. 2004; Tremblay & Ackerman 2007). These results are based on studies in temperate regions and very little is known regarding their role as pollinators in the Afrotropical Region. Larvae are usually found in fungi, under brackets and bark, in old tree trunks, in decaying plants, soil, *etc*. Only scattered reports on the larval diet and behaviour exist from the tropics and our



Figs 20.64–68. Larval features of Mycetophilidae: (64), larval habitus of *Exechia frigida* (De Geer), lateral view (non-Afrotropical); (65) same, head capsule, dorsal view; (66) same, ventral view; (67) same, left maxilla, ventral view; (68) same, left mandible, ventral view.

Abbreviations: abd spr – abdominal spiracle; ant – antenna; cr wlt – creeping welt; crd – cardo; ga – galea; lbr – labrum; md – mandible; md prsth – mandibular prostheca; mx – maxilla; mx plp – maxillary palpus; plpf – palpifer.

knowledge is almost exclusively based on studies undertaken in Europe. Recent contributions and reviews include those of Jakovlev (2011, 2012). Larvae of species in the subfamily Mycetophilinae are mostly found in soft ground fungi, but some species prefer a wide range of lignicolous fungi, fleshy or woody. Most groups of fungi and even Myxomycetes, have been reported as larval breeding media for fungus gnats and both polyphagy and oligophagy have been documented. Species in the remaining subfamilies have a more varied biology, several with larvae that develop in fungi or under bark. The larvae often occur in a small mucilaginous tube supported by threads and in some species these may be covered in a dry irregular sometimes communal web. Species of the genera *Docosia* Winnertz and *Leia* Meigen have been found in the nests of birds and mammals, in which they probably feed on mycelium. *Mycomya* spp. have been reared from fungi associated with dead wood. In the rainforests of Central African Republic, Matile (1972*b*) observed larvae of *Viridivora* feeding on mosses and liverworts and suggested that this behaviour may also apply to other species. Pupation usually takes place in the soil, but some species pupate in the host fungus. Within the subfamily Sciophilinae a large number of genera have pupae that hang in a sparse web of salivary threads. Several species of Hymenoptera in the families Braconidae, Ichneumonidae and Proctotrupidae have been reported as parasites of fungus gnats (Kolarov & Bechev 1995; Šedivý & Ševčík 2003). A protozoan (Trypanosomatidae) has been found in the gut of larvae of *Leia* (Gibbs 1959), and in North America a nematode (Steinernematidae) has been reported from adult *Mycetophila* Meigen (Poinar 1992).

Economic significance

As the ecological role of fungus gnats is poorly known, their economic significance is difficult to assess. In areas where wild mushrooms are extensively used as human food, the larvae of fungus gnats have long been considered as pests. Larvae of fungus gnats have also been reported to infest cultivated mushrooms causing extensive damage through their feeding action (*e.g.*, Sasakawa 1992; Sueyoshi & Murakami 2012; Tobar *et al*. 2010), or by serving as vectors of harmful nematodes (Tsuda *et al*. 1996). Larvae of the Afrotropical species, *Leia arsona* Hutson, 1978, have been recorded as feeding on stored root ginger in London (Hutson 1978). The importance of fungus gnat larvae in decomposition of organic matter is virtually unknown (Binns 1981, for review). As numerous species feed on fungal mycelium penetrating dead organic material, such as rotting tree trunks and branches, their role in decomposition may be more important than commonly recognised, *e.g.*, by carrying putrefactive micro-organisms into the decaying material (Irmler *et al*. 1996). In temperate regions the fungus gnat fauna has proved to be a good bioindicator of undisturbed forests (Økland 1994, 1996). As mentioned above, fungus gnats may also be of vital importance in the pollination of certain flowers, especially orchids.

Classification

The family Mycetophilidae is regarded by most contemporary authors to comprise a monophyletic group (Amorim & Rindal 2007; Rindal *et al*. 2009; Ševčík *et al*. 2013). The family belongs to the infraorder Bibionomorpha (*e.g.*, Wiegmann *et al*. 2011) and has commonly been included in the superfamily Sciaroidea, together with the families Bolitophilidae (non-Afrotropical), Cecidomyiidae, Diadocidiidae (non-Afrotropical), Ditomyiidae (non-Afrotropical), Lygistorrhinidae, Keroplatidae, Sciaridae and Rangomaramidae (non-Afrotropical) (Amorim & Rindal 2007; Wood & Borkent 1989: 1339). Phylogenetic relationship among the families included in the infraorder remains unresolved.

Following Edwards (1925*a*), the family has traditionally been divided into three subfamilies, Manotinae, Sciophilinae and Mycetophilinae. The last two mentioned subfamilies have been divided into a varying number of tribes: Sciophilinae into Gnoristini, Leiini, Metanepsiini, Mycomyini and Sciophilini and Mycetophilinae into Exechiini and Mycetophilini. Despite an ongoing debate regarding their delimitation, these tribes (except Exechiini and Mycetophilini), are today commonly treated at the subfamilial level. Notwithstanding, a recent molecular study by Ševčík *et al*. (2013), has demonstrated that the three genera in "Metanepsiinae" do not form a monophyletic group, but are nested within the Gnoristinae. Among the commonly recognised subfamilies, the monophyly of the Gnoristinae is probably the least well-supported, both by morphological and molecular data. For convenience the common practice of dividing the family in subfamilies is, however, followed here.

Identification

There is no comprehensive identification key covering the entire Afrotropical fauna of fungus gnats, but useful contributions can be found in Matile (1992 (Gnoristinae), 1998*b* (Sciophilinae, in part)) and Väisänen (1994) (Mycomyinae). Moreover, Vockeroth (1981: 228), Søli *et al*. (2000: 63) and Vockeroth (2009: 268) provide useful keys covering the Nearctic, Palaearctic, and Central American regions, respectively. At the generic level, available identification keys are noted in the "Synopsis of the fauna" section (below). In the field Mycetophilidae are best stored in alcohol, or micro-pinned for later double-mounting (see Chapter 2).

Key to genera of Afrotropical Mycetophilidae

1. Legs with trichia arranged in regular rows along entire length of tibia (*e.g.,* Fig. 19). 2
– Legs with trichia irregularly arranged along entire length of tibia (*e.g.,* Fig. 18), although sometimes tending to form rows towards apex 13
2. Head with row of very strong, erect, posteriorly-directed setae on occiput (behind eye) (Fig. 13); wing without apparent *M*-fork, branches present as detached veins (Fig. 22) (MANOTINAE). . . . . *Manota* Williston

– Head without such strong posteriorly-directed setae on occiput (behind eye); wing with apparent *M*-fork (*e.g.*, Fig. 25) 3

3. Head invariably with 2 or 3 ocelli, the lateral touching eye margin (*e.g.*, Figs 12, 14); wing vein R_{2+3} absent; microtrichia on wing membrane, especially towards apex, arranged in more or less regular longitudinal lines (*e.g.*, Fig. 21) (MYCETOPHILINAE) 28

– Head with 2 ocelli, inserted far from eye margin; rarely, ocelli absent; wing vein R_{2+3} present, or absent; microtrichia on wing membrane not clearly arranged in lines (as in *e.g.*, Fig. 20) (MYCOMYINAE) . . . 4

4. Head without ocelli; wing usually with striking apical fold in males; vein R_{2+3} absent (Fig. 23) . . . . . *Syndocosia* Speiser

– Head with ocelli; wing without striking apical fold (*e.g.*, Fig. 27) 5

5. Tibiae without strong setae (bristles); wing with costal vein (*C*) produced beyond apex of vein R_{4+5} (as in Fig. 24) . . . . . *Viridivora* Matile

– Tibiae with strong setae (bristles), about as long as apical width of tibia, often longer; wing with costal vein (*C*) ending at apex of vein R_{4+5}, or produced beyond 6

6. Wing with single vein, *CuA*, posteriorly to vein M_2 (Fig. 25); scutellum without long apical setae . . . . . *Moriniola* Matile

– Wing with fork (M_4 and *CuA*) posteriorly to vein M_2 (*e.g.*, Fig. 24); scutellum with long apical setae 7

7. Wing without vein R_{2+3}; costal vein (*C*) produced well beyond apex of vein R_{4+5} (Fig. 24) . . . . . *Parempheriella* Matile 8

– Wing with vein R_{2+3}; costal vein (*C*) ending at apex of vein R_{4+5} (Fig. 27) or produced beyond (Fig. 28) 9

8. Antenna with median flagellomeres as long as broad; palpus with terminal segment thread-like, much longer than penultimate segment; wing with subcostal vein (*Sc*) ending near level of apex of basal cell (*bc*), commonly before; point of furcation of posterior fork (M_4 and *CuA*) at level of base of crossvein *r–m* (rarely slightly before) (Fig. 24) . . . . . *Parempheriella sensu stricto*

– Antenna with median flagellomeres shorter than wide; palpus with terminal segment about as long as penultimate segment; wing with subcostal vein (*Sc*) ending at, or after, level of apex of basal cell (*bc*); point of furcation of posterior fork (M_4 and *CuA*) before base of crossvein *r–m* . . . . . *Parempheriella* (*Parempherina* Matile)

9. Thorax with laterotergite setulose (careful observation required as setae may be pale and difficult to discern); wing with anal lobe reduced (Fig. 26) . . . . . *Dinempheria* Matile

– Thorax with laterotergite bare; wing with anal lobe normal (*e.g.*, Fig. 27) 10

10. Wing with costal vein (*C*) ending at apex of vein R_{4+5} (Fig. 27) . . . . . *Mycomya* Rondani 11

– Wing with costal vein (*C*) produced beyond apex of R_{4+5} (*e.g.,* Figs 28, 29) 12

11. Male terminalia with tergite 9 with 2 well-separated median combs (Fig. 59) . . . . . *Mycomya* (*Mycomyopsis* Väisänen)

– Male terminalia with tergite 9 without well-separated median combs . . . . . *Mycomya sensu stricto*

12. Wing membrane without false vein between veins R_{4+5} and M_1; wing without distinct markings (Fig. 28) . . . . . *Mycomyiella* Matile

– Wing membrane with false vein between veins R_{4+5} and M_1; wing with, or without, conspicuous dark markings (Fig. 29) . . . . . *Neoempheria* Osten Sacken

13. Thorax with mediotergite setulose; wing membrane with numerous distinct macrotrichia and usually also microtrichia (*e.g.*, Figs 30, 33) (SCIOPHILINAE) 14

– Thorax with mediotergite bare; wing membrane without macrotrichia, or at most, with a few short macrotrichia near posterior margin, always with dense microtrichia (*e.g.*, Fig. 38) 18

14. Wing with only 2 major veins (M_1, *CuA*) posterior to radial veins; without forks (Fig. 30) . . . . *Azana* Walker

– Wing with anterior fork (M_1+M_2) and 1 or 2 posterior veins (*e.g.*, Fig. 31) 15

15. Wing with complete anterior fork (M_1+M_2) and 1 vein (*CuA*) posteriorly to it (*e.g.,* Figs 31, 32) 16

– Wing with both anterior (M_1+M_2) and posterior (M_4 and *CuA*) forks complete (*e.g.*, Fig. 33) 17

16. Wing without crossvein *sc–r* (Fig. 31); fore leg with tarsomere 1 at least 1.5 × as long as tibia, sometimes considerably so; head with lateral ocelli separated by less than individual width from eye margin . . . . . *Afrocnemia* Matile

– Wing with crossvein *sc–r* (Fig. 32); fore leg with tarsomere 1 slightly shorter than tibia; head with lateral ocelli inserted far from eye margin, separated by at least 3 × individual width . . . . . *Acnemia* Winnertz

17. Wing with point of furcation of posterior fork (M_4 and *CuA*) beyond point of furcation of anterior fork (M_1+M_2); vein M_4 sometimes obsolete basally (Fig. 33) . . . . . *Sciophila* Meigen

– Wing with point of furcation of posterior fork (M_4 and *CuA*) before point of furcation of anterior fork (M_1+M_2); M_4 complete (Fig. 34). . . . . *Leptomorphus* Curtis

18. Wing vein R_1 short, usually about as long as crossvein *r–m* and ending in basal ⅔ of wing (e.g., Fig. 36); if vein R_1 longer (*ca* 3–4 × as long as *r–m* in *Docosia*), then stem of anterior fork (M_1+M_2) about as long as crossvein *r–m* (e.g., Fig. 41); head with lateral ocellus close to eye margin (except in *Mohelia*), with, or without, median ocellus (LEIINAE) 19

– Wing vein R_1 long, several times as long as crossvein *r–m*, nearly always ending in distal ⅓ of wing (e.g., Fig. 44); if vein R_1 ending in basal ⅔ of wing (*Metanepsia*), then stem of anterior fork (M_1+M_2) *ca* 10 × as long as crossvein *r–m* (e.g., Fig. 43); head with lateral ocellus inserted far from eye margin; median ocellus present (GNORISTINAE). 25

19. Wings longitudinally folded; radial veins densely clothed in slightly flattened setae (Figs 8, 35); head with several strong, recurved, posteriorly-directed setae on occiput (Fig. 8); abdomen densely clothed in flattened, blade-shaped setae. . . . . *Allactoneura* de Meijere

– Wings not longitudinally folded; radial veins with a single row of setae; occiput with at most a few posteriorly-directed setae; abdomen with evenly dispersed normal setae. 20

20. Hind tibia with numerous strong setae (bristles) at least 2 × as long as apical width of tibia (e.g., Fig. 9) 21

– Hind tibia without strong setae (bristles) longer than width of tibia (as in Fig. 2) 23

21. Wing with costal vein (*C*) produced beyond apex of vein R_{4+5}; subcostal vein (*Sc*) ending in costal vein; vein *CuA* distinctly sigmoid (Fig. 36). . . . . *Acrodicrania* Skuse

– Wing with costal vein (*C*) ending at vein R_{4+5}; subcostal vein (*Sc*) free, or ending in costal vein; vein *CuA* straight or virtually so (e.g., Figs 37, 38) 22

22. Wing vein M_4 distinctly detached proximally, running more or less parallel with vein *CuA* towards base of wing; subcostal vein (*Sc*) weak, ending free; crossvein *sc–r* absent (Fig. 37); head with lateral ocelli touching eye margin; antenna with proximal part of each flagellomere dark, giving antenna conspicuous banded appearance (Fig. 1); thorax more or less unicoloured, usually light yellowish (Fig. 1). . . . *Clastobasis* Skuse

– Wing vein M_4 attached or slightly detached from vein *CuA*, in latter case curving distinctly towards vein *CuA* proximally; subcostal vein (*Sc*) distinct, ending in costal vein (*C*); crossvein *sc–r* present (Fig. 38); head with lateral ocelli close, but not touching eye margin; antenna not appearing banded (Fig. 9); thorax usually with contrasting pattern between brown and yellow (Fig. 9). . . . . .*Leia* Meigen

23. Wing with posterior fork incomplete; vein *CuP* joining vein *CuA*, forming conspicuous, closed cell *cua* (Fig. 39). . . . . *Paradoxa* Marshall

– Wing with posterior fork (M_4 and *CuA*) complete; vein *CuP* not joining vein *CuA*, to form conspicuous cell *cua* (e.g., Figs 40, 41). 24

24. Wing with stem of anterior fork (M_1+M_2) 3 × as long as crossvein *r–m*; subcostal vein (*Sc*) short, ending at vein *R* (Fig. 40); mouthparts somewhat prolonged (Fig. 16). . . . . *Mohelia* Matile

– Wing with stem of anterior fork (M_1+M_2) barely longer than crossvein *r–m*; subcostal vein (*Sc*) long, ending free (Fig. 41); mouthparts not prolonged . . . . . *Docosia* Winnertz

25. Wing with point of furcation of posterior fork (M_4 and *CuA*) opposite point of furcation of anterior fork (M_1+M_2) and subcostal vein (*Sc*) ending in costal vein (*C*) (Fig. 42) . . . . . *Synapha* Meigen

– Wing with point of furcation of posterior fork (M_4 and *CuA*) usually before point of furcation of anterior fork (M_1+M_2), if opposite point of furcation of anterior fork, then subcostal vein (*Sc*) ending in radial vein (R_1) (e.g., Fig. 44) 26

26. Wing crossvein *r–m* extremely short, barely longer than vein *Rs*; wing roundish, about 2 × as long as broad (Fig. 43); mouthparts reduced and palpus with only 1 visible segment (Fig. 15) . . . . . *Metanepsia* Edwards

– Wing crossvein *r–m* long, at least 1.5 × as long as vein *Rs*; wings normal, distinctly longer than 2 × width (e.g., Fig. 44); mouthparts normal; palpus with at least 3 well-separated segments 27

27. Wing with subcostal vein (*Sc*) ending free, or at vein *R*; crossvein *sc–r*, if present, close to apex of vein *Sc*; vein R_{2+3} present or absent; veins posteriorly to vein *R* normal, ending at wing margin (Fig. 44) . . . . . .*Dziedzickia* Johannsen

– Wing with subcostal vein (*Sc*) ending in costal vein (*C*); crossvein *sc–r* located about midway along vein *Sc*; vein R_{2+3} absent; veins posteriorly to vein *R* distally atrophied, not reaching wing margin . . . . . *Boletiniella* Matile

28. Thorax with anepisternum bare (e.g., Fig. 7) (EXECHIINI) 29

– Thorax with anepisternum with strong setae at least near upper margin (e.g., Fig. 12) (MYCETOPHILINI) 34

29. Wing with point of furcation of posterior fork (M_4 and *CuA*) beyond level of point of furcation of anterior fork (M_1+M_2) (e.g., Figs 45, 46) 30

– Wing with point of furcation of posterior fork (M_4 and *CuA*) before, or opposite, level of point of furcation of anterior fork (M_1+M_2) (e.g., Figs 47–49) 31

30. Thorax with mesonotum with discal setae (Fig. 7); wing with crossvein *r–m* > 2 × as long as stem of *M*-fork (Fig. 45); abdomen with pale markings (when present), usually situated towards fore margin of tergites. . . . . .*Exechia* Winnertz

– Thorax with mesonotum without discal setae; wing with crossvein *r–m* about as long as stem of *M*-fork (Fig. 46); pale abdominal markings (if present), usually situated towards hind margins of tergites . . . . . .*Pseudexechia* Tuomikoski

31. Wing with subcostal vein (*Sc*) ending free; vein *CuP* strong, extending well beyond point of furcation of posterior fork (M_4 and *CuA*) (Fig. 47); thorax with mediotergite sometimes with some dark, short setae on lower part . . . . . .*Rymosia* Winnertz

– Wing with subcostal vein (*Sc*) ending at vein R_1; vein *CuP* faint and short, not extending beyond point of furcation of posterior fork (M_4 and *CuA*) (care should be taken not to interpret the false vein between veins *CuA* and *CuP* as vein *CuP*) (e.g., Figs 48, 49); thorax with mediotergite bare 32

32. Thorax with mesonotum with most of disc evenly clothed in prostrate setae . . . . .*Brevicornu* Marshall

– Thorax with mesonotum with most of disc devoid of setae, or with erect setae arranged in rows . . . . . *Allodia* Winnertz 33

33. Thorax with mesonotum without setae over most of disc . . . . . .*Allodia sensu stricto*

– Thorax with mesonotum with several erect setae . . . . . .*Allodia* (*Brachycampta* Winnertz)

34. Thorax with anepimeron without setulae and setae 35

– Thorax with anepimeron with setulae and setae (e.g., Fig. 12) 36

35. Hind coxa with basal seta; wing with subcostal vein (*Sc*) ending free or at vein *R*; point of furcation of posterior fork (M_4 and *CuA*) before, opposite or very slightly beyond point of furcation of anterior fork (M_1+M_2) (Fig. 50). . . . . *Trichonta* Winnertz

– Hind coxa without basal seta; wing with subcostal vein (*Sc*) ending free; point of furcation of posterior fork (M_4 and *CuA*) well beyond point of furcation of anterior fork (M_1+M_2) (Fig. 51). . . . . *Phronia* Winnertz

36. Wing with posterior fork (M_4 and *CuA*) (e.g., Figs 52, 53) 37

– Wing without posterior fork, only single vein (*CuA*) present (e.g., Figs 54–56) 38

37. Wing vein M_4 slightly divergent from vein M_2, but parallel with, or convergent towards, vein *CuA* (Fig. 52); thorax with ventral border of mesonotum above antepronotum nearly straight, only slightly curved (Fig. 12) . . . . . *Mycetophila* Meigen

– Wing vein M_4 parallel with vein M_2, but slightly divergent from vein *CuA* (Fig. 53); thorax with upper portion of antepronotum inserted into sharp incision in lower border of mesonotum (Fig. 14) . . . . . .*Epicypta* Winnertz and *Platurocypta* Enderlein

38. Mid tibia with 1 or more short to long ventral setae (bristles) (Fig. 17); wing vein *CuA* slightly diverging from vein M_2 (Fig. 54) . . . . . *Zygomyia* Winnertz

– Mid tibia without ventral setae; wing vein *CuA* parallel, or converging towards vein M_2 (e.g., Figs 55, 56). 39

39. Wing with costal vein (*C*) ending at apex of vein R_{4+5} (Fig. 55) . . . . . .*Sceptonia* Winnertz

– Wing with costal vein (*C*) produced well beyond apex of vein R_{4+5} (e.g., Fig. 56) 40

40. Thorax with mesonotum with shiny median keel anteriorly; wing without incision near apex of vein *CuA*. . . . . *Aspidionia* Colless

– Thorax with mesonotum normal; wing with distinct incision near apex of vein *CuA* (Fig. 56) . . . . . .*Platyprosthiogyne* Enderlein

Synopsis of the fauna

The family Mycetophilidae currently includes more than 4,000 described, extant species in about 150 genera. Thirty-eight genera are recorded from the Afrotropics, nine of which are endemic to the region. Another four genera have a very restricted distribution, known only from the Australasian and/or the Oriental Regions outside the Afrotropics. Five genera are listed here, that were not included in Matile (1980*a*), the most recent species account for the Afrotropical Region. The undescribed species mentioned below were identified from collections of the Natural History Museum (London, UK), The Natural History Museum, University of Oslo (Oslo, Norway) and the National Museum (Bloemfontein, South Africa).

***Acnemia* Winnertz** (Sciophilinae)**.** A genus of 39 described species recorded from all zoogeographical regions, except the Australasian Region and Antarctica. The vast majority of species occur in the Holarctic Realm. Only one species, *A. falkei* Matile & Vockeroth, 1977, described from Uganda, is known from the Afrotropical Region. In the subfamily Sciophilinae, *Acnemia* is recognised by the combination of a single vein posteriorly to the vein *M*-fork; and the presence of crossvein *sc–r* (Fig. 32). The biology and immature stages of Afrotropical species remain unknown.

***Acrodicrania* Skuse** (Leiinae)**.** A small genus of eight described species, recorded from the Afrotropical, Australasian and Oriental Regions. The single Afrotropical species, *A. africana* Edwards, 1925, is only known from South Africa (Edwards 1925*b*), where it appears to be locally common. In the subfamily Leiinae, *Acrodicrania* is recognised by the combination of the lateral ocelli close to the eye margin; the wing without a complete posterior fork; and the strikingly sinuous vein *CuA*. The biology and immature stages remain unknown.

***Afrocnemia* Matile** (Sciophilinae)**.** Until recently, *Afrocnemia* was only known from the Afrotropical Region, with three described species from Central African Republic, but a fourth species from Israel, originally described as *Acnemia* (Chandler 1994), was added by Borkent & Wheeler (2013). In the tribe Sciophilini, this rare genus is recognised by the combination of a single posterior vein, the absence of crossvein *sc–r* (Fig. 31) and the elongate tarsi of the fore leg. The biology and immature stages remain unknown. An identification key to Afrotropical species was provided by Matile (1998*b*).

***Allactoneura* de Meijere** (Leiinae)**.** A small genus of eight extant species recorded from the Afrotropical, Oceanian/Australasian, Oriental and Palaearctic Regions. One species, *A. argentosquamosa* Enderlein, 1910, occurs in the Afrotropical Region, described from Seychelles (Enderlein 1910) and later recorded from Madagascar and Mauritius. Additional specimens have been examined from Burundi, Democratic Republic of the Congo and Tanzania. The systematics remains unclear, but more than one species certainly exists. *Allactoneura* spp. are readily distinguishable by their ability to fold their wings longitudinally in a wasp-like fashion (Fig. 8). Furthermore, the radial wing veins are densely clothed in flattened, almost scale-like setae (Fig. 35). The biology and immature stages remain unknown.

***Allodia* Winnertz** (Mycetophilinae: Exechiini)**.** A genus of *ca* 95 extant species, recorded from all zoogeographical regions, except Antarctica, with the majority described from the Palaearctic Region. Two species have been reported from the Afrotropical Region: one undescribed species of *Allodia sensu stricto* from Cameroon and one species from the Comoros, in the subgenus *A.* (*Brachycampta* Winnertz) (Matile 1979*a*). In Afrotropical genera of the subfamily Mycetophilinae, *Allodia* and *Brevicornu* can be distinguished in having the anepisternum bare; the wing with long and well-developed median and cubital forks; vein *Sc* ending at vein *R*; and a normally-developed anal vein (Fig. 49). As opposed to *Brevicornu*, *Allodia* has the mesonotum bare, or with erect setae. The biology and immature stages of Afrotropical species remain unknown.

***Aspidionia* Colless** (Mycetophilinae: Mycetophilini)**.** A genus with only two described species, one Afrotropical, the other Australasian. The single Afrotropical species, *A. balachowskyi* Matile, 1974, was described from Comoros (Matile 1974*b*). Among genera in the subfamily Mycetophilinae with a single cubital vein, *Aspidionia* is unique in having the mid anterior portion of the mesonotum developed into a shiny median keel; and in having an evenly curved wing border, without a distinct incision near the apex of vein *CuA* (*cf*. Colless 1966, fig. 8), as in *Platyprosthiogyne* (Fig. 56). The biology and immature stages remain unknown.

***Azana* Walker** (Sciophilinae)**.** A small genus with 14 extant species, known from all zoogeographical regions, except the Australasian Region and Antarctica. Two species occur in the Afrotropical Region, described from Côte d'Ivoire and Gabon, respectably (Matile 1998*a*), but additional undescribed species have been recognised from Nigeria (Matile 1980*a*: 225), Burundi, Madagascar and Tanzania. *Azana* is distinguished by the unique wing venation, with only two major veins posterior to radius (Fig. 30). Species vary in size and colouration, from dusty brown to bright yellow. The biology and immature stages of Afrotropical species remain unknown.

***Boletiniella* Matile** (Gnoristinae)**.** This endemic monotypic genus, with the single described species *B. nigrifemur* Matile, 1973, was erected by Matile (1973*a*), based on specimens from Bioko Is. (Equatorial Guinea) (as Fernando Póo) and Cameroon, but was later recorded from Gabon (Matile 1992). The species can be identified on the combination of the flattened antennae and the atrophied wing veins of the anterior and the posterior forks, which do not reach the wing margin. The biology and immature stages remain unknown.

***Brevicornu* Marshall** (Mycetophilinae: Exechiini)**.** The genus comprises more than 80 extant species, known from all zoogeographical regions, except Antarctica, with most described from the Palaearctic Region. One undescribed species is reported from Cameroon in the Afrotropical Region (Matile 1980*a*: 228), but the genus appears to be not uncommon in forested areas. Together with *Allodia*, *Brevicornu* is the only Afrotropical genus in the subfamily Mycetophilinae, with the anepisternum bare; the wing with long and well-developed median and cubital forks; vein *Sc* ending at vein *R*; and a normally developed anal vein (Fig. 48). Of the two, aforementioned genera *Brevicornu* is the only genus with the mesonotum clothed in numerous prostrate setae (*i.e.*, setae lying flat against the body). It may also be useful to examine male and female terminalia, as *Brevicornu* usually have elongated

terminalia, as opposed to those in *Allodia*. The biology and immature stages of Afrotropical species remain unknown.

***Clastobasis* Skuse** (Leiinae)**.** A small genus comprising 16 extant species, recorded from all zoogeographical regions, except the Nearctic and Neotropical Regions and Antarctica. Six species are recorded from the Afrotropical Region, described from Comoros, Oman, Senegal, Seychelles and Tanzania, but the genus appears to be widespread and locally common and numerous species await description. The genera *Leia* and *Clastobasis* are frequently confused in collections, due to their very similar wing venation (compare Figs 37 and 38), but the latter genus can be recognised based on their smaller size, colouration (usually unicolourous yellowish) and conspicuous banded antennae (Fig. 1). For identification see Matile (1973*b*, 1979*a*) and Chandler (2000). The biology and immature stages of Afrotropical species remain unknown.

***Dinempheria* Matile** (Mycomyinae)**.** An endemic Afrotropical genus with seven described species. It appears to be most common in lowland rainforests in Central Africa and additional species await description. Within the subfamily Mycomyinae, species of *Dinempheria* are easily identified based on their slender body; long legs; narrow wings with the anal lobe reduced (Fig. 26); and a setulose laterotergite. Species described to date are figured in Matile (1979*b*) and Väisänen (1994). The larvae are gregarious and spin webs and have been found on the underside of sporophores of Agaricaceae. Larvae of two species were described by Matile (1979*b*).

***Docosia* Winnertz** (Leiinae)**.** A genus of *ca* 80 extant species two-thirds of which occur in the Palaearctic Region. The genus is known from all zoogeographical regions, however, except the Australasian Region and Antarctica. Kurina & Ševčík (2012) reported *Docosia gilvipes* (Haliday *in* Walker, 1856) from South Africa (both sexes). A further eight specimens from four additional localities in South Africa have been examined, but as this material only comprises females, they could not be identified to species. Thus, Kurina & Ševčík's (2012) suggestion that *D. gilvipes* may represent an introduced species must remain an open question. Systematically, the genus takes an intermediate position between the subfamilies Gnoristinae and Leiinae, but due to the relatively short wing vein R_1 (Fig. 41), is commonly included in the Leiinae. *Docosia* can be separated from other genera in the subfamily in having the wing with complete anterior and posterior forks and a strong, long and abruptly ending vein *Sc* (Fig. 41). The biology and immature stages of Afrotropical species remain unknown.

***Dziedzickia* Johannsen** (Gnoristinae)**.** A genus of more than 60 species, recorded from all zoogeographical regions, except the Australasian Region and Antarctica, two-thirds of which occur in the Neotropics. Five species are recorded from the Afrotropical Region. As commonly treated, *Dziedzickia* covers a large, diverse assemblage of species globally, which are certainly paraphyletic (*e.g.*, Matile 1992; Ševčík *et al*. 2011, 2013). In genera in the subfamily Gnoristinae, *Dziedzickia* can be identified on the following combination of characters: presence of well-developed mouthparts; wing with long vein *Sc* ending free, or in vein *R*; point of furcation of posterior fork distinctly before point of furcation of anterior fork; and vein R_{2+3} present or absent (Fig. 44). Some species have distinctly serrated antennae that may even be branched, as in some *Metanepsia* (Fig. 3). The biology and immature stages of Afrotropical species remain unknown. An identification key, that includes the five described Afrotropical species, was provided by Matile (1992), but several additional species await description.

***Epicypta* Winnertz** (Mycetophilinae: Mycetophilini)**.** A large genus of *ca* 150 extant species, known from all zoogeographical regions, except Antarctica, with most by far described from the Neotropical Region. Twenty-one species have been recorded from the Afrotropical Region. The closely-related genus *Platurocypta* Enderlein was erected, based on material from Seychelles and today comprises 19 species from all regions, 11 occurring in the Afrotropics. As previously noted by Chandler (1981), distinctions between *Epicypta* and *Platurocypta* remain vague and problematic and the validity of the two genera remains unresolved. Afrotropical material, studied for preparation of this chapter, exhibit continuous variations in all characters commonly used to separate the two genera (*i.e.*, branches of anterior and posterior forks with, or without setae; posterior fork branching before, or after, anterior fork; costal vein ending at apex of vein R_{4+5}, or produced beyond vein R_{4+5} (Fig. 53); antepronotum and proepisternum completely, or partially fused (Fig. 14); and the chaetotaxy of mesonotum, antepronotum and propleuron (Fig. 14)). As Matile (1979*a*) pointed out, *Epicypta* and *Platurocypta* require a comprehensive revision, preferably also including parts of *Mycetophila*. Consequently, *Epicypta* and *Platurocyptahave* are not separated in the above generic key. Most Afrotropical species in the two genera were described from Bioko Is. (Equatorial Guinea) (as Fernando Póo) and Comoros and the male terminalia are illustrated by Matile (1973*a*, 1979*a*). The biology and immature stages of Afrotropical species remain unknown.

***Exechia* Winnertz** (Mycetophilinae: Exechiini). A large genus of *ca* 170 described species, known from all zoogeographical regions, except the Neotropical Region and Antarctica, with most from the Holarctic Realm. Ten species have been described from the Afrotropical Region (Chandler 2000; Matile 1980*a*), but the genus appears to be locally very common and numerous species await description. In the Afrotropical Region *Exechia* and *Pseudexechia* are the only genera within the subfamily Mycetophilinae with a short posterior wing fork and thorax with a bare anepisternum. Of the two genera, *Exechia* is the only one with numerous strong setae on the mesonotum. The biology and immature stages of Afrotropical species remain unknown.

***Leia* Meigen** (Leiinae)**.** A genus of more than 150 described species, recorded from all zoogeographical regions, except Antarctica, about two-fifths from the Neotropical Region. The genus is common and widespread in the Afrotropical Region and 23 species have been recorded. Within Leiinae, *Leia* is easily confused with *Clastobasis* (see above), but can be separated on the combination of wing with costal vein produced beyond apex of vein R_{4+5}; distinct vein *Sc* ending at costal vein (C); and presence of crossvein *sc–r* (Fig. 38). Larvae of the Afrotropical species, *L. arsona* Hutson, 1978, have been observed feeding on stored root ginger in London (Hutson 1978). There has been no attempt to compile an identification key for the Afrotropical species and a thorough revision of the genus is required.

***Leptomorphus* Curtis** (Sciophilinae)**.** A genus of 45 extant species, recorded from all zoogeographical regions, except

Antarctica (Borkent & Wheeler 2012). Ten species are recorded from the Afrotropical Region, originating in West and Central Africa (7 species) and one species each from Madagascar, South Africa and Tanzania. *Leptomorphus* spp. are large mycetophilids with long legs and rather slender wings (Fig. 34). Matile (1977) recognised four subgenera, of which three are represented in the Afrotropics. The phylogenetic analysis of Borkent & Wheeler (2012), however, did not recover support for Matile's subgeneric classification and this is not followed here. The biology and immature stages of Afrotropical species remain unknown. Borkent & Wheeler (2012) provided an identification key for all extant species.

***Manota* Williston** (Manotinae)**.** A very large genus of more than 250 described species, known from all zoogeographical regions, except Antarctica. The genus appears to be common and widespread in the Afrotropical Region, with 56 described species, most by Hippa & Kurina (2012), Hippa (2008), Jaschhof & Mostovski (2006), Kurina & Hippa (2014), Matile (1972*a*, 1979*a*) and Søli (1993). *Manota* is the single representative of the subfamily Manotinae occurring in the region. *Manota* are pale coloured, rather small species (2.5–3.5 mm) and can be recognised in having the fine tibial setae in regular rows; a conspicuous row of strong, erect occipital setae just behind the compound eye (Fig. 13); and reduced wing venation, with very short vein R_1, and M_1 and M_2 proximally reduced (Fig. 22). The biology and immature stages of Afrotropical species remain unknown.

***Metanepsia* Edwards** (Gnoristinae)**.** A genus of nine described species, confined to the Afrotropical and Oriental Regions, seven of which occur in the Afrotropics. The genus is chiefly identified on the basis of the roundish, often infuscate wing, with a short vein R_1 (Fig. 43) and the reduced mouthparts (Fig. 15); males also have asymmetrical antennal flagellomeres and sometimes even deeply-branched antennae (Fig. 3). The systematic position of this, in many respects, rather divergent genus, has been much discussed and is here included in the subfamily Gnoristinae, following Ševčík *et al*. (2013). The biology and immature stages remain unknown. Identification keys to described Afrotropical species were provided by Matile (1971, 1974*c*, 1980*b*), but numerous species await description.

***Mohelia* Matile** (Leiinae)**.** This endemic monotypic genus, was described based on material from Comoros (Matile 1979*a*). Recently two more species were described from South Africa, and one from Mauritius (Oliveira 2015). At least four additional species are known from Malawi (Oliveira 2015), Burundi, Madagascar, South Africa and Tanzania. *Mohelia* can be recognised by the combination of hind tibia without strong setae, short wing vein R_1 and the anterior fork with long stem (Fig. 40). The genus is closely-related to the Neotropical genus *Aphrastomyia* Coher & Lane and their phylogenetic relationship requires further investigation. The biology and immature stages remain unknown.

***Moriniola* Matile** (Mycomyinae)**.** This endemic monotypic genus, with the single described species, *M. grilloti* Matile, 1976, described from Democratic Republic of Congo (Matile 1976*a*). *Moriniola* is the only genus in the subfamily Mycomyinae with narrow wings and a single vein behind the anterior fork (Fig. 25). The biology and immature stages remain unknown.

***Mycetophila* Meigen** (Mycetophilinae: Mycetophilini)**.** The largest genus in the family, with *ca* 700 extant species, recorded from all zoogeographical regions, except Antarctica, with most species described from the Neotropical and Palaearctic Regions. Four species are described from the Afrotropical Region (Matile 1980*a*: 229), but additional species await description. Within the tribe Mycetophilini, *Mycetophila* have both the anterior and posterior wing forks complete, with vein M_4 slightly divergent from vein M_2, but parallel with, or convergent toward, vein *CuA* (Fig. 52). The biology and immature stages of Afrotropical species remain unknown.

***Mycomya* Rondani** (Mycomyinae)**.** A large genus comprising more than 350 species, recorded from all zoogeographical regions, except Antarctica. Eleven subgenera are recognised, two of which (*Mycomya sensu stricto* and *M*. (*Mycomyopsis* Väisänen)), have been recorded from the Afrotropical Region, with seven and two species, respectively. Within Mycomyinae, *Mycomya* are best recognised based on the presence of wing vein R_{2+3}; absence of the fold line between veins R_{4+5} and M_1; and costal vein ending at apex of vein R_{4+5} (Fig. 27). The biology and immature stages of Afrotropical species remain unknown.

***Mycomyiella* Matile** (Mycomyinae)**.** An endemic Afrotropical genus with nine described species. The genus appears to be rather common in the Afrotropics, particularly in Afromontane forests and species have been described from Bioko Is. (Equatorial Guinea) (as Fernando Póo), Cameroon, Ghana, South Africa and Tanzania. Within Mycomyinae, *Mycomyiella* can be recognised by the combination of wing vein R_{2+3} present; costal vein produced beyond apex of vein R_{4+5}; and absence of a fold line between veins R_{4+5} and M_1 (Fig. 28). The biology and immature stages remain unknown. An identification key for all known species was provided by Gammelmo (2004).

***Neoempheria* Osten Sacken** (Mycomyinae)**.** A genus of *ca* 120 extant species, recorded from all zoogeographical regions, except Antarctica, with more than half described from the Neotropical Region. Eleven species are recorded from the Afrotropical Region, six from Bioko Is. (Equatorial Guinea) (as Fernando Póo) and Comoros (Matile 1973*a*, 1979*a*). Within Mycomyinae, *Neoempheria* can be recognised on the combination of presence of wing vein R_{2+3}, costal vein produced beyond apex of vein R_{4+5}; presence of fold line between veins R_{4+5} and M_1; and the wing commonly with dark markings (Fig. 29). One species, tentatively included in the monotypic and poorly-known subgenus *Syndocosiella* Väisänen in the genus *Syndocosia* (see below), may key out together with *Neoempheria*. In contrast to species in *Neoempheria*, this species has wing vein *Sc* ending in vein *C*. Larvae of *N. ombrophila* Matile, 1975, were observed in a web on the underside of the sporophore of Agaricaceae (Delobel & Matile 1976).

***Paradoxa* Marshall** (Leiinae)**.** An interesting small genus, known from two species, one from the Australasian Region (New Zealand) and one from the Afrotropical Region (South Africa). The Afrotropical species, *P. paradoxa* Jaschhof, 2006, is illustrated by Jaschhof (2006). The genus is easily recognised by its unique wing venation, with a closed cell *cua* (Fig. 39). The biology and immature stages remain unknown.

***Parempheriella* Matile** (Mycomyinae)**.** With the exception of a single species recorded from South Korea, this genus is confined to the Afrotropical Region. Two subgenera are recognised, *P*. (*Parempherina* Matile), with four described species and *Parempheriella sensu stricto*, with 34 described species, but numerous additional Afrotropical species of this common and widespread genus await description. Most species were described and keyed by Matile (1974*a*). Within Mycomyinae, *Parempheriella* can be chiefly recognised by the absence of wing vein R_{2+3} and the costal vein produced well beyond apex of vein R_{4+5} (Fig. 24). The biology and immature stages remain unknown.

***Phronia* Winnertz** (Mycetophilinae: Mycetophilini)**.** A large genus of *ca* 150 extant species, known from all zoogeographical regions, except Antarctica, with most from the Holarctic Realm. Four species have been described from the Afrotropical Region, one from Seychelles and three from Comoros (Matile 1979*a*). Undescribed species are known from Madagascar, South Africa, Tanzania and Uganda. Within the subfamily Mycetophilinae, the two genera *Phronia* and *Trichonta* are distinguished by the combination of the setulose anepisternum and bare anepimeron. Some key characters used to separate the two genera in the Holarctic, fail when applied to Afrotropical material. Although *Phronia* seemingly always has the hind coxa without a basal seta and the posterior wing fork distinctly shorter than in *Trichonta*, with veins M_4 and *CuA* often reaching the wing margin (Fig. 51). The more rounded dorsal appendage of the gonostylus in *Phronia* also helps to separate males in the two genera. The biology and immature stages of Afrotropical species remain unknown.

***Platurocypta* Enderlein**. See *Epicypta*.

***Platyprosthiogyne* Enderlein** (Mycetophilinae: Mycetophilini)**.** An endemic Afrotropical genus with three described species, recorded from Cameroon, Comoros and Seychelles (Matile 1974*b*, 1980*a*: 229). Among genera in the subfamily Mycetophilinae with a single cubital wing vein, *Platyprosthiogyne* can be recognised in having the mid tibia without ventral setae; the mesonotum without an anterior median keel; the costal vein produced well beyond the apex of vein R_{4+5}; and the wing border with a distinct incision near the apex of vein *CuA* (Fig. 56). The biology and immature stages remain unknown.

***Pseudexechia* Tuomikoski** (Mycetophilinae: Exechiini)**.** A genus of 23 extant species, known from all zoogeographical regions, except the Australasian and Neotropical Regions and Antarctica, with most described from the Palaearctic Region. Seven species have been described from the Afrotropical Region (Kjærandsen 1994). *Exechia* and *Pseudexechia* are the only Afrotropical genera in the subfamily Mycetophilinae with a short posterior wing fork (Fig. 46) and bare anepisternum. As opposed to *Exechia*, the mesonotum is devoid of larger setae in *Pseudexechia*. The biology and immature stages of Afrotropical species remain unknown.

***Rymosia* Winnertz** (Mycetophilinae: Exechiini)**.** A genus of 80 extant species, known from all zoogeographical regions, except the Australasian Region and Antarctica, with most species described from the Palaearctic Region. The genus appears to be rare in the Afrotropics and Matile (1980*a*: 228) listed two species from Kenya and Tanzania; the former being questionable, as the record appears to be based on an erroneous identification of a European species. Additional undescribed species are known from Burundi, Kenya, Madagascar and Tanzania. *Rymosia* is unique among Afrotropical genera in the subfamily Mycetophilinae, by the combination of a bare anepisternum; wings with long and well-developed anterior and posterior forks; vein *Sc* ending free; and presence of a long and strong vein *CuP* (Fig. 47). The biology and immature stages of Afrotropical species remain unknown.

***Sceptonia* Winnertz** (Mycetophilinae: Mycetophilini)**.** A genus of 33 described species, occurring in all zoogeographical regions, except Antarctica. One species was described from Tanzania (Bechev 1994) and an undescribed species was previously reported from South Africa (Matile 1980*a*: 230). Among genera in the subfamily Mycetophilinae with a single cubital vein, *Sceptonia* can be recognised in having the mid tibia without ventral setae and the costal vein of the wing not extending beyond the apex of vein R_{4+5} (Fig. 55). The biology and immature stages of Afrotropical species remain unknown.

***Sciophila* Meigen** (Sciophilinae)**.** A large genus of *ca* 170 extant species occurring in all zoogeographical regions, except the Australasian Region and Antarctica. The genus appears common and widespread in the Afrotropical Region, with 21 described and numerous undescribed species. *Sciophila* is best recognised by the relatively broad wing, with numerous macrotrichia; presence of vein R_{2+3}; and the short posterior fork (Fig. 33). The biology and immature stages of Afrotropical species remain unknown. The identification key provided by Søli (1997*b*) deals with the majority of Afrotropical species.

***Synapha* Meigen** (Gnoristinae)**.** A genus of 30 extant species recorded from all zoogeographical regions, except Antarctica, but appears most common in the Southern Hemisphere. The genus appears rather widespread in the Afrotropical Region, with five described and several undescribed species. Among genera in the subfamily Gnoristinae, Afrotropical *Synapha* can be identified based on the short posterior wing fork (Fig. 42). The biology and immature stages of Afrotropical species remain unknown. The five described Afrotropical species were keyed by Matile (1992).

***Syndocosia* Speiser** (Mycomyinae)**.** An endemic Afrotropical genus of eight or nine described species. *Syndocosia* is mainly recognised in having the ocelli entirely reduced. A new monotypic subgenus *S*. (*Syndocosiella*) was erected to contain *S. ekoicola* Väisänen, 1982, known from a single, poorly-preserved specimen from Nigeria. The tentative inclusion of the species in *Syndocosia* was based almost exclusively on characters of the male terminalia, as the species diverges markedly in other respects: its size is almost half that of the other species, the ocelli are present and the wing has vein R_{2+3} and no apical fold (as in Fig. 23) (Väisänen 1982). Pending a more detailed analysis, the new subgenus has been omitted from the above identification key. Following the description provided by Väisänen (1982), *S. ekoicola* would key out together with the genus *Neoempheria*, but wing vein *Sc* ends in vein R_1 and not in *C* as in *Neoempheria*. The remaining eight species are described based on material from Central African Republic and Tanzania and most are keyed by Matile (1976*b*). Undescribed species have been reported from Bioko Is. (Equatorial Guinea)

(as Fernando Póo), Côte d'Ivoire and Democratic Republic of Congo (Matile 1976*b*) and additional undescribed species are known from Burundi and Tanzania. The biology and immature stages remain unknown.

***Trichonta* Winnertz** (Mycetophilinae: Mycetophilini)**.** A rather large genus of *ca* 110 extant species, recorded from all zoogeographical regions, except Antarctica, most of which occur in the Holarctic Realm. Only one species, *T. sincera* Gagné, 1981, described from Central African Republic, has been recorded from the Afrotropical Region (Gagné 1981), but undescribed species are known from Madagascar. Within the subfamily Mycetophilinae, the two genera *Trichonta* and *Phronia* are distinguished by the combination of the setulose anepisternum and bare anepimeron; for further details on the separation of the two genera, see *Phronia* (above). The biology and immature stages of Afrotropical species remain unknown.

***Viridivora* Matile** (Mycomyinae)**.** An endemic Afrotropical genus with two described species, recorded from Bioko Is. (Equatorial Guinea) (as Fernando Póo) (Matile 1973*a*) and Central African Republic (Matile 1972*b*). In the subfamily Mycomyinae, *Viridivora* is unique in the absence of strong tibial setae. The two known species have yellowish wings, without maculae, and a costal vein extending well beyond the apex of vein R_{4+5}. In rainforest, Matile (1972*b*) observed larvae of *Viridivora* feeding on mosses and liverworts growing on tree trunks. The larvae occurred under a thin, silky web.

***Zygomyia* Winnertz** (Mycetophilinae: Mycetophilini)**.** A large genus of *ca* 90 species, recorded from all zoogeographical regions, except Antarctica. Four described species occur in the Afrotropical Region, described from Cameroon and Ethiopia (Kurina 2012), but the genus is also recorded from Central African Republic, Comoros (Matile 1980*a*: 230) and Uganda. Among genera in the subfamily Mycetophilinae with a single cubital vein, *Zygomyia* can be recognised in having the mid tibia with one or more, ventral setae (Fig. 17) and wing vein M_4 clearly divergent from vein M_2 (Fig. 54). The biology and immature stages of Afrotropical species remain unknown.

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