

ASILIDAE**48**

(Assassin Flies or Robber Flies)

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Fig. 48.1. Female of *Promachus* sp. with hymenopteran prey (Zambia) (photograph © R. Felix).

Diagnosis

Small- to very large-sized flies (body length: 4–65 mm; wing length: 4–40 mm) (Figs 101, 185), that are predatory, capturing insects on the wing, and to a lesser extent, resting insects or spiders.

Asilidae can be diagnosed as follows: labellum of proboscis fused to prementum at least ventrally; hypopharynx heavily sclerotised, with dorsal seta-like spicules; labrum short, at most $\frac{1}{2}$ as long as labium; cibarium trapezoidal; vertex usually depressed (Figs 72, 73); postpronotal lobes fused to scutum (Figs

164, 184), extending medially; face with mystax (Fig. 1), usually macrosetose (Fig. 46), but sometimes only composed of setae near lower facial margin (Fig. 200); antenna positioned in dorsal $\frac{1}{2}$ of head (Fig. 46); fore- and mid coxa positioned close together; legs virtually originating at same level to capture and hold prey (Fig. 46); metakatepisternum usually small (Fig. 46), except in Laphriinae (Fig. 162), not visible between mid and hind coxa.

Head dichoptic in both sexes; face usually protruding to some extent, forming facial swelling (Fig. 1), but in several taxa entirely plane (Fig. 200); face with mystacal macrosetae

forming mystax (Fig. 1), which varies in extent from only covering lower facial margin (Fig. 200) to entire face (Fig. 46); frons predominantly parallel-sided (Fig. 80), but strongly divergent in a few taxa (Fig. 81); vertex slightly (Fig. 70) to considerably

depressed (Figs 72, 80); all 3 ocelli circular, placed on single ocellar triangle (Fig. 74); antenna positioned in dorsal $\frac{1}{2}$ of head (Fig. 46); antennal scapes separated proximally; postpedicel of varying length and shape (Figs 34, 46, 58, 66); stylus of



Figs 48.2–7. Photographs of living Asilidae (Asilinae): (2) *Alcimus* sp. ♂ (Zambia); (3) same ♀; (4) *Apoclea inarticulata* Theodor ♂ (United Arab Emirates); (5) *Apoclea* sp. ♀ (United Arab Emirates); (6) *Congomochtherus penicillatus* (Speiser) ♂ (Tanzania); (7) *Dasophrys androclea* (Walker) ♀ (South Africa). Figs 2, 3 (photographs © R. Felix), Figs 4, 5 (photographs © H. Roberts), Fig. 6 (photograph © S.A. Marshall), Fig. 7 (photograph © J.C.H. Londt).

varying development, shape and position, often composed of 1 or 2 cylindrical or rod-like articles, plus seta-like sensory article distally (e.g., Asilinae, Fig. 1; Brachyrhopalinae, Fig. 18; Leptogastrinae, Fig. 42; Ommatiinae, Fig. 46; Stenopogoninae, Fig. 54; Stichopogoninae, Fig. 58; Tillobromatinae, Fig. 61; and Willistoninae, Fig. 66), or stylus reduced, only seta-like sensory article present and positioned in cavity on postpedicel (e.g., Laphriinae, Fig. 33); proboscis well-developed and strong, usually straight, extending beyond frontoclypeal suture (Fig. 46), single genus (*Ancylorhynchus* Berthold), with posteriorly curved proboscis resembling parrot's beak (Fig. 110); labellum small, fused to prementum at least ventrally, usually entirely fused; palpus 1- or 2-segmented, usually small, cylindrical, sometimes laterally compressed and prominent, often setose.

Thorax with postpronotal lobe entirely fused to scutum (Figs 164, 184), extending medially; cervical sclerite flat; prosternum dorsal margin with or without flange-like projection; prosternum either fused to or separated laterally from proepisternum; proepisternum fused to lateral postpronotum, setulose, sometimes macrosetose; antepnotum usually bare, sometimes setose and rarely macrosetose; postpronotum usually setose, sometimes macrosetose; anterior proepimeron, anterior anepisternum, anterior and posterior basalar usually setose, sometimes macrosetose (Fig. 1); posterior anepisternum, anepimeron and anatergite setose or bare (Fig. 1); several taxa with at least 1 macroseta on superoposterior angle of anepisternum; katatergite setose or macrosetose, usually elevated and convex; metakatepisternum usually small (Fig. 46), in Laphriinae, large and visible between mid- and hind coxa (Fig. 162); scutum usually smooth, sometimes punctate; dorsocentral setae of varying length and development pre- and postsuturally (Figs 1, 61); acrostichal setae usually present presuturally; several genera with scutal mane (Figs 10, 11, 194), composed of dense setae between rows of acrostichal and dorsocentral setae; notopleural, supra-alar and postalar setae usually present (Figs 1, 46, 58). Scutellum large; mediotergite (mesopostnotum) not visible in dorsal view (Fig. 201); apical and discal scutellar macrosetae absent (Fig. 200) or present (Figs 1, 142, 144). Legs with hind coxa setose or macrosetose laterally (Fig. 1); hind coxa in a few taxa with anterior peg-like process; median hind trochanter setose, sometimes expanded medially and macrosetose; femur usually cylindrical (Figs 1, 46) to at least slightly expanded distally (Figs 22, 40), one genus with greatly expanded fore femur (Fig. 52) and several genera with distinctly clubbed hind femur (Figs 34, 146, 228), sometimes with ventrodiscal macrosetae mounted on tubercles; hind tibia usually straight, sometimes arched medially; proximal tarsomere as long as (Fig. 18) or sometimes longer than tarsomeres 2–3 combined (Fig. 200); pulvillus usually well-developed (Fig. 1), with two dorsal ridges, entirely reduced in several genera (Figs 25, 45, 66), or less commonly to small lobe visible at base of claw; setiform empodium usually present, sometimes reduced in length and rarely laterally compressed. Wing membrane usually hyaline (Fig. 195), sometimes darkened through brown staining (Figs 145, 159, 211), or patterned through white and brown staining (Figs 123, 157); membrane with microtrichia in many taxa, often covering entire or almost entire wing (Fig. 137) or with specific pattern; cell r_1 open (Figs 189, 199) or closed (Figs 83, 84, 145), when closed either by stalk (Fig. 145) or R_1 and R_{2+3} joining at point where they meet costal vein (C) (Figs 83, 233); cell r_4 open (Figs 83, 84, 145, 199); cell r_5

usually open (Figs 84, 145, 199), but often closed with stalk (Figs 83, 107, 233); cell m_3 open (Fig. 199) or closed (Figs 83, 84, 145); cell *cua* open (Fig. 199) or closed (Fig 83, 84); costal vein (C) usually circumambient (Figs 83, 84, 145, 199), sometimes terminating at veins *CuP* or *CuA+CuP* (Fig. 223) and even further anteriorly at vein R_4 (Fig. 221); auxiliary vein usually absent (Fig. 199), sometimes appearing as short stump vein on vein R_4 (Figs 85, 113, 223), in 4 genera long, connecting veins R_{2+3} and R_4 (Figs 84, 99, 201, 203); veins M_1 and M_2 never fused (Figs 83, 84, 199); alula usually well-developed (Figs 83, 84, 123), reduced in size in several genera (Fig. 197) and entirely reduced in a few genera (Fig. 171).

Abdomen elongate, parallel-sided (Fig. 201), sometimes slightly tapering distally (Fig. 203), or constricted between tergites 2–3 or 2–4 (Figs 145, 199), or dorsoventrally flattened (Figs 86, 88, 222); tergite 2 usually wider than long (Figs 145, 157, 199, 203), several genera with tergite 2 more than $5 \times$ as long as wide (Fig. 172); abdominal tergites without anterodorsal apodemes; male and female tergites 1–8 well-developed; male and female sternites 1–8 usually well-developed and simple; tergites with (Figs 201, 227) or without lateral macrosetae (Fig. 199); male terminalia usually straight (Fig. 194), but often rotated up to 180° (Fig. 164); epandrium either separated and joined proximally (Figs 247, 278, 295), separated, not joined proximally (Fig. 285), or fused entirely medially (Figs 265, 273); hypandrium usually well-developed and distinct (Figs 240, 259, 278, 284, 292, 310), often reduced to varying degree (Fig. 271) or fused to gonocoxite forming gonocoxite + hypandrial complex (Figs 268, 275, 281, 197); gonocoxite of varying shape, often with species-specific characters (Figs 259, 262, 269, 287, 310); gonocoxal apodeme usually absent, sometimes present, either short or long; gonostylus of varying shape, often with species-specific characters (Figs 248, 261, 263, 269, 310); subepandrial sclerite usually without setae or protuberances; lateral ejaculatory apodeme present; 1–3 phallic prongs, usually short, sometimes long; female terminalia with tergite 8 usually simple, sometimes with anterior transverse apodeme (Fig. 306); ovipositor usually consisting of segment 8 and following segments (Figs 23, 53), but sometimes involving segment 5 or 6 and following segments; ovipositor for direct sand or soil oviposition, with tergite 10 divided into 2 acanthophorite plates with acanthophorite spines (Figs 22, 23, 53, 56–58, 136, 306), a few genera with strong macrosetae on cercus for sand or soil oviposition, ovipositor for other types of oviposition, such as egg-dropping, simple (Figs 42, 45), for placing eggs in vegetation often knife-like in taxon-specific arrangements of sclerites (Figs 7, 17, 252, 254), for placing eggs in decaying wood, simple (Fig. 37); either 2 or 3 equally large, poorly- to well-sclerotised spermathecae present, sometimes median spermatheca larger or smaller than lateral ones; genital fork usually either ring-like (joined anteriorly and posteriorly) or inverted U-shaped (joined anteriorly, separated posteriorly), anterior and lateral genital fork apodemes usually present.

Larva (e.g., Figs 312–319) robust with 11 apparent segments, with small, partly retractable head capsule (Figs 312, 313); head dorso-ventrally flattened; maxilla dorso-ventrally flattened, divided into proximal part and movable distal part (Fig. 314); maxillary palpus inserted sub-apically (Fig. 314); mandibles pointed, stylet-like, not extending to apex of maxilla (Fig. 314); labrum pointed; submentum forming ventral plate; abdominal



Figs 48.8–13. Photographs of living Asilidae (Asilinae): (8) *Eremisca heleni* (Eflatoun) ♂ (left) and ♀ (right) *in copula* (United Arab Emirates); (9) *Melouromyia natalensis* (Ricardo) ♂ (South Africa); (10) *Neolophonotus* sp. ♂ (South Africa); (11) same; (12) *N. abuntius* (Walker) ♂ with heteropteran prey (South Africa); (13) *Philodicus* sp. ♂ with cicindelid prey (Namibia). Fig. 8 (photograph © H. Roberts), Fig. 9 (photograph © J.G.H. Londt), Figs 10, 11, 13 (photographs © S.A. Marshall), Fig. 12 (photograph © B. Londt).

segments 1–6 sometimes (Laphriinae) with contractile protuberances dorsally and laterally and proleg-like protuberances ventrally (Fig. 313) otherwise smooth (Fig. 312); posterior spiracle on apparent penultimate abdominal segment (Figs 312, 313); the caudal abdominal segment often appears partly divided and difficult to distinguish subdivision; apex of abdomen with taxon-specific sclerotised (hook-like) appendages.

Pupa (e.g., Figs 320–323) robust with appendages movable (exarate); head with 2 pairs of antennal processes; abdominal segments 1–7 with row of posteroventrally-oriented processes dorsally; segment 9 with caudally-oriented terminal processes.

Asilidae are very distinct and should not be confused in the field with most Asiloidea. The three rarely collected species of the closely related Apioceridae (see Chapter 46) superficially resemble ground-perching robber flies, but their non-predacious proboscis, short antennae and peculiar wing venation easily differentiate them from Asilidae. In addition, Afrotropical *Apiocera* Westwood species run over the surface on slender legs and do not sit or perch. Some Mydidae (see Chapter 47) could also be confused with certain Asilidae species, but, likewise, the

non-predacious proboscis, as well as long antennae, peculiar wing venation and resting position on the ground with the body almost touching the surface are unlike most assassin flies.

Biology and immature stages

An ecological classification has been attempted, based on observations of Afrotropical species and the structure of their ovipositor (Londt 1994c). Most of the information available is that recorded on specimen labels and in taxonomic literature. However, an analysis of 26 years of data from the semi-arid Karoo near Willowmore (Eastern Cape Province, South Africa) (Londt 1998a) and a year-long survey undertaken in a single mixed seasonal grassland habitat (KwaZulu-Natal Province, South Africa) (Londt 2002c) have been conducted. Dikow *et al.* (2009: 327) compared the species richness and endemism of Asilidae in biodiversity hotspots, wilderness areas and comparable areas in the Afrotropical Region and concluded that the hotspots and wilderness areas *sensu* Conservation International (Mittermeier *et al.* 2003; Myers 2003), harbour more Asilidae species than comparable areas outside.



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Figs 48.14–17. Photographs of living Asilidae (Asilinae): (14) *Promachus* sp. ♀ with asilid prey (*Microstylum* sp. ♂) (Namibia); (15) same ♂ (left) and ♀ (right) *in copula* (Namibia); (16) same ♀ (South Africa); (17) *Synolcus dubius* (Macquart) ♀ (South Africa). Figs 14, 15 (photographs © S.A. Marshall), Figs 16, 17 (photographs © J.G.H. Londt).

Dennis *et al.* (2013) summarised known information on the biology and morphology of immature stages. Oviposition commonly involves random egg-dropping, introduction of eggs directly into the ground (the ovipositors of those species involved

usually being equipped with strong setae or spines with which to dig), or eggs are deposited into suitable crevices in plant material or pasted between leaves (females frequently being equipped with elongate, knife-like ovipositors). While studies



Figs 48.18–23. Photographs of living Asilidae (Brachyrhopalinae and Dasyopogoninae): (18) *Afroholopogon capensis* (Lindner) ♀ (South Africa); (19) *Afroholopogon* sp. (South Africa); (20) *Habropogon bussinowi* Bosák & Hradský ♂ (United Arab Emirates); (21) *Pegesimallus aulicus* (Wiedemann) ♀ (South Africa); (22) *Pegesimallus* sp., ovipositing in soil (South Africa); (23) same with isopteran prey (Zambia). Figs 18, 21 (photographs © J.G.H. Londt), Figs 19, 22 (photographs © S.A. Marshall), Fig. 20 (photograph © H. Roberts), Fig. 23 (photograph © R. Felix).

undertaken in other zoogeographical regions (e.g., Melin 1923; Musso 1978) reveal that larvae are predatory, feeding on subterranean invertebrates, very little detailed biological information exists. Assassin fly larvae most probably live in soil or in burrows in wood, but knowledge of Afrotropical species is largely confined to isolated descriptions of eggs, larvae and

pupae. Some of the better known contributions are those of Engel (1929: larva and pupa of *Hyperechia* Schiner), Engel (1932: immatures of *Progonistes* Loew), Engel & Cuthbertson (1934: immatures of *Alcimus* Loew and *Hyperechia*), Engel & Cuthbertson (1939: immatures of *Neolophonotus* Engel and *Promachus* Loew), Londt & Harris (1987: larvae of *Millenarius*



Figs 48.24–29. Photographs of living Asilidae (*incertae sedis* and Laphriinae): (24) *Oligopogon penicillatus* Loew ♂ (South Africa); (25) *Anypodetus* sp. ♂ (Namibia); (26) *A. fasciatus* Hermann ♀ (Namibia); (27) *Choerades* sp. ♂ (South Africa); (28) *Goneccalypsis* sp. ♂ (Tanzania); (29) *Hoplistomerus nobilis* Loew ♀ (South Africa). Figs 24, 26, 29 (photographs © T. Dikow), Figs 25, 27, 28 (photographs © S.A. Marshall).



Figs 48.30–35. Photographs of living Asilidae (Laphriinae): (30) *Lamyra vorax* Loew ♀ with buprestid prey (Oman); (31) *Laphyctis* sp. ♂ (Namibia); (32) *Laxenecera albicincta* (Loew) ♂ (left) and ♀ (right) in copula (South Africa); (33) *Notiolaphria coerulescens* (Macquart) ♀ (Madagascar); (34) same ♂ (Mauritius); (35) *Nusa infumata* (Loew) ♂ with lepidopteran prey (Tanzania). Fig. 30 (photograph © M. Borer), Fig. 31 (photograph © T. Dikow), Fig. 32 (photograph © J.G.H. Londt), Figs 33, 35 (photographs © S.A. Marshall), Fig. 34 (photograph © D. Martiré).

dichaetus (Hull, 1967) (Figs 318–319) and Londt (1991: eggs and larvae of *Damalis femoralis* Ricardo, 1925).

Adult flies are predators, feeding exclusively on living prey, most frequently caught in flight, but sometimes actively hunting resting prey (e.g., Leptogastrinae). The proboscis and internal sucking pump (cibarium) are well-developed for this purpose and harbour all of the morphological autapomorphies (see diagnosis, Dikow 2009a). Although there is scattered information concerning prey taken by assassin flies, Londt (1987a: 44, 2006b) summarises what is known regarding adult feeding in general. Predation of honeybees in particular (Londt 1993a) and Lepidoptera in general (Londt 1999c), have received attention, as well as the predation of robber flies by other robber flies (Fig. 14) (Londt 1995). In most instances, a broad range of prey is taken (Figs 1, 13, 23, 30, 35, 42, 43, 54, 55, 58, 60), but a few species appear to specialise (e.g., *Hoplistomerus nobilis* Loew, 1858 (Fig. 29), primarily perches on large mammal dung and feeds almost exclusively on small dung beetles).

Male and female flies of the same species are morphologically identical (except the structures pertaining to the terminalia) (Figs 187–190), with females sometimes slightly larger (Figs 85–88). Only in very few Afrotropical species, e.g., *Daspletis vespertilio* (Engel, 1932) (Fig. 49) (Londt 2010a) and *Laxenecera albicincta* (Loew, 1852) (Fig. 32), is distinct sexual dimorphism evident. For the latter species, this dimorphism led to the description of the male and female as different species, i.e., *L. albicincta* and *L. zonata* Loew, 1860, respectively. Males of several *Pegesimallus* Loew species exhibit long, laterally compressed setae on the mid and hind tibiae and tarsi, giving them a “feathered” appearance, which led to the description of the genus *Lagodias* Loew and only later was it found to be an exclusively male, sexually dimorphous character (Oldroyd 1974). Females and males of other species, e.g., *Acnephatomyia* Londt species (Figs 85–88), exhibit some sexual dimorphism, but the sexes can be assigned to the correct species despite such differences.

Mating takes place in taxon-specific positions and involves, e.g., standing tail-to-tail (Figs 15, 32, 55), perching tail-to-tail (Fig. 63), or standing on top of each other (Fig. 59).

Economic significance

No species of Asilidae are known to have economic significance. Assassin flies, however, can have an effect on populations of their prey insects and spiders, including honeybees (Londt 1993a). As predatory flies, Asilidae may be seen as indicative of environmental health, i.e., greater numbers and diversity of robber flies may indicate good environmental health.

Classification

Asilidae is placed in the superfamily Asiloidea and is closely related to Apioceridae and Mydidae. Dikow (2009a) summarised the history of placements of Asilidae within Asiloidea and proposed that a clade (Apioceridae + Mydidae) is sister-group to Asilidae, based on both morphological (Dikow 2009a) and molecular data (Dikow 2009b). This set of relationships has also been supported by molecular analyses

focusing on Asiloidea (Trautwein et al. 2010) and Diptera in general (Wiegmann et al. 2011).

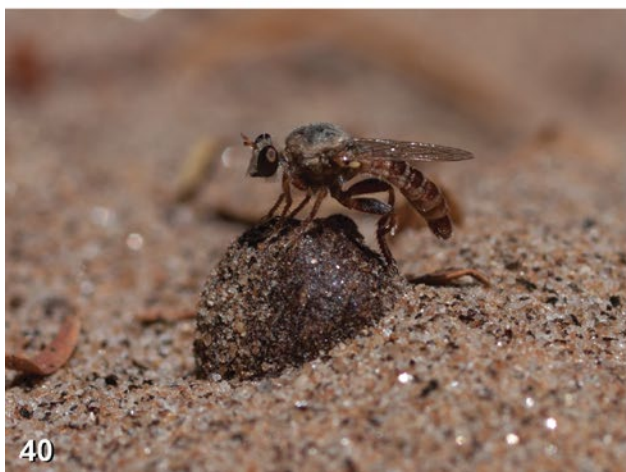
Artigas & Papavero (1988), Geller-Grimm (2004), Hull (1962) and Papavero (1973) followed a traditional classification based on overall morphological similarity. Dikow (2009a) published the only phylogenetic classification of Asilidae to date, but did not provide an updated identification key to world subfamilies. While that study was unable to include all genera known at the time (528), only 127 genera (24%) could not be placed in the phylogenetic classification, including 25 Afrotropical genera. Since 2009, 13 Afrotropical genera have been described and along with the 25 previously unplaced genera are here placed within this most recent classification. No new phylogenetic analyses have been conducted, but genera are placed in one of the 11 subfamilies based on presence of synapomorphic character states.

Of the 14 subfamilies recognised globally (Dikow 2009a), 11 are represented in the Afrotropical Region. Only the Australasian and Neotropical Bathypogoninae and Phellinae, as well as the Australasian and Holarctic Dioctriinae are not found within the confines of the region. The most diverse subfamilies in terms of number of genera and species are the Asilinae (41 genera, 574 species), Laphriinae (33, 201), Stenopogoninae (22, 269) and Brachyrhopalinae (16, 101), while several subfamilies are only represented by a few genera, such as Dasyopogoninae (3 genera, 57 species), Stichopogoninae (6, 26), Tillobromatinae (2, 27) and Trigonimiminae (2, 61).

The subfamily Asilinae is a megadiverse taxon in the Afrotropics, comprising 41 genera (183 genera globally), 26 of which are endemic and 574 species. This subfamily is global in distribution, except Antarctica. While most Afrotropical genera (29) include less than 10 species, *Promachus* (97 species) and *Neolophonotus* (254) are extremely diverse and can be encountered throughout the region, with *Neolophonotus* being particularly common in Southern Africa. Eleven endemic genera are monotypic and an additional nine have 2–4 species each. Asilinae was newly delineated by Dikow (2009a), who combined the Apocleinae and Asilinae *sensu* Artigas & Papavero (1988) and Geller-Grimm (2004) as Apocleinae was shown to be paraphyletic. The genus *Tolmerus* Loew still requires clarification in an Afrotropical context (see below).

The subfamily Brachyrhopalinae is a medium diverse taxon in the Afrotropics, comprising 16 genera (currently 32 genera globally), 13 of which are endemic and 101 species. The subfamily is distributed globally with the exception of the Oceanian Region and Antarctica. Thirteen Afrotropical genera have less than ten species, three endemic genera are monotypic and the endemic genera *Afroholopogon* Londt (19 species) and *Rhabdogaster* Loew (39) are relatively diverse. Brachyrhopalinae was elevated to subfamily status by Dikow (2009a) and includes genera previously assigned to Dasyopogoninae and Stenopogoninae *sensu* Artigas & Papavero (1988) and Geller-Grimm (2004).

The subfamily Dasyopogoninae is a very small taxon in the Afrotropics, comprising three genera (17 genera globally), one of which is endemic and monotypic and 57 species. This subfamily is global in distribution, except Antarctica. Dasyopogoninae was newly delineated by Dikow (2009a) as the monophyly



Figs 48.36–41. Photographs of living Asilidae (Laphriinae): (36) *Proagonistes praeceps* (Walker) ♀ (South Africa); (37) *Proagonistes* sp. ♀ (Namibia); (38) *Prytanomyia kochi* (Lindner) ♀ (Namibia); (39) *Stiphrolamyra* sp. ♂ (United Arab Emirates); (40) *Trichardis picta* Hermann ♂ (Namibia); (41) *T. leucocomus* Wulp ♂ (United Arab Emirates). Fig. 36 (photograph © J.G.H. Londt), Fig. 37 (photograph © S.A. Marshall), Figs 38, 40 (photographs © T. Dikow), Figs 39, 41 (photograph © H. Roberts).

of the previous delineation *sensu* Geller-Grimm (2004) and Papavero (1973) could not be established and several genera were assigned to Brachyrhopalinae, none of which are Afrotropical.

The subfamily Laphriinae is a diverse taxon in the Afrotropics, comprising 33 genera (112 genera globally), 19 of which are endemic and 201 species. This subfamily is global in distribution, except Antarctica. Most genera (26) include less than 10 species and the majority of species are placed in four genera, each with 22–29 species. Laphriinae was newly delineated by Dikow (2009a), who combined the Laphriinae and Laphystiinae *sensu* Geller-Grimm (2004) and Papavero (1973) as Laphystiinae was shown to be paraphyletic.

The subfamily Leptogastrinae is a diverse taxon in the Afrotropics, comprising seven genera (18 genera globally), one of which is endemic and 150 species. This subfamily is almost global in distribution, being absent only from Chile, New Zealand and Antarctica. With the exception of *Lasiocnemus* Loew,

all genera also occur outside the Afrotropical Region, primarily in the Old World, with *Schildia* Aldrich centred in the New World.

The subfamily Ommatiinae is a diverse taxon in the Afrotropics, comprising nine genera (13 genera globally), four of which are endemic and 132 species. This subfamily is global in distribution, except Antarctica. Three of the four endemic genera have between 1–3 species each, while *Afroesticus* Scarbrough has 21. Scarbrough (2010) published an identification key to Afrotropical genera and subgenera that has been adjusted and incorporated into the below key.

The subfamily Stenopogoninae is a highly diverse taxon in the Afrotropics, comprising 22 genera (currently 28 genera globally), 17 of which are endemic and 269 species. This subfamily is global in distribution, except Antarctica. Sixteen genera, 15 of which are endemic, have less than ten species and *Gonioscelis* Schiner with 40 species is the most diverse Afrotropical endemic. The global genus *Microstylum* Macquart



Figs 48.42–45. Photographs of living Asilidae (Leptogastrinae): (42) *Euscelidia* sp. ♀ with aranean prey (South Africa); (43) *Leptogaster aganniphe* Janssens ♂ with dipteran prey (South Africa); (44) *Lobus* sp. ♀ (Tanzania); (45) *Mesoleptogaster* sp. ♀ (Namibia). Fig. 42 (photograph © J.G.H. Londt), Fig. 43 (photograph © T. Dikow), Figs 44, 45 (photographs © S.A. Marshall).

with 79 Afrotropical species is one of the most diverse taxa and occurs throughout the region. Stenopogoninae was newly delineated by Dikow (2009a), as the monophyly of the previous delineation *sensu* Artigas & Papavero (1988) and Geller-Grimm (2004) could not be established and genera are assigned to Bathypogoninae, Brachyrhopalinae (2 Afrotropical genera), Phellinae, Tillobromatinae (2) and Willistoninae (3).

The subfamily Stichopogoninae is a small taxon in the Afrotropics, comprising six genera (14 genera globally), one of which is endemic and 26 species. This subfamily is global in distribution, except Antarctica. Oldroyd (1963) included *Psilinus* Wulp and *Sporadothrix* Hermann in an identification key to the taxon. *Psilinus* is a synonym of *Rhabdogaster*, placed in Brachyrhopalinae and *Sporadothrix* is placed in Willistoninae. Bosák & Hradský (2011: 739) recorded two genera for the first time for the region.

The subfamily Tillobromatinae is a small taxon in the Afrotropics, comprising two endemic genera (three genera globally)

and 27 species. Tillobromatinae only occurs in the Afrotropics, where it has its largest species diversity and in the Neotropics. Tillobromatinae was elevated to subfamily status by Dikow (2009a) and includes genera previously assigned to Stenopogoninae *sensu* Geller-Grimm (2004) and Papavero (1973).

The subfamily Trigonimiminae is a medium-sized taxon, comprising two Afrotropical genera (12 genera globally), one of which is endemic and 61 species. This subfamily has a global distribution, with the exception of the Oceanian Region and Antarctica. Oldroyd (1974) included *Oligopogon* Loew in an identification key to the taxon and in 1980 catalogued *Oligopogon* and *Oxynton* Janssens in the tribe Xenomyzini (within Stenopogoninae at that time). *Oligopogon* is placed as *incertae sedis* here, following Dikow (2009a) and *Oxynton* is placed in the subfamily Brachyrhopalinae.

The subfamily Willistoninae is a small taxon, comprising six Afrotropical genera (eight genera globally), five of which are endemic and 34 species. The subfamily is confined to



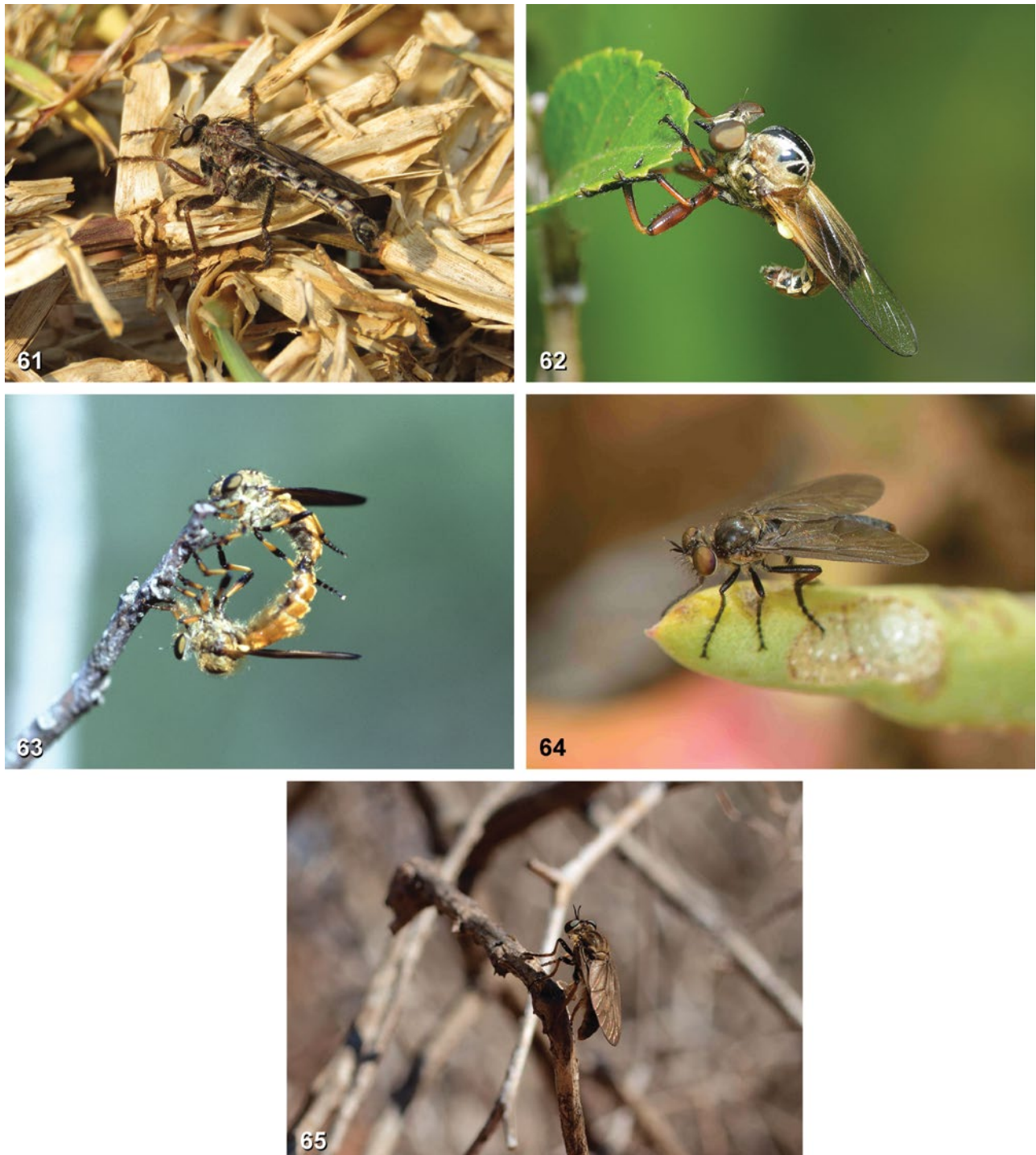
Figs 46–48. Photographs of living Asilidae (Ommatiinae): (46) *Cophinopoda pulchripes* (Bigot) ♀ (Réunion Is.); (47) *Ommatius* sp. ♂ (Tanzania); (48) same ♀ (United Arab Emirates). Fig. 46 (photograph © D. Martiré), Fig. 47 (photograph © S.A. Marshall), Fig. 48 (photograph © H. Roberts).



Figs 48.49–54. Photographs of living Asilidae (Stenopogoninae): (49) *Daspletis vespertilio* (Engel) ♂ (South Africa); (50) *D. setithoracicus* (Ricardo) ♀ (South Africa); (51) *D. vulpes* Loew ♂ (South Africa); (52) *Gonioscelis* sp. ♂ (Namibia); (53) *Microstylum* sp. ♀ (South Africa); (54) same ♂ with coreid prey (South Africa). Figs 49, 54 (photographs © J.G.H. Londt), Figs 50, 52 (photographs © T. Dikow), Figs 51, 53 (photographs © S.A. Marshall).



Figs 48.55–60. Photographs of living Asilidae (Stenopogoninae and Stichopogoninae): (55) *Microstylum* sp. ♀ (left) and ♂ (right) *in copula*, ♀ with hymenopteran prey (Namibia); (56) *Scylaticus* sp. ♀ (South Africa); (57) *Rhadinus* sp. ♀ (United Arab Emirates); (58) *Stichopogon* sp. ♀ with coleopteran prey (South Africa); (59) *Stichopogon* sp. ♂ (above) and ♀ (below) *in copula* (South Africa); (60) *Stichopogon* sp. ♀ with araneae prey (Zambia). Figs 55, 56, 58, 59 (photographs © S.A. Marshall), Fig. 57 (photograph © H. Roberts), Fig. 60 (photograph © R. Felix).



Figs 48.61–65. Photographs of living Asilidae (Tillobromatinae and Trigonomiminae): (61) *Hypenetes stigmatias* Loew ♂ (South Africa); (62) *Damalis* sp. ♀ (South Africa); (63) *D. speciosa* Loew ♀ (above, perching) and ♂ (below, upside-down) in copula (South Africa; see Londt 1991 for copulation sequence); (64) *Rhipidocephala* sp. ♂ (South Africa); (65) *Rhipidocephala* sp. ♀ (South Africa). Fig. 61 (photograph © J.G.H. Londt), Figs 62, 64 (photographs © S.A. Marshall), Figs 63, 65 (photographs © T. Dikow).

the Afrotropics (where it has its largest species diversity), the south-western Palearctic and western Nearctic Regions. Willistoninae was elevated to subfamily status by Dikow (2009a) and includes genera previously assigned to Stenopogoninae *sensu* Artigas & Papavero (1988) and Geller-Grimm (2004).

Taxa such as Asilinae, Dasypogoninae, Laphriinae, Leptogastrinae, Ommatiinae, Stichopogoninae and Trigonimiminae are no doubt monophyletic in the delineation used in the synopsis below. Potential changes to taxon assignment are most probable for Brachyrhopalinae, Stenopogoninae and Tillobromatinae, as the monophyly needs to be tested by including additional genera from the world fauna.

The morphological phylogenetic analysis of Dikow (2009a) was unable to place the Afrotropical genus *Oligopogon* and Nearctic genus *Coleomyia* Wilcox & Martin in any of the 14 subfamily taxa and these are, therefore, placed as *incertae sedis* within Asilidae. *Akatiomyia* Londt is added here, as it is morphologically similar to *Oligopogon* and new phylogenetic research is required to place both genera.

Identification

Asilidae is the largest family of Afrotropical Diptera, currently with 1,684 described species, representing about 8% of the entire Diptera fauna (Kirk-Spriggs & Stuckenberg 2009: 175). The oldest assassin-fly descriptions from the Afrotropical region were published by J.C. Fabricius and A.A.H. Lichtenstein from West Africa and South Africa between 1775 and 1796, *i.e.*, *Promachus fasciatus* (F., 1775) (Sierra Leone, Asilinae), *Teratopomyia cyanea* F., 1781 (South Africa, Brachyrhopalinae), *Asilus morio* F., 1794 ("Guinea", unplaced species), *A. bombylius* Lichtenstein, 1796 (South Africa, unplaced species), *A. melanotarsus* Lichtenstein, 1796 (South Africa, unplaced species) and *A. nigellus* Lichtenstein, 1796 (South Africa, unplaced species). The earliest comprehensive treatment of parts of the Afrotropical fauna was published by Loew (1860) focusing on the Southern African fauna.

Considering the global fauna, assassin flies are known to occur on all continents, except Antarctica and are diverse on many major islands/island groups, but are absent from



Figs 48.66–68. Photographs of living Asilidae (Willistoninae): (66) *Acnephalomyia andreoides* (Wiedemann) ♀ (South Africa); (67) *Sisyrondytes* sp. ♂ (United Arab Emirates); (68) *Trichoura tankwa* Londt ♀ (South Africa). Fig. 66 (photograph © S.A. Marshall), Fig. 67 (photograph © H. Roberts), Fig. 68 (photograph © T. Dikow).

the Hawaiian Is. The greatest species diversity is found in semi-arid to arid environments and tropical rainforests. Londt (1998a) recorded 61 species from the semi-arid Karoo near Willowmore (Eastern Cape Province, South Africa) and Fisher (1985, 2009: 616) recorded 97 species from the Tambopata Reserve in Amazonian Peru and 108 species from La Selva Biological Station in a Central American lowland rainforest in Costa Rica.

In an Afrotropical context, robber flies occur in almost every biome, but appear to have their greatest diversity in arid habitats. Assassin flies have not been recorded from the South Atlantic Ocean islands of Ascension, St. Helena, Tristan da Cunha and Gough, as well as the Cape Verde Is. Taxonomically, Afrotropical species are best known from arid to semi-arid Southern Africa, as well as the savanna belt from western Africa through eastern Africa. The fauna of the tropical rainforest in western and Central Africa and the arid environments of the southern Arabian Peninsula is much less known, due largely to the paucity of material. Through the comprehensive revisionary work of the senior author over the past 40 years the fauna has been reviewed extensively and this is particularly true for Southern Africa.

The Afrotropical Asilidae fauna is one of the most diverse in the world. Of the 557 genera globally, 148 genera (26.6%) occur within the region and 1,684 species (ca 22% of the world fauna) are known to date, with many additional species awaiting description.

Although the Afrotropical fauna has been catalogued (Oldroyd 1980), no single comprehensive manuscript reviewing the assassin-fly fauna has been published. Oldroyd's (1970, 1974) reviews of regional faunas (Congo basin and Southern Africa), complete with identification keys to genera, are among the more useful general references for the region, in light of this contribution these are now outdated. Londt published a series of papers in the *Annals of the Natal Museum* entitled "Afrotropical Asilidae 1–33" between 1977 and 2000. In more than 55 additional manuscripts, the senior author reviewed many other genera and through contributions of other authors many taxa were studied, however, a few of the larger global genera still require attention (e.g., *Leptogaster* Meigen, *Microstylum* and *Promachus*). The following eleven specialists have been the main contributors having each generated at least 50 specific names (currently valid or otherwise) – J.G.H. Londt (29% of fauna), H. Oldroyd (9%), H. Loew (6%), S.W. Bromley (6%), G. Ricardo (5%), J.P.M. Macquart (4%), F. Walker (3%), E. Janssens (3%), C.H. Martin (3%), E.O. Engel (3%) and A.G. Scarbrough (3%). The majority of genera occurring in the Afrotropical Region have likewise been described by few dipterists – J.G.H. Londt (44 genera, 30% of fauna, 42 endemic), H. Loew (26, 18%, 11), F. Hermann (13, 9%, 6), H. Oldroyd (10, 7%, 10) and F.M. Hull (7, 5%, 5).

Of the 148 genera in the Afrotropics, 91 (61.5%) are endemic to the region and 13 (8.8%) additional genera have their greatest species diversity and centre of distribution in the Afrotropics (four or less species known from outside the Afrotropical Region). There are 31 (20.9%) endemic, monotypic genera within the Afrotropical Region and 33 (22.4%) endemic genera with 2–4 species each. The most diverse endemic genus

is *Gonioscelis* with 40 species followed by *Rhabdogaster* (39), *Dasophrys* Loew (32), *Rhipidocephala* Hermann (26), *Proagonistes* (22) and *Hypenetes* Loew and *Afroestricus*, each with 21 species. By far the most speciose genus in the Afrotropics is *Neolophonotus* with 254 Afrotropical species, which is also represented by two species in the Palaearctic Region and Oldroyd (1975: 147) disputes the presence of *Neolophonotus* in the Oriental Region. This genus is the most commonly encountered assassin-fly taxon particularly in Southern Africa where its centre of diversity lies.

There are 22 described species that have not, for a variety of reasons, been assigned to any Afrotropical genus (Oldroyd 1980: 373 lists 14 unplaced species). In all instances, the type specimens require re-examination and at least some of these appear to have been lost. A list of these species is provided here for reference, along with the country/region from where they were originally described: *Asilus bombylius* Lichtenstein, 1796 (South Africa), *A. forficula* Macquart, 1846 (South Africa), *A. gabonicus* Macquart, 1855 (Gabon), *A. incisuralis* Macquart, 1838 (South Africa), *A. melanotarsus* Lichtenstein, 1796 (South Africa), *A. morio* F., 1794 ("Guinea"), *A. natalicus* Macquart, 1855 (South Africa), *A. nigellus* Lichtenstein, 1796 (South Africa), *A. schedius* Walker, 1849 (South Africa), *Dasygogon aequalis* Walker, 1857 (South Africa), *D. atripennis* Macquart, 1834 (Senegal), *D. caffer* Wiedemann, 1828 (South Africa), *D. carvilius* Walker, 1849 (unknown), *D. fossius* Walker, 1849 (South Africa), *D. lenticepsa* Thomson, 1869 (South Africa), *D. reinhardi* Wiedemann, 1824 (South Africa), *D. tragicus* Wiedemann, 1828 (South Africa), *Dioctria stigmatizans* F., 1805 (Mauritius), *Lophonotus albiciliatus* Loew, 1854 (Egypt; Sudan), *L. dubius* Bezzi, 1892 (Somalia), *L. leucotaenia* Bezzi, 1906 (Eritrea) and *L. macropterus* Loew, 1854 (Nubien = Sudan).

Londt (2002b) published the most recent key to the then recognised subfamilies of Afrotropical Asilidae (i.e., Apocleinae, Asilinae, Dasygogoninae, Laphriinae, Laphystiinae, Leptogastriinae, Ommatiinae, Stenopogoninae, Stichopogoninae and Trigonimiminae), which is superseded by the below identification key. Although efforts have been made to avoid the use of terminalia characters, this was not always possible and so, ideally, representatives of both sexes should be available when the below key is used. The Asilinae genus *Tolmerus* still requires clarification in an Afrotropical context (see below) and is not included in the below key.

The identification key provided below can also be accessed electronically at <https://asiloidflies.si.edu/content/online-identification-keys> and http://keys.lucidcentral.org/keys/phoenix/Afrotropical_Asilidae_genera/.

The photographs of pinned specimens in Figs 85–236 representing 69 genera, plus additional views of the head in anterior view, can be accessed electronically at Morphbank under Collection ID 860613 (<http://www.morphbank.net/myCollection/?id=860613>).

Larger specimens of Asilidae should be direct-pinned and smaller species micro-pinned in the field for later staging (see Chapter 2).

Key to genera of Afrotropical Asilidae

1. Abdominal tergite 2 not more than $4 \times$ as long as wide (e.g., Fig. 17); abdominal sternite 1 confined beneath tergite 1; wing with alula (e.g., Fig. 84) and tarsi with pulvilli (e.g., Fig. 46) usually present, but occasionally one or other may be absent 2
 - Abdominal tergite 2 at least $5 \times$ or more as long as wide (e.g., Figs 42–45); abdominal sternite 1 extending ca halfway back beneath tergite 2; wing without alula (e.g., Fig. 171) and tarsi without pulvilli (e.g., Fig. 42) (LEPTOGASTRINAE) 15
2. Fore tibia without spine-like tibial processes (macrosetae may be present); thorax with prosternum either fused to or separated from proepisternum by membranous area 3
 - Fore tibia with apical, unarticulated spur (*i.e.*, a spine-like process of distal tibial margin, somewhat sigmoid in shape, e.g., Fig. 23); thorax with prosternum separated from proepisternum by membranous area (DASYPOGONINAE) 21
3. Wing vein R_{2+3} ending in costal vein (C), cell r_1 thus open at wing margin (as in Fig. 185) 4
 - Wing vein R_{2+3} joining vein R_1 proximal to end of R_1 , cell r_1 thus closed, either stalked or closed at wing margin (as in Figs 83, 84) 10
4. Head with frons virtually same width at level of antennal insertion and vertex, or only slightly diverging (e.g., Figs 74, 80); eye more or less oval or posterior margin slightly sinuate in ventral $\frac{1}{4}$ (e.g., Figs 158, 224); thorax with prosternum either fused to or separated from proepisternum by membranous area 5
 - Head with frons narrowed at level of antennal insertion, then abruptly diverging dorsally (frons much wider at vertex than at antennal insertion) (e.g., Figs 58, 81); posterior margin of eyes distinctly sinuate in ventral $\frac{1}{2}$ (e.g., Fig. 60); thorax with prosternum fused to proepisternum, forming a precoxal bridge (STICHOPOGONINAE) 69
5. Antennal stylus with long setulae on all surfaces (either loosely arranged or tightly-packed) (e.g., Fig. 197); wing with alula reduced (e.g., Fig. 197) 6
 - Antennal stylus without long setulae (e.g., Fig. 220, *Rhipidocephala* sometimes with ventral setulae); wing with alula usually well-developed (e.g., Figs 185, 186) 7
6. Antennal stylus robust, broader than distal end of postpedicel; stylus setulae short and tightly-packed; thorax with prosternum separated from proepisternum by membranous area (confined to Western Cape Province, South Africa) *Akatiomyia* Londt
 - Antennal stylus narrower than distal end of postpedicel (Fig. 198); stylus setulae long and loosely arranged (Fig. 198); thorax with prosternum fused to proepisternum, forming precoxal bridge (Fig. 198) (widespread throughout Afrotropical Region) *Oligopogon* Loew
7. Head with tentorial pits well-developed, conspicuous anteroventrally (e.g., Fig. 71); wing cell m_3 open (e.g., Figs 137, 215) (TRIGONOMIMINAE) 8
 - Head with tentorial pits small, slit-like, inconspicuous ventrally (e.g., Fig. 78); wing cell m_3 open or closed (e.g., Figs 163, 205) 9
8. Antennal postpedicel consisting of proximal bulb, with elongate, but undifferentiated distal part (resembling stylus) (Fig. 138); abdominal tergite 1 entirely sclerotised (Fig. 137); hind trochanter with posteriorly-directed, setose protuberance; fairly robust flies, often shiny yellow-brown with glistening wings (Figs 62, 63, 137, 138) *Damalis* F.
 - Antennal postpedicel elongate, with distinct apical stylus (Fig. 216); abdominal tergite 1 often unsclerotised medially (Fig. 216); hind trochanter without protuberance; small, fragile, blackish flies (Figs 64, 65, 215, 216) *Rhipidocephala* Hermann
9. Female terminalia with divided tergite 10, bearing acanthophorite spines (may be difficult to discern in specimens with withdrawn terminalia) (e.g., Figs 189, 190, 306); thorax with anepisternum invariably without strong macroseta at superoposterior angle (e.g., Fig. 142); prosternum separated from proepisternum by membranous area 23
 - Female terminalia simple, tergite 10 never divided, without acanthophorite spines (e.g., Fig. 216); thorax with anepisternum usually with at least one macroseta at superoposterior angle, in front of wing insertion (e.g., Fig. 228) (if absent, then pulvilli also absent); prosternum fused to proepisternum, forming precoxal bridge (LAPHRIINAE [in part]) 74
10. Wing vein R_{2+3} bent anteriorly at tip, joining vein R_1 just before or at costal vein (C) (e.g., Figs 83, 233) 11
 - Wing vein R_{2+3} closing cell r_1 by obvious, fairly straight stalk (e.g., Fig. 95) 13

11. Costal wing vein (C) circumambient (as in Fig. 84); hind femur slender, without ventrodistal macrosetae inserted on tubercles (confined to eastern and southern Africa) *Perasis* Hermann
- Costal wing vein (C) terminating at or before vein *CuA+CuP* (cell *cup* not bordered by costal vein (C)) (e.g., Figs 83, 155, 233); hind femur stout, frequently with ventrodistal macrosetae inserted on tubercles (e.g., Figs 156, 234) (throughout sub-Saharan Africa and/or southern Arabia) 12
12. Antennal postpedicel almost 2 × as long as scape and pedicel combined (Fig. 155); larger species (> 13 mm); hind femur with ventrodistal macrosetae inserted on tubercles; wing with patches of yellow-brown infuscation (Fig. 155) (throughout sub-Saharan Africa); *Hoplistomerus* Macquart
- Antennal postpedicel only slightly longer than scape and pedicel combined (Fig. 233); smaller species (< 13 mm); hind femur with or without ventrodistal macrosetae inserted on tubercles (Fig. 234); wing usually without infuscation (Fig. 233) (throughout sub-Saharan Africa and southern Arabia) *Trichardis* Hermann
13. Thorax with anepisternum invariably without strong macroseta at superoposterior angle (e.g., Fig. 142); prosternum either fused to or separated from proepisternum by membranous area; palpus 1-segmented 14
- Thorax with anepisternum usually with at least one macroseta at superoposterior angle, in front of wing insertion (e.g., Fig. 228) (if absent, then pulvilli also absent); prosternum fused to proepisternum, forming precoxal bridge; palpus 1- or 2-segmented (LAPHRIINAE [in part]) 78
14. Antennal stylus with long setulae (e.g., Fig. 146); thorax with postmetacoxal area sclerotised (i.e., postmetacoxal bridge complete) (OMMATIINAE) 102
- Antennal stylus without setulae (e.g., Fig. 204); thorax with postmetacoxal area unsclerotised and membranous at least medially (ASILINAE) 110
15. Tarsal claws of unequal length, median claw shorter than lateral; wing veins *M* and *R* with trichoid spicules (reminiscent of setulae); thorax with long, posteriorly directed postsutural dorsocentral setae; male terminalia without surstylus (Fig. 281) (confined to south-western Madagascar) *Schildia* Aldrich
- Tarsal claws of equal length, median and lateral claws equally long; wing veins *M* and *R* without trichoid spicules; thorax usually without posteriorly directed postsutural dorsocentral setae; male terminalia invariably with distinct surstylus (e.g., Figs 275, 278) (throughout Afrotropical Region) 16
16. Wing cell *cua* closed (as in Fig. 83) 17
- Wing cell *cua* open (as in Fig. 199) 18
17. Hind tibia enlarged, swollen, widest medially, with at least 2 long ventrally-angled setae on ventral surface (Figs 167, 168); hind femur in distal ¾ long setose on all surfaces (Figs 167, 168); wing membrane usually brown patterned (Fig. 167) *Lasiocnemus* Loew
- Hind tibia cylindrical, usually widest at distal tip, without long ventrally-angled setae on ventral surface (Fig. 104); hind femur in distal ¾ not long setose (Fig. 104); wing membrane never brown patterned (although sometimes appearing darker due to dense microtrichia) (Fig. 103) *Ammophilomima* Enderlein
18. Thorax with postpronotum medially with distinct, cylindrical, peg-like protuberance (Fig. 148) *Euscelidia* Westwood
- Thorax with postpronotum medially without protuberance (median postpronotum may be slightly elevated) (e.g., Figs 172, 174, 176, 182) 19
19. Hind tibia with dorsal and ventral rows of short macrosetae (Figs 45, 181, 182); hind legs long, almost cylindrical throughout (Figs 45, 181, 182) *Mesoleptogaster* Frey
- Hind tibia without distinct rows of short macrosetae (single macrosetae may be present particularly towards distal tip) (e.g., Fig. 44); hind legs not markedly elongated, at least femur distinctly clubbed distally (e.g., Fig. 44) 20
20. Antennal postpedicel short (as long as, or marginally longer than scape and pedicel combined); male terminalia with hypandrium and gonocoxite fused to form “lobus”; surstylus without movable secondary ventral lobe, invariably bipartite distally; female terminalia often with long macrosetae distally on abdominal sternite 8 *Lobus* Martin
- Antennal postpedicel short or long (Figs 172, 174); male terminalia with hypandrium and gonocoxite invariably separated; surstylus invariably with movable secondary ventral lobe, with only single tip (sometimes more or less blunt with distinct dorso- and ventrodistal points); female terminalia without long macrosetae distally on abdominal sternite 8 *Leptogaster* Meigen

21. Fore tibial spur slender, sigmoid, not associated with proximal tarsal process, at most with group of stout, peg-like, black, tarsal macrosetae (Fig. 218); scutellum with 2 well-developed apical macrosetae (Fig. 217); male terminalia with epandrium and hypandrium unfused (suture distinctly visible).
Saropogon Loew
- Fore tibial spur stout, associated with well-developed proximal tarsal process (e.g. Fig. 200); apical scutellar macrosetae highly reduced to absent (e.g., Fig. 200); male terminalia with epandrium and hypandrium fused, forming continuous ring (no suture apparent) (e.g., Fig. 262) 22
22. Head with ocellar tubercle prominent (Fig. 200); median occipital sclerite with 2 vertical macrosetae; postpronotal lobe without macrosetae (Fig. 200); weak dorsocentral macrosetae may be present post-suturally.
Pegesimallus Loew
- Head with ocellar tubercle not prominent; median occipital sclerite with 4–6 vertical macrosetae; post-pronotal lobe with 1–2 stout macrosetae; pre- and postsutural dorsocentral macrosetae present
Caroncoma Londt
23. Thorax with anatergite setose (e.g., Figs 108, 144, 186) 24
- Thorax with anatergite bare (e.g., Figs 118, 222) 32
24. Antennal stylus composed of 2–3 distinctly discernible articles (1–2 segment-like articles plus apical seta-like sensory article) 25
- Antennal stylus reduced, composed of greatly reduced segment-like articles (not always evident) and apical seta-like sensory article in cavity on distal postpedicel 31
25. Head with occiput without macrosetae (*i.e.*, with weak postocular and occipital setae only). 26
- Head with occiput with obvious macrosetae (including postocular and occipital setae) (e.g., Fig. 108) 27
26. Antennal scape distinctly longer than pedicel; eye : face width ratio < 1.1 : 1; male terminalia with hypandrium less than ½ as long as epandrial lobes.
Diocobroma Hull
- Antennal scape and pedicel of virtually same length; eye : face width ration > 1.3 : 1; male terminalia with hypandrium *ca* as long as epandrial lobes.
Dogonia Oldroyd
27. Thorax with proepisternum with a few strong macrosetae in addition to setae (Fig. 108); antepronotum and scutum with very strong macrosetae, giving a bristly appearance (Fig. 108)
Anasilomos Londt
- Thorax with proepisternum with setae only (some may be stronger than others, but never as strong as scutal macrosetae); antepronotum and scutum with setae or regular macrosetae 28
28. Abdominal tergite 1–4 with group of strong macrosetae dorsolaterally; antennal stylus composed of two articles (1 segment-like article, plus apical seta-like sensory article); male terminalia bulbous (Figs 295–297); female abdominal tergites 7 and 8 of virtually same length
Ontomyia Dikow & Londt
- Abdominal tergite 1 (only) with group of strong macrosetae dorsolaterally; antennal stylus composed of three articles (2 segment-like articles, plus apical seta-like sensory article); male terminalia slender, never bulbous; female abdominal tergite 8 distinctly shorter than tergite 7 (*Fishermyia* female unknown) 29
29. Head with facial swelling well-developed on entire face.
Oratostylum Ricardo
- Head with facial swelling weak, only ventral margin moderately developed 30
30. Scutellum with 2 apical scutellar macrosetae; head with mystax occupying ventral ⅓ of face only; antennal postpedicel elongate, spindle-shaped, > 1.5 × as long as scape and pedicel combined (confined to Madagascar)
Fishermyia Londt
- Scutellum with 4 or more apical scutellar macrosetae present; head with mystax occupying almost entire face, although sometimes weak in dorsal part; antennal postpedicel usually somewhat clavate, < 1.5 × as long as scape and pedicel combined (confined to southern Africa)
Remotomyia Londt
31. Head with facial swelling occupying *ca* ¾ of face (Fig. 144); mystax entirely covering face (Fig. 144); thoracic pre- and postsutural dorsocentral setae well-developed; postmetacoxal membrane clothed in long setae (Fig. 144); wing vein M_1 not strongly arched anteriorly (Fig. 143)
Daspletis Loew
- Head with facial swelling occupying at most ventral ½ of face (Figs 186, 188, 190); mystax primarily confined to ventral ½ of face (Figs 186, 188, 190); only postsutural dorsocentral setae well-developed; postmetacoxal membrane usually bare (Figs 186, 188, 190); wing vein M_1 usually strongly arched anteriorly (Figs 185, 187, 189)
Microstylum Macquart

32. Costal wing vein (C) not circumambient, cell *cup* and alula without bordering vein C (*i.e.*, C terminates at or before point where vein *CuP* joins wing margin) (e.g., Figs 91, 93, 105, 117, 211, 221, 223) 33
- Costal wing vein (C) circumambient (around entire wing margin, even when weakly-developed as in *Trichoura*) (e.g., Fig. 157) 43
33. Tarsal claws with pulvilli minute or absent (e.g., Fig. 224) (WILLISTONININAE [in part]) 34
- Tarsal claws with pulvilli well-developed (e.g., Fig. 212) 38
34. Abdomen broad, obviously dorsoventrally flattened (width : length ratio of abdominal tergite 2 > 2) (e.g., Figs 85, 222) 35
- Abdomen cylindrical, not obviously dorsoventrally flattened (width : length ratio of abdominal tergite 2 < 1.5) (e.g., Figs 102, 224) 37
35. Costal wing vein (C) terminating before reaching vein *CuA+CuP* (e.g., Fig. 221); cell *r*₅ closed and stalked (stalk frequently not reaching wing margin) (e.g., Fig. 221) *Sisyrodytes* Loew
- Costal wing vein (C) terminating at point where vein *CuA+CuP* reaches wing margin (e.g., Fig. 85); cell *r*₅ open (e.g., Fig. 85) 36
36. Wing cell *m*₃ open (Fig. 85); vein *R*₄ with short stump vein (Fig. 85); tarsal claws with pulvilli poorly developed, but clearly discernible; male terminalia with hypandrium somewhat flat or only gently concave. *Acnephatomyia* Londt
- Wing cell *m*₃ closed and stalked; vein *R*₄ without stump vein (Fig. 117); tarsal claws with pulvilli minute, difficult to discern; male terminalia with hypandrium distinctly cup-shaped *Astiptomyia* Londt
37. Small species (wing length: < 3.5 mm) (Fig. 101); tarsal claws without empodium (Fig. 102); wing without stump vein on vein *R*₄; thorax with scutal macrosetae well-developed, many times longer than accompanying setae. *Ammodaimon* Londt
- Larger species (wing length: > 6.0 mm) (Fig. 223); tarsal claws with well-developed empodium (Fig. 224); wing with short stump vein on vein *R*₄ (Fig. 223); thorax with scutal macrosetae moderately developed, not considerably longer than accompanying setae (Fig. 224) *Sporadothrix* Hermann
38. Thoracic postmetacoxal area sclerotised (*i.e.*, postmetacoxal bridge complete) (Fig. 212) *Rhabdogaster* Loew
- Thoracic postmetacoxal area entirely membranous 39
39. Thorax with scutum greatly elevated anterodorsally, hump-like *Oxynton* Janssens
- Thorax with scutum of more usual shape, not hump-like 40
40. Hind coxa anteriorly with elongate, distally rounded, peg-like process *Ischiolobos* Londt
- Hind coxa anteriorly without peg-like process 41
41. Head with strong mystacal macrosetae extending over entire face (Fig. 106); thorax with 1–4 long postalar macrosetae (Fig. 106) *Amphisbetetus* Hermann
- Head with strong mystacal macrosetae either confined to lower ½ of face or absent (weak mystacal setae present) (e.g., Figs 92, 94); thoracic postalar macrosetae usually absent (1 or 2 macrosetae in some species) (e.g., Figs 92, 94). 42
42. Head with mystacal macrosetae more extensive, if restricted to single row on lower facial margin, then weaker mystacal setae also present on face (e.g., Figs 92, 94); abdominal tergites usually bare (Figs 91–94) (primarily in Southern Africa) *Afroholopogon* Londt
- Head with mystacal macrosetae restricted to single row on lower facial margin; abdominal tergites primarily pubescent (small median bare maculae present) (Palearctic & southern Arabian Peninsula) *Wadipogon* Bosák & Hradský
43. Palpus 1-segmented (usually fairly robust and curved, such that their distal ends converge) 44
- Palpus 2-segmented (weak distal segment may be tucked away in oral cavity) 46
44. Proboscis with spine-like processes distally; antennal stylus not clearly differentiated, apical seta-like sensory article situated sub-apically in cavity on postpedicel. *Hynirhynchus* Lindner
- Proboscis of more usual form, without spine-like processes distally (e.g., Figs 152, 208); antennal stylus clearly differentiated, apical seta-like sensory article situated apically in cavity on stylus 45

45. Proboscis shorter than antenna (Fig. 152); mystax occupying ventral $\frac{1}{3}$ of face (Fig. 152); male mid tarsomeres 4–5 with highly modified, rather spade-shaped setae (usually reddish in colour) (Fig. 152) *Habropogon* Loew
- Proboscis longer than antenna (Fig. 208); mystax occupying ventral $\frac{1}{2}$ of face (Fig. 208); male mid tarsomeres 4–5 with regular setae only (Fig. 208) *Pycnomerinx* Hull
46. Head almost circular in anterior view (*i.e.*, face narrow) (e.g., Fig. 69) 47
- Head distinctly wider than high in anterior view (e.g., Fig. 70) 51
47. Thorax with katatergite bare. 48
- Thorax with katatergite setose (e.g., Fig. 98) 49
48. Fore femur with large, proximoventral spinose process (*i.e.*, strongly raptorial) (Figs 52, 150) *Gonioscelis* Schiner
- Fore femur of more usual form, without large spinose process *Stenopogon* Loew
49. Thoracic dorsocentral macrosetae developed pre- and postsuturally (Fig. 154) *Haroldia* Londt
- Thoracic dorsocentral macrosetae developed only postsuturally (e.g., Fig. 98) 50
50. Antennal stylus composed of two articles (1 segment-like article, plus apical seta-like sensory article) (Fig. 98); male terminalia with hypandrium usually bifurcate distally *Afroscleropogon* Londt
- Antennal stylus composed of three articles (2 segment-like articles plus apical seta-like sensory article); male terminalia with hypandrium usually simple *Rhacholaemus* Hermann
51. Proboscis strongly downwardly-curved, resembling a parrot's beak (Fig. 110) *Ancylorhynchus* Berthold
- Proboscis of more usual form, not strongly downwardly-curved (e.g., Fig. 134) 52
52. Head with facial swelling strongly projecting ventrally only (not dorsally), giving pointed, nose-like appearance; mystacal macrosetae largely confined to small area at apex of facial swelling *Lycostommyia* Oldroyd
- Head with facial swelling not projecting ventrally, of more usual form; mystacal macrosetae placed more widely on facial swelling (Figs 134, 136) 53
53. Head with mystax occupying entire face, even if weakly-developed dorsally (e.g., Fig. 134) 54
- Head with mystax not occupying entire face, with distinct gap between dorsal mystacal setae and antennal sockets (e.g., Fig. 220) 59
54. Antennal postpedicel widening toward middle (in lateral view), apical $\frac{1}{2}$ appearing strongly incised ventrally (*P. astroptica* Londt, 1994) *Pedomyia* Londt [in part]
- Antennal postpedicel either distinctly laterally compressed or cylindrical 55
55. Antennal postpedicel distinctly laterally compressed, strap-like; stylus laterally compressed *Hermannomyia* Oldroyd
- Antennal postpedicel more or less cylindrical (may appear slightly laterally compressed) (Figs 133, 134); stylus more or less cylindrical 56
56. Large, bee-mimicking flies (wing length: > 15 mm) (Figs 119, 120); palpus large, well-developed (Fig. 120); thoracic anepimeral macroseta absent (Fig. 120) *Bana* Londt
- Small flies (wing length: < 10 mm) (e.g., Figs 129, 130, 133–136); palpus moderately developed (e.g., Figs 130, 134, 136); thoracic anepimeral macroseta usually present (e.g., Figs 130, 136) 57
57. Male terminalia club-like (Fig. 134); epandrium greatly developed, hemispherical; hypandrium greatly reduced *Corymyia* Londt
- Male terminalia of more usual form (e.g., Fig. 130); epandrium not greatly developed; hypandrium not greatly reduced 58
58. Head with mystax well-developed, occupying entire face (Fig. 130); scutellum with numerous apical scutellar setae, usually some discal scutellar setae (central area usually bare) (Fig. 129); male terminalia with gonocoxite with two sub-equal, pointed, distal processes, lateral one with at most a small tumid dorsodistal projection *Connomyia* Londt
- Head with mystax moderately developed, occupying entire face, but usually weak dorsally; scutellum usually with few apical scutellar setae, rarely few discal scutellar setae present; male terminalia with gonocoxite with lateral process having distal or dorsodistal flange-like process *Danomyia* Londt

59. Thorax with anepimeral macroseta; hind tarsus with empodium laterally compressed and blade-like *Empodiodes* Oldroyd
 – Thorax without anepimeral macroseta; hind tarsus with empodium seta-like, not laterally compressed and blade-like 60
60. Head with facial swelling strongly developed in ventral $\frac{3}{4}$, dorsal part distinctly defined (e.g., Fig. 158) 61
 – Head with facial swelling at most moderately developed, dorsal part not distinctly defined (e.g., Fig. 220). 62
61. Body not entirely metallic blue-black (Fig. 158); antennal postpedicel strongly club-shaped, subequal to length of scape and pedicel combined (Fig. 158); wing largely transparent with dark maculae (especially “pterostigma-like” marking at base of cell r_1) (Fig. 157). *Hyphenetes* Loew
 – Body entirely metallic blue-black; antennal postpedicel elongate, cylindrical, ca 2 × as long as scape and pedicel combined; wing fairly uniformly black *Teratopomyia* Oldroyd
62. Head with mystax occupying at most ventral $\frac{1}{3}$ of face (e.g., Figs 180, 236) 63
 – Head with mystax occupying at least ventral $\frac{1}{2}$ of face (e.g., Fig. 220) 67
63. Wing cells *cua* and m_3 closed and stalked (Fig. 235); male terminalia with hypandrium reduced, largely fused with gonocoxites (WILLISTONININAE [in part]). *Trichoura* Londt
 – Wing cells *cua* and m_3 open at wing margin (even if only narrowly); male terminalia with hypandrium moderately well-developed, not fused with gonocoxites 64
64. Male terminalia with epandrial lobes separated, only joined proximally 65
 – Male terminalia with epandrial lobes fused medially for at least proximal $\frac{1}{2}$ of length. 66
65. Larger flies (wing length: > 5 mm) *Antiscylaticus* Londt
 – Smaller flies (wing length: < 5 mm) *Microphontes* Londt
66. Scutellum with discal setae (ca 4); male terminalia with epandrial lobes fused medially for virtually entire length (only slight distal indentation) *Irwinomyia* Londt
 – Scutellum without discal setae (Fig. 180); male terminalia with epandrial lobes fused medially for ca $\frac{1}{2}$ length *Macroetra* Londt
67. Antennal postpedicel widening toward middle (in lateral view), apical $\frac{1}{2}$ appearing strongly incised ventrally. *Pedomya* Londt [in part]
 – Antennal postpedicel spindle-shaped (e.g., Fig. 219) 68
68. Male terminalia with epandrial lobes short, fused medially for ca $\frac{1}{3}$ length; male hypandrium elongate, ventrally directed with upturned distal region. *Agrostomyia* Londt
 – Male terminalia with epandrial lobes long, entirely separated medially or very narrowly joined proximally; male hypandrium more or less straight and distally directed. *Scylaticus* Loew
69. Tarsi without pulvilli. 70
 – Tarsi with pulvilli (even if only weakly developed) 71
70. Wing cell m_3 open (Fig. 213); head with mystacial setae dorsoventrally flattened (Fig. 214). *Rhadinus* Loew
 – Wing cell m_3 closed; head with mystacial setae circular in cross-section *Turkmenomyia* Paramonov
71. Tarsi with pulvilli weakly developed, about $\frac{1}{2}$ length of tarsal claw (confined to Kenya) *Nanoculcita* Londt & Copeland
 – Tarsi with pulvilli well-developed, almost reaching distal end of tarsal claw. 72
72. Head with 2 well-developed ocellar macrosetae (Fig. 81); wing cell m_3 with long stalk at base (Fig. 225); usually small, or even tiny flies (body length: < 10 mm) (Figs 58–60, 225, 226); habitat sandy banks of streams, rivers and lakes. *Stichopogon* Loew
 – Head with ocellar macrosetae weak or absent (e.g., Fig. 126); wing cell m_3 with short basal stalk or stalk absent (e.g., Fig. 125); habitat not as above 73
73. Thorax with scutum entirely grey pubescent (Fig. 125); larger flies (body length: > 10 mm) (littoral zones on East African coast and Indian Ocean islands) *Clinopogon* Bezzi
 – Thorax with scutum bare; smaller flies (body length: < 10 mm) (confined to southern Arabian Peninsula) *Dichropogon* Bezzi

74. Tarsi with pulvilli poorly developed (ca $\frac{1}{2}$ length of tarsal claw) (Fig. 206) *Prytanomyia* Özdikmen
 – Tarsi with pulvilli well-developed (as long as or slightly shorter than tarsal claw) (e.g., Fig. 164) 75
75. Thorax with anepisternum with strong macroseta on superoposterior angle; small flies (body length: < 8 mm); head with face narrower than width of one eye in anterior view; antennal scape 2 × as long as pedicel *Gerrolasius* Hermann
 – Thorax with anepisternum without obvious strong macroseta on superoposterior angle; larger flies (body length: > 8 mm); head with face as wide or wider than width of one eye; antennal scape < 2 × as long as pedicel. 76
76. Head with mystax composed almost entirely of fine setae, uniformly covering face; fine setae of thorax and abdomen longish and soft; no conspicuous macrosetae on body; wing cell r_5 usually closed; bee-like in appearance *Pilophoneus* Londt
 – Head with mystax composed of strong macrosetae, largely restricted to ventral facial margin (e.g., Fig. 164); fine setae of thorax and abdomen minute; thoracic and abdominal macrosetae conspicuous and moderately well-developed (e.g., Fig. 164); wing cell r_5 open (e.g., Fig. 163); not bee-like in appearance 77
77. Scutellum with apical macrosetae moderately developed; antennal postpedicel virtually as long as scape and pedicel combined; thorax and abdomen extensively bare *Ericomyia* Londt
 – Scutellum without apical macrosetae (Fig. 163); antennal postpedicel considerably longer than scape and pedicel combined (Fig. 164); thorax and abdomen entirely setose (Figs 163, 164) *Laphyctis* Loew
78. Thorax with postmetacoxal area sclerotised (i.e., postmetacoxal bridge complete, no suture evident) 79
 – Thorax with postmetacoxal area membranous (some *Proagonistes* with almost complete bridge, but dorsoventral suture evident) 84
79. Larger flies (body length: > 10 mm) (confined to Madagascar) 80
 – Small to tiny flies (body length: < 10 mm) (confined to sub-Saharan Africa) 81
80. Male terminalia with cercus short, barely extending beyond tip of epandrium *Katharma* Oldroyd
 – Male terminalia with cercus very long, extending well beyond tip of epandrium *Katharmacercus* Tomasovic
81. Antennal postpedicel without stylus, with seta-like sensory article inserted just beyond $\frac{1}{2}$ length; thorax with scutum without distinct macrosetae anteriorly; anatergite bare; scutellum with tubercular projection apically *Afromosia* Londt
 – Antennal postpedicel with distinct stylus, seta-like sensory article inserted sub-apically and laterally on postpedicel; thorax with scutum anteriorly with pair of small macrosetae; anatergite setose; scutellum simple, smoothly rounded 82
82. Antennal stylus as long as or longer than scape; head with postocular macrosetae weakly developed *Dichaethyrea* de Meijere
 – Antennal stylus shorter than scape; head with postocular macrosetae well-developed 83
83. Head with face wide (eye : face width ratio < 1.5); mystax of males with dorsoventrally flattened, shiny scale-like macrosetae (Fig. 28); thorax with scutum shiny, at most slightly punctulate (Fig. 28) *Goneccalypsis* Hermann
 – Head with face narrow (eye : face width ratio > 1.5); mystax of both sexes without laterally situated dorsoventrally flattened scale-like setae; thorax with scutum punctate *Loewinella* Hermann
84. Wing vein M_3 with apical portion perfectly aligned with proximal portion of vein M_2 (forming cross) (confined to Madagascar) *Orthogonis* Hermann
 – Wing veins not so aligned (e.g., Figs 111, 123, 159, 227) (except in *Anypodetus nigrifacies* Ricardo, 1925, in which alignment is almost perfect) (widespread Afrotropical Region) 85
85. Proboscis long, narrow and laterally compressed (knife-like) (as in Fig. 124) 86
 – Proboscis short to moderate in length, often stout, somewhat triangular in cross-section (e.g., Fig. 228) 88
86. Hind femur considerably expanded mediodistally and with ventrodial macrosetae inserted on tubercles *Storhyngomerus* Hermann
 – Hind femur not obviously expanded mediodistally, with only regular ventrodial macrosetae (not inserted on tubercles) (e.g., Fig. 124) 87

87. Antennal postpedicel at most $2 \times$ as long as scape and pedicel combined (Fig. 124); female ovipositor short and not markedly tubular; smaller (body length: < 20 mm), not obviously robust, setaceous, or bee-like flies (Figs 27, 123, 124) *Choerades* Walker
- Antennal postpedicel $> 2 \times$ as long as scape and pedicel combined; female ovipositor somewhat elongate, tubular; large (body length: > 20 mm), robust, setaceous, bee-like flies *Dasyllina* Bromley
88. Palpus laterally compressed and leaf-like (e.g., Fig. 160); female ovipositor projecting distally as slender tube (e.g., Fig. 159) 89
- Palpus cylindrical in cross-section (e.g., Fig. 228); female ovipositor short, not markedly tubular 92
89. Wing cell r_5 closed (Fig. 159); broad flies, bee-like in appearance (mimicking carpenter bees) (Figs 159, 160) *Hyperechia* Schiner
- Wing cell r_5 open; not broad and bee-like in appearance 90
90. Head with facial swelling only weakly developed; antennal postpedicel virtually as long as scape and pedicel combined *Andrenosoma* Rondani
- Head with facial swelling well to strongly developed; antennal postpedicel ca $1.5 \times$ as long as scape and pedicel combined 91
91. Larger flies (body length: > 20 mm) mimicking pompilid wasps (Figs 36, 37); thorax with scutum blackish (sometimes with red-brown lateral parts) (Fig. 37) *Proagonistes* Loew
- Smaller flies (body length: < 20 mm); thorax with scutum brown-yellow to reddish, clothed in golden setae *Systropalpus* Hull
92. Wing vein M_2 not reaching wing margin *Ctenota* Loew
- Wing vein M_2 reaching wing margin (e.g., Figs 161, 169, 227) 93
93. Head with postgena well-developed, with ventral flange-like projection (in lateral view) (e.g., Fig. 162) 94
- Head with postgena simple, not ventrally extended and flange-like (e.g., Figs 112, 166, 170, 192) 95
94. Hind leg greatly elongate (hind femur ca $2 \times$ as long as mid femur) (Fig. 162); abdomen somewhat constricted in anterior $\frac{1}{2}$ (Fig. 161); larger flies (body length: ca 20–36 mm) (Figs 30, 161, 162) *Lamyra* Loew
- Hind leg normally proportioned (hind femur not more than $1.5 \times$ as long as mid femur) (Fig. 228); abdomen more or less parallel-sided, not noticeably constricted (Fig. 227); smaller flies (body length: ca 10–27 mm) (Figs 39, 227, 228) *Stiphrolamyra* Engel
95. Wing cell r_5 closed (e.g., Fig. 169) 96
- Wing cell r_5 open (e.g., Figs 111, 165, 192) 98
96. Palpus bulbous (virtually spherical); mystax composed of fine setae only *Afromelittodes* Oldroyd & Van Bruggen
- Palpus not markedly bulbous (cylindrical) (e.g., Fig. 170); mystax composed of strong macrosetae (e.g., Fig. 170) 97
97. Antennal postpedicel with numerous well-developed dorsal setulae (Fig. 169); scape usually ca $2 \times$ as long as pedicel (Fig. 169); often rather bee-like in appearance (Figs 32, 169, 170) *Laxenecera* Macquart
- Antennal postpedicel without setulae; scape only slightly longer than pedicel; never bee-like in appearance *Nusa* Walker
98. Tarsi without pulvilli (Fig. 112); thorax with anepisternum without macrosetae on superoposterior angle (Fig. 112) *Anypodetus* Hermann
- Tarsi with pulvilli (e.g., Figs 166, 192); thorax with anepisternum with strong macrosetae on superoposterior angle (Figs 166, 192) 99
99. Antennal postpedicel bearing well-defined segment-like stylus, tipped with terminal pit-enclosed seta-like sensory article (Fig. 165) *Laphystotes* Oldroyd
- Antennal postpedicel simple, tipped with terminal, obliquely positioned pit-enclosed seta-like sensory article (e.g., Fig. 191) 100
100. Generally pale yellow-brown to red-brown flies; legs entirely yellow-brown to red-brown *Smeryngolaphria* Hermann

- Generally dark red-brown to black flies; legs extensively or entirely blackish (e.g., Figs 191, 192) 101
- 101. Head of male with mystax at least laterally overlaid by shiny scale-like setae (Fig. 34); wing with proximal $\frac{1}{2}$ transparent, distal $\frac{1}{2}$ uniformly clothed in dense microtrichia. *Notiophria* Londt
- Head in both sexes with mystax not overlaid by shiny scale-like setae (Fig. 192); wing membrane more extensively clothed in black microtrichia (Fig. 192). *Nannolaphria* Londt
- 102. Head with mystax with some dorsal macrosetae arranged in two distinct vertical rows (e.g., Figs 47, 48, 90). 103
- Head with mystax simple, dorsal setae not arranged in distinct vertical rows (e.g., Fig. 46, 130, 184) 108
- 103. Scutellum without apical macrosetae; antennal stylus with ventral setulae arranged in single row *Metommatius* Hull
- Scutellum with apical macrosetae (e.g., Figs 89, 146); antennal stylus with ventral setulae arranged in two distinct divergent rows (e.g., Figs 90, 146) 104
- 104. Head with facial swelling moderately well-developed (at least in ventral $\frac{1}{2}$) (e.g., Fig. 90). 105
- Head with facial swelling only weakly developed ventrally (e.g., Fig. 146) 106
- 105. Head with facial swelling moderately well-developed, abruptly produced in ventral $\frac{2}{3}$ (Fig. 90); proboscis more or less cylindrical medially (only slightly higher than wide), shorter than compound eye (in lateral view) (Fig. 90); antennal postpedicel small, virtually as wide as scape (Fig. 89); thorax with 2–3 stout, long presutural dorsocentral macrosetae (Fig. 89) *Afroestricus* Scarbrough
- Head with facial swelling less developed, with only ventral $\frac{1}{2}$ developed; proboscis oval in diameter medially (higher than wide), as long as or slightly longer than compound eye (in lateral view); antennal postpedicel wider than scape; thorax with short presutural dorsocentral macrosetae *Longibeccus* Scarbrough
- 106. Abdominal tergites 2–4 strongly constricted laterally (Fig. 145). *Emphysomera* Schiner
- Abdomen tergites 2–4 more or less parallel-sided (not noticeably constricted) (e.g., Figs 47, 48) 107
- 107. Thorax with stout macroseta on anepimeron; male mystax usually narrow, individual macrosetae tapering evenly from proximal to distal; male abdominal sternites 3–4 without pattern of erect macrosetae and/or dense setae (Figs 47, 48). *Ommatius* Wiedemann
- Thorax usually without macroseta on anepimeron, if present, then only setose, rarely macrosetose; male mystax usually with several thick macrosetae of uniform diameter medially, tapering only at or just before apex; male abdominal sternites 3–4 with pattern of erect macrosetae and/or dense setae *Pygommatius* Scarbrough & Marascia
- 108. Head with face narrow at antennal insertion, $< \frac{1}{5}$ as wide as head at greatest width; antennal postpedicel 2–6 \times as long as scape and pedicel combined (Fig. 184); stylus short, much shorter than postpedicel (Fig. 184). *Michotamia* Macquart
- Head with face wide, $> \frac{1}{5}$ as width of head; antennal postpedicel short, virtually as long as scape or scape and pedicel combined (Fig. 46); stylus long, usually $> 3 \times$ as long as postpedicel (e.g., Fig. 46) 109
- 109. Head with mystax composed of dense macrosetae medially (Figs 46, 132); numerous ocellar setae positioned fan-like posteriorly; antennal stylus with setulae short, arranged in single row (Fig. 132); larger robust flies (body length: > 10 mm) (Figs 46, 131, 132). *Cophinopoda* Hull
- Head with mystax composed of sparse setae medially; only 2 ocellar setae posteriorly; antennal stylus with setulae long, arranged in two rows; smaller flies (body length: < 9 mm). *Thallosia* Oldroyd
- 110. Thorax with anatergite bare (although setae may be present on mediotergite (mesopostnotum)) (e.g., Figs 100, 114, 142, 178, 194, 196, 202, 204, 230, 232) 111
- Thorax with anatergite setose (e.g., Figs 96, 128) 136
- 111. Antennal stylus composed of two articles (one segment-like article plus apical seta-like sensory article); head with facial swelling weakly developed ventrally (e.g., Figs 100, 114, 202, 204); dorsocentral macrosetae only postsuturally (e.g., Figs 100, 114, 178, 202, 204) 112
- Antennal stylus composed of three articles (two unequal segment-like articles plus apical seta-like sensory article); head with facial swelling not distinctly defined or gently convex (Figs 17, 142, 194, 196, 230, 232); thorax with dorsocentral macrosetae usually inserted pre- or postsuturally (e.g., Figs 142, 194, 196, 230, 232) 118

112. Wing with complete auxiliary vein on vein R_4 (connecting veins R_{2+3} and R_4) (as in Fig. 84; Figs 99, 201, 203) 113
- Wing either without auxiliary vein on vein R_4 or with only short stump vein on vein R_4 (e.g., Figs 113, 178) 116
113. Wing either with auxiliary vein long, or running parallel to vein R_{4+5} for considerable distance before reaching fork of veins R_4 and R_5 (e.g., Figs 84, 203); cell r_4 short, diverging rapidly near wing margin (e.g., Fig. 203); posterior wing margin with microtrichia arranged in single row (aligned in same plane as wing membrane); scutellum with 8 or more apical macrosetae (e.g., Fig. 203); discal scutellar setae and macrosetae present (Fig. 204) 114
- Wing either with auxiliary vein shorter, or at most running parallel to vein R_{4+5} for short distance (e.g., Figs 99, 201); cell r_4 long, diverging gradually towards wing margin (e.g., Figs 99, 201); posterior wing margin with microtrichia arranged in two rows (diverging from plane of wing membrane); scutellum with fewer than 8 apical macrosetae (e.g., Figs 99, 201); discal scutellar setae composed of setae only (no macrosetae) (e.g., Figs 99, 201) 115
114. Head with vertex of regular width, with ocellar tubercle of regular shape and size (Figs 77, 203); ocellar tubercle usually not visible in lateral view (Fig. 204) *Promachus* Loew
- Head with vertex wide, entirely occupied by ocellar tubercle; ocellar tubercle distinctly visible in lateral view *Tuberconspicus* Tomasovic
115. Wing with auxiliary vein very short (virtually as long as section of vein R_4 between fork of vein R_{4+5} and point at which crossvein joins R_4) (Fig. 99) *Alcimus* Loew
- Wing with auxiliary vein longer (Fig. 201) *Philodicus* Loew
116. Wing without stump vein on vein R_4 (Fig. 178); female ovipositor telescopic, comprised of abdominal segments 5 and following (confined to Madagascar & Mauritius) *Lycoprosopa* Hull
- Wing with short stump vein (st vn) on vein R_4 (e.g., Fig. 113); female ovipositor not obviously telescopic, comprising abdominal segments 8 and following (confined to West Africa, Arabian Peninsula & North Africa) 117
117. Scutellum with 2 apical macrosetae (Figs 113, 115); hind coxa with 2–3 lateral macrosetae; wing cell r_5 open or closed (Figs 113, 115); female ovipositor tubular; cercus spinose with well-developed macrosetae *Apoclea* Macquart
- Scutellum with 4–6 apical macrosetae; hind coxa with single lateral macroseta; wing cell r_5 open; female ovipositor laterally compressed; cercus without macrosetae *Erax* Scopoli
118. Head with dorsal postocular setae short to moderately long, at most weakly proclinate (e.g., Fig. 232) 119
- Head with dorsal postocular setae long, markedly proclinate (e.g., Figs 12, 142, 194, 196, 230) 123
119. Antennal stylus distinctly longer than postpedicel (e.g., Fig. 232) 120
- Antennal stylus shorter or virtually same length as postpedicel 121
120. Thorax with postpronotal lobes with macrosetae in addition to fine setae; hind coxa with single lateral macroseta; posterior wing margin with microtrichia arranged in two rows (diverging from plane of wing membrane) *Dysclytus* Loew
- Thorax with postpronotal lobes with fine setae only (Fig. 232); hind coxa with 4–5 lateral macrosetae; posterior wing margin with microtrichia arranged in single row (lying in same plane as wing membrane) *Torasilus* Londt
121. Thorax with dorsocentral macrosetae well-developed pre- and postsuturally; hind coxa with more than 2 lateral macrosetae *Zelamyia* Londt
- Thorax with dorsocentral macrosetae well-developed only postsuturally; hind coxa with 2 lateral macrosetae 122
122. Female cercus with fine setae only (without dorsodistal projection) *Acasilus* Londt
- Female cercus with fine setae and dorsodistal spine-like projection *Juxtasilus* Londt
123. Posterior wing margin with microtrichia arranged in 2 rows (diverging from plane of wing membrane) *Robertomyia* Londt
- Posterior wing margin with microtrichia arranged in single row (lying in same plane as wing membrane) 124
124. Wing cell r_5 closed well before wing margin *Megadrillus* Bigot

- Wing cell r_5 open (e.g., Figs 141, 193, 195, 229) 125
- 125. Female ovipositor at least 2 × as long as high (in lateral view) (as in Figs 252, 253). 126
- Female ovipositor < 2 × as long as high (in lateral view) (Figs 254, 255) 130
- 126. Hind coxa with at least one lateral macroseta together with fine setae (e.g., Figs 17, 230). 127
- Hind coxa with fine setae only (without macrosetae) 129
- 127. Discal wing cell (d) markedly constricted at mid length (Fig. 229) *Synolcus* Loew
- Discal wing cell (d) not markedly constricted at mid length (e.g., Fig. 141) 128
- 128. Head with facial swelling smoothly (if only slightly) convex (Fig. 142); antennal stylus as long as or slightly longer than postpedicel (Fig. 142); thorax with scutum not markedly humped (Fig. 142); scutal mane (i.e., long, tightly-packed, fine setae arranged in narrow strip mid-dorsally) undeveloped (Fig. 142) *Dasophrys* Loew
- Head with facial swelling undeveloped; antennal stylus shorter than postpedicel; thorax with scutum markedly humped; scutal mane well-developed *Gibbasilus* Londt
- 129. Scutellum with > 6 apical macrosetae; scutal mane (i.e., long, tightly-packed, fine setae arranged in narrow strip mid-dorsally) well-developed, but without clearly discernible acrostichal macrosetae *Hippomachus* Engel
- Scutellum with 6 or fewer apical macrosetae; scutal mane well-developed with clearly discernible acrostichal macrosetae. *Labarus* Londt
- 130. Female terminalia with ovipositor laterally compressed, distinctly longer than high (in lateral view) (Figs 254, 255); cercus smoothly rounded distally (Fig. 255); male terminalia (Figs 240–242), with abdominal sternite 8 with bifurcate medial process distally; phallus long, Z-shaped, each straight section being of similar length and general development. *Millenarius* Londt
- Female terminalia with ovipositor usually tubular in form, but if somewhat laterally compressed, then never distinctly longer than high (in lateral view); male terminalia (Figs 243–235), with abdominal sternite 8 usually without medial process distally (if process present, then never bifurcate, but knob-like or in form of smoothly-rounded dorsoventrally flattened projection); male phallus short to moderately long, usually fairly straight, but if somewhat Z-shaped, then basal section invariably much more robust than other sections *Neolophonotus* Engel 131
- 131. Hind coxa with fine setae only; thorax with postpronotal lobe invariably with setae 132
- Hind coxa with at least 1 (often more) lateral macroseta in addition to fine setae; thorax with postpronotal lobe with or without setae. 133
- 132. Thorax with scutal mane (i.e., long, tightly-packed, fine setae arranged in narrow strip mid-dorsally), usually weakly developed, with only weak, loosely arranged, usually pale coloured setae (rarely absent) in posterior part or absent anteriorly; if scutal mane present, then not bicoloured (black anteriorly, pale yellow or white posteriorly) *Neolophonotus angustibarbus*-group
- Thorax with scutal mane well-developed, with longish setae arranged loosely or as tightly-packed row; scutal mane unicolourous black along entire length (may be bordered by smaller pale coloured setae) *Neolophonotus suillus*-group
- 133. Thorax with postpronotal lobes setose with several setae 134
- Thorax with postpronotal lobes bare (rarely with 1–3 isolated, erect setae). 135
- 134. Thorax with scutal mane (i.e., long, tightly-packed, fine setae arranged in a narrow strip mid-dorsally), weakly to moderately developed, bicolourous (black setae anteriorly, white setae posteriorly) *Neolophonotus chionthrix*-group
- Thorax with scutal mane usually well-developed, unicolourous black (may be bordered by pale coloured setae; exceptions with white setae anteriorly and black setae posteriorly) *Neolophonotus comatus*-group
- 135. Thorax with scutal mane bicolourous (black setae anteriorly, black or yellow-white setae posteriorly) or unicolourous (white setae along entire length) *Neolophonotus pellitus*-group
- Thorax with scutal mane unicolourous black (often bordered by pale coloured setae; exceptions with white setae anteriorly and black setae posteriorly) *Neolophonotus squamosus*-group
- 136. Scutellum with 4 or more apical macrosetae 137
- Scutellum with 3 or fewer apical macrosetae (e.g., Figs 95, 127). 138

137. Head with facial swelling confined to lower $\frac{1}{2}$ of face; male terminalia with phallus straight. *Eremisca* Hull
 – Head with facial swelling well-developed; male terminalia with phallus strongly curved. *Machimus* Loew
138. Female abdominal sternites 1–5 pubescent, sternites 6–10 shiny and bare; female ovipositor telescopic, comprised of segment 6 and following abdominal segments. *Astochia* Becker
 – Female abdominal sternites 1–6 (at least) pubescent; female ovipositor more or less conical, comprised of segment 8 and following abdominal segments 139
139. Antennal stylus composed of 2 articles (1 segment-like article, plus apical seta-like sensory article) (some Malagasy species with 3 articles) 140
 – Antennal stylus composed of 3 articles (2 clearly evident segment-like articles, plus apical seta-like sensory article) 141
140. Mid femur swollen and with conspicuous cluster of well-developed macrosetae ventrally; proboscis curved upwards distally; thorax with dorsocentral macrosetae developed only postsuturally; female sternites 1–6 pubescent, sternites 7–9 shiny and bare; female cercus spinose, with well-developed macrosetae *Hoplophomerus* Becker & *Curvirostris* Tomasovic
 – Mid femur not conspicuously swollen, without cluster of well-developed macrosetae ventrally; proboscis straight; thorax with dorsocentral macrosetae developed pre- and postsuturally; female sternites 1–7 pubescent, sternites 8–9 shiny and bare; female cercus finely setose *Heligmonevra* Bigot
141. Thorax with postpronotal lobe (and much of scutum) clothed in uniformly short setae (some species have setae of intermediate length, Fig. 96); hind coxa usually with 2 lateral macrosetae (Fig. 96); male terminalia with epandrium with characteristic sub-apical dorsomedial lobe; male phallus straight, laterally compressed with at most tiny distal prongs; female ovipositor relatively short, only slightly laterally compressed distally *Afromochtherus* Lehr
 – Thorax with postpronotal lobe with fine, long setae (e.g., Fig. 128); hind coxa usually with 1 lateral macroseta (*Notomochtherus* with ca 3 long, weak setae, barely differentiated from accompanying setae, e.g., Fig. 128); male terminalia with epandrium and phallus differently developed; female ovipositor of various forms 142
142. Male terminalia with phallus strongly curved, exceptionally long, often coiled; terminal abdominal segments with characteristic deep (laterally compressed) appearance; hypandrium not markedly constricted medially *Valiraptor* Londt
 – Male terminalia with phallus more or less straight to bowed; terminal abdominal segments tubular, not laterally compressed; hypandrium slightly (*Notomochtherus*) to markedly constricted medially. 143
143. Hind femur uniformly dark red-brown to black (proximal or distal end may be paler) (e.g., Fig. 6) 144
 – Hind femur chiefly yellow, with or without distinct dark red-brown or blackish marks or fascia (e.g., Figs 9, 121). 146
144. Hind coxa with ca 3 weakly developed lateral macrosetae; male terminalia with phallus abruptly bent upwards at virtually mid length; female ovipositor broader than deep *Notomochtherus* Londt
 – Hind coxa with single lateral macroseta; male terminalia with phallus more or less straight or with slight curve. 145
145. Thorax with dorsocentral setae well-developed pre- and postsuturally; female terminalia with cercus finely setose; ovipositor laterally compressed; male terminalia with phallus of characteristic shape (shaft gently bowed, prongs short and weakly developed, sperm pump proximally situated (see Theodor 1976)) *Cerdistus* Loew
 – Thorax with dorsocentral setae only well-developed postsuturally (Figs 6, 128); female terminalia with cercus usually spinose, short macrosetae dorsally or finely setose with strongly sclerotised, upturned tip; ovipositor conical; male terminalia with phallus of characteristic development (more or less straight or slightly sinuous, prongs short and moderately well-developed, lateral pair upwardly directed, median prong downwardly directed, sperm pump distally situated (see Londt & Tsacas 1987)). *Congomochtherus* Oldroyd
146. Hind femur almost entirely yellow (may have poorly defined pale brown patches or dark distal ends) (e.g., Fig. 122) 147
 – Hind femur with well-defined dark red-brown patches or fascia (other than dark distal ends) (e.g., Fig. 9). 150

147. Antennal scape and trochanters blackish (e.g., Fig. 122) 148
 – Antennal scape and trochanters yellowish 149
148. Confined to Southern Africa. *Caenoura* Londt
 – Confined to Central Africa (*T. kivuensis* (Tsacas, 1969)). *Tsacasiella* Lehr [in part]
149. Head with facial swelling occupying ventral ½ of face and moderately developed; male terminalia not greatly elongate; epandrium with dorsomedial process; male gonocoxite not markedly elongate; gonostylus elongate, considerably longer than gonocoxite; phallus downwardly-curved distally, prongs minute. *Sphagomyia* Londt
 – Head with facial swelling occupying < ½ of face and only weakly developed; male terminalia greatly elongate; epandrium usually with small ventrodistal process; male gonocoxite, gonostylus and phallus long, narrow and relatively straight. *Tsacasiella* Lehr [in part]
150. Male abdominal sternite 8 with prominent distomedial process *Gongromyia* Londt
 – Male abdominal sternite 8 without prominent distomedial process. 151
151. Antennal postpedicel at least 2 × as long as scape; male terminalia with epandrium characteristically shaped, shortish, converging strongly distally; phallus bent abruptly upwards at virtually mid length and with 3 short, well-developed terminal prongs. *Dikowmyia* Londt
 – Antennal postpedicel < 2 × as long as scape; male terminalia with epandrium and phallus of different shape. 152
152. Male terminalia with epandrium with complicated arrangement of lobes and processes distally; female ovipositor shortish, broad proximally, laterally compressed distally *Aneomochtherus* Lehr
 – Male terminalia with epandrium simple, without lobes and processes; female ovipositor longish, laterally compressed for most of length *Melouromyia* Londt

Synopsis of the fauna

Ecological comments below follow Londt (1994c) and are based on personal observations as well as more recently available field photographs. The oviposition strategy is likewise based on personal observations together with ovipositor morphology.

***Acasilus* Londt** (Asilinae). An endemic monotypic genus, with the single medium-sized species, *A. tigrimontis* Londt, 2005, confined to South Africa (Londt 2005a). The species inhabits semi-desert habitat and adults probably perch within and/or at the tips of shrubs and bushes. Oviposition probably takes place on or in vegetation.

***Acnephalomyia* Londt** (Willistoninae). An endemic genus of seven small- to medium-sized, bee-like species (Figs 66, 85–88), confined to Southern Africa (Namibia and South Africa) (Londt 2010c). The genus inhabits desert, Fynbos, grassland, savanna, semi-desert and woodland habitats and adults perch on stones or on the ground (Fig. 66). Oviposition takes place in sand or soil. Londt (2010c) provided an identification key to the seven species.

***Afroesticrus* Scarbrough** (Ommatiinae). An endemic genus of 20 species of small- to large-sized flies (Figs 89, 90) described by Scarbrough (2005). The genus is widely distributed, in Southern Africa (Botswana, Mozambique, Namibia, South Africa and Zimbabwe), Central Africa (Angola, Cameroon, Chad, Democratic Republic of Congo, Gabon, Malawi, Republic of Congo and Zambia), East Africa (Burundi, Eritrea, Ethiopia, Kenya, Rwanda, Tanzania and Uganda), the southern Arabian Peninsula (Yemen), West Africa (Gambia, Ghana, Mali, Mauritania, Niger and Nigeria) and the Indian Ocean islands (Madagascar) (Scarbrough 2005). The genus inhabits savanna

and woodland habitats and adults perch either on the ground or within or at the tips of shrubs and bushes. The oviposition strategy remains unknown, but probably involves random egg-dropping. Other useful references on the genus include Londt (2010b, 2012a) and Tomasovic & De Bakker (2010). Scarbrough (2005) provided an identification key to species.

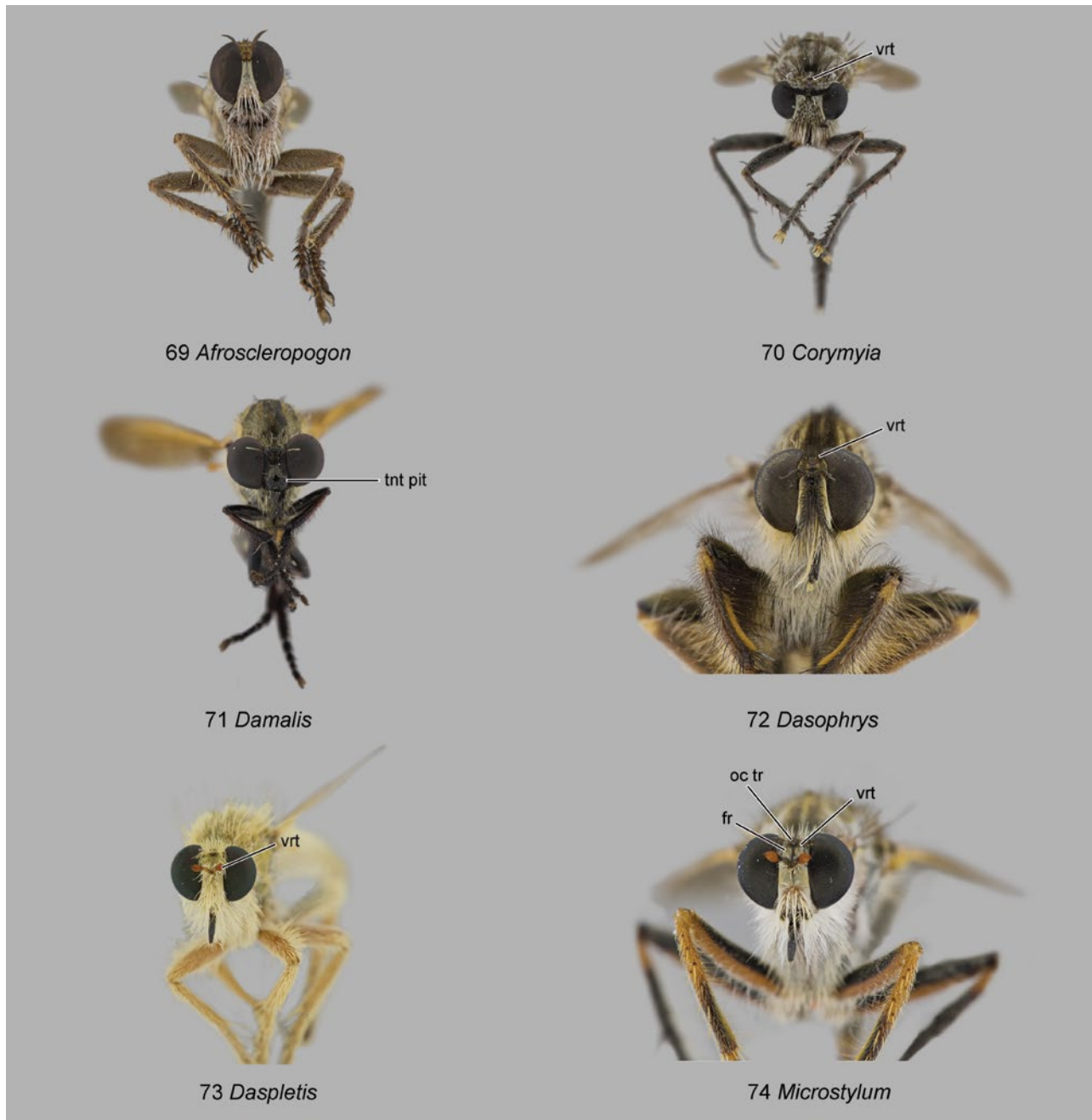
***Afroholopogon* Londt** (Brachyrhopalinae). An endemic genus of 19 described species of small- to medium-sized, bee-like species (Figs 18, 19, 91–94) (Londt 2005b). The distribution of the genus is centred in Southern Africa (Botswana, Namibia, South Africa, Swaziland and Zimbabwe), but is also recorded from East Africa (Eritrea and Kenya) and the southern Arabian Peninsula (Yemen and Oman). The genus inhabits grass in Fynbos, grassland, savanna, semi-desert and woodland habitats and adults perch either on rocks or within, or at the tips of grasses, shrubs and bushes (Figs 18, 19). Oviposition takes place in sand or soil. Other useful references to the genus include Londt (1994a). Londt (2005b) provided an identification key to all species.

***Afromelittodes* Oldroyd & Van Bruggen** (Laphriinae). An endemic genus of two large-sized, bee-mimicking species confined to Southern Africa: *A. mimos* Londt, 2003 and *A. solis* Oldroyd & Van Bruggen, 1963 (both from Namibia and South Africa) (Londt 2003). The genus inhabits savanna and woodland habitats and adults perch within trees. Oviposition takes place on or in vegetation. Other useful references to the genus include Oldroyd & Van Bruggen (1963). Londt (2003) provided an identification key to the two species.

***Afromochtherus* Lehr** (Asilinae). An endemic genus of 15 medium- to large-sized species (Figs 95, 96) reviewed by Londt (2002b) and Londt & Vieira (2013). The genus is fairly

widespread throughout the Afrotropics and occurs in Southern Africa (Botswana, Namibia, South Africa and Zimbabwe), Central Africa (Democratic Republic of Congo, Malawi and Zambia), East Africa (Kenya and Tanzania) and the Indian Ocean islands (Madagascar). The genus inhabits Fynbos, grassland,

savanna, semi-desert and woodland habitats and adults perch on the ground, on stones and rocks, within shrubs and bushes, or at the tips of branches. Oviposition takes place in sand or soil. Other useful references to the genus include Tomasovic (2006) and Tsacas (1969). An identification key to continental



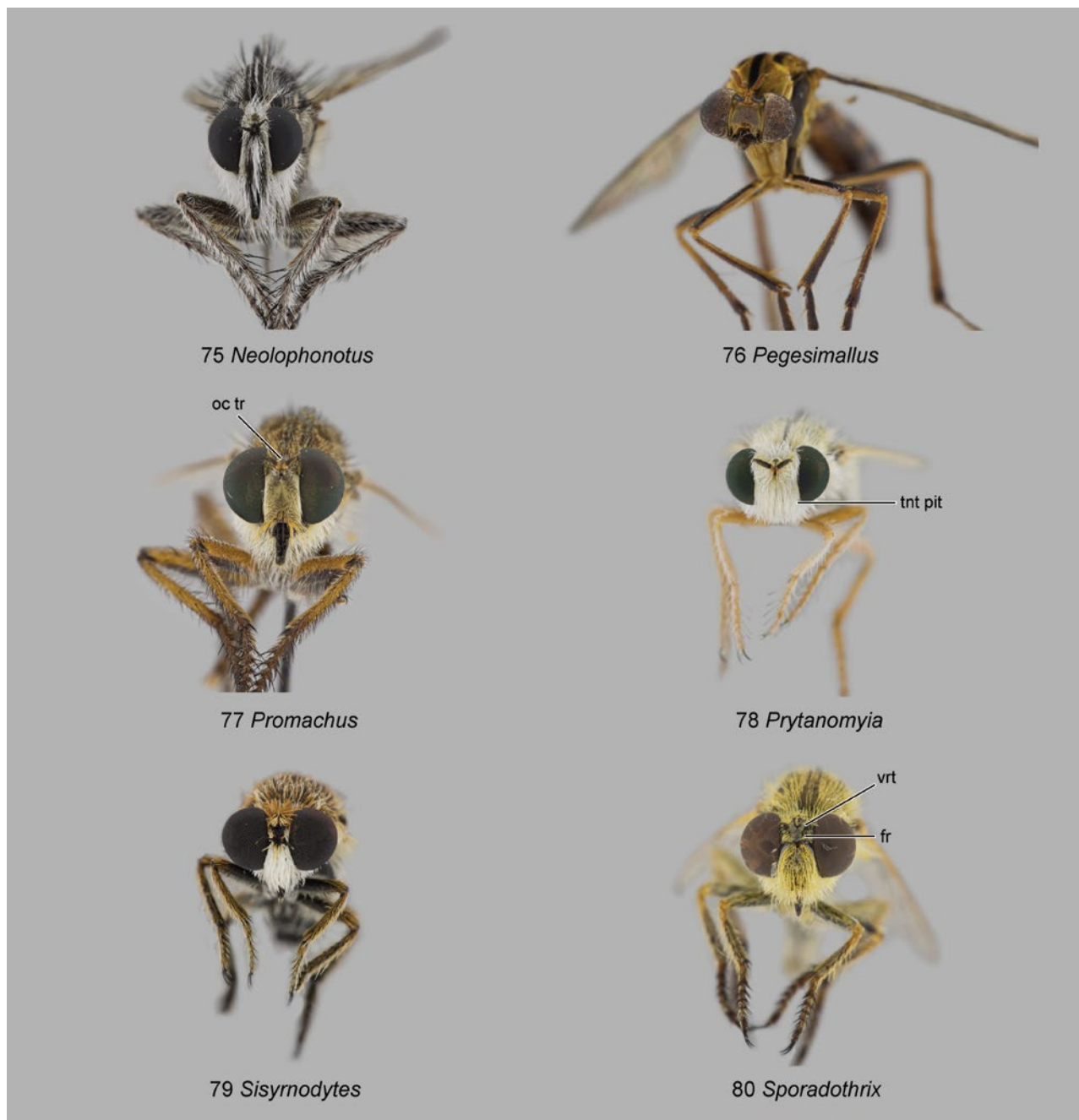
Figs 48.69–74. Heads of Afrotropical Asilidae (anterior views): (69) *Afoscleropogon* sp. ♀; (70) *Corymyia antimelas* Londt ♂; (71) *Damalis femoralis* Ricardo ♂; (72) *Dasophrys androclea* (Walker) ♂; (73) *Daspletis setithoracicus* (Ricardo) ♂; (74) *Microstylum* sp. ♂.

Abbreviations: fr – frons; oc tr – ocellar triangle; tnt pit – tentorial pit; vrt – vertex.

Afrotropical species was provided by Londt (2002c) and the Malagasy species by Londt & Vieira (2013).

***Afromosia* Londt** (Laphriinae). An endemic monotypic genus, with the single small-sized species, *A. barkemeyeri* Londt,

2015, confined to Central Africa (Cameroon) (Londt 2015a). The habitat and ecology of the species remain unknown, but it probably occurs at forest margins or in woodland savanna. Oviposition probably takes place through random egg-dropping or into vegetation.



Figs 48.75–80. Heads of Afrotropical Asilidae (anterior views): (75) *Neolophonotus* sp. ♂; (76) *Pegesimallus calvifrons* Londt ♀; (77) *Promachus amastrus* (Walker) ♂; (78) *Prytanomyia kochi* (Lindner) ♀; (79) *Sisyrnydites subater* Oldroyd ♀; (80) *Sporadothrix gracilis* Hermann ♂.

Abbreviations: fr – frons; oc tr – ocellar triangle; tnt pit – tentorial pit; vrt – vertex.

Afroscleropogon Londt (Stenopogoninae). An endemic genus of seven medium-sized species (Figs 69, 97, 98) confined to Southern Africa (Botswana, Namibia and South Africa) (Londt 1999d). The genus inhabits Fynbos, grassland, savanna and semi-desert habitats and adults perch on the ground. Oviposition takes place in sand or soil. A useful additional reference is Oldroyd (1974), who treated species under the name *Stenopogon* Loew. Londt (1999d) provided an identification key to species.

Agrostomyia Londt (Brachyrhopalinae). An endemic monotypic genus, with the single medium-sized species, *A. dimorpha* Londt, 1994, confined to Southern Africa (Namibia and South Africa) (Londt 1994b). Other useful references include Londt (1999d). The species inhabits savanna and grassland habitats and adults perch on the ground or within grass. Oviposition takes place in sand or soil.

Akatiomyia Londt (*incerta sedis*). An endemic monotypic genus, with the single small-sized, black species, *A. eremnos* Londt, 2013, confined to Southern Africa (South Africa) (Londt 2013a). The species inhabits Fynbos habitats and adults perch at the tips of shrubs and bushes. Oviposition takes place in sand or soil.

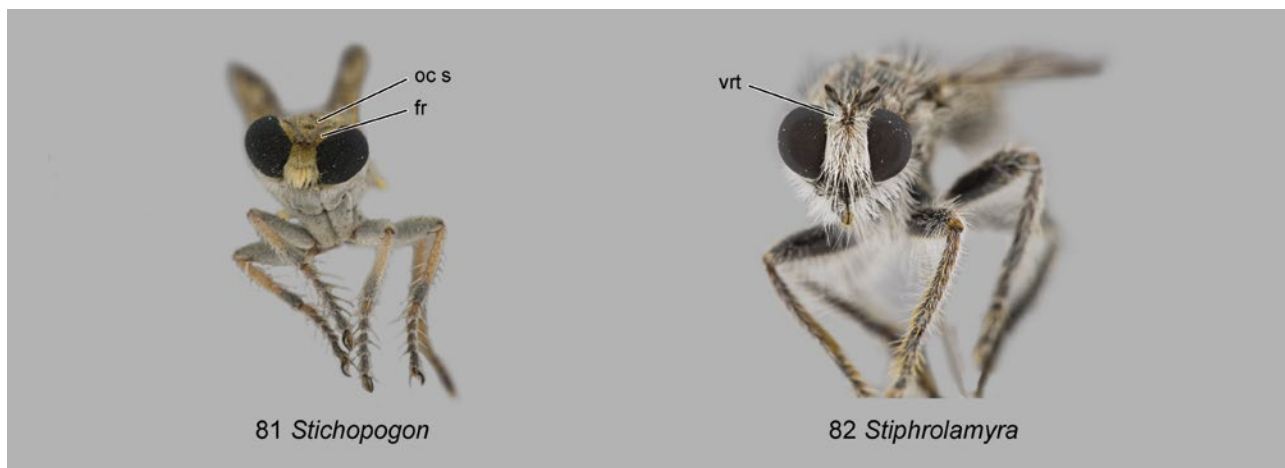
Alcimus Loew (Asilinae). A medium-sized genus of 18 described very large-sized species (Figs 2, 3, 99, 100), requiring modern revision. Currently, considered an Afrotropical endemic, although it may occur in the south-western Palearctic Region. The genus is widespread throughout sub-Saharan Africa, being recorded from Southern Africa (South Africa and Zimbabwe), Central Africa (Malawi), East Africa (Ethiopia, Kenya, Sudan, Tanzania and Uganda) and West Africa (Gambia and Senegal). The genus inhabits grassland, savanna and woodland habitats and adults perch on the ground, including river banks, on rocks, or at the tips of shrubs and bushes (Figs 2, 3). Oviposition takes place in sand or soil. Some biological information was provided by Cuthbertson (1933, 1934, 1935,

1936, 1937, 1938, 1939) and Engel & Cuthbertson (1934). Other useful references include Engel & Cuthbertson (1934), Londt (2005a, 2010b) and Oldroyd (1974). No identification key to Afrotropical species is currently available.

Ammodaimon Londt (Willistoninae). A small endemic genus of two small-sized, bee-like species (Figs 101, 102), *A. acares* Londt, 1985 and *A. platythrix* Londt, 2010, confined to Southern Africa (Namibia) (Londt 1985c). Unpublished records indicate that the genus also occurs in South Africa. The genus inhabits grassland and semi-desert habitats and adults perch on the ground. Oviposition takes place in sand or soil. Londt (2010c) provided an identification key to the two species.

Ammophilomima Enderlein (Leptogastrinae). A medium-sized genus of 41 large-sized species (Figs 103, 104), recorded from the Afrotropical and Oriental Regions and reviewed by Janssens (1953) and Martin (1973). The ten Afrotropical species are recorded from Central Africa (Cameroon and Democratic Republic of Congo), East Africa (Burundi and Kenya) and West Africa (Nigeria), although most species are recorded from Democratic Republic of Congo. There are unpublished records of the genus from Angola, Central African Republic, Côte d'Ivoire, Equatorial Guinea, Gabon, Ghana, Liberia, Malawi, Mozambique, Togo and Uganda. The biology remains unknown, but the genus probably inhabits forest habitats and adults perch within or at the tips of shrubs and bushes. Oviposition probably takes place through random egg-dropping. Other useful references include Janssens (1955) and Oldroyd (1970). Martin (1973) provided an identification key to Afrotropical species.

Amphisbetetus Hermann (Brachyrhopalinae). A genus of 12 small-sized, often bee-like species (Figs 105, 106), primarily known from the south-western Palearctic Region, but also recorded from the Australasian Region. The single Afrotropical species, *A. hermanni* Bosák & Hradský, 2011, is confined to the southern Arabian Peninsula (United Arab Emirates) (Bosák



Figs 48.81–82. Heads of Afrotropical Asilidae (anterior views): (81) *Stichopogon hermanni* Bezzi ♂; (82) *Stiphrolamyra diaxantha* (Hermann) ♂.

Abbreviations: fr – frons; oc tr – ocellar triangle; vrt – vertex.

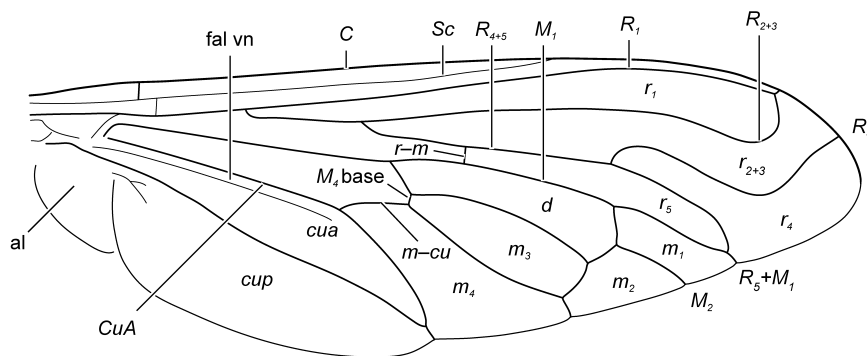
& Hradský 2011: 729). Other useful references include Eflatoun (1937) and Theodor (1980). The biology remains unknown, but the genus probably inhabits semi-desert habitats and adults probably perch on the ground or on low vegetation. Oviposition takes place in sand or soil.

Anasillomos Londt (Stenopogoninae). An endemic genus of two medium-sized species (Figs 107, 108), *A. chrysopos* Londt, 1983 and *A. juergeni* Dikow, 2015, confined to Southern Africa (Botswana, Namibia and South Africa) (Dikow 2015). The genus inhabits grassland, savanna and semi-desert habitats and adults perch on the ground. Oviposition takes place in sand or soil. Other useful references include Dikow & Londt (2000b) and Londt (1983c). Dikow (2015) provided an identification key to the two species.

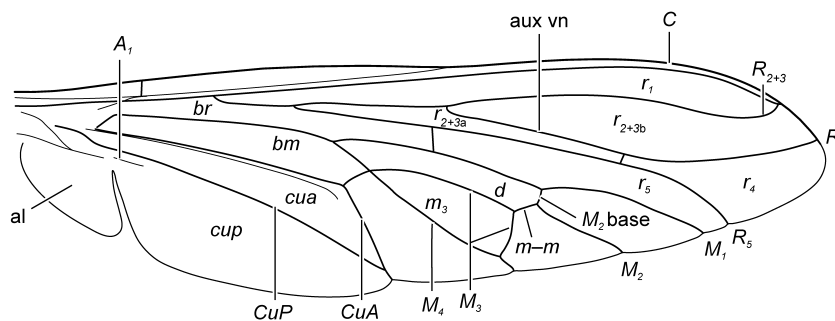
Ancylorhynchus Berthold (Stenopogoninae). A large genus of 50 medium- to large-sized, wasp-like species (Figs 109, 110, 292–294, 298–300), occurring in the Afrotropical, Australasian,

Oriental and Palaearctic Regions. The 27 Afrotropical species were reviewed by Londt (2011) and are widespread throughout sub-Saharan Africa, recorded from Southern Africa (Botswana, Lesotho, Mozambique, Namibia, South Africa, Swaziland and Zimbabwe), Central Africa (Angola, Democratic Republic of Congo, Malawi and Zambia), East Africa (Burundi, Eritrea, Kenya, Somalia, Sudan and Tanzania) and West Africa (Côte d'Ivoire, Gambia, Ghana and Nigeria). The genus inhabits forest (possibly), Fynbos, grassland, savanna, semi-desert and woodland habitats and adult perch on the ground, on rocks and at the tips of grass. Oviposition takes place in sand or soil. Some biological information was provided by Cuthbertson (1935, 1936). Other useful references include Bromley (1936), Oldroyd (1970, 1974) and Londt (2010b). Londt (2011) provided an identification key to Afrotropical species.

Andrenosoma Rondani (Laphriinae). A genus of 64 medium- to large-sized species, occurring in all zoogeographical



83 *Hoplistomerus*



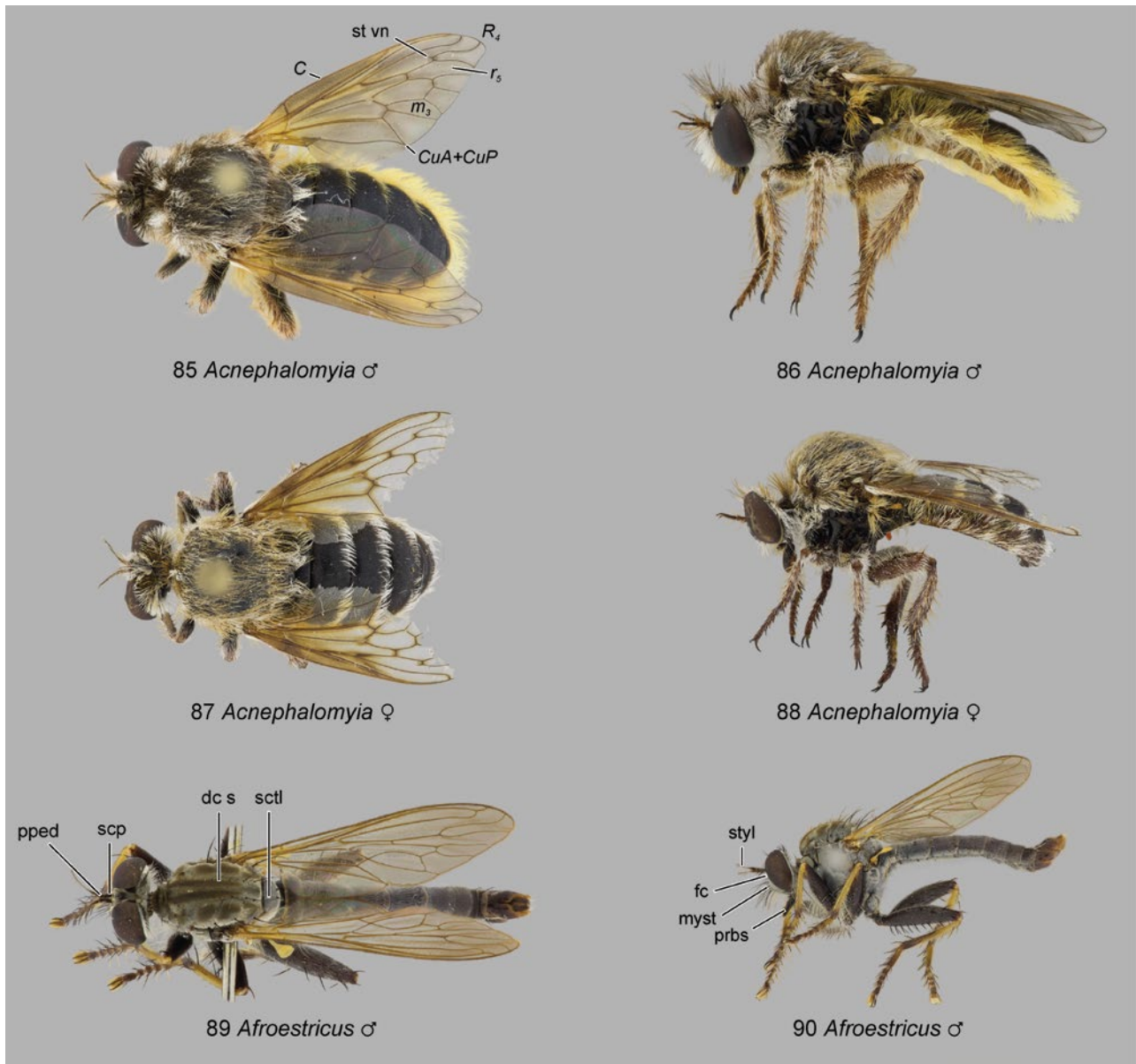
84 *Promachus*

Figs 48.83–84. Wings of Afrotropical Asilidae (dorsal views): (83) *Hoplistomerus nobilis* Loew; (84) *Promachus amastrus* (Walker).

Abbreviations: A_1 – first branch of anal vein; al – alula; aux vn – auxiliary vein; bm – basal medial cell; br – basal radial cell; C – costal vein; CuA – anterior branch of cubital vein; cua – anterior cubital cell; CuP – posterior branch of cubital vein; cup – posterior cubital cell; d – discal cell; fal vn – false vein; M_1 – first branch of media; m_1 – first medial cell; M_2 – second branch of media; m_2 – second medial cell; M_3 – third branch of media; m_3 – third medial cell; M_4 – fourth branch of media; m_4 – fourth medial cell; m-cu – medial-cubital crossvein; m-m – medial crossvein; R_1 – anterior branch of radius; r_1 – first radial cell; R_{2+3} – second branch of radius; r_{2+3} – second + third radial cell; r_4 – fourth radial cell; R_4 – upper branch of third branch of radius; R_{4+5} – third branch of radius; r_5 – fifth radial cell; R_5 – lower branch of third branch of radius; R_5+M_1 – lower branch of third branch of radius + first branch of media; r-m – radial-medial crossvein; Sc – subcostal vein.

regions, except Antarctica. Two species occur in the Afrotropical Region, *A. boranicum* Corti, 1895 and *A. serpentina* (Bezzi, 1908), that are widespread throughout sub-Saharan Africa, recorded from Southern Africa (South Africa and Zimbabwe), Central Africa (Democratic Republic of Congo and Malawi), East Africa (Ethiopia and Kenya) and West Africa (Côte d'Ivoire). The biology is poorly known, but species probably inhabit forest, savanna and woodland habitats and

adults probably perch within shrubs, bushes and trees. Oviposition takes place in vegetation. The immature stages of the extralimital species, *Andrenosoma cruentum* (McAtee, 1919) (Figs 320–323) were described by Dennis & Barnes (2014). Other useful references include Engel & Cuthbertson (1937), Oldroyd (1970), the unpublished thesis of Fisher (1986) and Tomasovic (2010). No identification key to Afrotropical species is currently available.



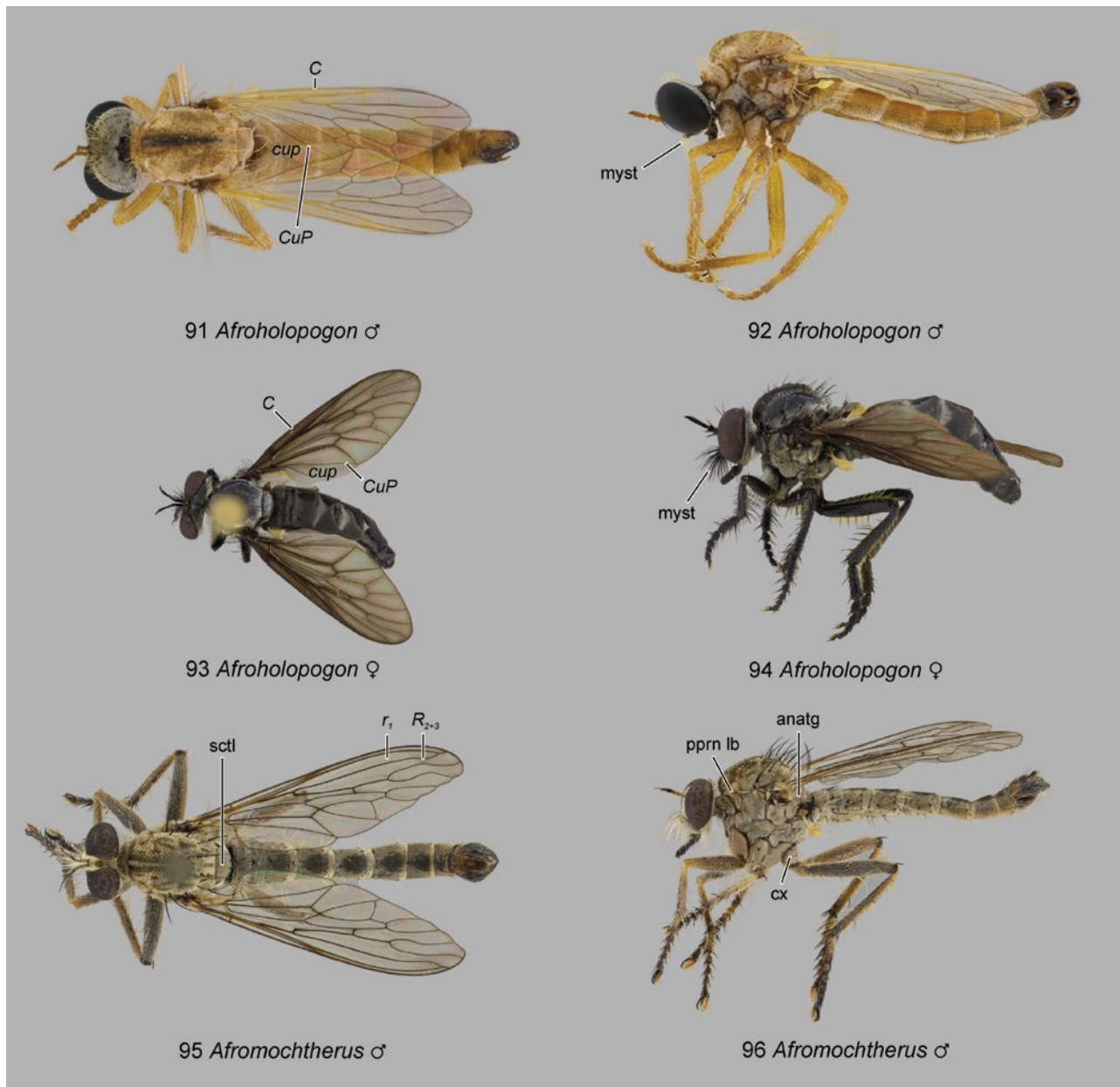
Figs 48.85–90. Habitus photographs of Asilidae: (85) *Acnephalomyia* sp. ♂, dorsal view; (86) same, lateral view; (87) *Acnephalomyia* sp. ♀, dorsal view; (88) same, lateral view; (89) *Afroesticus chiastoneurus* (Speiser) ♂, dorsal view; (90) same, lateral view.

Abbreviations: C – costal vein; CuA+CuP – anterior branch of cubital vein + posterior branch of cubital vein; dc s – dorsocentral seta; fc – face; m_3 – third medial cell; myst – mystax; pped – postpedicel; prbs – proboscis; R_4 – upper branch of third branch of radius; r_5 – fifth radial cell; scp – scape; sctl – scutellum; st vn – stump vein; styl – stylus.

***Aneomochtherus* Lehr** (Asilinae). A genus of 63 medium-sized species, occurring in the Afrotropical, Oriental and Palearctic Regions. The three Afrotropical species, *A. africanus* (Ricardo, 1919), *A. deserticolus* (Karsch, 1888) and *A. monobia* (Speiser, 1910), are confined to East Africa (Kenya and Tanzania) and were reviewed by Londt (2002b). Habitat requirements of the genus remain unknown, but probably comprise savanna and woodland habitats and adults probably

perch within and/or at the tips of trees and shrubs. Oviposition takes place on or in vegetation. Londt (2002b) provided an identification key to Afrotropical species.

***Antiscylaticus* Londt** (Brachyrhopalinae). An endemic monotypic genus, with the single medium-sized species, *A. snowi* Londt, 2010, confined to West Africa (Gambia) (Londt 2010b, 2012a). The species inhabits grassland habitats and



Figs 48.91–96. Habitus photographs of Asilidae: (91) *Afroholopogon* sp., dorsal view ♂; (92) same, lateral view; (93) *Afroholopogon* sp., dorsal view ♀; (94) same, lateral view; (95) *Afromochtherus mendax* (Tsacas), dorsal view ♂; (96) same, lateral view.

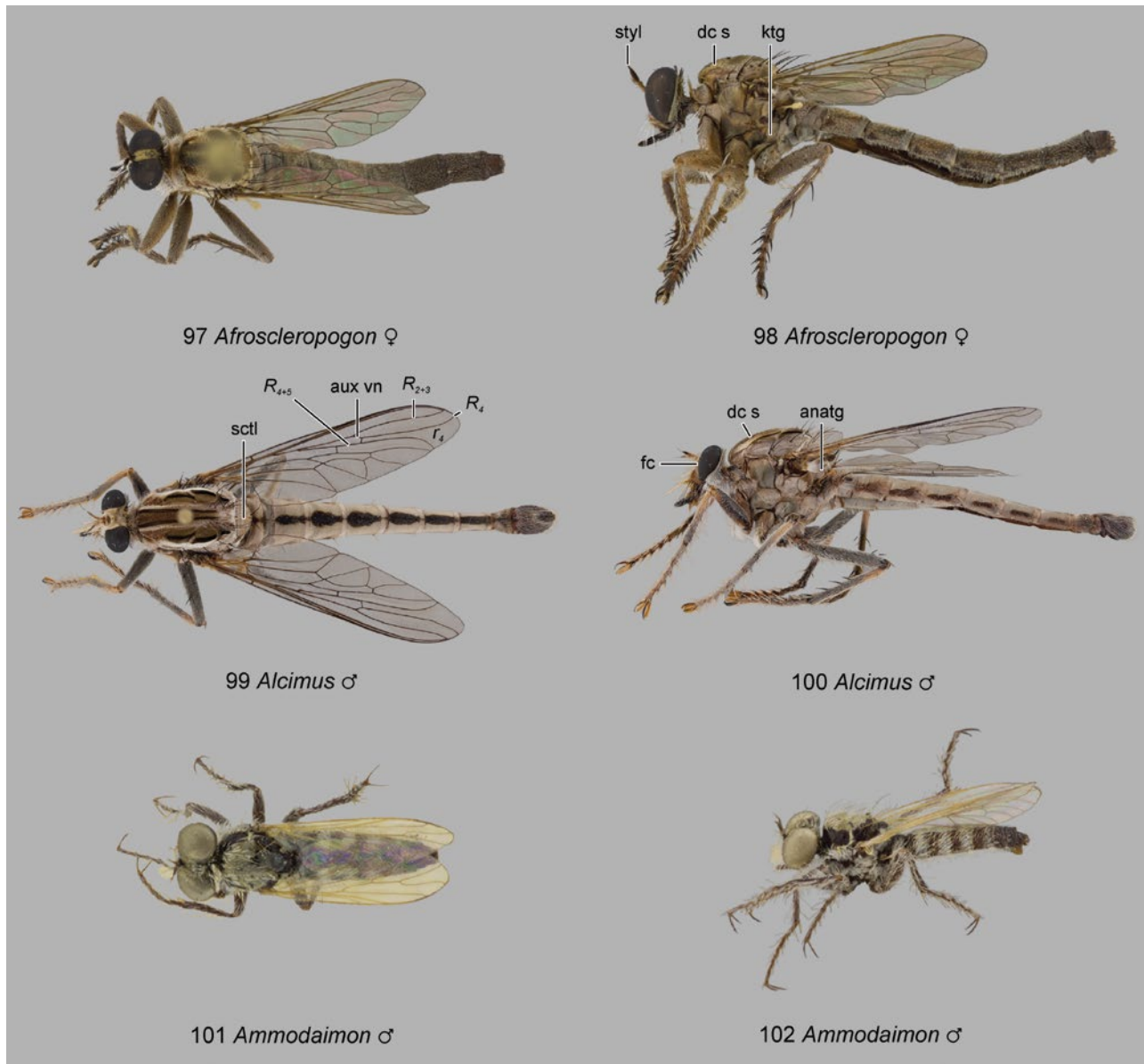
Abbreviations: anatg – anatergite; C – costal vein; CuP – posterior branch of cubital vein; cup – posterior cubital cell; cx – coxa; myst – mystax; pprn lb – postpronotal lobe; r_1 – first radial cell; R_{2+3} – second branch of radius; sctl – scutellum.

adults probably perch on the ground or within and at the tips of grass. Oviposition takes place in sand or soil.

***Anypodetus* Hermann** (Laphriinae). An endemic genus of eight medium-sized, bee-like species (Figs 25, 26, 111, 112, 264–266) reviewed by Londt (2000a). The genus is more or less confined to Southern Africa (Botswana, Mozambique, Namibia, South Africa and Zimbabwe) and Central Africa (Zambia). The genus inhabits open sandy places in forest, grassland,

savanna, semi-desert and woodland habitats and adults perch on the ground, but have also been observed to perch on low vegetation (Figs 25, 26). The oviposition strategy is unknown, but probably takes place directly into sand. Other useful references include Oldroyd (1974). Londt (2000a) provided an identification key to species.

***Apoclea* Macquart** (Asilinae). A genus of 21 medium-sized species (Figs 4, 5, 113–116), occurring in the Afrotropical,



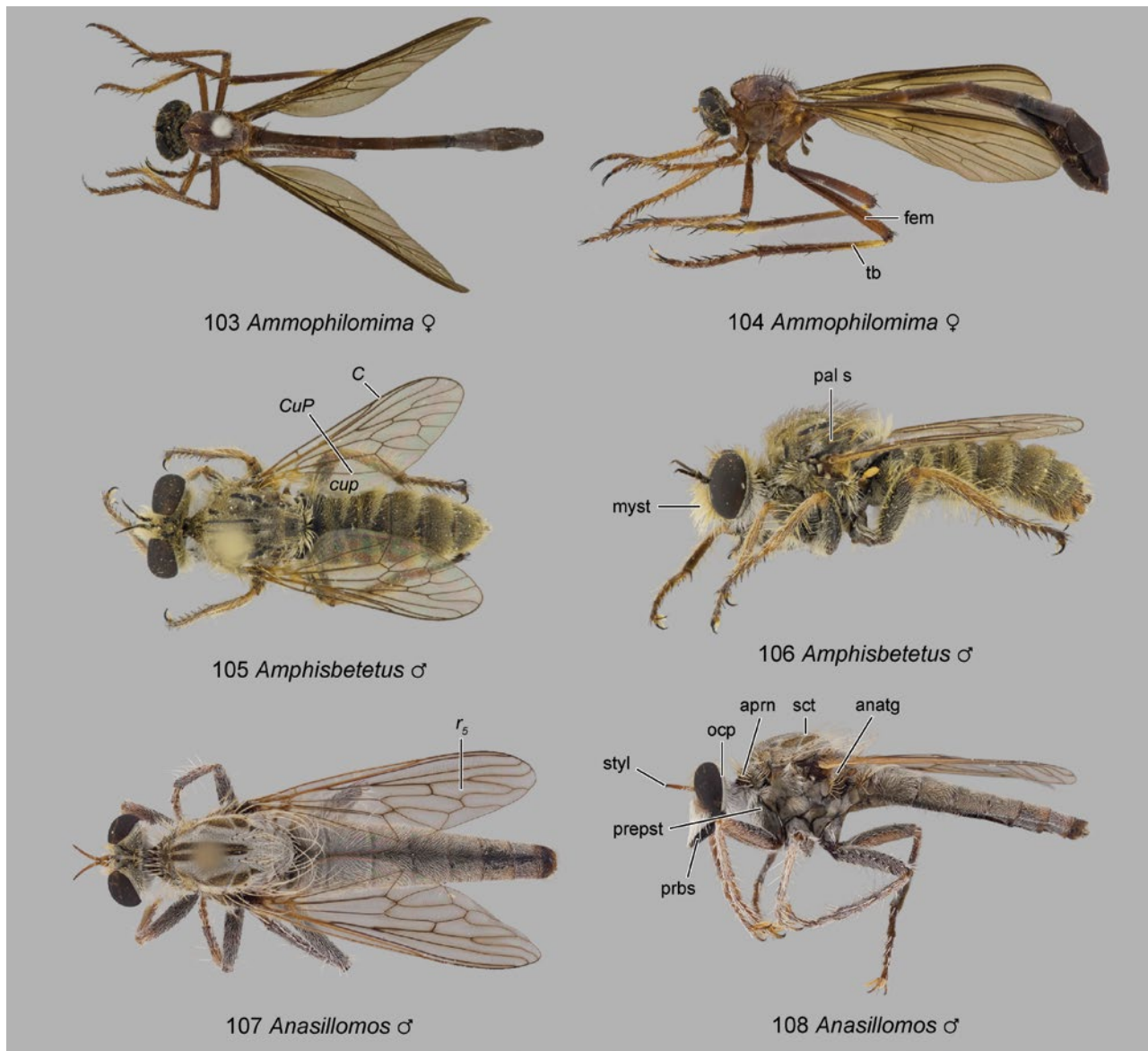
Figs 48.97–102. Habitus photographs of Asilidae: (97) *Afroscleropogon* sp., dorsal view ♀; (98) same, lateral view; (99) *Alcimus* sp., dorsal view ♂; (100) same, lateral view; (101) *Ammodaimon* sp., dorsal view ♂; (102) same, lateral view.

Abbreviations: anatg – anatergite; aux vn – auxiliary vein; dc s – dorsocentral seta; fc – face; ktg – katatergite; R_{2+3} – second branch of radius; r_4 – fourth radial cell; R_4 – upper branch of third branch of radius; R_{4+5} – third branch of radius; sctl – scutellum; styl – stylus.

Oriental and Palearctic Regions. Four species are recorded from the Afrotropics, from East Africa (Sudan), the southern Arabian Peninsula (Oman, United Arab Emirates and Yemen) and West Africa (Niger). Unpublished records are also known for Djibouti and Senegal. The genus inhabits desert and semi-desert habitats and adults perch on the ground or on low vegetation (Figs 4, 5). Oviposition probably takes place in sand or soil. Other useful references include Bosák & Hradský

(2011), Eflatoun (1934, 1937), Londt (2005a) and Walker & Pittaway (1987). No identification key to Afrotropical species is currently available.

***Astiptomyia* Londt** (Willistoninae). An endemic monotypic genus, with the single small, bee-like species, *A. bikos* Londt, 2010 (Figs 117, 118), confined to Southern Africa (Namibia) (Londt 2010c). The species inhabits desert and semi-desert



Figs 48.103–108. Habitus photographs of Asilidae: (103) *Ammophilomima auripennis* Janssens, dorsal view ♀; (104) same, lateral view; (105) *Amphisbetetus favillaceus* (Loew), dorsal view ♂ (non-Afrotropical); (106) same, lateral view; (107) *Anasillomos juergeni* Dikow, dorsal view ♀; (108) same, lateral view.

Abbreviations: anatg – anatergite; aprn – antepronotum; C – costal vein; CuP – posterior branch of cubital vein; cup – posterior cubital cell; fem – femur; myst – mystax; ocp – occiput; pal s – postalar seta; prbs – proboscis; prepst – proepisternum; r_5 – fifth radial cell; sct – scutum; styl – stylus; tb – tibia.

habitats and adults probably perch on the ground. Oviposition takes place in sand or soil.

Astochia Becker (Asilinae). A genus of 44 large-sized species, occurring in the Afrotropical, Australasian (possibly), Oriental and Palaearctic Regions (Geller-Grimm 2004). Five species reviewed by Londt (1982b) occur in the Afrotropics that are widespread throughout sub-Saharan Africa, recorded from Southern Africa (South Africa and Zimbabwe), Central Africa (Democratic Republic of Congo and Malawi), East Africa (Kenya, Tanzania and Uganda), the southern Arabian Peninsula (Yemen) and West Africa (Nigeria and Sierra Leone). The genus inhabits savanna and woodland habitats and adults perch at the tips of grass, shrubs and bushes. Oviposition takes place on or in vegetation. Other useful references include Londt (2002b). Londt (1982b) provided an identification key to the five Afrotropical species.

Bana Londt (Stenopogoninae). An endemic genus described by Londt (1992b), comprising two large-sized, bee-like species (Figs 119, 120), *B. apicida* Londt, 1992 and *B. madiba* Londt, 2013, confined to Southern Africa (Namibia and South Africa) (Londt 2013b). The genus inhabits grassland, savanna and semi-desert habitats and adults perch on the ground or at the tips of grass, shrubs and bushes. Oviposition takes place in sand or soil. Londt (2013b) provided an identification key to the two species.

Caenoura Londt (Asilinae). An endemic genus of two small-to medium-sized species (Figs 121, 122), described by Londt (2002b), *C. annularis* (Loew, 1858) and *C. sinuatus* (Loew, 1858), confined to Southern Africa (Lesotho, South Africa and Zimbabwe). The genus inhabits grassland, savanna and woodland habitats and adults perch within grass. Oviposition takes place on or in vegetation. Londt (2002b) provided an identification key to the two species.

Caroncoma Londt (Dasypogoninae). An endemic monotypic genus described by Londt (1980b), with the single medium-sized species, *C. atrimaculatus* (Oldroyd, 1960), confined to the Indian Ocean islands (Madagascar). The species probably inhabits forest habitats and adults probably perch on the ground or within or at the tips of shrubs and bushes. Oviposition takes place in sand or soil. Other useful references include Oldroyd (1960a).

Cerdistus Loew (Asilinae). A genus of 64 medium-sized species, occurring in the Afrotropical, Australasian (doubtfully), Oriental and Palaearctic Regions (Geller-Grimm 2004). The single Afrotropical species, *C. griseola* (Oldroyd, 1960), was recorded from Madagascar by Oldroyd (1960b), but remains doubtful and requires revision, along with Palaearctic species. Geller-Grimm (2002) further records an undescribed species from Socotra Is. (Yemen). The genus inhabits either forest (Madagascar) or semi-desert (Socotra Is.) habitats and adults perch within and/or at the tips of shrubs and bushes. Oviposition probably takes place on or in vegetation. Other useful references include Londt (2002b).

Choerades Walker (Laphriinae). A genus of 75 medium-sized, bee-like species (Figs 27, 123, 124), occurring in the Afrotropical, Australasian, Oriental and Palaearctic Regions. Twenty-five species occur in the Afrotropics, but the genus requires modern revision. Londt (1977) reviewed the Southern

African species, while Londt (2015a) discussed the genus and transferred species then catalogued as *Laphria* to this and other genera. Species of the genus are widespread throughout sub-Saharan Africa, recorded from Southern Africa (Mozambique, South Africa and Zimbabwe), Central Africa (Cameroon, Democratic Republic of Congo, Gabon, Malawi and Republic of Congo), East Africa (Uganda) and West Africa (Côte d'Ivoire, Gambia, Ghana, Liberia, Nigeria and Sierra Leone). A single record for an Indian Ocean island (Seychelles) requires confirmation. The genus inhabits forest habitats (including thick coastal bush) and adults perch at the tips of shrubs, bushes and trees and within trees. Oviposition takes place on or in vegetation (wood). Some biological information (as *Laphria*) was provided by Cuthbertson (1936). Other useful references include Oldroyd (1970), who produced a key to Afrotropical *Laphria*, that includes species now assigned to *Choerades*, Oldroyd (1974), who keyed the Southern African species (also under the name *Laphria*), Bromley (1935), Tomasovic (2007, 2008a) and Londt (2015a). No useful identification key to Afrotropical species is currently available.

Clinopogon Bezzi (Stichopogoninae). A genus of nine medium-sized species (Figs 125, 126), occurring in the Afrotropical, Australasian, Oriental and Palaearctic Regions. Two species occur in the Afrotropics, *C. nicobarensis* (Schiner, 1868) and *C. reginaldi* (Séguy, 1955). This littoral genus is distributed along almost the entire eastern coastline of Africa (*C. nicobarensis*) and Tromelin Is. (*C. reginaldi*). The genus inhabits maritime beach habitats and adults perch on the ground. Oviposition takes place in sand or soil. Other useful references include Londt & Copeland (2017), Oldroyd (1974) and Séguy (1955). Although Londt (1979b) briefly reviewed the Afrotropical species, the genus requires modern revision and no identification key to Afrotropical species is currently available.

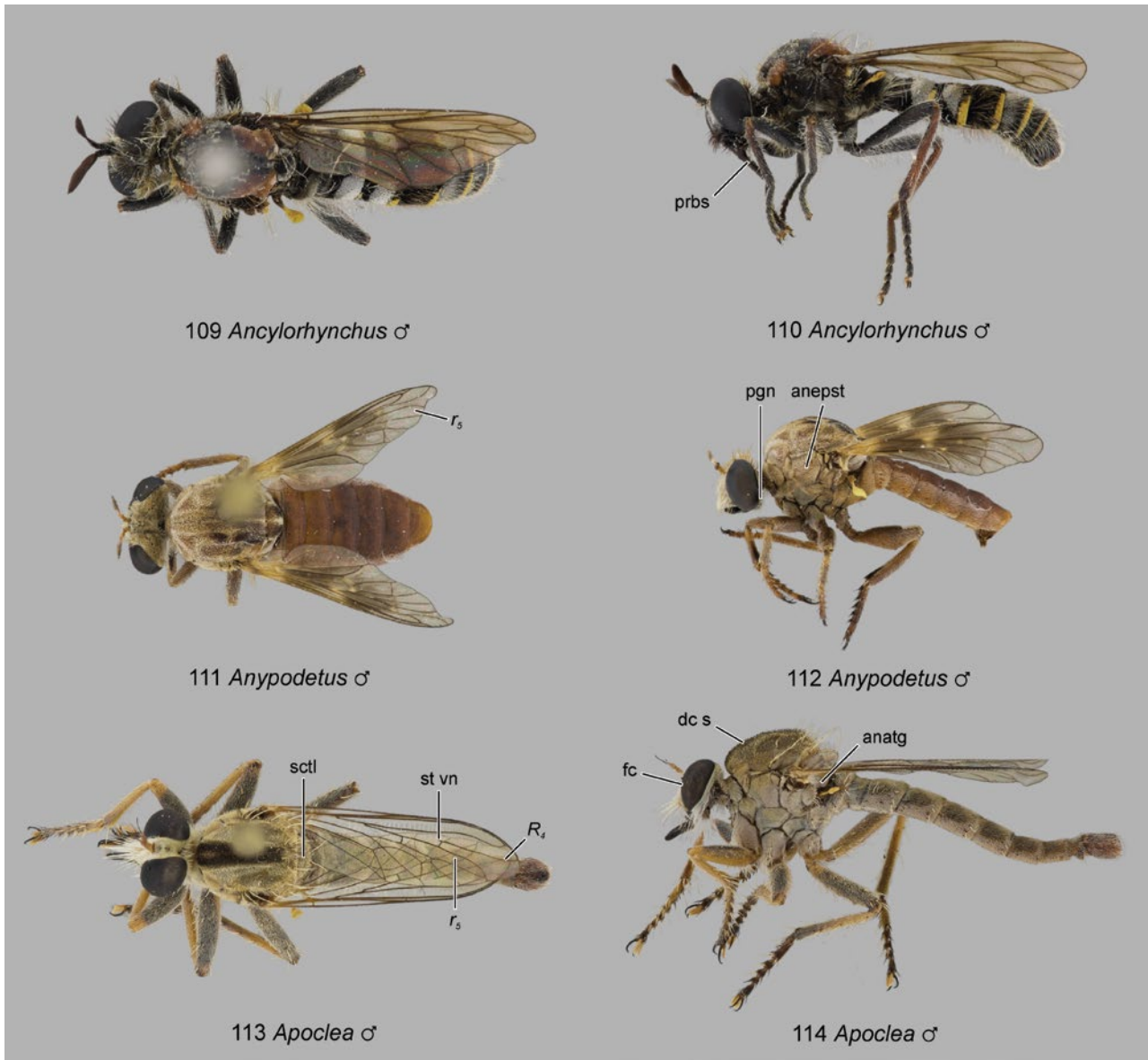
Congomochtherus Oldroyd (Asilinae). An endemic genus of seven medium-sized species (Figs 6, 127, 128), reviewed by Londt & Tsacas (1987) and Londt (2014c). The genus is widespread throughout sub-Saharan Africa, recorded from Southern Africa (Namibia, South Africa and Zimbabwe), Central Africa (Angola, Cameroon, Democratic Republic of Congo, Republic of Congo and Zambia), East Africa (Kenya, Tanzania and Uganda) and West Africa (Nigeria). The genus inhabits Fynbos, grassland, savanna and woodland habitats and adults perch on the ground, on stones, riverbanks and other riparian habitats, including rocks surrounded by water (Fig. 6). Oviposition probably takes place in riverine sand or soil. Other useful references include Londt (2002b) and Oldroyd (1970). Londt (2014c) provided an identification key to the seven species.

Connomyia Londt (Stenopogoninae). A near endemic genus of 22 medium-sized, bee-like species (Figs 129, 130), occurring in the Afrotropical and Oriental Regions. The 20 Afrotropical species were reviewed by Londt (1993c) and are widespread throughout sub-Saharan Africa, recorded from Southern Africa (Botswana, Lesotho, Mozambique, Namibia, South Africa and Zimbabwe), Central Africa (Angola, Democratic Republic of Congo and Malawi), East Africa (Eritrea, Kenya and Tanzania) and West Africa (Burkina Faso, Gambia, Mali, Nigeria and Senegal). The genus inhabits Fynbos, grassland, savanna and woodland habitats and adults perch on the ground. Oviposition

takes place in sand or soil. Other useful references include Londt (2010b). Londt (1993c) provided an identification key to Afrotropical species.

***Cophinopoda* Hull** (Ommatiinae). A genus of 11 large- to very large-sized species (Figs 46, 131, 132), occurring in the Afrotropical, Australasian, Oriental and Palearctic Regions. Five species occur in the Afrotropics, that were reviewed by Tsacas & Artigas (1994) and are confined to the Indian Ocean

islands of Comoros, Europa Is., Madagascar (incl. Sainte-Marie Is.), Mauritius (Maurice Is.), Réunion Is., Seychelles (incl. Aldabra and Cosmoledo Is.) and Socotra Is. (Yemen). The biology remains unknown, but species apparently inhabit “dry forest, scrub” and other island vegetation and adults probably perch at the tips of shrubs and bushes (Fig. 46). The oviposition strategy probably involves random egg-dropping. Other useful references include Martin (1964). Tsacas & Artigas (1994) provided an identification key to the five Afrotropical species.



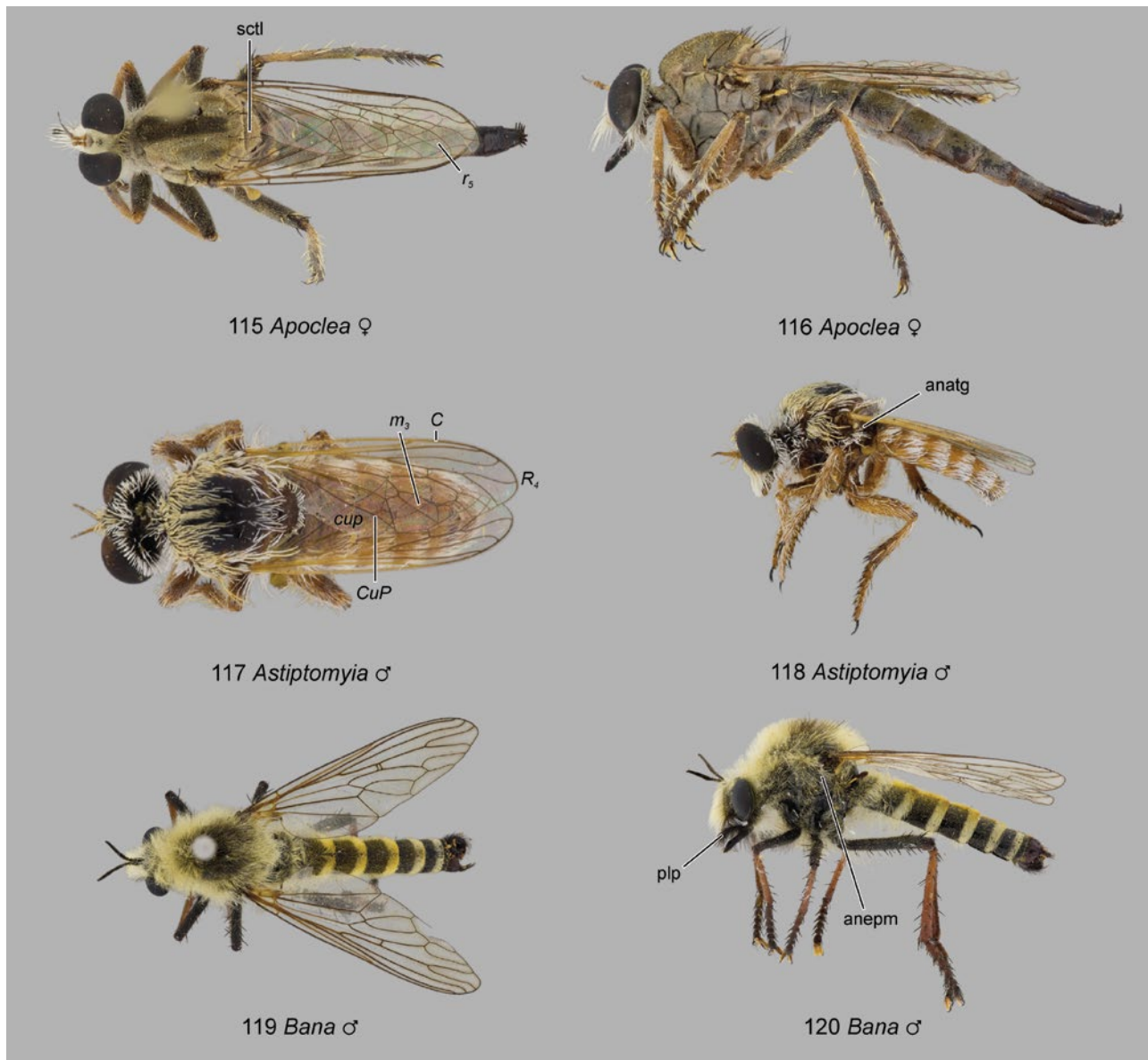
Figs 48.109–114. Habitus photographs of Asilidae: (109) *Ancyloerhynchus unifasciatus* (Loew), dorsal view ♂; (110) same, lateral view; (111) *Anypodetus fascipennis* Engel, dorsal view ♂; (112) same, lateral view; (113) *Apoclea* sp., dorsal view ♂; (114) same, lateral view.

Abbreviations: anatg – anatergite; anepst – anepisternum; dc s – dorsocentral seta; fc – face; pgn – postgena; prbs – proboscis; R_4 – upper branch of third branch of radius; r_5 – fifth radial cell; sctl – scutellum; st vn – stump vein.

Corymyia Londt (Stenopogoninae). An endemic genus of four small-sized species (Figs 70, 133–136), confined to Southern Africa (South Africa) (Londt 1994b). The genus inhabits grassland, Fynbos and semi-desert habitats and adults perch on the ground. Oviposition takes place in sand or soil. Londt (1994b) provided an identification key to the four species.

Ctenota Loew (Laphriinae). A genus of seven medium- to large-sized species, occurring in the Afrotropical and Palaearctic

Regions. Two species occur in the Afrotropics, *C. molitrix* Loew, 1873 and *C. ruficornis* (Wulp, 1899), confined to the southern Arabian Peninsula (United Arab Emirates and Yemen) and East Africa (Sudan). The genus most probably inhabits semi-desert habitats and adults probably perch on the ground, on stones or in riparian habitats. Oviposition takes place in sand or soil. Other useful references include Efflatoun (1934), who provided an excellent description of the type species (*C. molitrix*), which occurs in Egypt, Hull (1962), Theodor (1980) and Bosák



Figs 48.115–120. Habitus photographs of Asilidae: (115) *Apoclea* sp., dorsal view ♀; (116) same, lateral view; (117) *Astiptomyia bikos* Londt, dorsal view ♂; (118) same, lateral view; (119) *Bana apicida* Londt, dorsal view ♂; (120) same, lateral view.

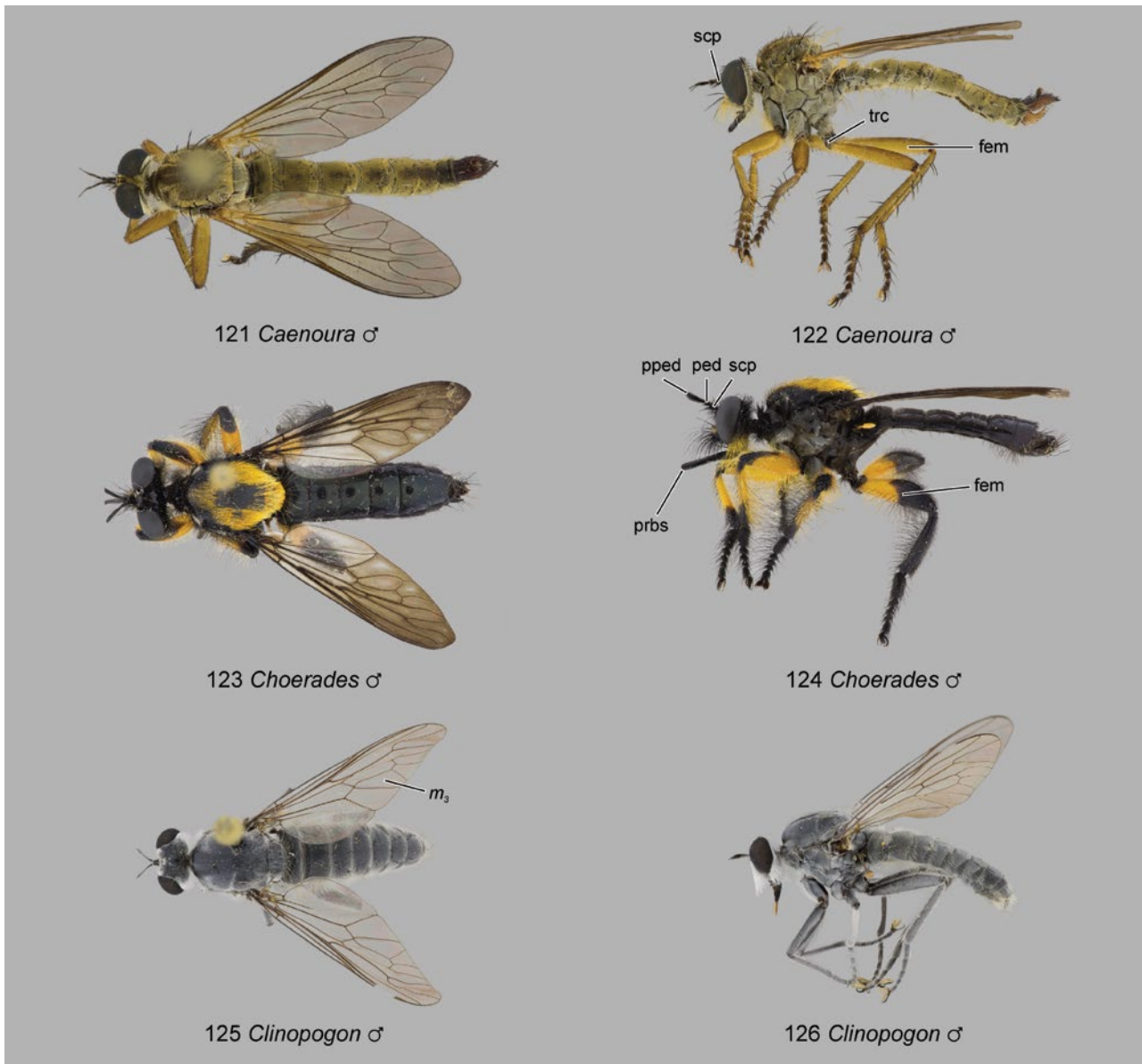
Abbreviations: anatg – anatergite; anepm – anepimeron; C – costal vein; CuP – posterior branch of cubital vein; cup – posterior cubital cell; m_3 – third medial cell; plp – palpus; R_4 – upper branch of third branch of radius; r_5 – fifth radial cell; sct – scutellum.

& Hradský (2011). No identification key to Afrotropical species is currently available.

Curvirostris Tomasovic (Asilinae). An endemic monotypic genus, with the single large-sized species, *C. dupontae* Tomasovic, 2015, confined to West Africa (Côte d'Ivoire) (Tomasovic 2015). The species inhabits forest margin habitats and adults probably perch at the tips of shrubs, bushes and trees. The oviposition strategy remains unknown. *Curvirostris* and

Hoplopheromerus key out together in the above identification key and these genera are potentially synonymous.

Damalis F. (Trigonimiminae). A large genus of 107 medium-sized species (Figs 62, 63, 71, 137–140, 307–309), occurring in the Afrotropical, Oriental and Palaearctic Regions. Thirty-five species are recorded from the Afrotropics, which were reviewed by Londt (1989a) and Oldroyd (1960a). The genus is widespread throughout the Afrotropics, recorded from



Figs 48.121–126. Habitus photographs of Asilidae: (121) *Caenoura annulitarsis* (Loew), dorsal view ♂; (122) same, lateral view; (123) *Choerades bella* (Loew), dorsal view ♂; (124) same, lateral view; (125) *Clinopogon nicobarensis* (Schiner), dorsal view ♂; (126) same, lateral view.

Abbreviations: fem – femur; m₃ – third medial cell; ped – pedicel; pped – postpedicel; prbs – proboscis; scp – scape; trc – trochanter.

Southern Africa (Mozambique, South Africa and Zimbabwe), Central Africa (Angola, Cameroon, Central African Republic, Democratic Republic of Congo, Malawi and Zambia), East Africa (Kenya, Tanzania and Uganda), West Africa (Benin, Côte d'Ivoire, Ghana, Guinea, Liberia, Nigeria and Sierra Leone) and the Indian Ocean islands (Madagascar). Aspects of the biology of *D. femoralis* Ricardo, 1925 were published by Londt (1991). The genus inhabits forest (margins), Fynbos, grassland, savanna and woodland habitats and adults perch within grass and at the tips of grass, shrubs, bushes and trees (Figs 62, 63). Oviposition takes place through random egg-dropping. Some biological information was provided by Cuthbertson (1938, as *Lophurodamalis* Hermann) and eggs and larvae were described by Londt (1991). Londt (1989a) and Oldroyd (1960a) provided identification keys to the continental Afrotropical and Malagasy species, respectively.

Danomymia Londt (Stenopogoninae). An endemic genus of nine medium-sized, bee-like species, centred in Southern Africa (Botswana, South Africa and Zimbabwe), but also recorded from Central Africa (Chad) and East Africa (Sudan) (Londt 1993c). The genus inhabits grassland, savanna and woodland habitats and adults perch on the ground. Oviposition takes place in sand or soil. Londt (1993c) provided an identification key to the nine species.

Dasophrys Loew (Asilinae). A large endemic genus of 32 medium- to large-sized species (Figs 7, 72, 141, 142), reviewed by Londt (1981b) who later added an additional species (Londt 1985a). The genus is confined to Southern Africa (Lesotho, Mozambique, Namibia, South Africa, Swaziland and Zimbabwe) and inhabits forest and woodland habitats and adults perch within and at the tips of shrubs and bushes (Fig. 7). Oviposition takes place on or in woody vegetation. Some biological information was provided by Cuthbertson (1936). Other useful references include Londt (2005a). Londt (1981b) provided the most recent identification key to species, but see Londt (1985a) for an additional species.

Daspletis Loew (Stenopogoninae). An endemic genus of nine medium- to very large-sized species (Figs 49–51, 73, 143, 144), confined to Southern Africa (Botswana, Namibia, South Africa, Zimbabwe) (Londt 2010a), with unpublished records from Mozambique. Tomasovic (2016) described a new species from Gabon, but the generic assignment is questionable. The genus inhabits grassland, savanna and semi-desert habitats and adults perch on the ground or on low vegetation (Figs 49–51). Oviposition takes place in sand or soil. Other useful references include Londt (1983c, 1985a) and Tomasovic & Constant (2013). Londt (2010a) provided the most recent identification key to species, but see Tomasovic (2016) for an additional species.

Dasyllina Bromley (Laphriinae). An endemic monotypic genus, with the single large-sized, bee-like species, *D. fulvithorax* Bromley, 1935, confined to Central Africa (Democratic Republic of Congo). The biology remains unknown, but the species probably inhabits forest or woodland habitats and adults probably perch within or at the tips of shrubs, bushes and trees. Oviposition probably takes place on or in vegetation. Other useful references include Bromley (1935), Londt (1988b) and Oldroyd (1970).

Dichaethyrea De Meijere (Laphriinae). A genus of two small-sized species, occurring in the Afrotropical and Oriental Regions. The single Afrotropical species, *D. calvifrons* Londt, 1982, is confined to the Indian Ocean islands (Madagascar) (Londt 1982a). The biology remains unknown, but the species probably inhabits forest habitats and adults probably perch within and/or at the tips of shrubs and bushes. Oviposition probably takes place through random egg-dropping.

Dichropogon Bezzi (Stichopogoninae). A genus of five small-sized species, occurring in the Afrotropical and Palaearctic Regions. *Dichropogon* was formerly treated as a subgenus of *Stichopogon* (Geller-Grimm 2004; Hull 1962), but was recently elevated to full generic status for south-western Palaearctic species. A single species, *D. tenebrosus* Bosák & Hradský, 2011, is recorded from the Afrotropics, confined to the southern Arabian Peninsula (United Arab Emirates) (Bosák & Hradský 2011: 741). The biology of the species remains unknown, but is probably similar to that of semi-desert inhabiting *Stichopogon* species, with adults probably perching on the ground. Oviposition takes place in sand or soil.

Dikowmyia Londt (Asilinae). An endemic monotypic genus, with the single medium-sized species, *D. mediorus* Londt, 2002, confined to Southern Africa (South Africa) (Londt 2002b). The species inhabits grassland habitats and adults probably perch within and at the tips of grass. Oviposition probably takes place in or on vegetation.

Diocobroma Hull (Stenopogoninae). An endemic monotypic genus, with the single medium-sized species, *D. flavoterminalis* Hull, 1962, confined to Southern Africa (Botswana and Namibia) (Hull 1962). The biology of the species remains unknown, but it probably inhabits grassland, savanna and semi-desert habitats and adults probably perch on the ground. Oviposition takes place in sand or soil. Other useful references include Londt (1983c) and Dikow & Londt (2000b).

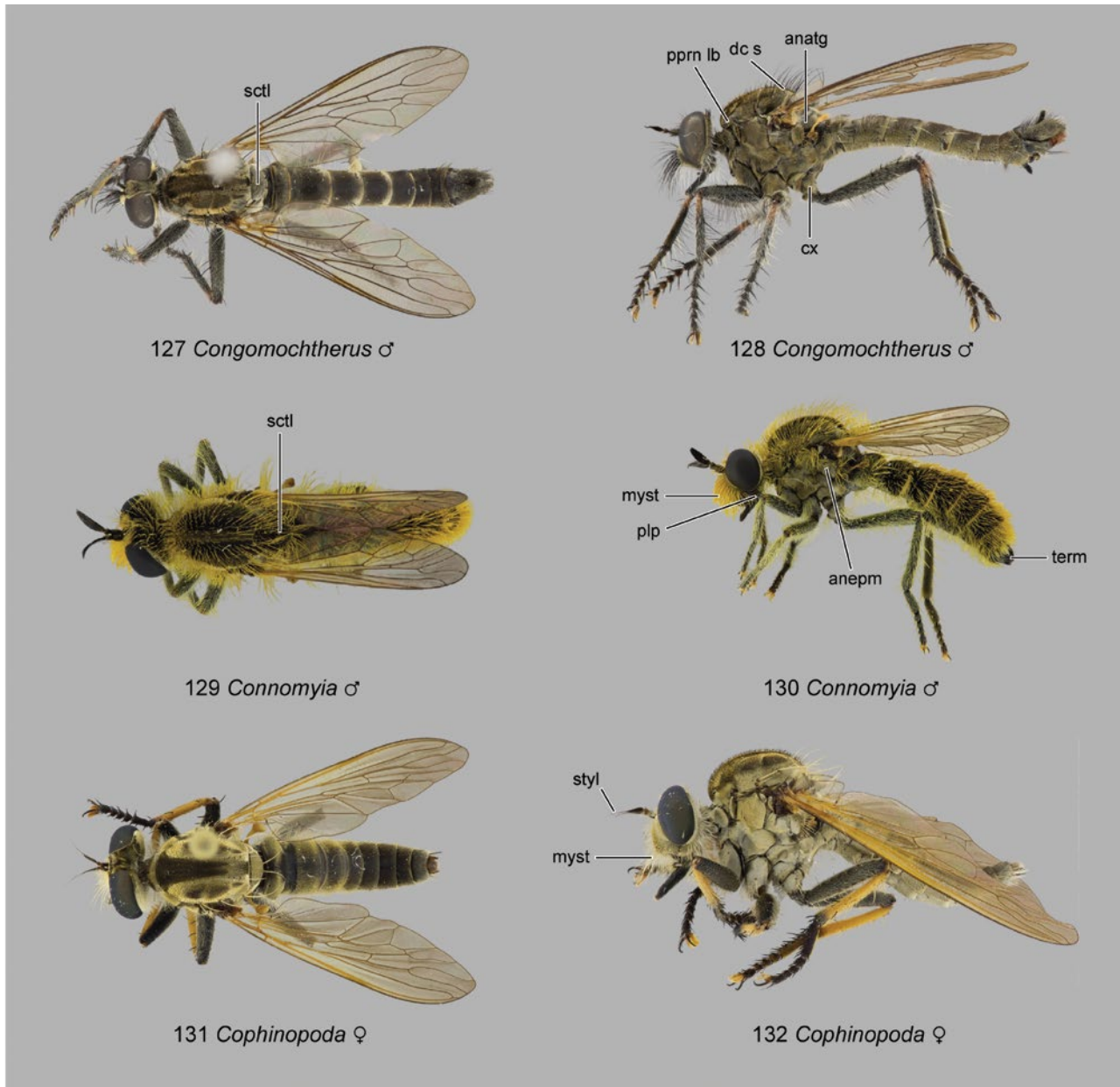
Dogonia Oldroyd (Stenopogoninae). An endemic monotypic genus, with the single medium- to large-sized species, *D. saegeri* Oldroyd, 1970, confined to Central Africa (Democratic Republic of Congo). The genus was described by Oldroyd (1970) and was reviewed by Londt (2008a). The biology of the species remains unknown, but it probably inhabits forest habitats and adults probably perch on the ground or at the tips of shrubs and bushes. Oviposition takes place in sand or soil.

Dysclytus Loew (Asilinae). An endemic monotypic genus, with the single large-sized species, *D. firmatus* Walker, 1857, confined to Southern Africa (South Africa) (Londt 1979a). The species inhabits savanna and woodland habitats and adults perch at the tips of shrubs and bushes. Oviposition takes place on or in vegetation. Other useful references include Londt (2005a) and Oldroyd (1974).

Emphysomera Schiner (Ommatiinae). A genus of 21 medium-sized species (Figs 145, 146), occurring in the Afrotropical, Australasian and Oriental Regions. Four species are recorded from the Afrotropics, that are widespread and recorded from Southern Africa (Botswana, Mozambique, South Africa, Swaziland and Zimbabwe), Central Africa (Chad, Democratic Republic of Congo, Gabon, Malawi and Zambia), East Africa (Kenya, Tanzania and Uganda), West Africa (Côte d'Ivoire,

Gambia, Ghana, Guinea, Liberia, Senegal and Sierra Leone) and the Indian Ocean islands (Madagascar) (Scarbrough & Marascia 1996). The genus inhabits forest and woodland habitats and adults perch at the tips of shrubs and bushes. Oviposition takes place through random egg-dropping. Other useful references include Londt (2010b). Scarbrough & Marascia (1996) provided an identification key to the four species.

***Empodiodes* Oldroyd** (Stenopogoninae). An endemic genus of four small- to medium-sized species, confined to Southern Africa (Namibia and South Africa). The genus was described by Oldroyd (1972) and was reviewed by Londt (1992a, 2012c). The genus inhabits grassland, Fynbos and savanna habitats and adults perch on the ground. Oviposition takes place in sand or soil. Londt (2012c) provided an identification key to the four species.



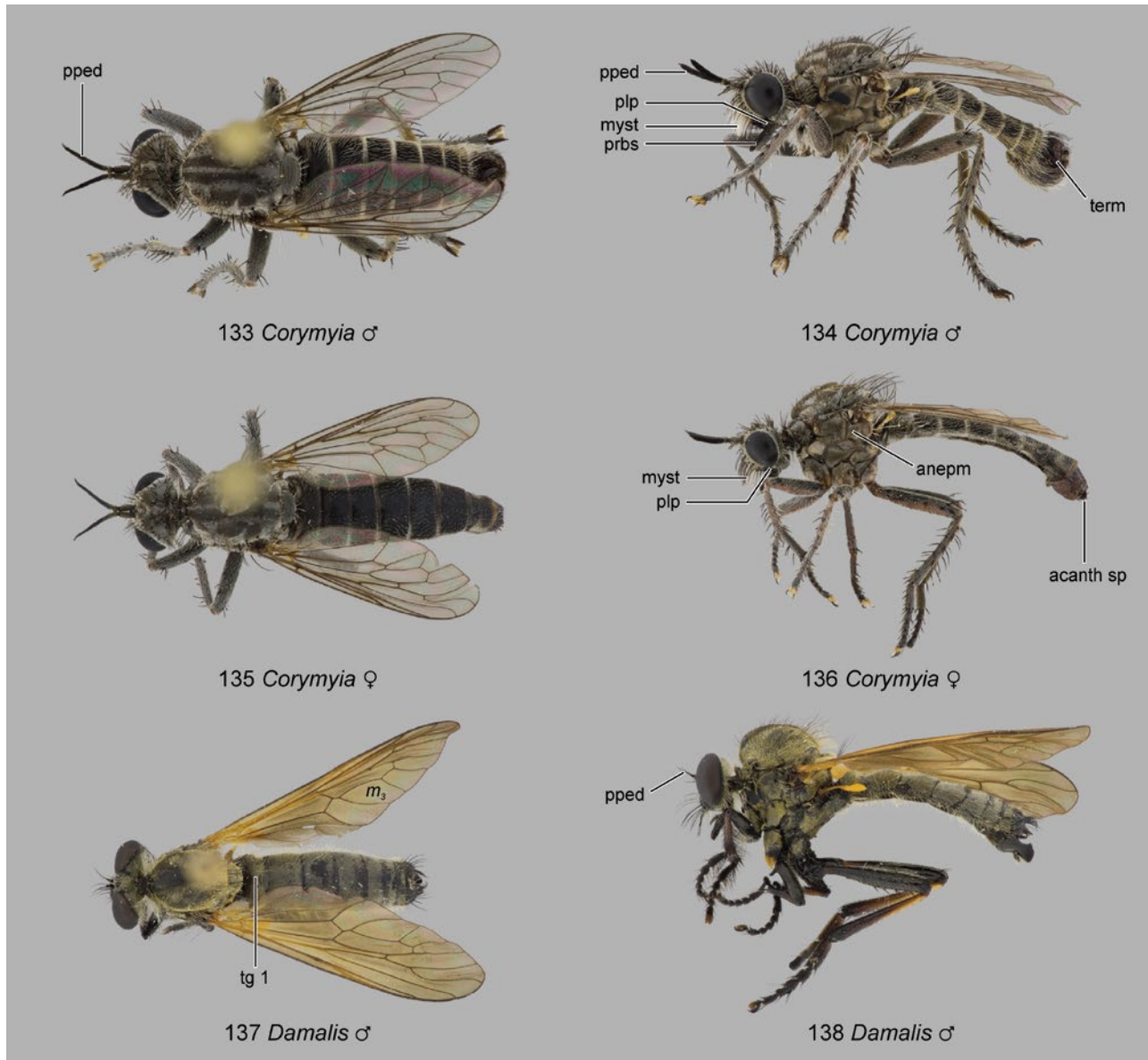
Figs 48.127–132. Habitus photographs of Asilidae: (127) *Congomochtherus elferinki* Londt & Tsacas, dorsal view ♂; (128) same, lateral view; (129) *Connomyia leonina* (Engel), dorsal view ♂; (130) same, lateral view; (131) *Cophinopoda pulchripes* (Bigot), dorsal view ♀; (132) same, lateral view.

Abbreviations: anatg – anatergite; anepm – anepimeron; cx – coxa; dc s – dorsocentral seta; myst – mystax; plp – palpus; pprn lb – postpronotal lobe; sctl – scutellum; styl – stylus; term – terminalia.

Erax Scopoli (Asilinae). A genus of 27 medium-sized species occurring in the Afrotropical and Palearctic Regions. Three species, *E. albiceps* Macquart, 1850, *E. costalis* (Wulp, 1899) and *E. nigrotinctus* (Becker, 1909), occur in the Afrotropics, confined to East Africa (Kenya) and the southern Arabian Peninsula (Yemen). The genus probably inhabits desert and semi-desert habitats and adults probably perch on the ground. The oviposition strategy remains unknown, but may take place in sand or soil. Other useful references include

Londt (2005a). No identification key to Afrotropical species is currently available.

Eremisca Hull (Asilinae). A genus of 17 medium-sized species (Fig. 8), occurring in the Afrotropical and Palearctic Regions. The single Afrotropical species, *E. heleni* (Efllatoun, 1934), is confined to the southern Arabian Peninsula (Oman and United Arab Emirates) (Lehr 1988b). The genus probably inhabits desert and semi-desert habitats and adults perch on



Figs 48.133–138. Habitus photographs of Asilidae: (133) *Corymyia melas* Londt, dorsal view ♂; (134) same, lateral view; (135) *C. antimelas* Londt, dorsal view ♀; (136) same, lateral view; (137) *Damalis femoralis* Ricardo, dorsal view ♂; (138) same, lateral view.

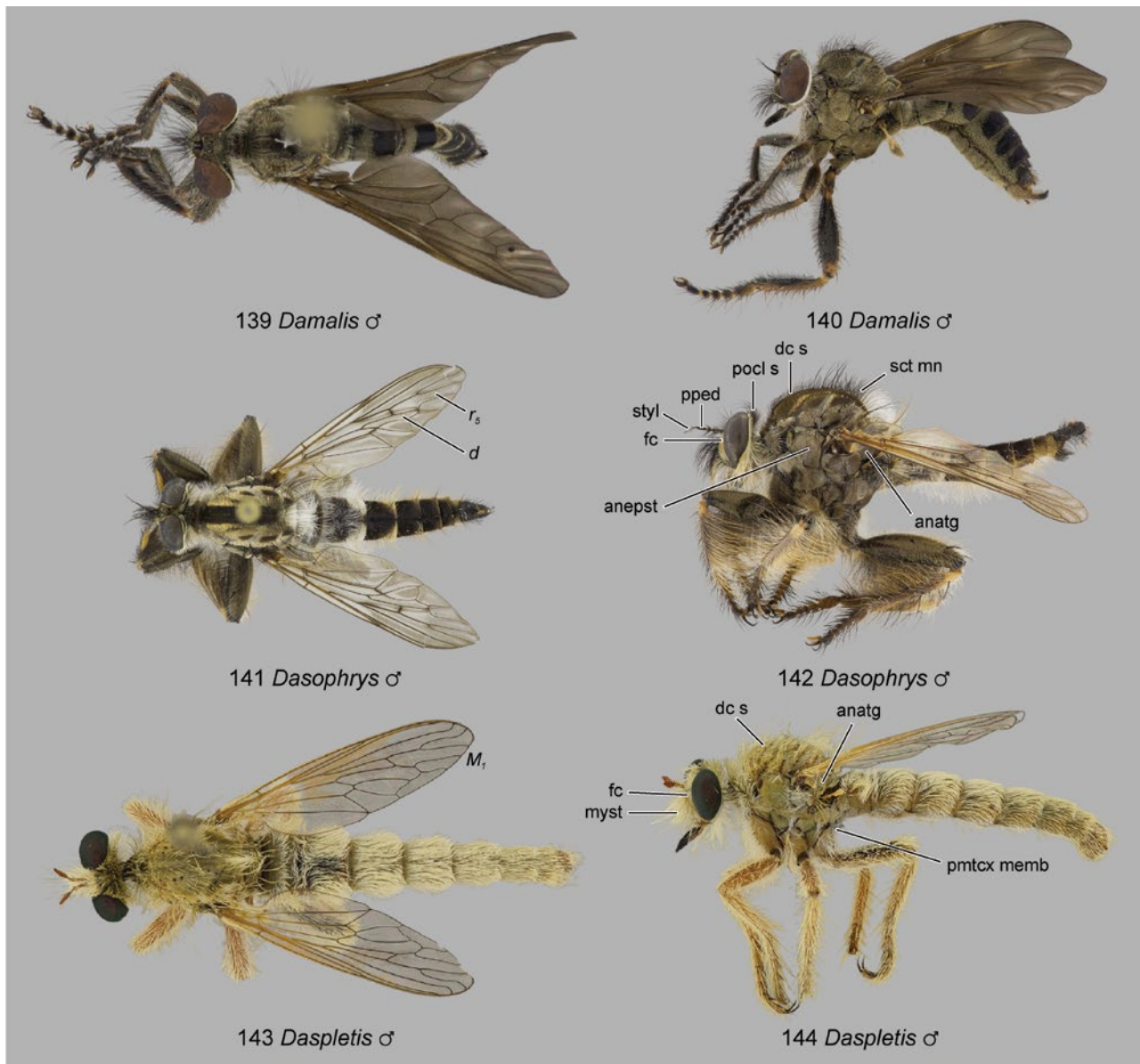
Abbreviations: acanth sp – acanthophorite spine; anepm – anepimeron; m_3 – third medial cell; myst – mystax; plp – palpus; pped – postpedicel; prbs – proboscis; term – terminalia; tg – tergite.

the ground (Fig. 8). Oviposition probably takes place in sand or soil. Other useful references include Bosák & Hradský (2011) and Theodor (1980).

***Ericomyia* Londt** (Laphriinae). An endemic monotypic genus, with the single medium-sized, bee-like species, *E. atomentosa* (Oldroyd, 1960), confined to the Indian Ocean islands (Madagascar) (Londt 2015a). The biology of the species

remains unknown, but it probably inhabits forest habitats and adults probably perch at the tips of shrubs, bushes and trees. Oviposition may involve random egg-dropping or placement of eggs on or in dead wood. Other useful references include Oldroyd (1960a).

***Euscelidia* Westwood** (Leptogastrinae). A large genus of 68 medium-sized species (Figs 42, 147, 148, 275–277), occurring

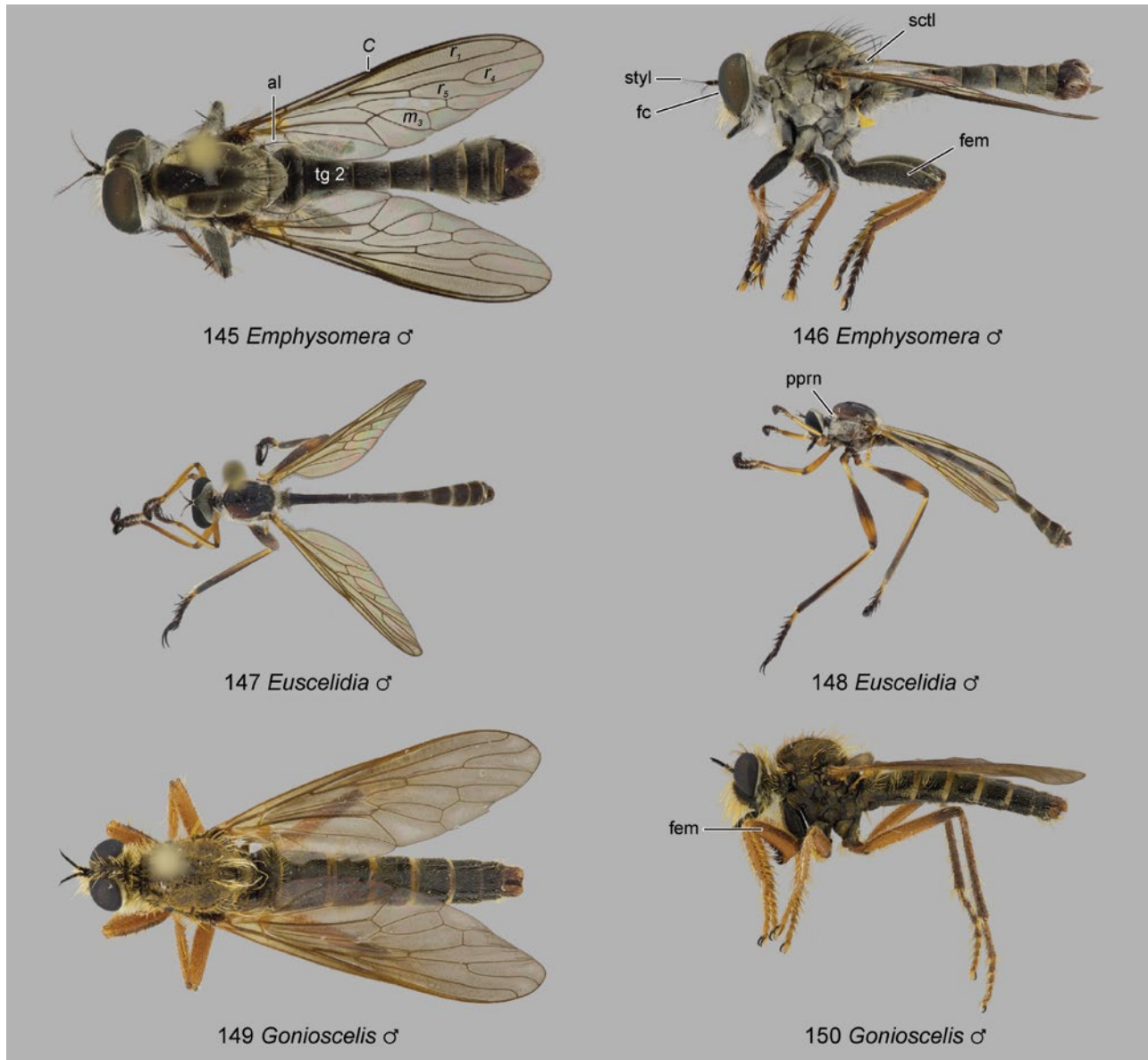


Figs 48.139–144. Habitus photographs of Asilidae: (139) *Damalis annulata* Loew, dorsal view ♂; (140) same, lateral view; (141) *Dasophrys androclea* (Walker), dorsal view ♂; (142) same, lateral view; (143) *Daspletis setithoracicus* (Ricardo), dorsal view ♂; (144) same, lateral view.

Abbreviations: anatg – anatergite; anepst – anepisternum; *d* – discal cell; dc s – dorsocentral seta; fc – face; *M*₁ – first branch of media; myst – mystax; pmtcx memb – postmetacoxal membrane; pocl s – postocular seta; pped – postpedicel; *r*₅ – fifth radial cell; sct mn – scutal mane; styl – stylus.

in the Afrotropical, Oriental and Palaearctic Regions. The 55 Afrotropical species are widespread throughout the region, reported from Southern Africa (Botswana, Mozambique, Namibia, South Africa, Swaziland and Zimbabwe), Central Africa (Angola, Cameroon, Central African Republic, Chad, Democratic Republic of Congo, Malawi and Zambia), East Africa (Burundi, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania and Uganda), West Africa (Burkina Faso, Côte d'Ivoire, Gambia, Ghana, Guinea, Liberia, Mali, Nigeria, Senegal,

Sierra Leone and Togo) and the Indian Ocean islands (Madagascar) (Dikow 2003). The genus inhabits grassland, fynbos, savanna, semi-desert and woodland habitats and adults perch at the tips of grass, shrubs, bushes and trees (Fig. 42). Oviposition takes place through random egg-dropping. Some biological information was provided by Cuthbertson (1939). Other useful references include Londt (2010b, 2012a). Dikow (2003) provided an identification key to the 55 Afrotropical species.



Figs 48.145–150. Habitus photographs of Asilidae: (145) *Empysomera pallidapex* (Bigot), dorsal view ♂; (146) same, lateral view; (147) *Euscelidia procula* (Walker), dorsal view ♂; (148) same, lateral view; (149) *Gonioscelis* sp., dorsal view ♂; (150) same, lateral view.

Abbreviations: al – alula; C – costal vein; fc – face; fem – femur; m_3 – third medial cell; pprn – postpronotum; r_1 – first radial cell; r_4 – fourth radial cell; r_5 – fifth radial cell; sctl – scutellum; styl – stylus; tg – tergite.

Fishermyia **Londt** (Stenopogoninae). An endemic monotypic genus, with the single large-sized species, *F. stuckenbergi* Londt, 2012, confined to the Indian Ocean islands (Madagascar) (Londt 2012b). The species inhabits arid spiny woodland habitats and adults perch on the ground. Oviposition takes place in sand or soil.

Gerrolasius **Hermann** (Laphriinae). An endemic genus of three small species, *G. hermanni* Londt, 1988, *G. meridionalis* Hermann, 1920 and *G. oldroydi* Londt, 1988, confined to Southern Africa (Botswana, Mozambique and South Africa) and East Africa (Somalia) (Londt 1988b). The genus inhabits grassland and savanna habitats and adults perch at the tips of grass. Oviposition takes place through random egg-dropping. Londt (1988b) provided an identification key to the three species.

Gibbasilus **Londt** (Asilinae). An endemic genus of six medium-sized species confined to Southern Africa (South Africa). The genus was described by Londt (1986a) and was later reviewed by Londt (1990b, 2016). The genus inhabits Fynbos habitats and adults perch at the tips of shrubs and bushes. Oviposition takes place on or in vegetation. Londt (2016) provided an identification key to the six species.

Goneccalypsis **Hermann** (Laphriinae). A genus of four small-sized species (Fig. 28) occurring in the Afrotropical and Oriental Regions. Two species occur in the Afrotropics, *G. argenteoviridis* (Hermann, 1907) and *G. montanus* Londt, 1982, confined to Southern Africa (Lesotho and South Africa) (Londt 1982a). The genus inhabits grassland (incl. montane grassland) and savanna habitats and adults perch at the tips of grass. Oviposition probably takes place through random egg-dropping. Londt (1982a) provided an identification key to the two Afrotropical species.

Gongromyia **Londt** (Asilinae). An endemic monotypic genus, with the single medium-sized species, *G. bulla* Londt, 2002, confined to Southern Africa (South Africa) (Londt 2002b). The species probably inhabits grassland habitats and adults perch within and at the tips of grass. Oviposition probably takes place in or on vegetation.

Gonioscelis **Schiner** (Stenopogoninae). An endemic genus of 40 medium-sized species (Figs 52, 149, 150), widely distributed throughout sub-Saharan Africa, recorded from Southern Africa (Botswana, Lesotho, Mozambique, Namibia, South Africa and Zimbabwe), Central Africa (Angola, Cameroon, Chad, Democratic Republic of Congo, Malawi, Republic of Congo and Zambia), East Africa (Burundi, Eritrea, Ethiopia, Kenya, Tanzania and Uganda) and West Africa (Gambia and Ghana) (Londt 2004c). The genus inhabits grassland, Fynbos, savanna and woodland habitats and adults perch on the ground or on rocks and at the tips of grass, shrubs and bushes (Fig. 52). Oviposition takes place in sand or soil. Some biological information was provided by Cuthbertson (1936, 1938, 1939). Other useful references include Engel (1926), Londt (2010b), Oldroyd (1970, 1974), Ricardo (1925), Tomasovic (2009) and Tomasovic & Constant (2013). Londt (2004c) provided an identification key to the 40 Afrotropical species.

Habropogon **Loew** (Brachyrhopalinae). A genus of 43 small-sized species (Figs 20, 151, 152, 256–258), occurring in the Afrotropical and Palearctic Regions. Ten species are recorded

from the Afrotropics, with a disjunct distribution in sub-Saharan Africa, recorded from Southern Africa (Namibia and South Africa), the southern Arabian Peninsula (United Arab Emirates and Yemen) and West Africa (Gambia) (Londt 2000b). The genus inhabits grassland and savanna habitats and adults perch on the ground or on low vegetation (Fig. 20). Oviposition takes place in sand or soil. Other useful references include Bosák & Hradský (2011), Kirk-Spriggs & McGregor (2009) and Londt (1981a, 1999a, 2000b, 2010b, 2012a). Londt (2000b) provided the most recent identification key to Afrotropical species, but see Bosák & Hradský (2011: 731) for two additional species.

Haroldia **Londt** (Stenopogoninae). An endemic genus of two small species (Figs 153, 154), *H. oldroydi* Londt, 1999 and *H. trivialis* (Oldroyd, 1974), confined to Southern Africa (South Africa) (Londt 1999d). The genus inhabits Fynbos and Succulent-Karoo habitats and adults perch on the ground (coastal sand dunes and beaches). Oviposition takes place in sand or soil. Other useful references include Oldroyd (1974). Londt (1999d) provided an identification key to the two species.

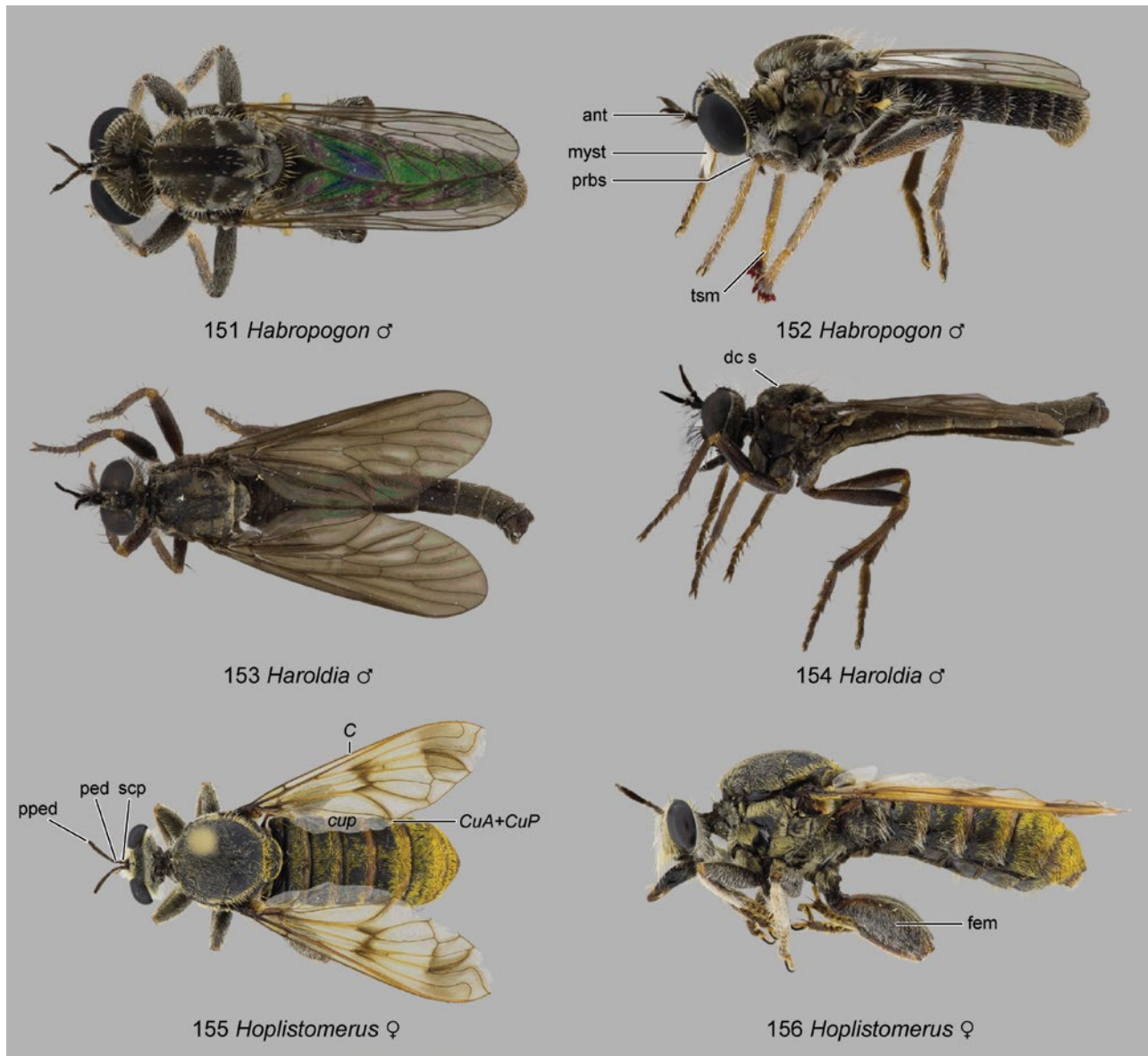
Heligmonevra **Bigot** (Asilinae). A genus of 61 medium-sized species occurring in the Afrotropical, Australasian and Oriental Regions. Twenty-four species are recorded from the Afrotropics, being widespread throughout the region, including Southern Africa (Namibia), Central Africa (Bioko Is. (Equatorial Guinea), Cameroon, Democratic Republic of Congo, Gabon, Malawi and Republic of Congo), East Africa (Eritrea, Kenya, Tanzania (incl. Zanzibar Is.)), West Africa (Côte d'Ivoire, Gambia and Ghana) and the Indian Ocean islands (Madagascar and Seychelles). The genus inhabits forest, savanna and woodland habitats and adults perch within grass. Oviposition probably takes place on or in vegetation. Martin (1964) reviewed the Malagasy fauna (13 species) and other useful references include Engel (1927), Londt (2002b, 2010b, 2012a) and Tomasovic & Dekoninck (2014). No identification key to Afrotropical fauna is currently available.

Hermannomyia **Oldroyd** (Brachyrhopalinae). An endemic genus of three medium-sized species, *H. engeli* (Hull, 1962), *H. oldroydi* Londt, 1981 and *H. ukazi* Londt & Copeland, 2013, confined to Southern Africa (Lesotho, South Africa and Zimbabwe) and East Africa (Kenya). The genus inhabits grassland, savanna and woodland habitats and adults perch on the ground. Oviposition takes place in sand or soil. The genus was reviewed by Londt (1981a) and Londt & Copeland (2013) and other useful references include Oldroyd (1974). Londt & Copeland (2013) provided an identification key to the three species.

Hippomachus **Engel** (Asilinae). A near endemic genus of ten medium-sized species, occurring in the Afrotropical and Palearctic Regions. Nine species occur in the Afrotropics that are widespread in sub-Saharan Africa, recorded from Southern Africa (Namibia, South Africa and Zimbabwe), Central Africa (Angola and Central African Republic), East Africa (Djibouti and Kenya) and West Africa (Gambia) (Londt 1983b, 1985a, 2010b). The genus inhabits savanna and woodland habitats and adults perch within trees. Oviposition takes place on or in vegetation. Londt (1983b) provided the most recent identification key to Afrotropical species, but see Londt (1985a, 2010b) for two additional species.

Hoplistomerus Macquart (Laphriinae). An endemic genus of 11 medium- to large-sized species (Figs 29, 83, 155, 156, 267, 268), widely distributed throughout sub-Saharan Africa, recorded from Southern Africa (Botswana, Lesotho, Mozambique, Namibia, South Africa, Swaziland and Zimbabwe), Central Africa (Chad, Democratic Republic of Congo, Malawi and Zambia), East Africa (Ethiopia, Kenya, Somalia, Tanzania and Uganda), the southern Arabian Peninsula (Yemen) and West

Africa (Gambia, Ghana, Guinea, Mali, Mauritania, Niger, Nigeria and Senegal) (Londt 2007b). *Hoplistomerus nobilis* was accidentally introduced into the Neotropical Region (Costa Rica) (Fisher 2009: 622). The genus mainly inhabits grassland and savanna habitats and adults perch on the ground or on stones (Fig. 29). Oviposition probably takes place in decomposing vegetable matter (including dung). The genus feeds almost exclusively on dung-frequenting beetles (Coleoptera: Scarabaeidae)



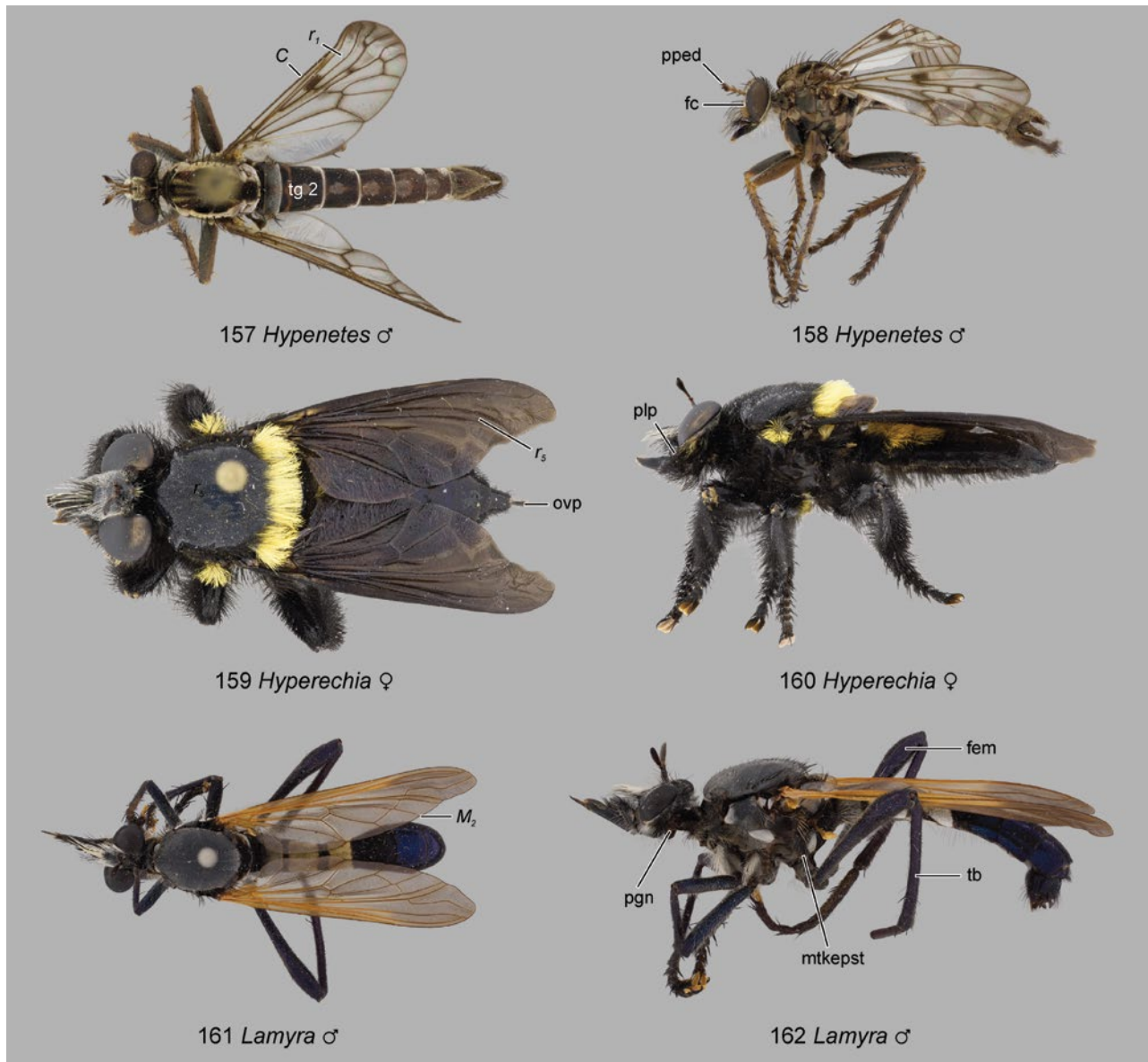
Figs 48.151–156. Habitus photographs of Asilidae: (151) *Habropogon capensis* Londt, dorsal view ♂; (152) same, lateral view; (153) *Haroldia trivialis* (Oldroyd), dorsal view ♂; (154) same, lateral view; (155) *Hoplistomerus nobilis* Loew, dorsal view ♀; (156) same, lateral view.

Abbreviations: ant – antenna; C – costal vein; CuA+CuP – anterior branch of cubital vein + posterior branch of cubital vein; cup – posterior cubital cell; dc s – dorsocentral seta; fem – femur; myst – mystax; ped – pedicel; pped – postpedicel; prbs – proboscis; scp – scape; tsm – tarsomeres.

and some biological information was provided by Cuthbertson (1933, 1936, 1939). Other useful references include Londt (2010b, 2012a) and Oldroyd (1940, 1970, 1974). An identification key to the 11 species is provided by Londt 2007b.

***Hoplopheromerus* Becker** (Asilinae). A genus of ten large-sized species, occurring in the Afrotropical, Oriental and Palearctic Regions. Five species occur in the Afrotropics that are fairly widespread throughout sub-Saharan Africa, including

Central Africa (Democratic Republic of Congo) and West Africa (Burkina Faso, Côte d'Ivoire, Guinea and Nigeria). The genus inhabits forest habitats and adults perch within trees. Oviposition takes place on or in vegetation. *Curvirostris* and *Hoplopheromerus* key out together in the above identification key and these genera are potentially synonymous, with *Hoplopheromerus* then having priority. Other useful references include Londt (2002b). Tsacas & Oldroyd (1967) provided the most recent identification key to the five Afrotropical species.



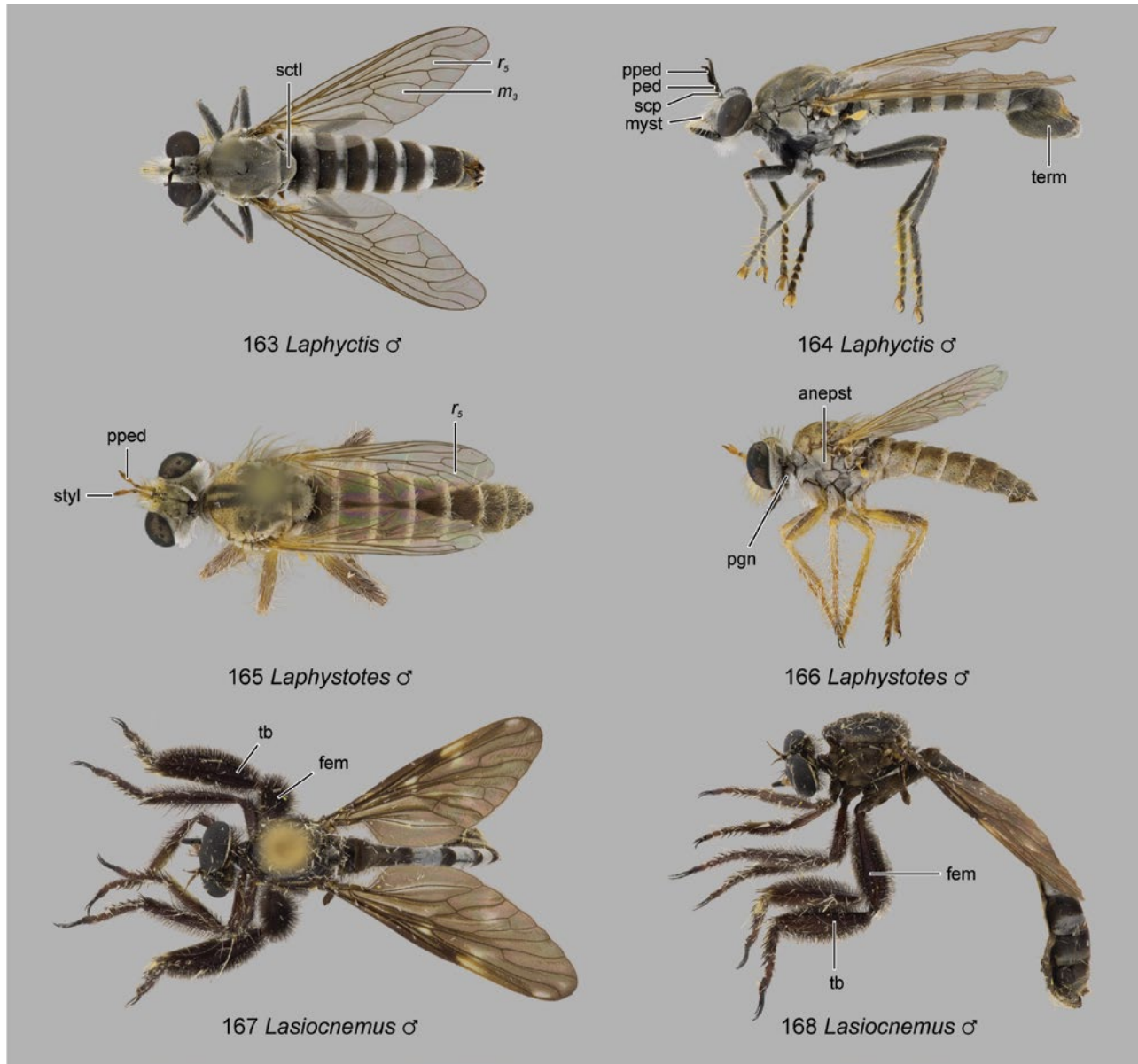
Figs 48.157–162. Habitus photographs of Asilidae: (157) *Hypenetes stigmae* Loew, dorsal view ♂; (158) same, lateral view; (159) *Hyperechia nigripennis* (Wiedemann), dorsal view ♀; (160) same, lateral view; (161) *Lamyra gulo* (Loew), dorsal view ♂; (162) same, lateral view.

Abbreviations: C – costal vein; fc – face; fem – femur; M₂ – second branch of media; mtkepst – metakatepisternum; ovp – ovipositor; pgn – postgena; plp – palpus; pped – postpedicel; r₁ – first radial cell; r₅ – fifth radial cell; tb – tibia; tg – tergite.

***Hynirhynchus* Lindner** (Brachyrhopalinae). An endemic genus of two small- to medium-sized species, *H. pantherinus* (Bigot, 1879) and *H. zebra* Lindner, 1955, recorded from East Africa (Kenya and Tanzania) and West Africa (Gambia and Senegal) (Londt 1992a). Little is known regarding the biology of the genus, but it probably inhabits grassland, savanna and woodland habitats and adults probably perch on the ground or on river banks. Oviposition takes place in sand or soil. Other useful references include Lindner (1955) and Londt

(2010b). Londt (1992a) provided an identification key to the two species.

***Hypenetes* Loew** (Tillobromatinae). An endemic genus of 21 small- to large-sized species (Figs 61, 157, 158, 303–306), confined to Southern Africa (South Africa) (Londt 1985b). The genus inhabits grassland, Fynbos and savanna habitats and adults perch on the ground, on beaches, rocks, or the tips of grass (Fig. 61). Oviposition takes place in sand or soil. Other



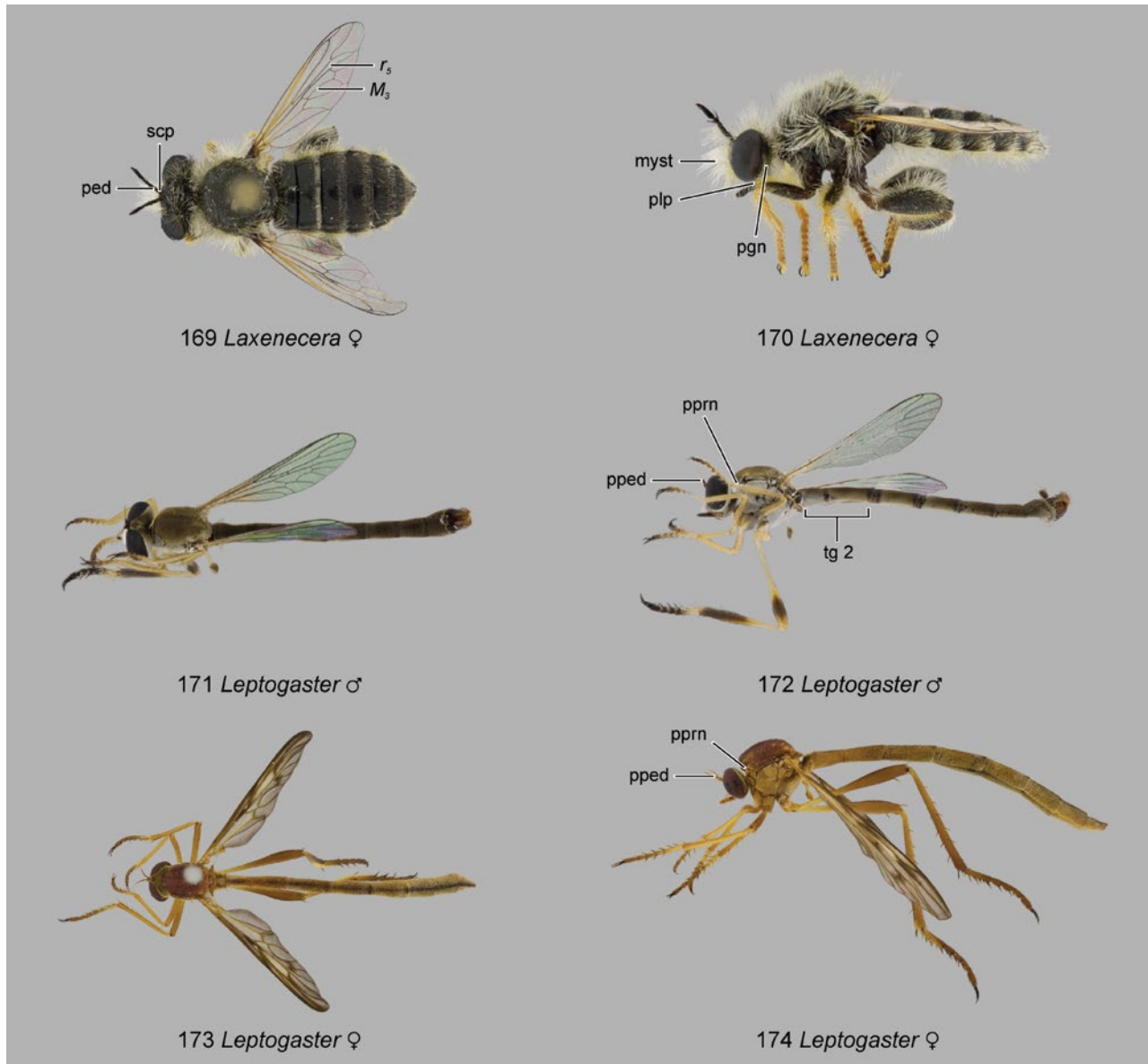
Figs 48.163–168. Habitus photographs of Asilidae: (163) *Laphyctis* sp., dorsal view ♂; (164) same, lateral view; (165) *Laphystotes ariel* Londt, dorsal view ♂; (166) same, lateral view; (167) *Lasiocnemus lugens* Loew, dorsal view ♂; (168) same, lateral view.

Abbreviations: anepst – anepisternum; fem – femur; m_3 – third medial cell; myst – mystax; ped – pedicel; pgn – postgena; pped – postpedicel; r_5 – fifth radial cell; scp – scape; sctl – scutellum; styl – stylus; tb – tibia; term – terminalia.

useful references include Oldroyd (1974). Londt (1985*b*) provided an identification key to the 21 species.

***Hyperechia* Schiner** (Laphriinae). A genus of 17 large-sized, carpenter bee (*Xylocopa* Latreille species; Apidae) mimicking flies (Figs 159, 160), occurring in the Afrotropical and Oriental Regions, in need of modern revision. Fourteen species occur in the Afrotropics, which are fairly widespread throughout the region, recorded from Southern Africa (Mozambique, Namibia,

South Africa and Zimbabwe), Central Africa (Cameroon, Democratic Republic of Congo and Malawi), East Africa (Kenya and Tanzania (incl. Zanzibar)), West Africa (Guinea and Senegal) and the Indian Ocean islands (Madagascar). The genus inhabits forest and woodland habitats and adults perch within trees. Oviposition takes place on or in vegetation (wood). Some biological information was provided by Cuthbertson (1934) and Poulton (1925) who also illustrated the immature stages. Other useful references include Enderlein (1930), Grünberg (1907),



Figs 48.169–174. Habitus photographs of Asilidae: (169) *Laxenecera mollis* (Loew), dorsal view ♀; (170) same, lateral view; (171) *Leptogaster aganniphe* Janssens, dorsal view ♂; (172) same, lateral view; (173) *L. carotenoides* Tomasovic, dorsal view ♀; (174) same, lateral view.

Abbreviations: M_3 – third branch of media; myst – mystax; ped – pedicel; pgn – postgena; plp – palpus; pped – postpedicel; pprn – postpronotum; r_5 – fifth radial cell; scp – scape; tg – tergite.

Londt (2010b) and Oldroyd (1970, 1974). Oldroyd (1970, 1974) provided the most recent identification keys to part of the Afrotropical fauna.

***Irwinomyia* Londt** (Brachyrhopalinae). An endemic genus of two small-sized species, *I. argentea* Londt, 1994 and *I. aurea* Londt, 1994, confined to Southern Africa (Namibia) (Londt 1994b). The biology of the genus is poorly known, but species inhabit grassland, savanna and semi-desert habitats and adults perch on the ground or possibly within and/or at the tips of grass. Oviposition takes place in sand or soil. Londt (1994b) provided an identification key to the two species.

***Ischiolobos* Londt** (Brachyrhopalinae). An endemic genus of four small-sized species, confined to Southern Africa (Lesotho and South Africa) and East Africa (Tanzania) (Londt 2005b). The genus inhabits grassland, Fynbos and savanna habitats and adults perch on the ground or within grass. Oviposition takes place in sand or soil. Other useful references include Lindner (1955). Londt (2005b) provided an identification key to the four species.

***Juxtasilus* Londt** (Asilinae). An endemic monotypic genus, with the single medium-sized species, *J. capensis* (Londt, 1979), confined to Southern Africa (South Africa) (Londt 2005a). The species inhabits Fynbos and semi-desert habitats and adults probably perch within and/or at the tips of shrubs and bushes. Oviposition takes place on or in vegetation.

***Katharma* Oldroyd** (Laphriinae). An endemic monotypic genus, with the single large-sized species, *K. sanguinaria* Oldroyd, 1960, confined to the Indian Ocean islands (Madagascar) (Oldroyd 1960a). The biology of the species remains unknown, but it probably inhabits forest habitats and adults perch within trees. The oviposition strategy is unknown, but probably takes place on or in vegetation. Other useful references include Tomasovic (2014).

***Katharmacercus* Tomasovic** (Laphriinae). An endemic genus of two large-sized species, *K. flagellata* (Oldroyd, 1960) and *K. matilei* (Menier & Tsacas, 2001), confined to the Indian Ocean islands (Madagascar) (Tomasovic 2014). The biology of the genus remains unknown, but species probably inhabit forest habitats and adults perch within shrubs and bushes. The oviposition strategy is unknown, but probably takes place on or in vegetation. Other useful references include Menier & Tsacas (2001). No identification key to the species is currently available.

***Labarus* Londt** (Asilinae). An endemic monotypic genus, with the single small-sized species, *L. ignota* Londt, 2005 (Figs 237–239, 252, 253), confined to Southern Africa (South Africa) (Londt 2005a). The species inhabits Fynbos habitats and adults probably perch within and/or at the tips of shrubs and bushes. Oviposition takes place on or in vegetation.

***Lamyra* Loew** (Laphriinae). A genus of four large- to very large-sized, wasp-like species (Figs 30, 161, 162, 269–271). The genus is endemic to the Afrotropical Region, although one species, *L. vorax* Loew, 1858, extends into Israel and Saudi Arabia in the Palaearctic Region (Dikow & Londt 2000a). The genus is widespread throughout sub-Saharan Africa, recorded from Southern Africa (Botswana, Mozambique, Namibia,

South Africa, Swaziland and Zimbabwe), Central Africa (Angola, Democratic Republic of Congo, Malawi and Zambia), East Africa (Djibouti, Ethiopia, Kenya, Somalia, Sudan, Tanzania and Uganda), the southern Arabian Peninsula (United Arab Emirates and Yemen; the photograph provided in Fig. 30 also represents a new record for Oman) and West Africa (Burkina Faso, Gambia, Ghana, Mauritania and Niger). The genus inhabits savanna and woodland habitats and adults perch at the tips of shrubs, bushes and trees (Fig. 30). The oviposition strategy remains unknown, but probably takes place on or in vegetation (wood). Some biological information was provided by Bosák & Hradský (2011: 714) and Cuthbertson (1938). Other useful references include Bosák & Hradský (2011), Kirk-Spriggs & McGregor (2009), Londt (2010b) and Oldroyd (1974). Dikow & Londt (2000a) provided an identification key to the four species.

***Laphyctis* Loew** (Laphriinae). An endemic genus of two medium-sized, wasp-like species (Figs 31, 163, 164), *L. gigantea* (Loew, 1852) and *L. orichalcea* (Lindner, 1973), requiring modern revision, recorded from Southern Africa (Mozambique, Namibia, South Africa and Zimbabwe) and East Africa (Kenya). The genus apparently inhabits savanna and semi-desert habitats and adults perch on the ground (Fig. 31). The oviposition strategy remains unknown, but probably takes place on or in sand or soil. Other useful references include Lindner (1973) and Oldroyd (1974), who dealt with species under the name *Laphystia*; later transferred to *Laphyctis* by Londt (1988b). No identification key is currently available.

***Laphystotes* Oldroyd** (Laphriinae). An endemic genus of two small-sized species (Figs 165, 166, 272–274), *L. albicans* (Engel, 1932) and *L. ariel* Londt, 2004, confined to Southern Africa (Namibia, South Africa and Zimbabwe) (Londt 2004a). The genus inhabits savanna habitats and adults perch on the ground. Oviposition probably takes place in sand or soil. Other useful references include Oldroyd (1974). Londt (2004a) provided an identification key to the two species.

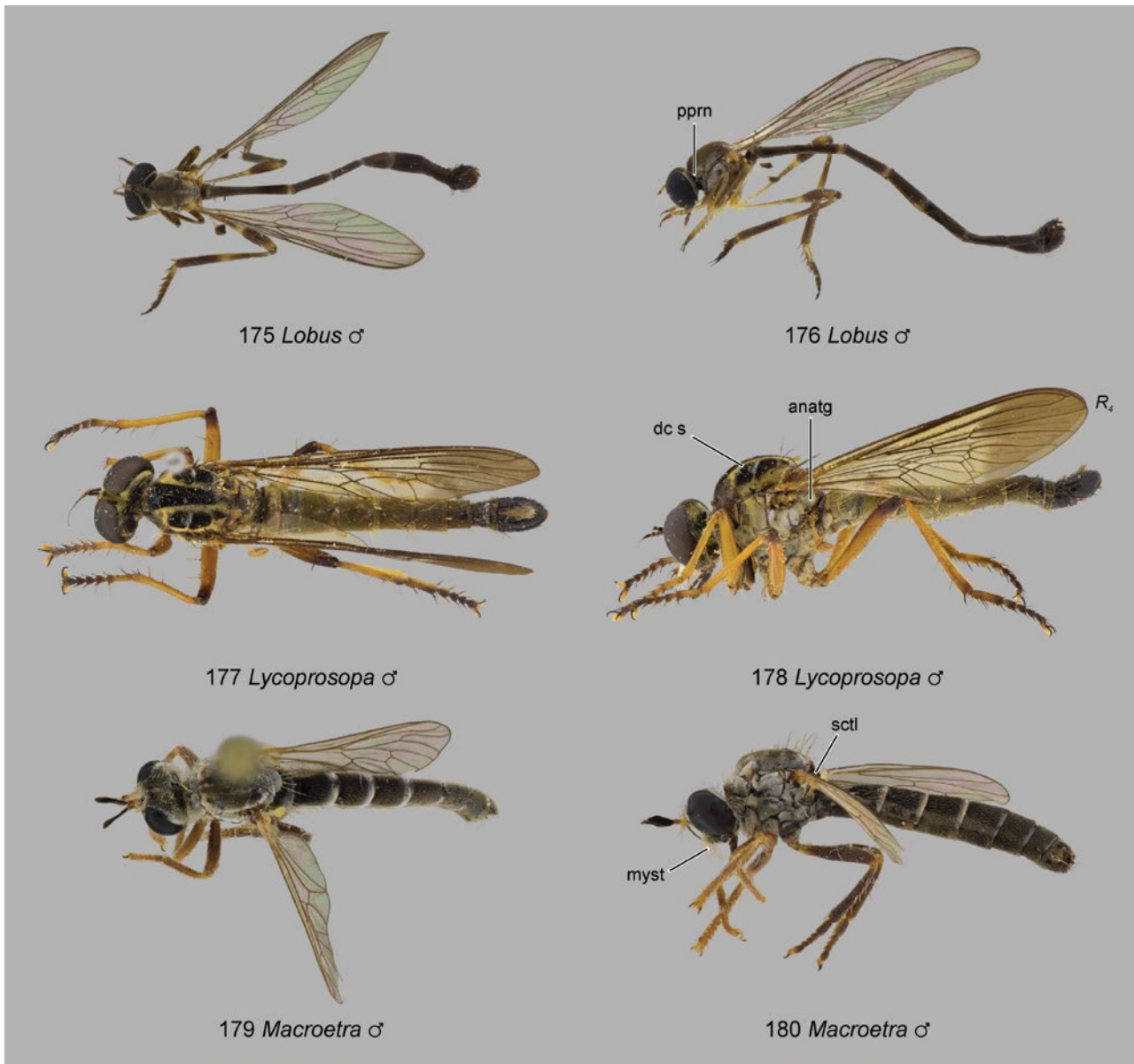
***Lasiocnemus* Loew** (Leptogastrinae). An endemic genus of eight small- to large-sized species (Figs 167, 168, 278–280), reviewed by Dikow (2007). The genus is widely distributed throughout sub-Saharan Africa, recorded from Southern Africa (Botswana, Namibia, Mozambique, South Africa, Swaziland and Zimbabwe), Central Africa (Cameroon, Democratic Republic of Congo, Malawi and Zambia), East Africa (Kenya, Somalia and Tanzania) and West Africa (Côte d'Ivoire, Nigeria and Senegal) (Dikow 2007). There are also unpublished records from Ethiopia. The genus inhabits grassland, savanna and woodland habitats and adults perch at the tips of grass. Oviposition takes place through random egg-dropping. Other useful references include Janssens (1952). Dikow (2007) provided an identification key to the eight species.

***Laxenecera* Macquart** (Laphriinae). A large genus of 32 small- to large-sized, bee-like species (Figs 32, 169, 170), requiring modern revision. The genus occurs in the Afrotropical and Oriental Regions, with highest diversity in the Afrotropics, with 29 species. The genus is widespread throughout sub-Saharan Africa, recorded from Southern Africa (Botswana, Mozambique, Namibia, South Africa and Zimbabwe), Central Africa (Angola, Democratic Republic of Congo, Gabon, Malawi and Zambia), East Africa (Burundi, Ethiopia, Kenya, Somalia,

Tanzania and Uganda), the southern Arabian Peninsula (recorded from "Arabia") and West Africa (Côte d'Ivoire, Gambia, Nigeria, Senegal and Sierra Leone). The genus inhabits grassland and savanna habitats and adults perch within and at the tips of grass (Fig. 32). The oviposition strategy is unknown, but may involve oviposition in or on vegetation. Some biological information was provided by Cuthbertson (1937, 1938). Other useful references include Londt (2010b, 2012a), Oldroyd

(1970, 1974), Tomasovic (2008a) and Tomasovic & Constant (2013). Oldroyd (1974) provided the most recent identification key to Southern African species.

Leptogaster Meigen (Leptogastrinae). A very large genus of 204 small- to medium-sized species (Figs 43, 171–174), occurring in all zoogeographical regions, except Antarctica, with 55 species in the Afrotropics. The genus is in need of

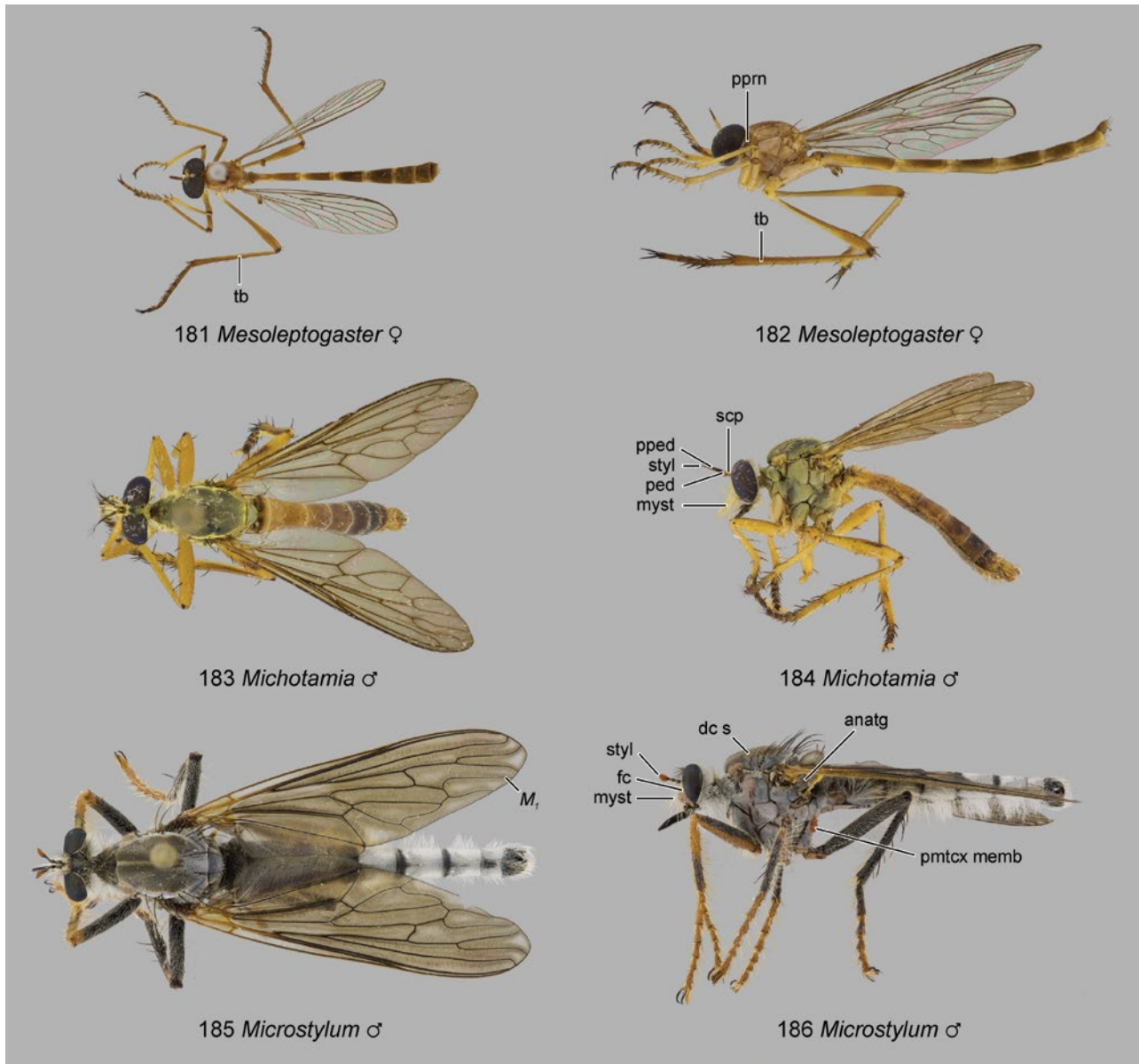


Figs 48.175–180. Habitus photographs of Asilidae: (175) *Lobus* sp., dorsal view ♂; (176) same, lateral view; (177) *Lycoprosopa atrimaculata* (Hobby), dorsal view ♂; (178) same, lateral view; (179) *Macroetra damara* Londt, dorsal view ♂; (180) same, lateral view.

Abbreviations: anatg – anatergite; dc s – dorsocentral seta; myst – mystax; pprn – postpronotum; R_4 – upper branch of third branch of radius; sctl – scutellum.

modern revision as it is currently paraphyletic, with the Afrotropical species not representing *Leptogaster sensu stricto* (T. Dikow, unpubl.). Oldroyd (1980: 357) catalogued the fauna and the study of *Leptogaster* type specimens reveals that many of these require transfer to existing genera, including *Lobus* and *Mesoleptogaster* (see below), reducing the total number of *Leptogaster* species from 74 to 55 (T. Dikow, unpubl.). The genus is widespread throughout the Afrotropics, recorded

from Southern Africa (South Africa and Zimbabwe), Central Africa (Democratic Republic of Congo), East Africa (Burundi, Rwanda, Somalia, Sudan, Tanzania and Uganda), the southern Arabian Peninsula (United Arab Emirates and Socotra Is. (Yemen)), West Africa (Côte d'Ivoire and Gambia) and the Indian Ocean islands (Madagascar). There are also unpublished records from Botswana, Eritrea, Ethiopia, Lesotho, Mali, Namibia and Seychelles. The genus inhabits grassland, savanna



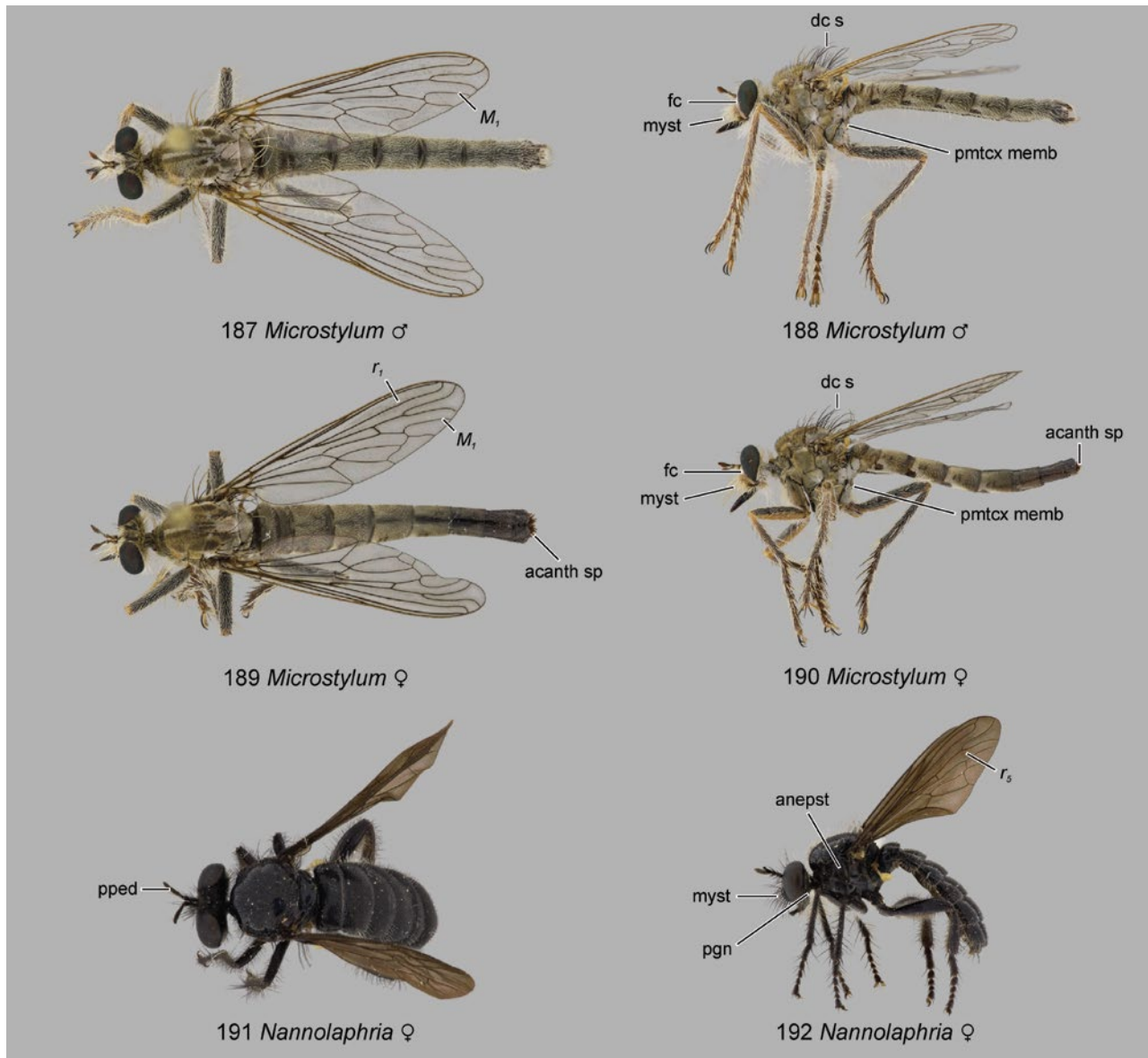
Figs 48.181–186. Habitus photographs of Asilidae: (181) *Mesoleptogaster* sp., dorsal view ♀; (182) same, lateral view; (183) *Michotamia fuscifemorata* Joseph & Parui, dorsal view ♂ (non-Afrotropical); (184) same, lateral view; (185) *Microstylum* sp., dorsal view ♂; (186) same, lateral view.

Abbreviations: anatg – anatergite; dc s – dorsocentral seta; fc – face; M_1 – first branch of media; myst – mystax; ped – pedicel; pmtcx memb – postmetacoxal membrane; pped – postpedicel; pprn – postpronotum; scp – scape; styl – stylus; tb – tibia.

and woodland habitats and adults perch within grass (Fig. 43). Oviposition takes place through random egg-dropping. Other useful references include Bosák & Hradský (2011), Janssens (1953, 1954, 1955, 1957), Londt (2010b), Martin (1964) and Oldroyd (1970). No identification key to Afrotropical fauna is currently available.

Lobus Martin (Leptogastrinae). A genus of 31 small- to medium-sized species (Figs 44, 175, 176), occurring in the

Afrotropical, Oriental and Palaearctic Regions, with 17 species in the Afrotropics (Martin 1972). Although seven species were catalogued by Oldroyd (1980: 359), there are numerous additional species in the Afrotropics. The study of type specimens has indicated that 11 species should be assigned to the genus and unidentified material has also revealed additional undescribed species (T. Dikow, unpubl.). The genus is fairly widely distributed, recorded from Central Africa (Democratic Republic of Congo), East Africa (Ethiopia, Eritrea, Kenya, Rwanda and



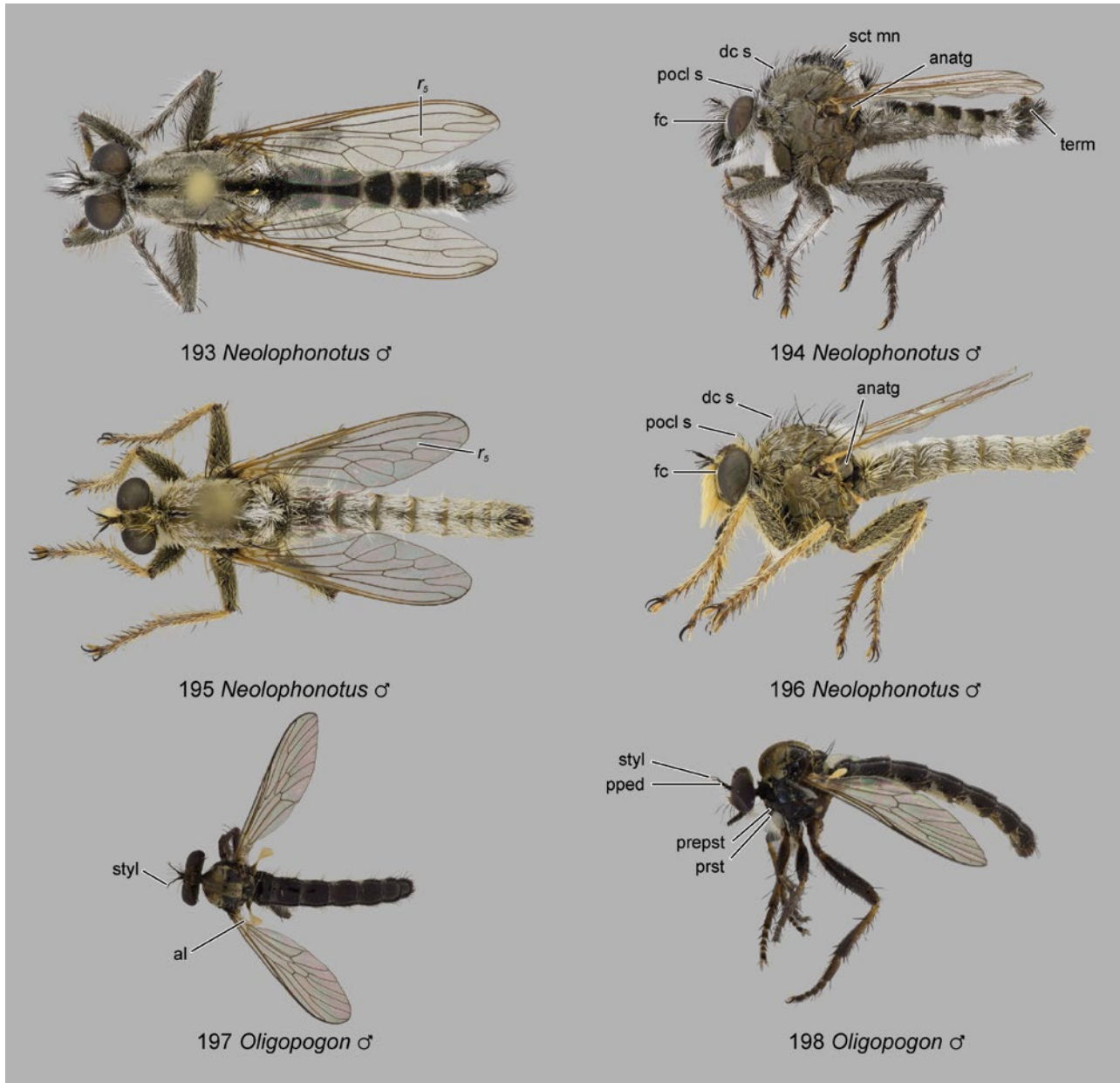
Figs 48.187–192. Habitus photographs of Asilidae: (187) *Microstylum* sp., dorsal view ♂; (188) same, lateral view; (189) same, dorsal view ♀; (190) same, lateral view; (191) *Nannolaphria nigra* Londt, dorsal view ♀; (192) same, lateral view.

Abbreviations: acanth sp – acanthophorite spine; anepst – anepisternum; dc s – dorsocentral seta; fc – face; M_1 – first branch of media; myst – mystax; pgn – postgena; pmtcx memb – postmetacoxal membrane; pped – postpedicel; r_1 – first radial cell; r_5 – fifth radial cell.

Somalia) and West Africa (Liberia). There are also unpublished records from Angola, Benin, Cameroon, Central African Republic, Ghana, Guinea-Bissau, Madagascar, Namibia, Nigeria, South Africa, Tanzania, Uganda and Zambia. Recorded localities indicate that the genus inhabits forest or woodland habitats and adults probably perch at the tips of shrubs, bushes and trees (Fig. 44). Oviposition probably takes place through

random egg-dropping. Other useful references include Tomasovic (2013) and Tomasovic & De Bakker (2010). No identification key to Afrotropical species is currently available.

Loewinella Hermann (Laphriinae). A genus of nine small-sized species, occurring in the Afrotropical and Palearctic Regions, with six species in the Afrotropics (Londt 1982a).



Figs 48.193–198. Habitus photographs of Asilidae: (193) *Neolophonotus bimaculatus* Londt, dorsal view ♂; (194) same, lateral view; (195) *N. chionthrix* Hull, dorsal view ♂; (196) same, lateral view; (197) *Oligopogon penicillatus* Loew, dorsal view ♂; (198) same, lateral view.

Abbreviations: al – alula; anatg – anatergite; dc s – dorsocentral seta; fc – face; pocl s – postocular seta; pped – postpedicel; prepst – proepisternum; prst – prosternum; r_5 – fifth radial cell; sct mn – scutal mane; styl – stylus; term – terminalia.

The genus is widespread in the Afrotropics, recorded from Southern Africa (Mozambique, Namibia, South Africa and Zimbabwe), Central Africa (Democratic Republic of Congo), West Africa (Côte d'Ivoire, Niger and Nigeria) and the Indian Ocean islands (Madagascar). The genus inhabits grassland, savanna and woodland habitats and adults perch at the tips of grass. Oviposition probably takes place through random egg-dropping. Londt (1982a) provided an identification key to the six Afrotropical species.

Longibeccus Scarbrough (Ommatiinae). An endemic genus of two medium- to large-sized species (Figs 284–286, 290, 291), *L. fuscovittatus* (Ricardo, 1900) and *L. imperator* (Oldroyd, 1939), widely distributed throughout sub-Saharan Africa, recorded from Southern Africa (Botswana, Mozambique, South Africa and Zimbabwe), Central Africa (Angola, Chad and Democratic Republic of Congo), East Africa (Ethiopia, Kenya, Sudan and Uganda) and West Africa (Côte d'Ivoire, Ghana and Nigeria) (Scarborough 2010). The genus inhabits savanna and woodland habitats and adults probably perch within grass, shrubs and bushes. Oviposition probably takes place through random egg-dropping. Scarborough (2010) provided an identification key to the two species.

Lycoprosopa Hull (Asilinae). An endemic genus of two large-sized species (Figs 177, 178), *L. atrimaculata* (Hobby, 1934) and *L. dioctriaeformis* (Macquart, 1846), requiring modern revision. The genus is confined to the Indian Ocean islands (Madagascar and Mauritius). The genus probably inhabits forest habitats and adults probably perch within and/or at the tips of trees. Oviposition takes place on or in vegetation. Other useful references include Hobby (1934), Hull (1962) and Londt (2005a). No identification key to the two species is currently available.

Lycostomyia Oldroyd (Tillobromatinae). An endemic genus of six medium-sized species, confined to Southern Africa (Namibia and South Africa) (Londt 1992a). The genus inhabits fynbos, grassland, savanna, semi-desert and woodland habitats and adults perch on the ground or on rocks. Oviposition takes place in sand or soil. Other useful references include Hermann (1907) and Oldroyd (1974). Londt (1992a) provided an identification key to the six species.

Machimus Loew (Asilinae). A genus of 187 medium-sized species, occurring in the Afrotropical, Nearctic, Oriental, Palearctic and possibly Neotropical Regions, but requiring modern revision. Thirteen species occur in the Afrotropics, confined to Central Africa (Democratic Republic of Congo and Malawi) and East Africa (Ethiopia, Kenya, Tanzania (incl. Zanzibar Is.) and Uganda). The genus probably inhabits savanna and woodland habitats and adults perch on the ground (Efflatoun 1934, 1937) and within shrubs and bushes. Oviposition takes place on or in vegetation. Some biological information was provided (as *Tolmerus*) by Cuthbertson (1935, 1936). Other useful references include Londt (2002b) and Tomasovic (2013, 2014). No identification key to Afrotropical species is currently available.

Macroetra Londt (Brachyrhopalinae). An endemic genus of three small-sized species (Figs 179, 180), *M. angola* Londt, 1994, *M. cera* Londt, 1994 and *M. damara* Londt, 1994, recorded from Southern Africa (Namibia and South Africa) and Central Africa (Angola) (Londt 1994b). The genus inhabits

grassland and semi-desert habitats and adults perch on the ground. Oviposition takes place in sand or soil. Londt (1994b) provided an identification key to the three species.

Megadrillus Bigot (Asilinae). An endemic genus of two medium-sized species, *M. brevipennis* (Macquart, 1838) and *M. heteronevrus* (Macquart, 1838), transferred to *Neolophonotus* and reviewed by Londt (1987b), but subsequently resurrected by Londt (2004b). The genus is confined to Southern Africa (South Africa) and inhabits fynbos habitats and adults perch on the ground or on stones. Oviposition takes place in sand or soil. Species can be identified by reference to Londt (1987b).

Melouromyia Londt (Asilinae). An endemic genus of two medium-sized species (Fig. 9), *M. diaphorus* Londt, 2002 and *M. natalensis* (Ricardo, 1919), recorded from Southern Africa (Botswana, Mozambique, South Africa, Swaziland and Zimbabwe) and Central Africa (Malawi) (Londt 2002b). The genus inhabits forest, savanna and woodland habitats and adults perch within and at the tips of shrubs and bushes. Oviposition probably takes place on or in vegetation. Londt (2002b) provided an identification key to the two species.

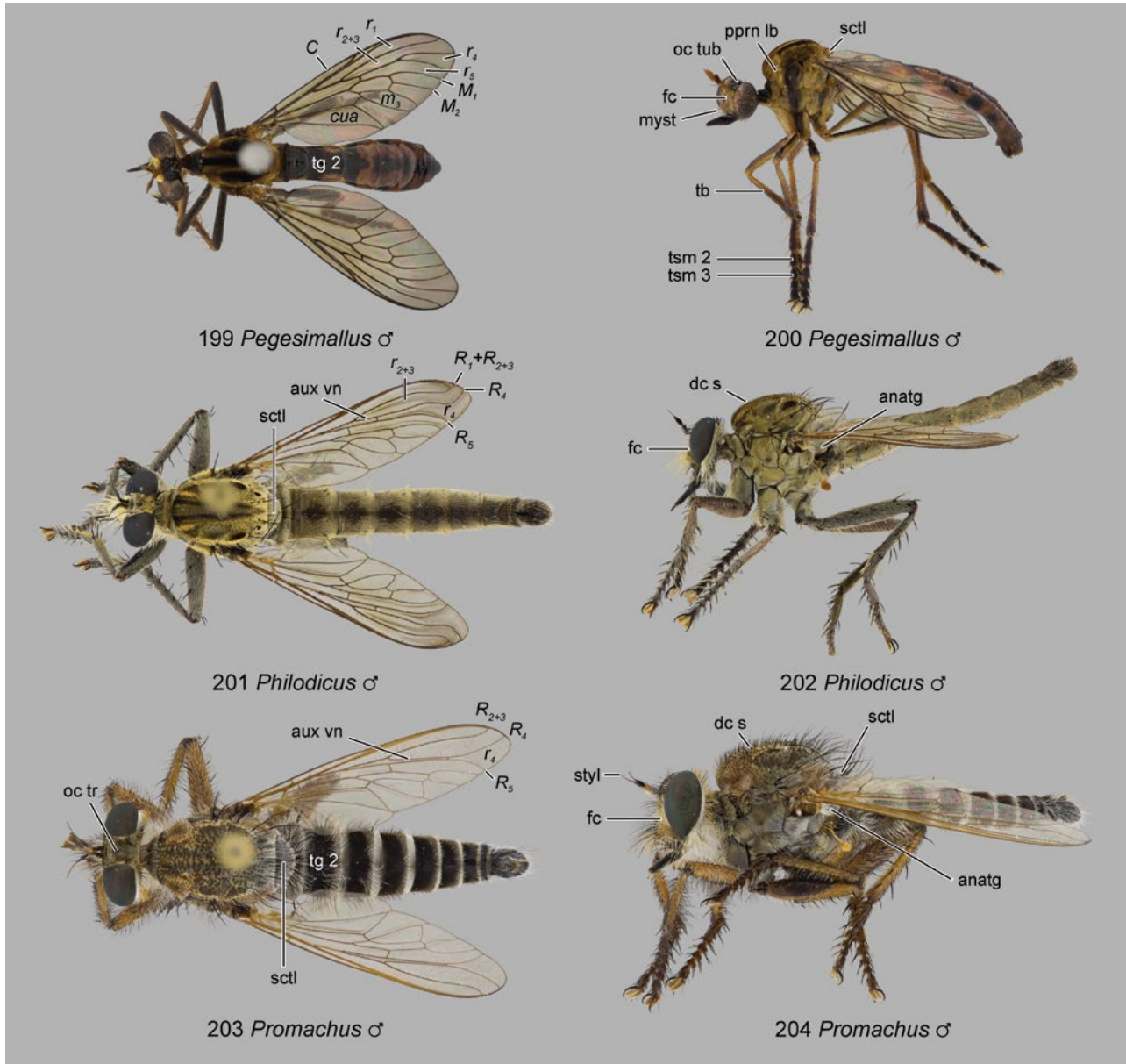
Metommatius Hull (Ommatiinae). A genus of three medium-sized species, *M. planatus* (Scarborough & Marascia, 2000), *M. politus* (Scarborough & Marascia, 2000) and *M. pulchellus* (Bromley, 1936), occurring in the Afrotropical and Palearctic Regions (Scarborough & Marascia 2000). The genus is widespread throughout sub-Saharan Africa, recorded from Southern Africa (Botswana, Namibia, South Africa, Swaziland and Zimbabwe), Central Africa (Malawi), East Africa (Kenya and Tanzania) and West Africa (Ghana). The genus inhabits savanna and woodland habitats and adults perch at the tips of grass, shrubs, bushes and trees. Oviposition takes place through random egg-dropping. Scarborough (2010) published an identification key to the three species.

Mesoleptogaster Frey (Leptogastrinae). A genus of 30 medium-sized species (Figs 45, 181, 182), occurring in the Afrotropical, Oceanian, Oriental and Palearctic Regions. Five species occur in the Afrotropics. Hull (1962) accepted Frey's subgenus and combined *Leptogaster madagascariensis* Frey, 1937 with *Mesoleptogaster*, which was not followed by Oldroyd (1980: 357). The genus was, however, accepted by Geller-Grimm (2004) and Lehr (1988a: 270). This species, along with four other *Leptogaster* species and additional undescribed species requires to be combined with *Mesoleptogaster*, based on the study of type specimens of *Leptogaster* (T. Dikow, unpubl.). *Mesoleptogaster* is a fairly widely distributed genus, with unpublished records from Central Africa (Angola, Cameroon and Democratic Republic of Congo), East Africa (Ethiopia and Tanzania), the Indian Ocean islands (Madagascar), Southern Africa (Mozambique and South Africa) and West Africa (Ghana, Mali and Nigeria). The biology remains unknown. Recorded localities suggest that the genus inhabits forest or woodland habitats and adults probably perch at the tips of shrubs, bushes and trees (Fig. 45). Oviposition probably takes place through random egg-dropping. No identification key to Afrotropical species is currently available.

Michotamia Macquart (Ommatiinae). A genus of 34 large-sized species (Figs 183, 184), occurring in the Afrotropical, Australasian and Oriental Regions, with the single species, *M. coarctata* (Macquart, 1855), recorded from the Afrotropics

(Scarborough 2010), confined to the Indian Ocean islands (Madagascar). The biology remains unknown, but the genus probably inhabits forest habitats with adults perching at the tips of shrubs, bushes, or trees. Oviposition probably takes place through random egg-dropping.

Microphontes Londt (Brachyrhopalinae). An endemic genus of three small-sized species, *M. megoura* Londt, 1994, *M. safra* Londt, 1994 and *M. whittingtoni* Londt, 1994, confined to Southern Africa (Namibia and South Africa) (Londt 1994b). The genus inhabits Fynbos and grassland habitats and adults perch



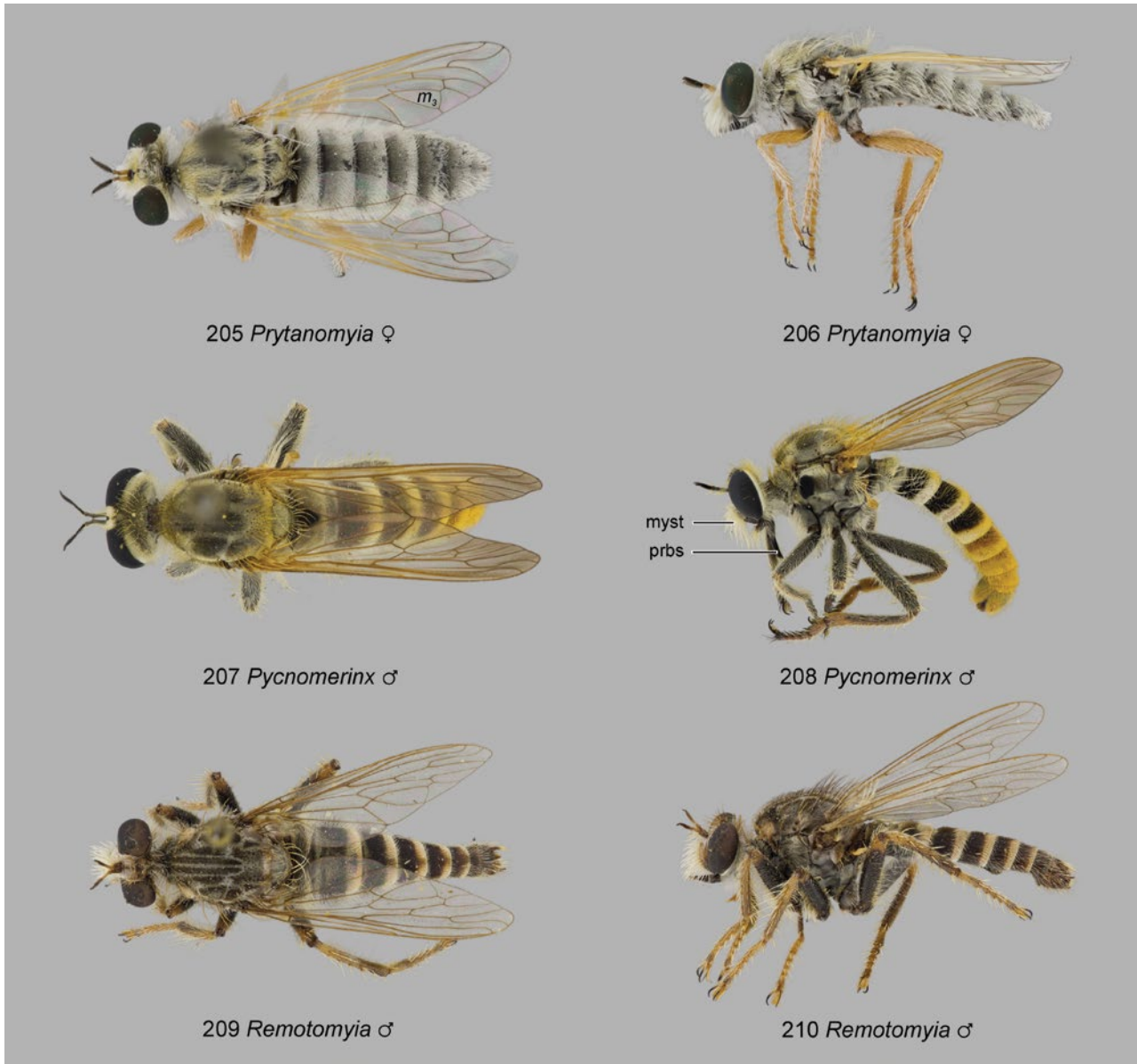
Figs 48.199–204. Habitus photographs of Asilidae: (199) *Pegesimallus calvifrons* Londt, dorsal view ♂; (200) same, lateral view; (201) *Philodicus fraterculus* (Walker), dorsal view ♂; (202) same, lateral view; (203) *Promachus amastrus* (Walker), dorsal view ♂; (204) same, lateral view.

Abbreviations: anatg – anatergite; aux vn – auxiliary vein; C – costal vein; cua – anterior cubital cell; dc s – dorsocentral seta; fc – face; M_1 – first branch of media; M_2 – second branch of media; m_3 – third medial cell; myst – mystax; oc tr – ocellar triangle; oc tub – ocellar tubercle; pprn lb – postpronotal lobe; r_1 – first radial cell; R_1+R_{2+3} – anterior branch of radius + second branch of radius; r_{2+3} – second + third radial cell; R_{2+3} – second branch of radius; r_4 – fourth radial cell; R_4 – upper branch of third branch of radius; r_5 – fifth radial cell; R_5 – lower branch of third branch of radius; sctl – scutellum; styl – stylus; tb – tibia; tg – tergite; tsm – tarsomere.

on the ground. Oviposition takes place in sand or soil. Londt (1994b) provided an identification key to the three species.

***Microstylum* Macquart** (Stenopogoninae). A very large genus of 138 large- to very large-sized species (Figs 53–55, 74, 185–190), occurring in the Afrotropical, Nearctic, Neotropical (E. Fisher, pers. comm. 2017), Oriental and Palearctic Regions, while Geller-Grimm (2004) questioned records from the Australasian Region. The genus requires modern revision,

with many undescribed species known from Madagascar alone (E. Fisher, pers. comm. 2017). Seventy-nine species occur in the Afrotropics, but 50 valid names are catalogued and species remain in need of modern taxonomic treatment. The genus is widespread throughout the Afrotropics, recorded from Southern Africa (Lesotho, Mozambique, Namibia, South Africa and Zimbabwe), Central Africa (Angola, Chad, Democratic Republic of Congo, Gabon, Malawi and Zambia), East Africa (Kenya, Sudan and Tanzania), West Africa (Gambia, Nigeria and

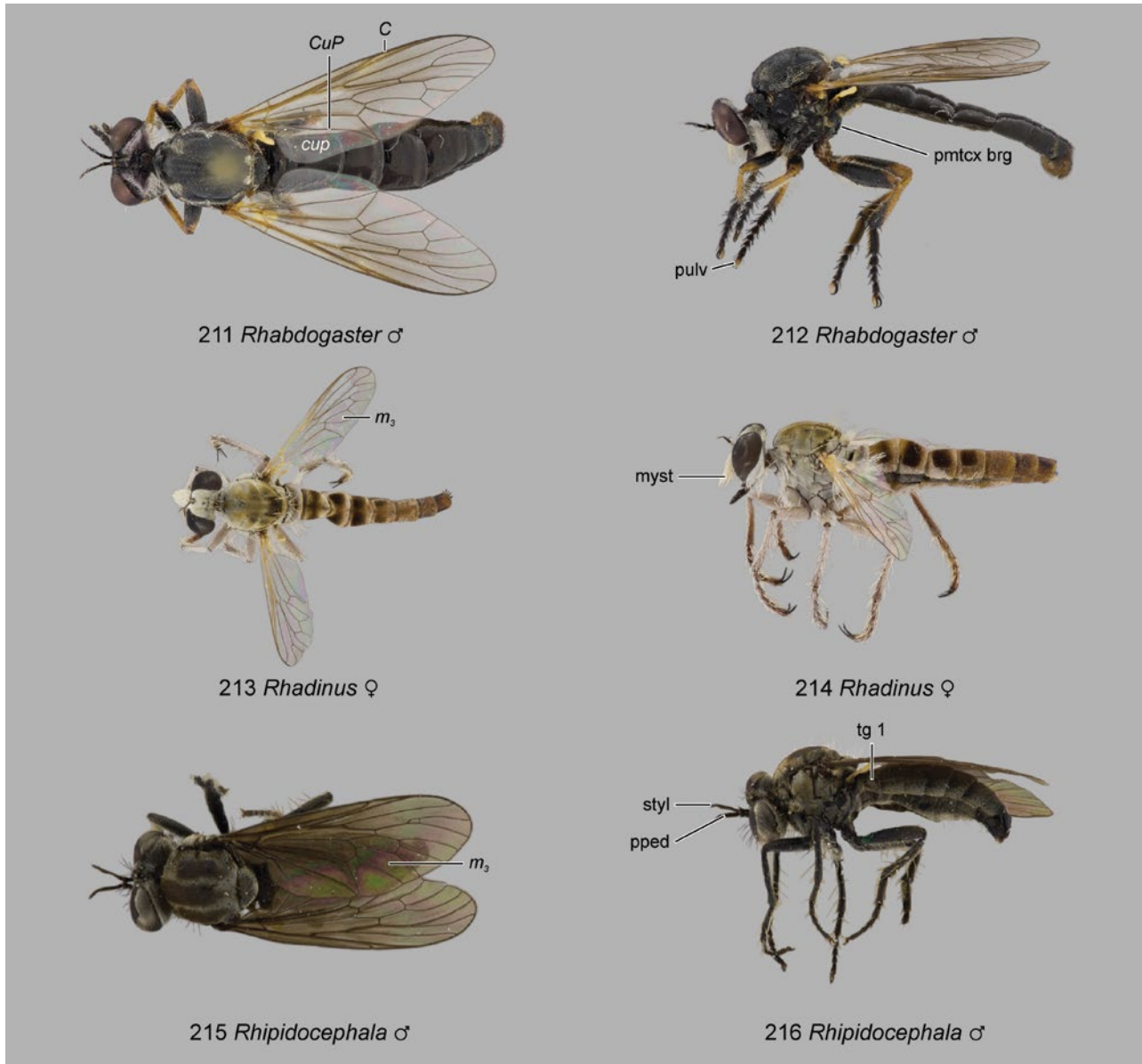


Figs 48.205–210. Habitus photographs of Asilidae: (205) *Prytanomyia kochi* (Lindner), dorsal view ♀; (206) same, lateral view; (207) *Pycnomerinx* sp., dorsal view ♂; (208) same, lateral view; (209) *Remotomyia longipalpus* Londt, dorsal view ♂; (210) same, lateral view.

Abbreviations: m_3 – third medial cell; myst – mystax; prbs – proboscis.

Senegal) and the Indian Ocean islands (Madagascar). The genus inhabits forest, Fynbos, grassland, savanna and woodland habitats and adults perch on the ground, on rocks, or at the tips of grass, shrubs or bushes (Figs 53–55). Oviposition takes place in sand or soil. Some biological information was provided by Cuthbertson (1933, 1937, 1939). The Malagasy fauna has received useful taxonomic treatments through the work of Bromley (1927), who described seven new species and keyed 11 of the 15 then known and Bromley (1931), who added a

further five new species. Bromley (1942), Engel (1932), Oldroyd (1960a) and Timon-David (1952) together added a further nine species to the fauna, Timon-David (1952) producing another identification key to species, which Oldroyd (1960a) updated. Malagasy *Microstylum* are among the largest known Afrotropical Asilidae and a specimen of *Microstylum magnum* Bromley, 1927 in Muséum national d'Histoire naturelle, Paris, France, has a body length of 65 mm and a wing length of 40 mm (E. Fisher, pers. comm. 2017). Other useful references



Figs 48.211–216. Habitus photographs of Asilidae: (211) *Rhabdogaster* sp., dorsal view ♂; (212) same, lateral view; (213) *Rhadinus tewfiki* Efflatoun, dorsal view ♀; (214) same, lateral view; (215) *Rhipidocephala* sp., dorsal view ♂; (216) same, lateral view.

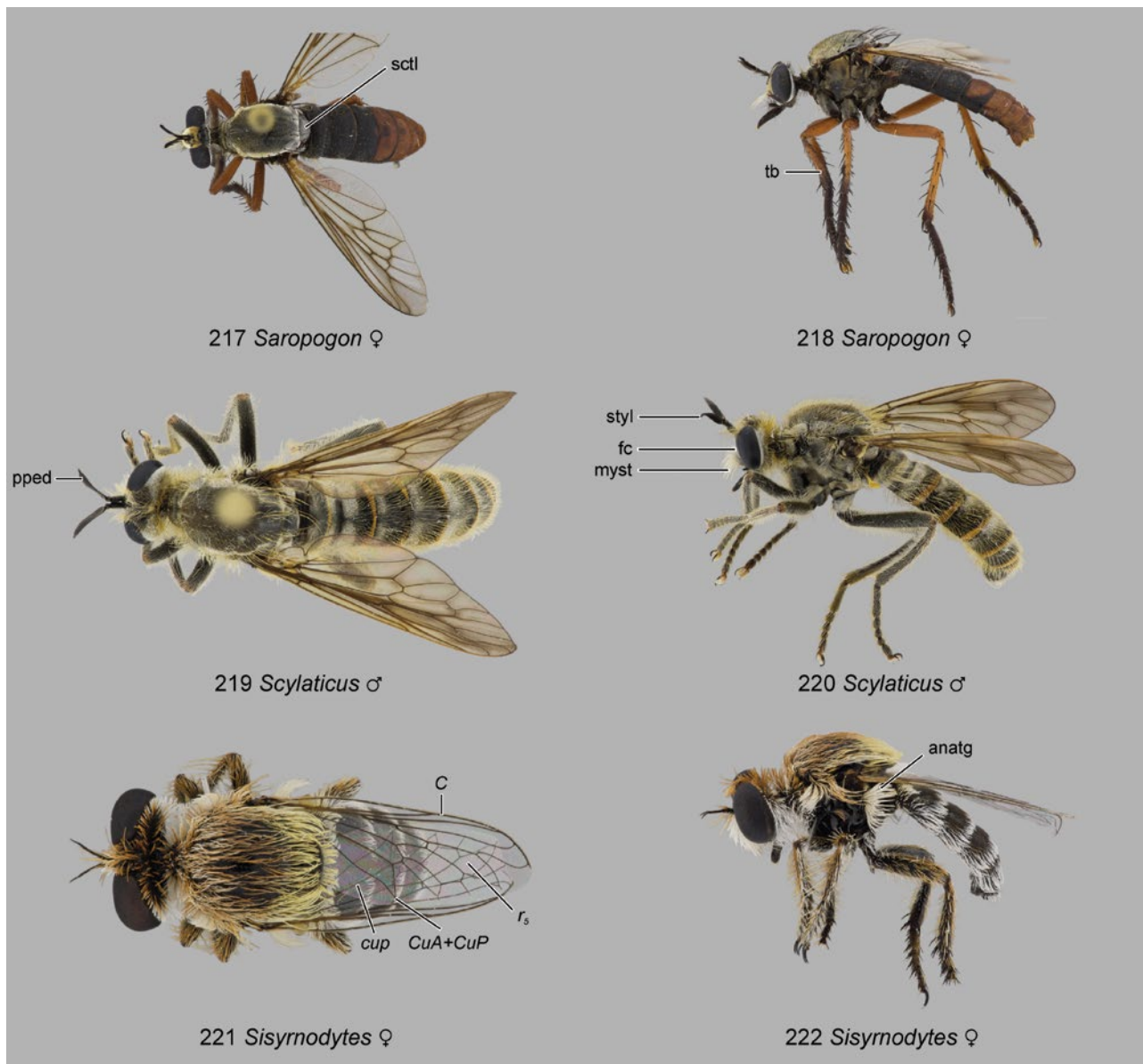
Abbreviations: C – costal vein; CuP – posterior branch of cubital vein; cup – posterior cubital cell; m_3 – third medial cell; myst – mystax; pmtcx brg – postmetacoxal bridge; pped – postpedicel; pulv – pulvillus; styl – stylus; tg – tergite.

include Engel's (1932) key to the species he was familiar with, Bromley (1947) and Oldroyd (1970). No single identification key to Afrotropical species is currently available.

Millenarius Londt (Asilinae). An endemic genus of four medium-sized species (Figs 240–242, 318, 319), described by Londt (2005a) and later reviewed by Londt (2014a). The genus is confined to Southern Africa (South Africa) and inhabits

grassland habitats and adults perch within or at the tips of grass. Oviposition takes place on or in vegetation, with the eggs pasted between leaves (Londt & Harris 1987). Londt (2014a) provided an identification key to the four species.

Nannolaphria Londt (Laphriinae). An endemic monotypic genus, with the single medium-sized species, *N. niger* Londt, 1977 (Figs 191, 192), confined to Southern Africa (South Africa)



Figs 48.217–222. Habitus photographs of Asilidae: (217) *Saropogon zinidi* Londt, dorsal view ♀; (218) same, lateral view; (219) *Scylaticus costalis* (Wiedemann), dorsal view ♂; (220) same, lateral view; (221) *Sisyrnodytes subater* Oldroyd, dorsal view ♀; (222) same, lateral view.

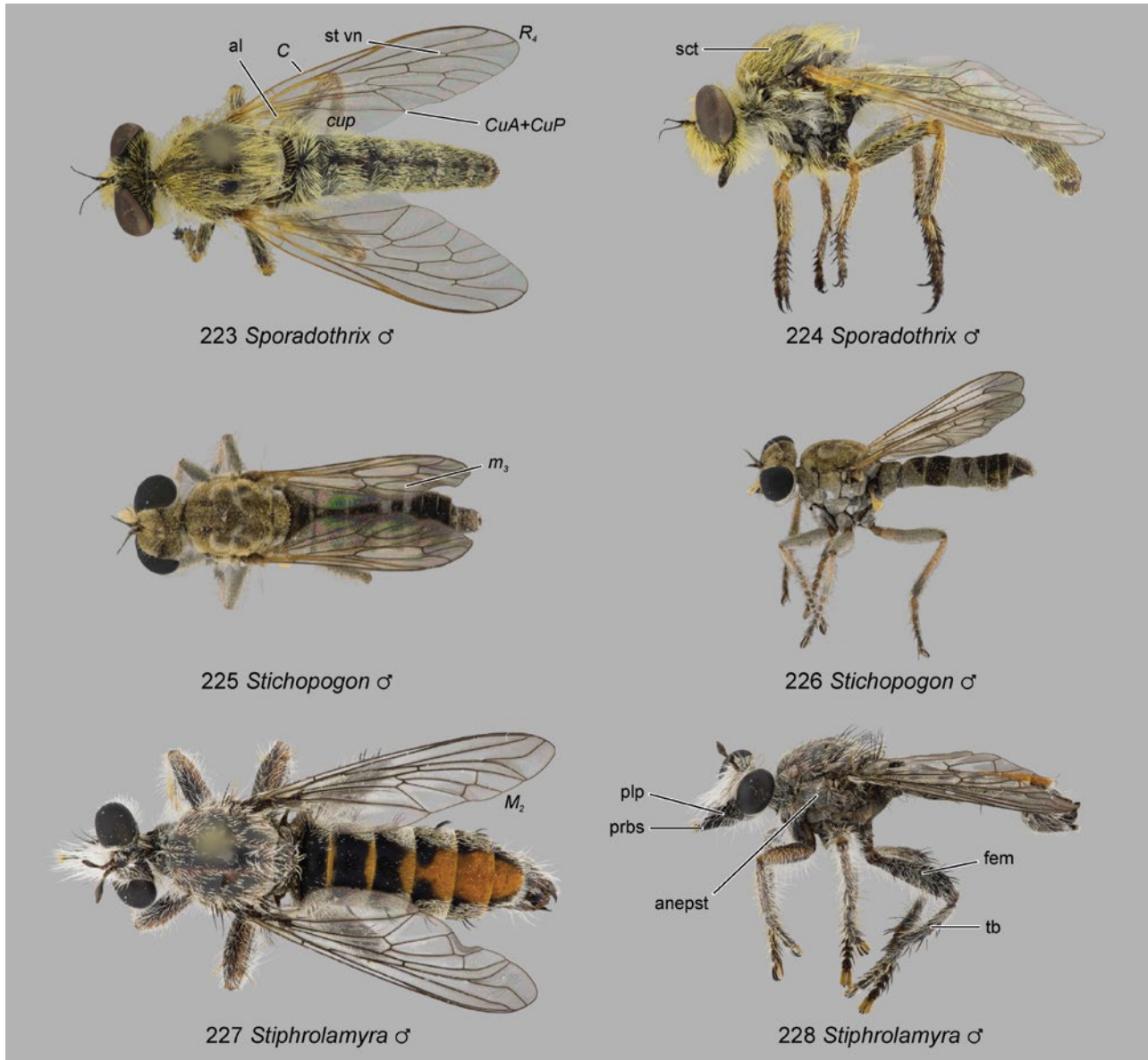
Abbreviations: anatg – anatergite; C – costal vein; CuA+CuP – anterior branch of cubital vein + posterior branch of cubital vein; cup – posterior cubital cell; fc – face; myst – mystax; pped – postpedicel; r₅ – fifth radial cell; sctl – scutellum; styl – stylus; tb – tibia.

(Londt 1977, 2015a). The species inhabits forest habitats and adults perch at the tips of shrubs and bushes. Oviposition probably takes place on or in vegetation.

Nanoculcita Londt & Copeland (Stichopogoninae). An endemic monotypic genus, with the single medium-sized species, *N. kenya* Londt & Copeland, 2017, confined to Eastern Africa (Kenya) (Londt & Copeland 2017). The species inhabits

sandy areas in open forest and woodland habitats and adults perch on the ground, or on riverbanks and beaches. Oviposition takes place in sand or soil.

Neolophonotus Engel (Asilinae). A near endemic genus of 256 medium- to large-sized species (Figs 10–12, 75, 193–196, 243–245), 254 of which occur in the Afrotropical Region, with two species extending into Egypt in the Palearctic.



Figs 48.223–228. Habitus photographs of Asilidae: (223) *Sporadothrix gracilis* Hermann, dorsal view ♂; (224) same, lateral view; (225) *Stichopogon hermanni* Bezzi, dorsal view ♂; (226) same, lateral view; (227) *Stiphrolamyra diaxantha* (Hermann), dorsal view ♂; (228) same, lateral view.

Abbreviations: al – alula; anepst – anepisternum; C – costal vein; CuA+CuP – anterior branch of cubital vein + posterior branch of cubital vein; cup – posterior cubital cell; fem – femur; M_2 – second branch of media; m_3 – third medial cell; plp – palpus; prbs – proboscis; R_4 – upper branch of third branch of radius; sct – scutum; st vn – stump vein; tb – tibia.

Neolophonotus is one of the most speciose genera globally and is divided into five species-groups, based on overall morphological similarity. The genus was reviewed by Londt (1985d, 1986b, 1987b, 1988a), who subsequently added a few additional species (Londt 1990a) and is widespread throughout sub-Saharan Africa, recorded from Southern Africa (Botswana, Lesotho, Mozambique, Namibia, South Africa, Swaziland and Zimbabwe), Central Africa (Angola, Democratic Republic of Congo, Malawi and Zambia), East Africa (Eritrea, Ethiopia, Kenya, Somalia, Tanzania and Uganda) and the southern Arabian Peninsula (United Arab Emirates). The genus inhabits grassland, fynbos, savanna, semi-desert and woodland habitats and adults perch on the ground, on beaches, rocks and stones, in riparian habitats or at the tips of grass, shrubs, bushes and trees (Figs 10–12). Oviposition takes place in sand or soil, or on or in vegetation (*N. suillus* species-group). Some biological information was provided by Cuthbertson (1936, 1937, 1938, 1939, some as *Lophopeltis* Engel). Other useful references include Bosák & Hradský (2011), Engel (1927), Londt (2004b), Tomasovic (2009) and Tomasovic & Constant (2013). Londt (1985d, 1986b, 1987b, 1988a, 1990a) provided the most recent identification keys to Afrotropical species, but see also *Megadrillus* (Londt 2004b).

Notiophria Londt (Laphriinae). An endemic genus of six medium-sized species (Figs 33, 34), described by Londt (1977) and reviewed by Londt (2015a). The genus is recorded from Southern Africa (Mozambique and Zimbabwe), Central Africa (Malawi), East Africa (Burundi, Kenya, Tanzania and Uganda) and the Indian Ocean islands (Comoros, Madagascar, Mauritius and Réunion Is.) (Londt 2015a). The genus inhabits forest habitats and adults perch on fallen trees (E. Fisher, pers. comm. 2017), but have also been photographed on exposed leaves (Figs 33, 34). Oviposition probably takes place on or in vegetation. Londt (2015a) provided an identification key to the six species.

Notomochtherus Londt (Asilinae). An endemic monotypic genus, with the single medium-sized species, *N. brevicauda* Londt, 2002, confined to Southern Africa (South Africa) (Londt 2002b). The species probably inhabits fynbos and grassland habitats and adults perch within grass. The oviposition strategy remains unknown as females are unknown.

Nusa Walker (Laphriinae). A genus of 30 medium-sized species (Fig. 35), occurring in the Afrotropical, Oriental and Palearctic Regions, with three species in the Afrotropics, *N. eos* Londt, 2006, *N. infumata* (Loew, 1851) and *N. ingwavuma* Oldroyd, 1974 (Londt 2006a). The genus is widespread throughout sub-Saharan Africa, recorded from Southern Africa (Botswana, Mozambique, Namibia, South Africa and Zimbabwe), Central Africa (Democratic Republic of Congo, Malawi and Zambia), East Africa (Ethiopia, Kenya, Somalia, Sudan, Tanzania (incl. Zanzibar Is.) and Uganda), the southern Arabian Peninsula (Socotra Is. (Yemen)) and West Africa (Gambia, Ghana and Mali). The genus inhabits grassland and savanna habitats and adults perch on the ground and on stones (Fig. 35). Oviposition probably takes place in sand or soil. Some biological information was provided by Cuthbertson (1939, under the synonym *Dasythrix* Loew). Other useful references include Londt (2010b) and Oldroyd (1970, 1974). Londt (2006a) provided an identification key to the three Afrotropical species.

Oligopogon Loew (*incertae sedis*). A genus of 35 small-sized species (Figs 24, 197, 198), occurring in the Afrotropical and Palearctic Regions, with 29 species in the Afrotropics (Londt 2014b). The taxonomic position of the genus remains uncertain. Oldroyd (1980: 370) placed it together with genera he listed as Trigonimiminae; Geller-Grimm (2004) listed it under the subfamily Stenopogoninae; and Dikow (2009a) considered the genus as *incertae sedis*. The genus has its highest species diversity in the Afrotropics, where it is widespread throughout the region, recorded from Southern Africa (Lesotho, Mozambique, Namibia, South Africa, Swaziland and Zimbabwe), Central Africa (Angola, Democratic Republic of Congo, Malawi and Zambia), East Africa (Burundi, Kenya, Sudan and Tanzania), West Africa (Côte d'Ivoire, Gambia, Ghana, Nigeria and Senegal) and the Indian Ocean islands (Madagascar) (Londt 2014b). The genus inhabits forest (margins), grassland and savanna habitats and adults perch on the ground, within or at the tips of grass, shrubs, bushes and trees (Fig. 24). Oviposition probably takes place in sand or soil. Other useful references include Geller-Grimm & Hradský (2003), Londt (2010b, 2012a), Oldroyd (1970, 1974) and Tomasovic & De Bakker (2010). Londt (2014b) provided an identification key to the 29 Afrotropical species.

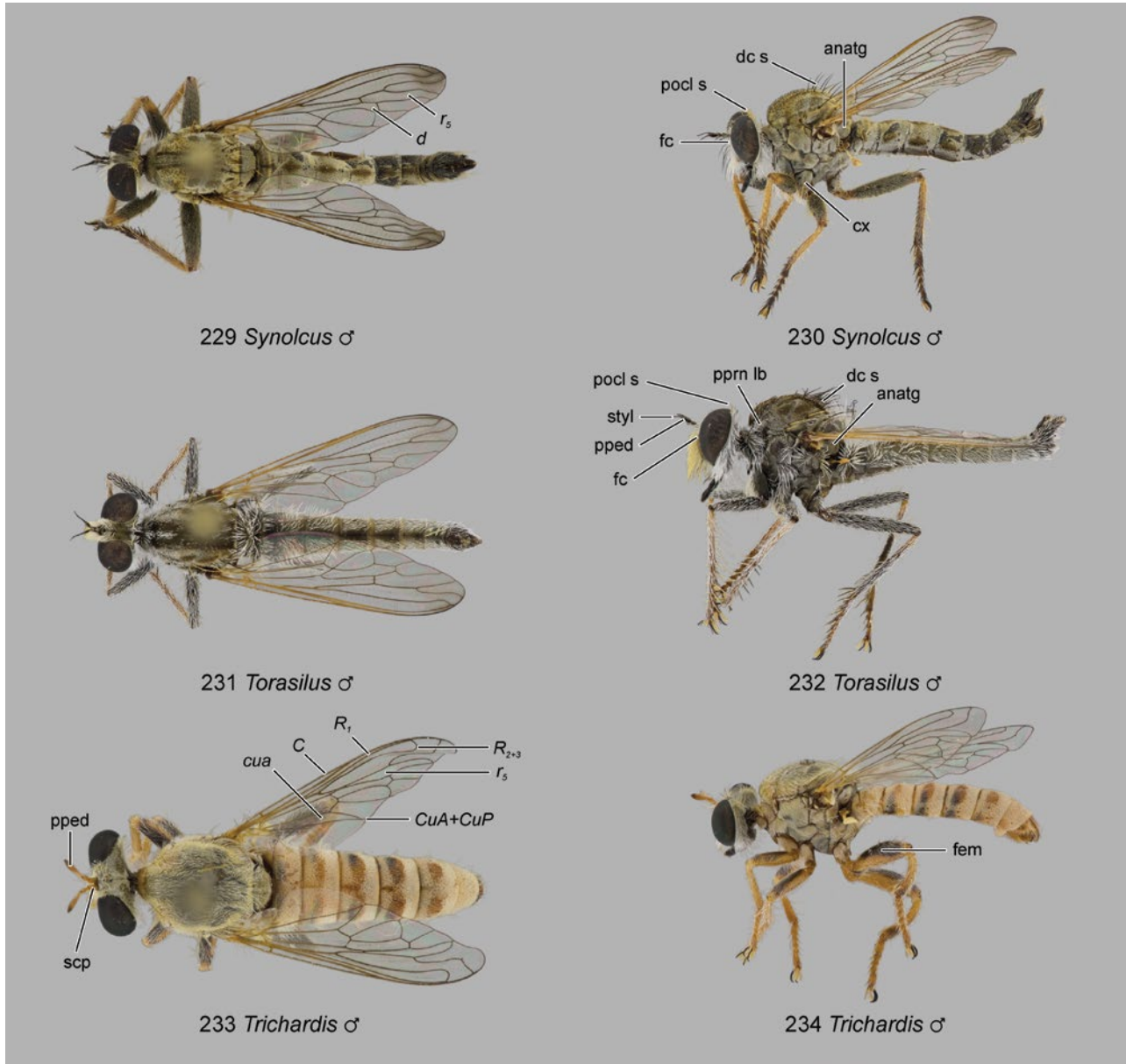
Ommatius Wiedemann (Ommatiinae). A very large genus of ca 250 medium- to large-sized species (Figs 47, 48, 287–289), occurring in the Afrotropical, Australasian, Nearctic, Neotropical and Palearctic Regions, with 70 species in the Afrotropics. The genus requires modern revision. The Malagasy fauna was studied by Oldroyd (1960b) who described four new species and later reviewed by Martin (1964), who added a further 20 species and provided an identification key. The 41 species occurring in sub-Saharan Africa still require modern revision, despite Scarbrough (2002, 2003, 2010) and Scarbrough *et al.* (2003) having described 19 species in recent years. The genus is widespread throughout the Afrotropics, recorded from Southern Africa (Mozambique, South Africa and Zimbabwe), Central Africa (Angola, Cameroon, Chad, Democratic Republic of Congo, Malawi, Republic of Congo and Zambia), East Africa (Burundi, Ethiopia, Kenya, Rwanda, Sudan, Tanzania and Uganda), the southern Arabian Peninsula (United Arab Emirates and Yemen (incl. Socotra Is. and Abd al Kuri Is.)), West Africa (Côte d'Ivoire, Gambia, Ghana, Guinea, Niger, Nigeria and Senegal) and the Indian Ocean islands (Comoros, Madagascar and Mauritius). The genus inhabits grassland, savanna and woodland habitats and adults perch within grass and at the tips of shrubs, bushes and trees (Figs 47, 48). Oviposition takes place through random egg-dropping. Some biological information was provided by Cuthbertson (1933, 1934, 1936, 1937, 1938, 1939). Other useful references include Bromley (1936, 1942), Londt (2010b, 2012a), Oldroyd (1960b, 1968, 1970, 1974) and Tomasovic (2009). No single identification key to Afrotropical species is currently available.

Ontomyia Dikow & Londt (Stenopogoninae). An endemic monotypic genus, with the single medium-sized species, *O. ricardoi* (Londt, 1985) (Figs 295–297), confined to Southern Africa (Namibia) (Dikow & Londt 2000b). The species inhabits grassland, savanna and semi-desert habitats and adults perch on the ground. Oviposition takes place in sand or soil.

Oratostylum Ricardo (Stenopogoninae). An endemic genus of three medium-sized species, *O. crenum* Dikow & Londt, 2000, *O. lepidum* Ricardo, 1925 and *O. zebra* Dikow & Londt,

2000, confined to Southern Africa (Botswana, Namibia, South Africa and Zimbabwe) (Dikow & Londt 2000b). The genus inhabits grassland and savanna habitats and adults perch on the ground. Oviposition takes place in sand or soil. Other useful references include Ricardo (1925). Dikow & Londt (2000b) provided an identification key to the three species.

***Orthogonis* Hermann** (Laphriinae). A genus of 15 medium-sized species, occurring in the Afrotropical, Australasian, Nearctic and Oriental Regions, with the single Afrotropical species, *O. madagascarensis* Bromley, 1942, confined to the Indian Ocean islands (Madagascar) (Bromley 1942). The biology remains unknown, but the species probably inhabits forest



Figs 48.229–234. Habitus photographs of Asilidae: (229) *Synolcus acrobaptus* (Wiedemann), dorsal view ♂; (230) same, lateral view; (231) *Torasilus solus* Londt, dorsal view ♂; (232) same, lateral view; (233) *Trichardis picta* Hermann, dorsal view ♂; (234) same, lateral view.

Abbreviations: anatg – anatergite; C – costal vein; cua – anterior cubital cell; CuA+CuP – anterior branch of cubital vein + posterior branch of cubital vein; cx – coxa; d – discal cell; dc s – dorsocentral seta; fc – face; fem – femur; pocl s – postocular seta; pped – postpedicel; ppn lb – postpronotal lobe; R_1 – anterior branch of radius; R_{2+3} – second branch of radius; r_5 – fifth radial cell; scp – scape; styl – stylus.

habitats and adults probably perch within or at the tips of shrubs, bushes and trees. The oviposition strategy is unknown, but probably takes place on or in vegetation. Other useful references include Hull (1962).

***Oxynoton* Janssens** (Brachyrhopalinae). An endemic genus of two small- to medium-sized species, *O. arnaudi* Oldroyd, 1974 and *O. francoisi* Janssens, 1951, recorded from Southern Africa (Zimbabwe), Central Africa (Chad, Democratic Republic of Congo and Zambia) and East Africa (Burundi, Kenya, Rwanda and Tanzania) (Londt 1996). Oldroyd (1980: 371) listed the genus in the tribe Xenomyzini (Trigonimiminae), but Londt (1996) included it to the subfamily Stenopogoninae. It is here included in the subfamily Brachyrhopalinae. The biology and immature stages remain unknown, but the genus probably inhabits savanna habitats and adults probably perch on the ground and within and at the tips of grass. Oviposition takes place in sand or soil. Londt (1996) provided an identification key to the two species.

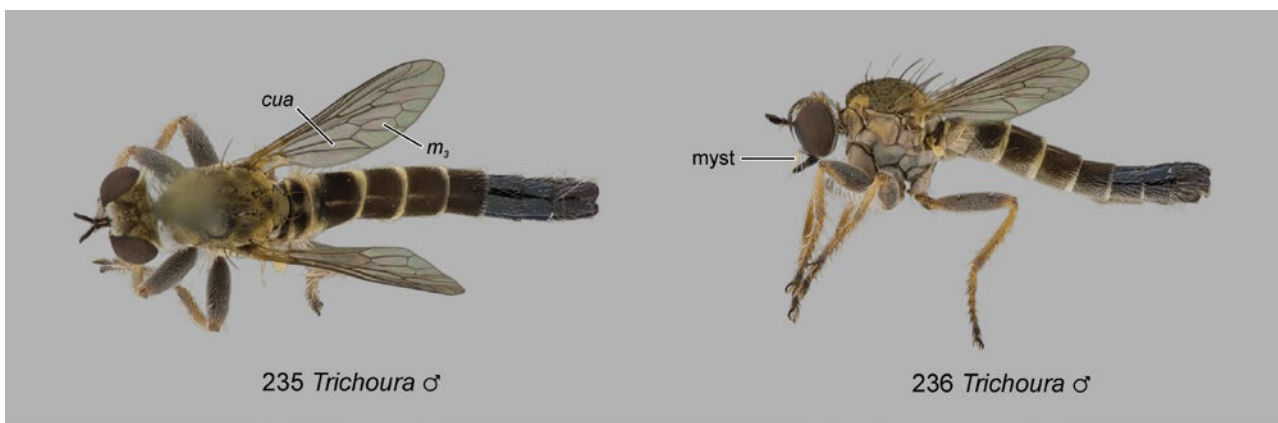
***Pedomyia* Londt** (Brachyrhopalinae). An endemic genus of nine small-sized, bee-like species, confined to Southern Africa (Namibia and South Africa) (Londt 1994b). The genus inhabits grassland, Fynbos, savanna and semi-desert habitats and adults perch on the ground. Oviposition takes place in sand or soil. Londt (1994b) provided an identification key to the nine species.

***Pegesimallus* Loew** (Dasypogoninae). A large genus of 51 small- to large-sized species (Figs 21–23, 76, 199, 200, 262, 263), occurring in the Afrotropical, Oriental and Palaearctic Regions, with 46 species in the Afrotropics (Londt 1980b). The genus is widespread, recorded from Southern Africa (Botswana, Lesotho, Mozambique, Namibia, South Africa, Swaziland and Zimbabwe), Central Africa (Angola, Cameroon, Central African Republic, Democratic Republic of Congo, Gabon, Malawi and Zambia), East Africa (Burundi, Kenya, Somalia, Sudan, Tanzania and Uganda), West Africa (Benin, Burkina Faso, Côte d'Ivoire, Gambia, Guinea, Nigeria, Senegal and Sierra Leone) and the Indian Ocean islands (Madagascar). The genus inhabits forest, savanna and woodland habitats and adults perch

on the ground, within grass or within and at the tips of shrubs and bushes (Figs 21–23). Oviposition takes place in sand or soil. Some biological information was provided by Cuthbertson (1936, 1938, as *Neolaparus* Williston). Other useful references include Bromley (1936), Londt (2010b, 2012a) and Tomasovic (2008b). Londt (1980b) provided an identification key to the 46 Afrotropical species.

***Perasis* Hermann** (Laphriinae). A genus of ten medium-sized species, occurring in the Afrotropical, Nearctic, Neotropical and Palaearctic Regions. Two species occur in the Afrotropics, *P. carpenteri* Oldroyd, 1970 and *P. transvaalensis* Ricardo, 1925 (Londt 2007a). The genus is fairly widespread in sub-Saharan Africa, recorded from Southern Africa (South Africa) and East Africa (Burundi and Uganda). Lehr (1988a: 211) further records *P. arabicus* (Macquart, 1838) from the southern Arabian Peninsula (Yemen), but no specimens from the Afrotropical part of the Arabian Peninsula were studied by Londt (1999b, 2007a). The genus inhabits grassland and savanna habitats and adults perch on the ground. Oviposition probably takes place in sand or soil. Other useful references include Londt (1999b), Oldroyd (1970) and Ricardo (1925). Londt (2007a) provided an identification key to the two Afrotropical species.

***Philodicus* Loew** (Asilinae). A genus of 50 large-sized species (Figs 13, 201, 202, 246–248) requiring modern revision, occurring in the Afrotropical, possibly Australasian, Oriental and Palaearctic Regions, with 23 species in the Afrotropics (Blasdale 1957). The genus is widespread throughout sub-Saharan Africa, recorded from Southern Africa (Botswana, Lesotho, Namibia, South Africa and Zimbabwe), Central Africa (Democratic Republic of Congo and Malawi), East Africa (Kenya, Somalia, Sudan and Uganda), the southern Arabian Peninsula (Yemen) and West Africa (Benin, Côte d'Ivoire, Gambia, Ghana, Guinea, Liberia, Nigeria, Senegal, Sierra Leone and Togo). The genus probably inhabits grassland (usually in the vicinity of fresh or saline water), savanna and woodland habitats and adults perch on the ground or on beaches and river banks and at the tips of grass, shrubs and bushes (Fig. 13). Oviposition takes place in sand or soil. Some biological information was provided by Cuthbertson (1937, 1938, 1939).



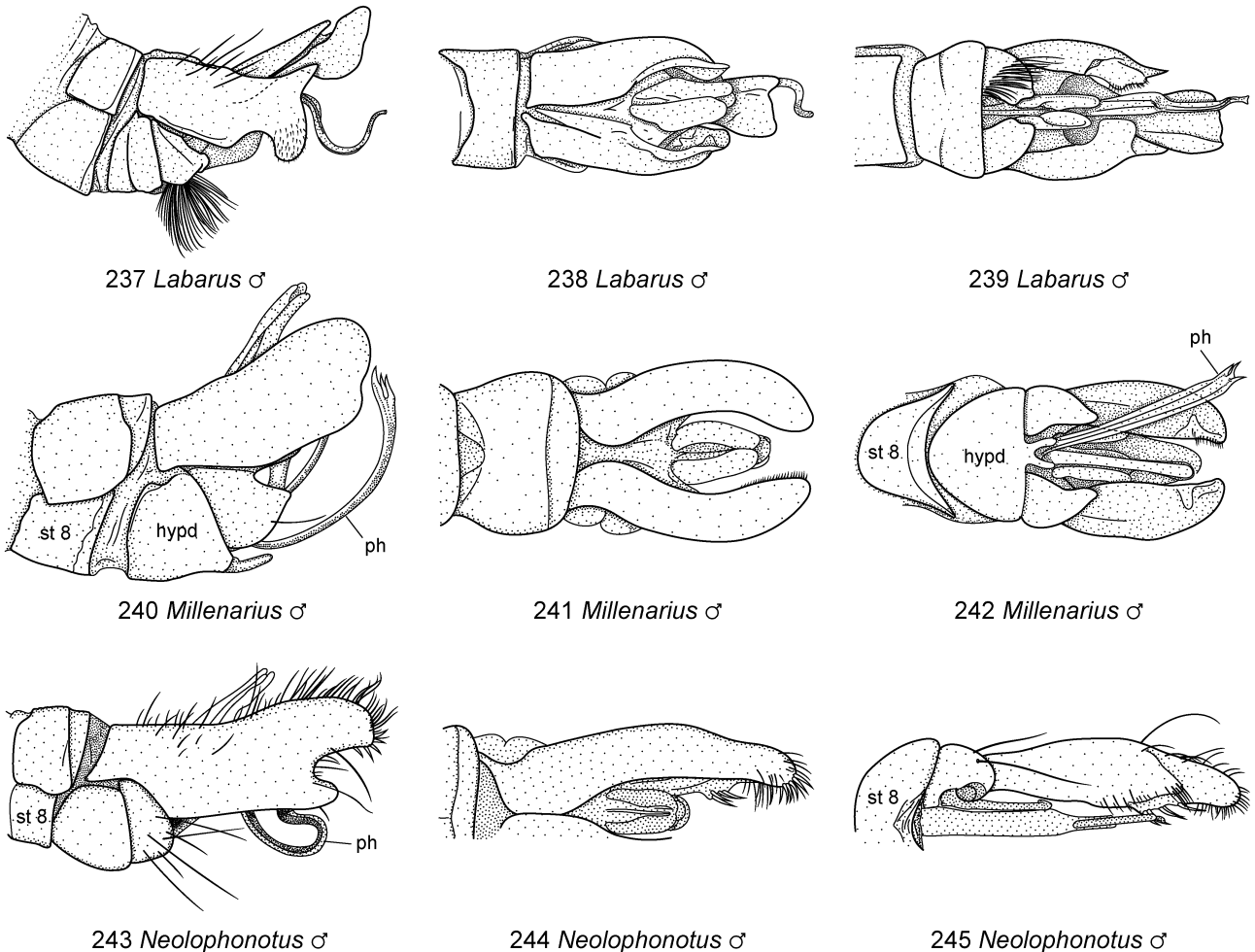
Figs 48.235–236. Habitus photographs of Asilidae: (235) *Trichoura tankwa* Londt, dorsal view ♂; (236) same, lateral view.

Abbreviations: *cua* – anterior cubital cell; *m₃* – third medial cell; *myst* – mystax.

Other useful references include Londt (1978, 2005a, 2010b, 2012a, 2015b) and Tomasovic (2012a). Blasdale (1957) and Londt (2015b) provided the most recent identification keys to Afrotropical species.

***Pilophoneus* Londt** (Laphriinae). An endemic genus of two medium-sized, bee-like species, *P. analogos* Londt, 2014 and *P. krugeri* (Oldroyd, 1974), described by Londt (1988b) and later reviewed by Londt (2014d). The genus is recorded in sub-Saharan Africa from Southern Africa (South Africa), Central Africa (Zambia) and East Africa (Tanzania). The genus inhabits grassland and savanna habitats and adults probably perch within and/or at the tips of grass. The oviposition strategy remains unknown, but may involve inserting eggs into dead wood. Other useful references include Oldroyd (1974). Londt (2014d) provided an identification key to the two species.

***Proagonistes* Loew** (Laphriinae). A large endemic genus of 22 large- to very large-sized, pompilid-mimicking species (Figs 36, 37) reviewed by Bromley (1930, 1933), but requiring modern revision. The genus is widely distributed throughout sub-Saharan Africa, recorded from Southern Africa (Mozambique, South Africa and Zimbabwe), Central Africa (Cameroon, Democratic Republic of Congo, Gabon, Malawi and Republic of Congo), East Africa (Kenya, Tanzania and Uganda), West Africa (Côte d'Ivoire, Ghana, Guinea, Nigeria and Sierra Leone), the Indian Ocean islands (Madagascar) and the Atlantic Ocean islands (São Tomé and Príncipe). The genus inhabits forest and woodland habitats and adults perch within shrubs, bushes and trees (Figs 36, 37). Other useful references include Oldroyd (1970), Tomasovic (2010) and Tomasovic & Kwandjo (2007). Oviposition probably takes place on or in vegetation. Oldroyd (1970) provided the most recent identification key to the 22 Afrotropical species.



Figs 48.237–245. Male terminalia of Asilidae (Asilinae): (237) *Labarus ignota* Londt, lateral view; (238) same, dorsal view; (239) same, ventral view; (240) *Millenarius graminosus* Londt, lateral view; (241) same, dorsal view; (242) same, ventral view; (243) *Neolophonotus boa* Londt, lateral view; (244) same, dorsal view; (245) same, ventral view. Figs 237–239 (after Londt 2005a, figs 36–38), Figs 240–242 (after Londt 2005a, figs 44–46), Figs 243–245 (after Londt 1988a, figs 56–58).

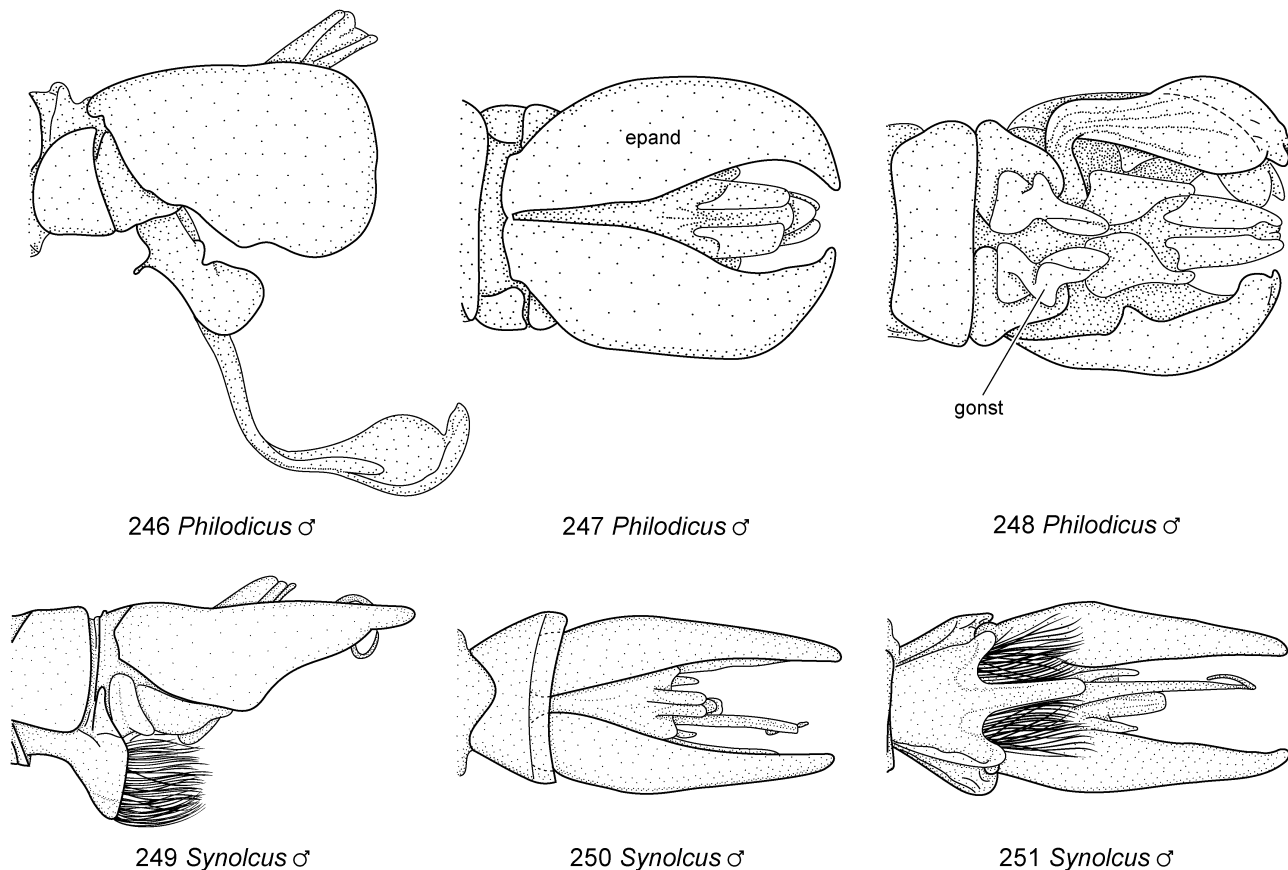
Abbreviations: hypd – hypandrium; ph – phallus; st – sternite.

Promachus Loew (Asilinae). A very large genus of 230 medium- to large-sized species (Figs 1, 14–16, 77, 84, 203, 204), occurring in all zoogeographical regions, except Antarctica, but requiring modern revision. While Geller-Grimm (2004) placed *Bactria* Meigen in synonymy with *Promachus*, the taxonomic position of these genera has not been adequately resolved, as *Bactria* is the older name (Londt 2005a). Ninety-eight species occur in the Afrotropics, being widespread throughout the Afrotropics, recorded from Southern Africa (Lesotho, Mozambique, Namibia, South Africa and Zimbabwe), Central Africa (Angola, Bioko Is. (Equatorial Guinea), Cameroon, Democratic Republic of Congo, Gabon, Malawi, Republic of Congo and Zambia), East Africa (Ethiopia, Kenya, Sudan, Tanzania and Uganda), the southern Arabian Peninsula (United Arab Emirates and Socotra Is. (Yemen)), West Africa (Benin, Côte d'Ivoire, Gambia, Ghana, Guinea, Liberia, Nigeria, Senegal, Sierra Leone and Togo) and the Indian Ocean islands (Madagascar). The genus inhabits forest, grassland, fynbos, savanna, semi-desert and woodland habitats and adults perch on stones, within grass or at the tips of shrubs and bushes (Figs 1, 14–16). Oviposition takes place on or in vegetation. Some biological information was provided by Cuthbertson (1934, 1935, 1937,

1938, 1939, some as *Bactria*). Other useful references include Bosák & Hradský (2011), Bromley (1931), Londt (2010b), Oldroyd (1974) and Tomasovic (2012b, 2014). No identification key to Afrotropical species is currently available.

Prytanomyia Özdikmen (Laphriinae). An endemic monotypic genus, with the single small-sized species, *P. kochi* (Lindner, 1973) (Figs 38, 78, 205, 206), described by Oldroyd (1974, as *Prytania*). The species is confined to Southern Africa (Namibia) and Central Africa (Angola) and inhabits desert habitats and adults perch on the ground or on beaches (Fig. 38). Oviposition probably takes place in sand or soil. The genus was reviewed by Londt & Dikow (2017).

Pycnomerinx Hull (Stenopogoninae). An endemic genus of three medium-sized, wasp-like species, *P. cogani* Oldroyd, 1974, *P. gweta* Oldroyd, 1974 and *P. rhodesii* (Ricardo, 1925) (Figs 207, 208), confined to Southern Africa (Botswana, Namibia and Zimbabwe) (Londt 1990c), with unpublished records from Mozambique. The genus inhabits grassland and savanna habitats and adults perch on the ground or at the tips of grass. Oviposition takes place in sand or soil. Other useful



Figs 48.246–251. Male terminalia of Asilidae (Asilinae): (246) *Philodicus tenuipes* Loew, lateral view; (247) same, dorsal view; (248) same, ventral view; (249) *Synolcus acrobaptus* (Wiedemann), lateral view; (250) same, dorsal view; (251) same, ventral view. Figs 246–248 (after Londt 2015b, figs 21–23), Figs 249–251 (after Londt 2012d, figs 14–16).

Abbreviations: epand – epandrium; gonst – gonostylus.

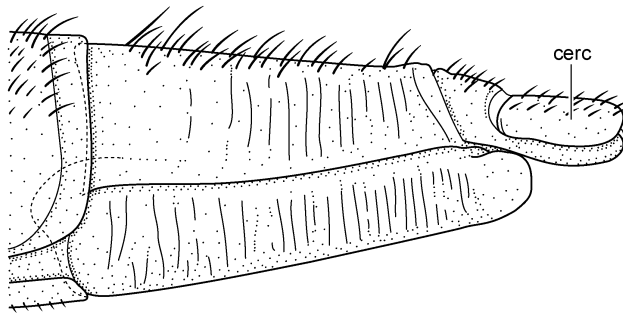
references include Oldroyd (1974). Londt (1990c) provided an identification key to the three species.

Pygommatius Scarbrough & Marascia (Ommatiinae). A genus of 39 medium-sized species, occurring in the Afrotropical and Oriental Regions, with 25 species in the Afrotropics. Originally described by Scarbrough & Marascia (2003), as a subgenus of *Ommatius*, the group was elevated to generic rank by Scarbrough & Hill (2005). The genus is widespread, recorded from Southern Africa (Botswana, Mozambique, Namibia, South Africa, Swaziland and Zimbabwe), Central Africa (Cameroon, Central African Republic, Chad, Democratic Republic of Congo, Gabon, Malawi, Republic of Congo and Zambia), East Africa (Ethiopia, Kenya, Tanzania and Uganda), West Africa (Benin, Côte d'Ivoire, Gambia, Ghana, Guinea, Mali, Nigeria and Sierra Leone) and the Indian Ocean islands (Madagascar) (Scarbrough & Marascia 2003). The genus inhabits grassland, savanna and woodland habitats and adults perch at the tips of grass, shrubs, bushes and trees. Oviposition takes place through random egg-dropping. Other useful references include Londt (2010b, 2012a) and Scarbrough (2010).

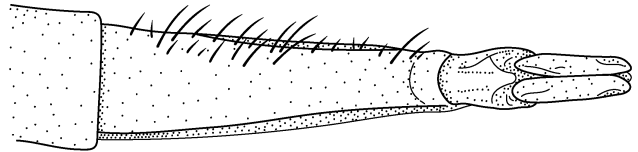
Scarbrough & Marascia (2003) provided an identification key to the 25 Afrotropical species.

Remotomyia Londt (Stenopogoninae). An endemic genus of four medium- to large-sized species (Figs 209, 210), confined to Southern Africa (Botswana, Namibia, South Africa and Zimbabwe) (Londt 1983c). The genus inhabits grassland, savanna and semi-desert habitats and adults perch on the ground. Oviposition takes place in sand or soil. Other useful references include Dikow & Londt (2000b) and Hull (1967). Dikow & Londt (2000b) provided an identification key to the four species.

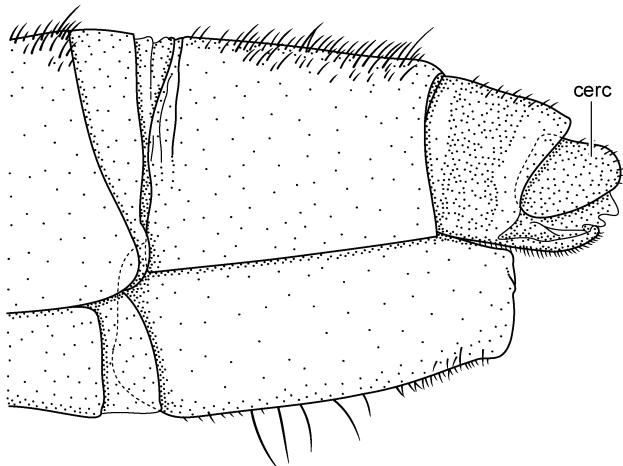
Rhabdogaster Loew (Brachyrhopalinae). A near endemic genus of 39 small- to medium-sized species (Figs 211, 212, 259–261), with *R. cinerascens* (Wulp, 1899) extending into Saudi Arabia (Londt 2006c) and Iran (Lehr 1988a: 226) in the Palearctic (Londt 2006c). The genus is widespread throughout sub-Saharan Africa, recorded from Southern Africa (Botswana, Lesotho, Mozambique, Namibia, South Africa, Swaziland and Zimbabwe), Central Africa (Angola, Democratic Republic of



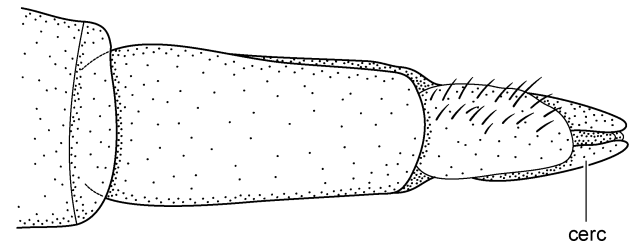
252 *Labarus* ♀



253 *Labarus* ♀



254 *Millenarius* ♀



255 *Millenarius* ♀

Figs 48.252–255. Female ovipositors of Asilidae (Asilinae): (252) *Labarus ignota* Londt, lateral view; (253) same, dorsal view; (254) *Millenarius graminosus* Londt, lateral view; (255) same, dorsal view. Figs 252, 253 (after Londt 2005a, figs 41, 42), Figs 254, 255 (after Londt 2005a, figs 49, 50).

Abbreviation: cerc – cercus.

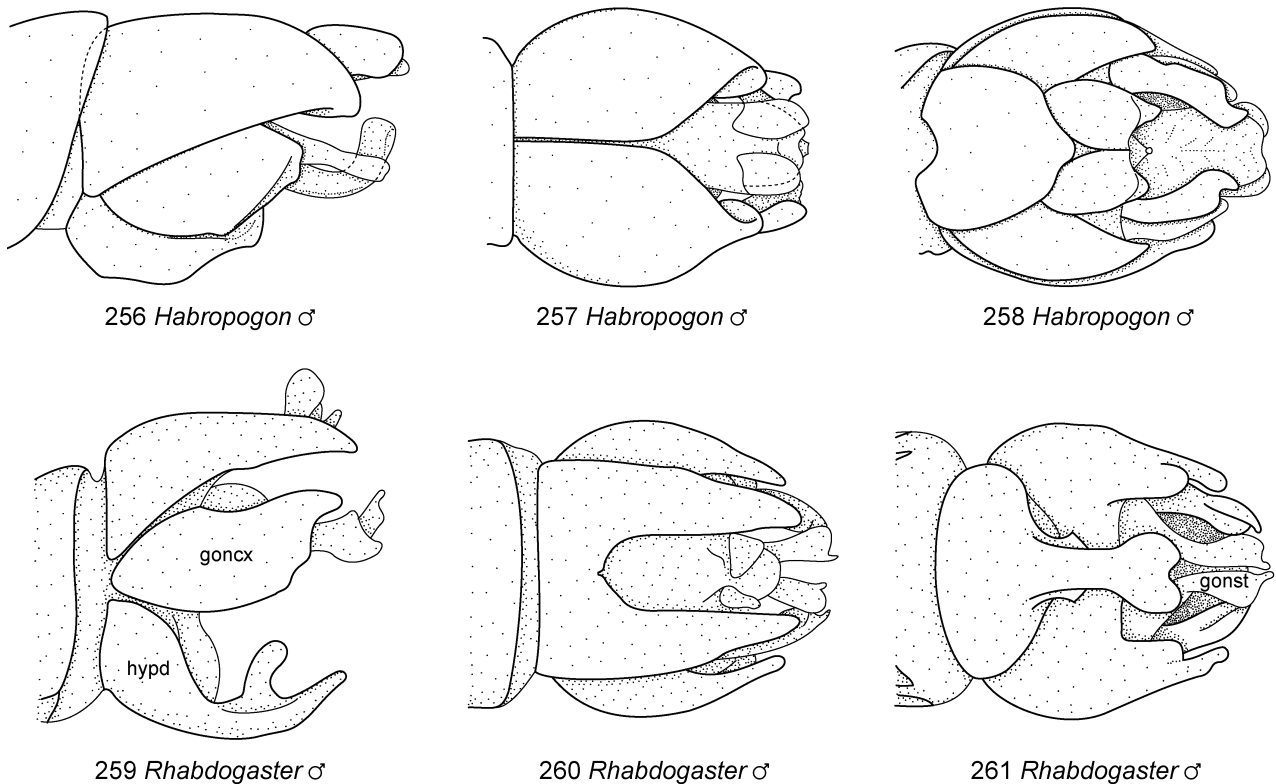
Congo and Zambia), East Africa (Eritrea, Kenya, Sudan, Tanzania and Uganda), the southern Arabian Peninsula (Yemen and Oman) and West Africa (Côte d'Ivoire and Gambia) (Londt 2006c). The genus inhabits grassland, Fynbos, savanna and woodland habitats and adults perch on the ground and at the tips of grass. Oviposition takes place in sand or soil. Other useful references include Londt (1993b, 2010b) and Tomasovic & Constant (2013). Londt (2006c) provided an identification key to the 39 Afrotropical species.

Rhacholaemus Hermann (Stenopogoninae). An endemic genus of nine small- to medium-sized species confined to Southern Africa (Namibia and South Africa) (Londt 1999d). The genus inhabits grassland, Fynbos, savanna and semi-desert habitats and adults perch on the ground. Oviposition takes place in sand or soil. Other useful references include Oldroyd (1974). Londt (1999d) provided an identification key to the nine species.

Rhadinus Loew (Stichopogoninae). A genus of ten small-sized, bee-like species (Figs 57, 213, 214), occurring in the Afrotropical and Palearctic Regions, which requires modern revision. Four species occur in the Afrotropics, confined to East Africa (Sudan) and the southern Arabian Peninsula (United Arab Emirates and Yemen (incl. Socotra Is.)), with

unpublished records from Djibouti. The biology of the genus is poorly known, but species probably inhabit semi-desert habitats and adults probably perch on the ground or on beaches and river banks. Oviposition takes place in sand or soil. Other useful references include Bosák & Hradský (2011), Efflatoun (1934, 1937) and Geller-Grimm (2002). No identification key to Afrotropical species is currently available.

Rhipidocephala Hermann (Trigonimiminae). An endemic genus of 26 small-sized species (Figs 64, 65, 215, 216), reviewed by Oldroyd (1966), but requiring modern revision. Geller-Grimm (2004) and Lehr (1988a: 214) recorded the genus as questionable from the Palearctic parts of the Arabian Peninsula. The genus is widespread, recorded from Southern Africa (Botswana, Lesotho, Mozambique, South Africa and Zimbabwe), Central Africa (Democratic Republic of Congo), East Africa (Burundi, Ethiopia, Kenya, Somalia and Tanzania), the southern Arabian Peninsula (Yemen), West Africa (Gambia, Ghana and Nigeria) and the Indian Ocean islands (Madagascar) (Oldroyd 1966). The genus inhabits grassland, Fynbos, savanna and woodland habitats and adults perch at the tips of grass or within shrubs and bushes (Figs 64, 65). Oviposition takes place through random egg-dropping. Some biological information was provided by Cuthbertson (1935). Oldroyd (1966) provided the most recent identification key to the 26 species.



Figs 48.256–261. Male terminalia of Asilidae (Brachyrhopalinae): (256) *Habropogon capensis* Londt, lateral view; (257) same, dorsal view; (258) same, ventral view; (259) *Rhabdogaster eremia* Londt, lateral view; (260) same, dorsal view; (261) same, ventral view. Figs 256–258 (after Londt 2000b, figs 28–30), Figs 259–261 (after Londt 2006c, figs 21–23).

Abbreviations: goncx – gonocoxite; gonst – gonostylus; hypd – hypandrium.

Robertomyia Londt (Asilinae). An endemic genus of two medium- to large-sized species, *R. lavignei* Londt, 1990 and *R. snowi* Londt, 2010, described by Londt (1990a) and later reviewed by Londt (2010b). The genus is recorded from East Africa (Somalia) and West Africa (Gambia), with an unpublished record from Kenya. The genus probably inhabits savanna and woodland habitats and adults probably perch at the tips of shrubs and bushes. Oviposition probably takes place on or in vegetation. Londt (2010b) provided an identification key to the two species.

Saropogon Loew (Dasyopogoninae). A genus of 135 small- to medium-sized species (Figs 217, 218), occurring in all zoogeographical regions, except Antarctica. Ten species occur in the Afrotropics, confined to East Africa (Eritrea, Ethiopia, Kenya, Sudan and Tanzania), the southern Arabian Peninsula (Oman, United Arab Emirates and Yemen) and West Africa (Mali, Mauritania, Niger and Senegal) (Londt 1997). The genus apparently inhabits grassland, savanna and semi-desert habitats and adults probably perch on the ground or on low vegetation. Oviposition takes place in sand or soil. Other useful references include Bosák & Hradský (2011) and Londt (2010b). Londt (1997) provided the most recent identification key to the 10 sub-Saharan species, but see Bosák & Hradský (2011) for the Arabian Peninsula fauna.

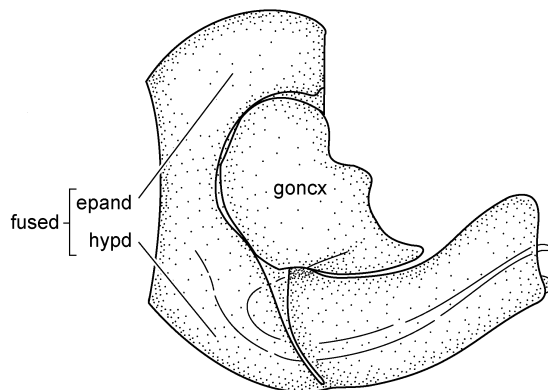
Schildia Aldrich (Leptogastrinae). A genus of ten small-sized species (Figs 281–283), occurring in the Afrotropical, Neotropical and Oriental Regions, with a single Afrotropical species, *S. adina* Dikow & Bayless, 2009, confined to the Indian Ocean islands (Madagascar) (Dikow & Bayless 2009). While many extralimital species inhabit forest habitats, *S. adina* purportedly inhabits “xeric shrub lands” and adults probably perch at the tips of shrubs, bushes and trees. The oviposition strategy probably involves random egg-dropping. Dikow & Bayless (2009) provided an identification key to the world fauna.

Scylaticus Loew (Stenopogoninae). A genus of 48 small- to large-sized, bee- or wasp-like species (Figs 56, 219, 220), occurring

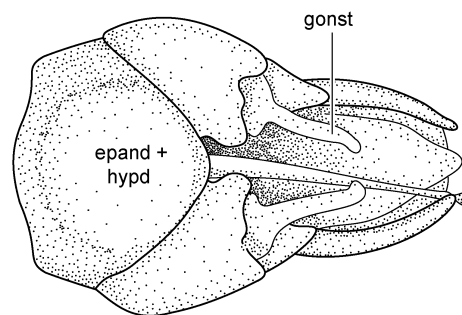
in the Afrotropical, Neotropical, Oriental and Palaearctic Regions, with 36 species in the Afrotropics (Londt 1992c). The genus is distributed throughout sub-Saharan Africa, recorded from Southern Africa (Botswana, Lesotho, Namibia, South Africa and Zimbabwe), Central Africa (Malawi and Zambia), East Africa (Kenya), West Africa (Gambia) and the southern Arabian Peninsula (United Arab Emirates) (Londt 1992c). The genus inhabits grassland, Fynbos, savanna, semi-desert and woodland habitats and adults perch on the ground or at the tips of shrubs and bushes (Fig. 56). Oviposition takes place in sand or soil. Other useful references include Bosák & Hradský (2011), Engel (1932), Londt (2010b) and Tomasovic & Constant (2013). Londt (1992c) provided an identification key to the 36 Afrotropical species.

Sisyrodytes Loew (Willistoninae). A genus of 18 small- to medium-sized, bee-like species (Figs 67, 79, 221, 222, 310, 311), occurring in the Afrotropical and Palaearctic Regions, with 16 species in the Afrotropics (Londt 2009a). The genus is widespread throughout sub-Saharan Africa, recorded from Southern Africa (Botswana, Mozambique, Namibia, South Africa and Zimbabwe), Central Africa (Malawi and Zambia), East Africa (Eritrea, Kenya and Tanzania), the southern Arabian Peninsula (United Arab Emirates and Yemen) and West Africa (Benin, Gambia, Mauritania, Niger and Nigeria) (Londt 2009a). The genus inhabits grassland, Fynbos, savanna, semi-desert and woodland habitats and adults perch on the ground or on stones and rocks (Fig. 67). Oviposition takes place in sand or soil. Other useful references include Bosák & Hradský (2011) and Oldroyd (1957). Londt (2009a) provided an identification key to the 16 Afrotropical species.

Smeryngolaphria Hermann (Laphriinae). A genus of 10 small- to medium-sized species, occurring in the Afrotropical and Oriental Regions. Three species occur in the Afrotropics, *S. bicolorata* Tomasovic, 2003, *S. pallida* Bromley, 1935 and *S. bromleyi* Londt, 1989, reviewed by Londt (1989b) with further revision required. The genus is fairly widespread throughout the Afrotropics, recorded from Central Africa (Democratic



262 *Pegasimallus* ♂



263 *Pegasimallus* ♂

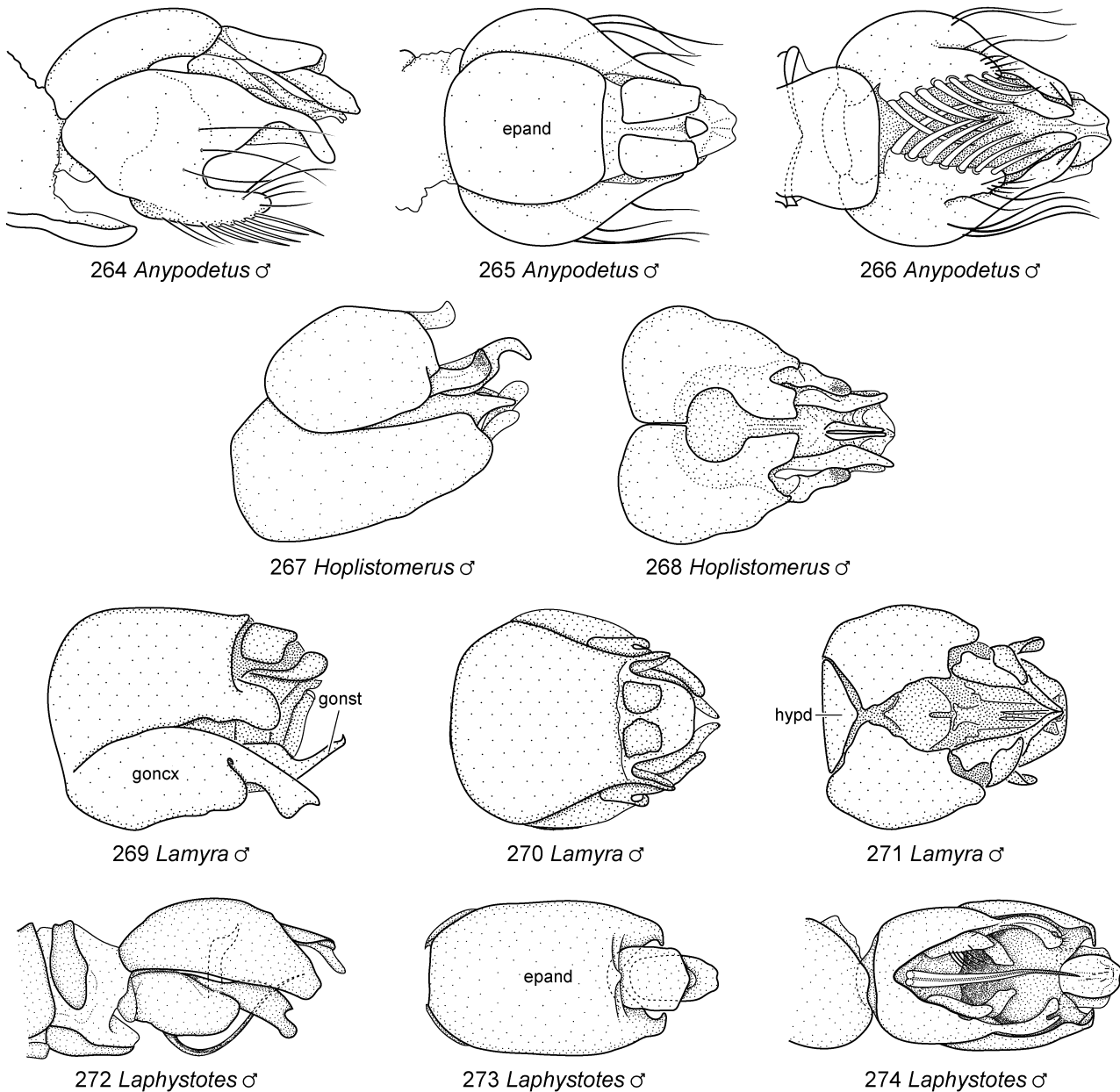
Figs 48.262–263. Male terminalia of Asilidae (Dasyopogoninae): (262) *Pegasimallus laticornis* (Loew), lateral view; (263) same, ventral view. Figs 262, 263 (after Londt 1980b, figs 53, 54).

Abbreviations: epand – epandrium; goncx – gonocoxite; gonst – gonostylus; hypd – hypandrium.

Republic of Congo), West Africa (Nigeria) and the Indian Ocean islands (Madagascar) (Londt 1989b). The biology of the genus remains unknown, but species probably inhabit forest habitats and adults probably perch within trees. Oviposition probably takes place on or in vegetation. Other useful references include Tomasovic (2003). Londt (1989b) provided the

most recent identification key to Afrotropical species, but see Tomasovic (2003) for an additional species.

Sphagomyia Londt (Asilinae). An endemic genus of three small-sized species, *S. botswana* Londt, 2002, *S. gambia* Londt, 2012 and *S. kenya* Londt, 2002, described by Londt (2002b)



Figs 48.264–274. Male terminalia of Asilidae (Laphriinae): (264) *Anypodetus leucothrix* Londt, lateral view; (265) same, dorsal view; (266) same, ventral view; (267) *Hoplistomerus nobilis* Loew, lateral view; (268) same, ventral view; (269) *Lamyra gulo* (Loew), lateral view; (270) same, dorsal view; (271) same, ventral view; (272) *Laphystotes ariel* Londt, lateral view; (273) same, dorsal view; (274) same, ventral view. Figs 264–266 (after Londt 2000a, figs 19–21), Figs 267, 268 (after Londt 2007b, figs 21, 23), Figs 269–271 (after Dikow & Londt 2000, figs 4–6), Figs 272–274 (after Londt 2004a, figs 17–19).

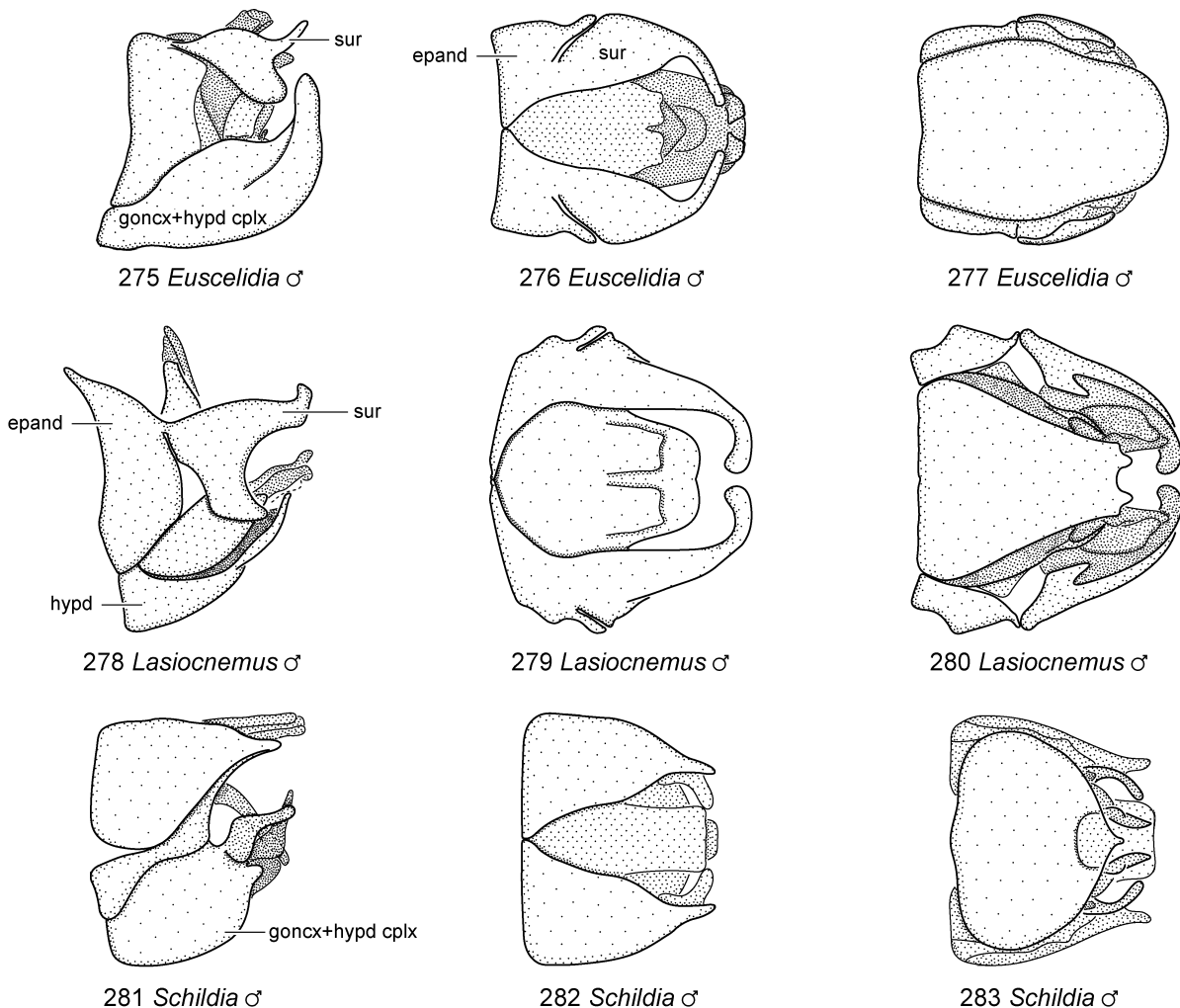
Abbreviations: epand – epandrium; goncx – gonocoxite; gonst – gonostylus; hypd – hypandrium.

and reviewed by Londt (2012a). Species are recorded from Southern Africa (Botswana and South Africa), East Africa (Kenya) and West Africa (Gambia). The genus inhabits savanna and woodland habitats and adults probably perch within shrubs and bushes. Oviposition probably takes place on or in vegetation. Londt (2012a) provided an identification key to the three species.

***Sporadothrix* Hermann** (Willistoninae). An endemic monotypic genus, with the single medium-sized species, *S. gracilis* Hermann, 1907 (Figs 80, 223, 224), confined to Southern Africa (Botswana, Namibia and South Africa) (Londt 2010c). The species inhabits grassland, savanna and semi-desert habitats and adults perch on the ground or within grass. Oviposition takes place in sand or soil.

***Stenopogon* Loew** (Stenopogoninae). A large genus of 170 medium-sized species, occurring in the Afrotropical, Nearctic, Oriental and Palaearctic Regions, that is in need of modern revision. Only two species occur in the Afrotropics, *S. coxalis* (Becker, 1922) and *S. lehri* Londt, 1999, that were reviewed by Londt (1999d, 2002a) and are confined to East Africa (Kenya, Somalia and Sudan). The biology of the genus remains unknown, but species probably inhabit grassland, savanna and semi-desert habitats and adults perch on the ground or on low vegetation. Oviposition takes place in sand or soil. No identification key to Afrotropical species is currently available.

***Stichopogon* Loew** (Stichopogoninae). A large genus of 102 small-sized species (Figs 58–60, 81, 225, 226, 301, 302), occurring in all zoogeographical regions, except Antarctica.

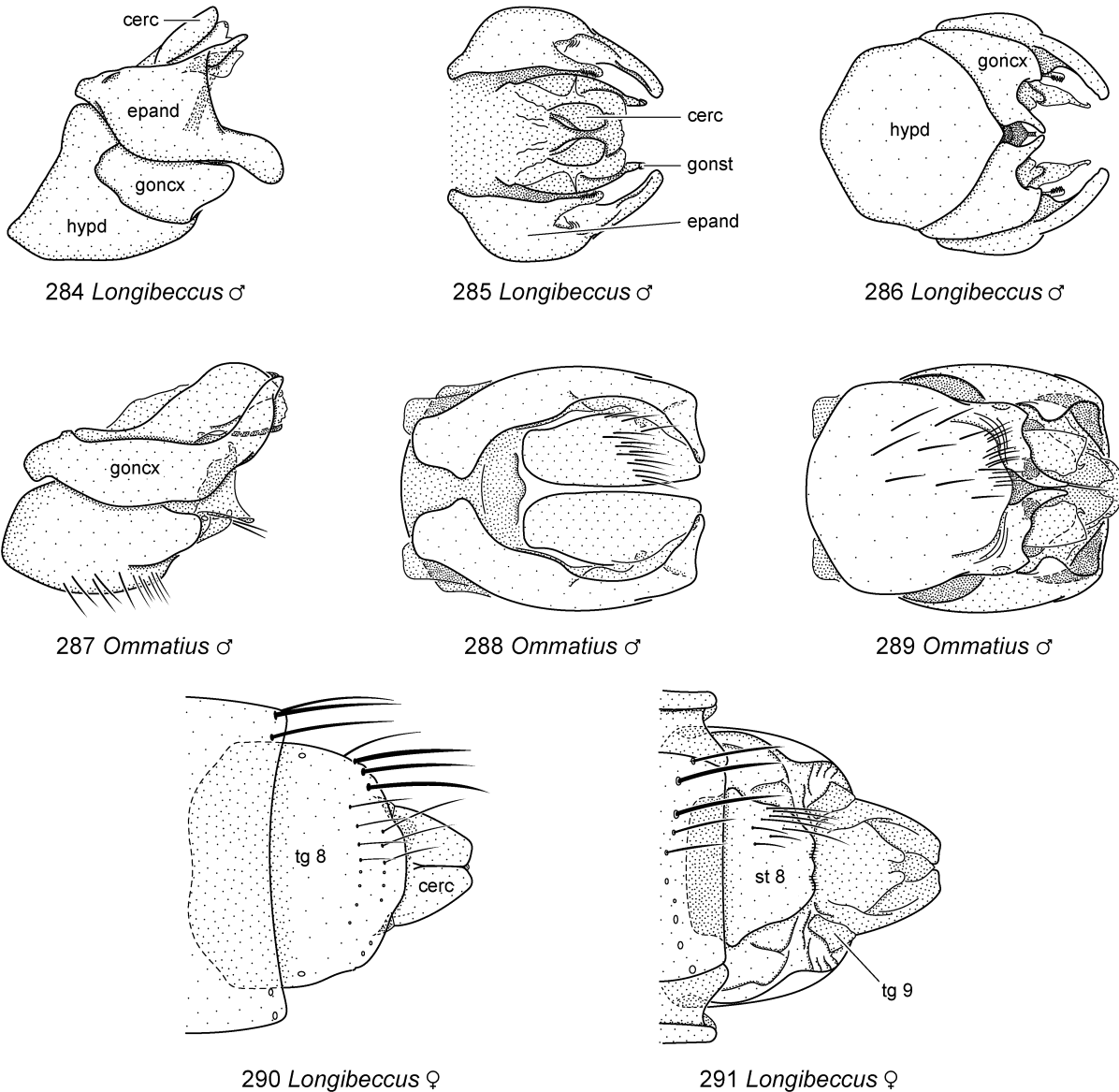


Figs 48.275–283. Male terminalia of Asilidae (Leptogastrinae): (275) *Euscelidia ochricornis* (Loew), lateral view; (276) same, dorsal view; (277) same, ventral view; (278) *Lasiocnemus londti* Dikow, lateral view; (279) same, dorsal view; (280) same, ventral view; (281) *Schildia adina* Dikow & Bayless, lateral view; (282) same, dorsal view; (283) same, ventral view. Figs 275–277 (after Dikow 2003, fig. 23), Figs 278–280 (after Dikow 2007, figs 5–7), Figs 281–283 (after Dikow & Bayless 2009, figs 13–15).

Abbreviations: epand – epandrium; goncx+hypd cplx – gonocoxal + hypandrial complex; hypd – hypandrium; sur – surstylus.

Seventeen species occur in the Afrotropics (Londt 1979b), that are widespread throughout the region, recorded from Southern Africa (Botswana, Lesotho, Mozambique, Namibia, South Africa and Zimbabwe), Central Africa (Angola and Democratic Republic of Congo), East Africa (Ethiopia and Sudan), the southern Arabian Peninsula (United Arab Emirates and Yemen (incl. Socotra Is.)), West Africa (Gambia, Mauritania and Niger) and the Indian Ocean islands (Madagascar). The genus inhabits grassland, Fynbos, savanna and semi-desert habitats

and adults perch on the ground, or on beaches and river banks (Figs 58–60). Oviposition takes place in sand or soil. Some biological information was provided by Cuthbertson (1938). Other useful references include Bosák & Hradský (2011), Efflatoun (1934, 1937), Howarth (2006), Londt (2010b), Oldroyd (1970, 1974) and Séguy (1955). Londt (1979b) provided the most recent identification key to eight Afrotropical species, but see the recent addition of the southern Arabian Peninsula fauna by Bosák & Hradský (2011: 746).



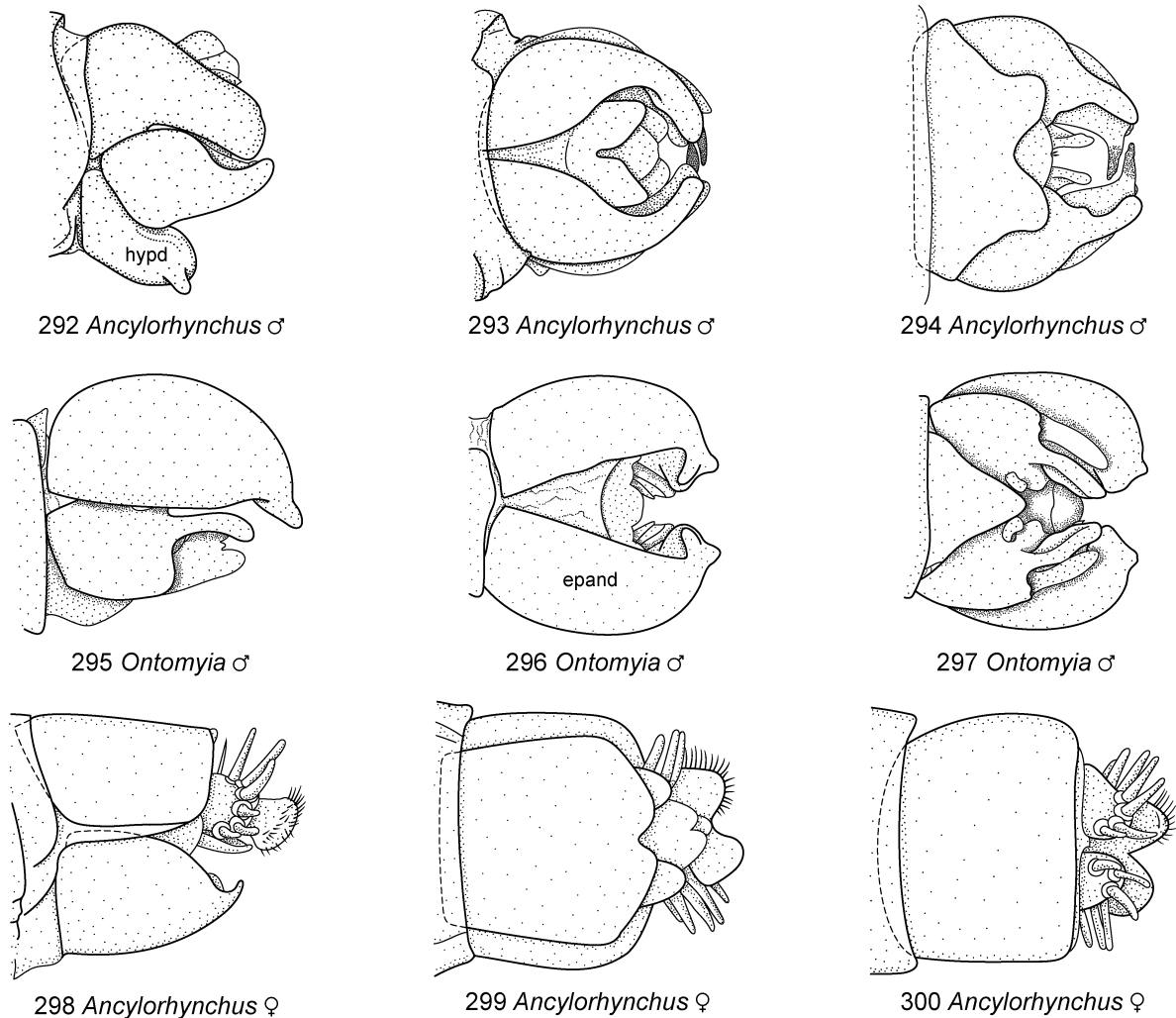
Figs 48.284–291. Male and female terminalia of Asilidae (Ommatiinae): (284) male terminalia of *Longibeccus fuscovittatus* (Ricardo), lateral view; (285) same, dorsal view; (286) same, ventral view; (287) same, *Ommatius neotenellus* Bromley, lateral view; (288) same, dorsal view; (289) same, ventral view; (290) female terminalia of *L. fuscovittatus*, dorsal view; (291) same, ventral view. Figs 284–291 (after Scarbrough 2010, figs 31–33, 74–76, 37, 38, respectively).

Abbreviations: cerc – cercus; epand – epandrium; goncx – gonocoxite; gonst – gonostylus; hypd – hypandrium; st – sternite; tg – tergite.

***Stiphrolamyra* Engel** (Laphriinae). A genus of 15 small- to large-sized, wasp-like species (Figs 39, 82, 227, 228), occurring in the Afrotropical and Palaearctic Regions. Ten species occur in the Afrotropics (Londt 1983a), that are widespread throughout sub-Saharan Africa, recorded from Southern Africa (Botswana, Mozambique, Namibia, South Africa and Zimbabwe), Central Africa (Democratic Republic of Congo), East Africa (Kenya and Uganda) and the southern Arabian Peninsula (United Arab Emirates and Yemen). The genus inhabits arid biomes, including grassland, savanna and semi-desert habitats and adults perch on rocks or at the tips of shrubs and bushes (Fig. 39). Oviposition probably takes place through random egg-dropping. Other useful references include Bosák & Hradský (2011), Kirk-Spriggs & McGregor (2009), Oldroyd

(1974) and Theodor (1980). Londt (1983a) provided the most recent identification key to the eight Southern African species.

***Storthyngomerus* Hermann** (Laphriinae). An endemic genus of five wasp-like species, distributed throughout the Afrotropics, recorded from Southern Africa (Botswana, Mozambique, South Africa and Zimbabwe), Central Africa (Cameroon, Democratic Republic of Congo, Gabon and Malawi), East Africa (Kenya, Tanzania and Uganda), West Africa (Côte d'Ivoire, Gambia, Ghana, Guinea, Liberia, Nigeria and Sierra Leone) and the Indian Ocean islands (Madagascar) (Londt 1998b). The genus inhabits forest habitats and adults perch at the tips of shrubs, bushes and trees. Oviposition probably takes



Figs 48.292–300. Male and female terminalia of Asilidae (Stenopogoninae): (292) male terminalia of *Ancyloerhynchus cruciger* (Loew), lateral view; (293) same, dorsal view; (294) same, ventral view; (295) same, *Ontomyia ricardoii* (Londt), lateral view; (296) same, dorsal view; (297) same, ventral view; (298) female terminalia of *A. cruciger*, lateral view; (299) same, ventral view; (300) same, dorsal view. Figs 292–294, 298–300 (after Londt 2011, figs 61–66), Figs 295–297 (after Dikow & Londt 2000, figs 2–4).

Abbreviations: epand – epandrium; hypd – hypandrium.

place on or in vegetation. Other useful references include Londt (2010b) and Oldroyd (1970, 1974). Londt (1998b) provided an identification key to the five species.

Synolcus Loew (Asilinae). An endemic genus of 13 medium- to large-sized species (Figs 17, 229, 230, 249–251), reviewed by Londt (1980a, 1990b, 2012d) and recorded from Southern Africa (Namibia and South Africa) and Central Africa (Malawi). The genus inhabits forest, savanna, semi-desert and woodland habitats and adults perch on the ground or within shrubs, bushes and trees (Fig. 17). Oviposition takes place on or in vegetation. Londt (2012d) provided an identification key to the thirteen species.

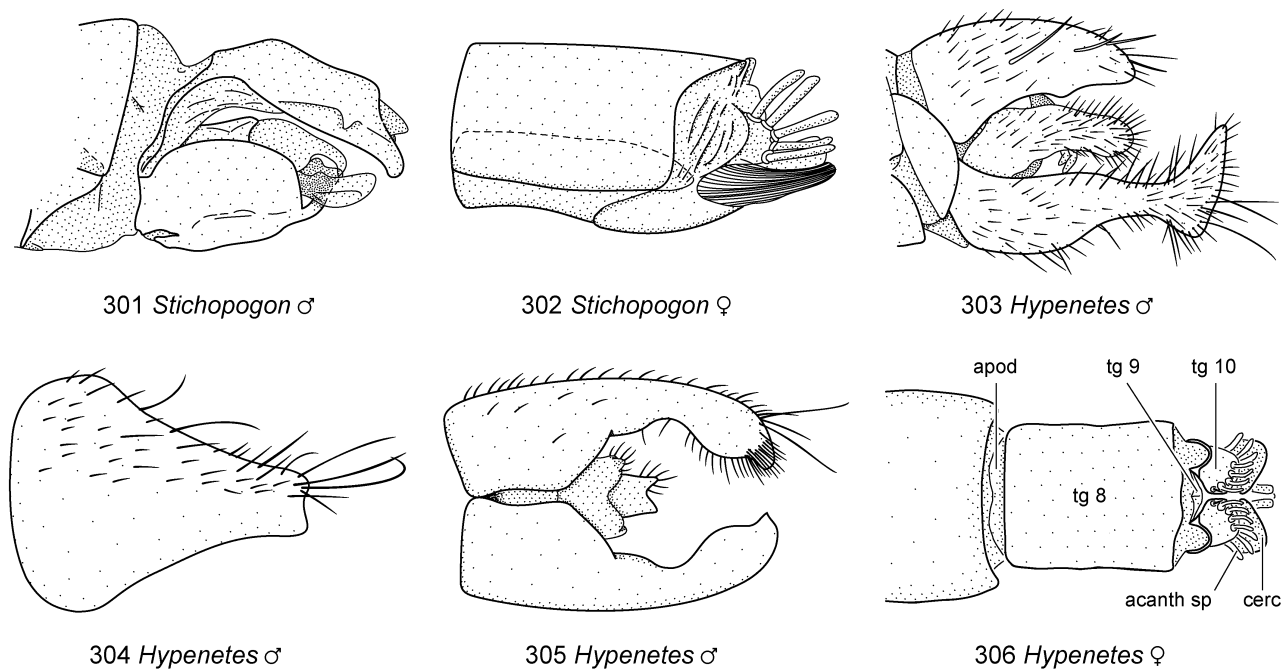
Systropalpus Hull (Laphriinae). An endemic monotypic genus, with the single large-sized species, *S. aurivulpes* Hull, 1962, confined to East Africa (Ethiopia). The biology remains unknown, but the species probably inhabits forest or woodland habitats and adults probably perch within trees. Oviposition probably takes place on or in vegetation.

Teratopomyia Oldroyd (Brachyrhopalinae). An endemic monotypic genus, with the single medium-sized, wasp-like species, *T. cyaneus* (F., 1781), confined to Southern Africa (Lesotho and South Africa) (Londt 2009b). The species inhabits Fynbos and savanna habitats and adults perch on the ground or at the tips of grass, shrubs and bushes. Oviposition takes place in sand or soil.

Thallosia Oldroyd (Ommatiinae). An endemic monotypic genus, with the single medium-sized species, *T. congoicola* Oldroyd, 1970, confined to Central Africa (Democratic Republic of Congo) and West Africa (Gambia). The species inhabits savanna and woodland habitats and adults probably perch within grass or at the tips of shrubs, bushes and trees. Oviposition probably takes place through random egg-dropping. Other useful references include Londt (2010b) and Scarbrough (2010).

Tolmerus Loew (Asilinae). A genus of 73 medium- to large-sized species, occurring in the Afrotropical, Nearctic and Palaearctic Regions and requiring modern revision. Three species occur in the Afrotropics, *T. socotrae* Geller-Grimm, 2002, *T. unicus* (Becker, 1910) and *T. wraniki* Geller-Grimm, 2002, confined to the southern Arabian Peninsula (Yemen (incl. Socotra Is.)). The status of the genus requires clarification. Oldroyd (1980: 339) listed *Tolmerus* as a synonym of *Machimus*, but Geller-Grimm (2002) recorded three species of *Tolmerus* from Socotra Is. (Yemen) and Geller-Grimm (2004) listed *Tolmerus* as a distinct genus. The genus probably inhabits savanna habitats and adults probably perch within shrubs and bushes. Oviposition probably takes place on or in vegetation. No identification key to Afrotropical species is currently available, but detailed descriptions are provided by Geller-Grimm (2002).

Torasilus Londt (Asilinae). An endemic monotypic genus, with the single large-sized species, *T. solus* Londt, 2005 (Figs



Figs 48.301–306. Male and female terminalia of Asilidae (Stichopogoninae and Tillobromatinae): (301) male terminalia of *Stichopogon punctum* Loew, lateral view; (302) same, female terminalia, lateral view; (303) male terminalia of *Hypenetes stigmatias* Loew, lateral view; (304) same, male hypandrium, ventral view; (305) same, dorsal view; (306) female terminalia of *H. stigmatias*, dorsal view. Figs 301, 302 (after Londt 1979b, figs 27, 35), Figs 303–305 (after Londt 1985b, figs 77–79), Fig. 306 (after Dikow 2009a, fig. 87).

Abbreviations: acanth sp – acanthophorite spine; apod – apodeme; cerc – cercus; tg – tergite.

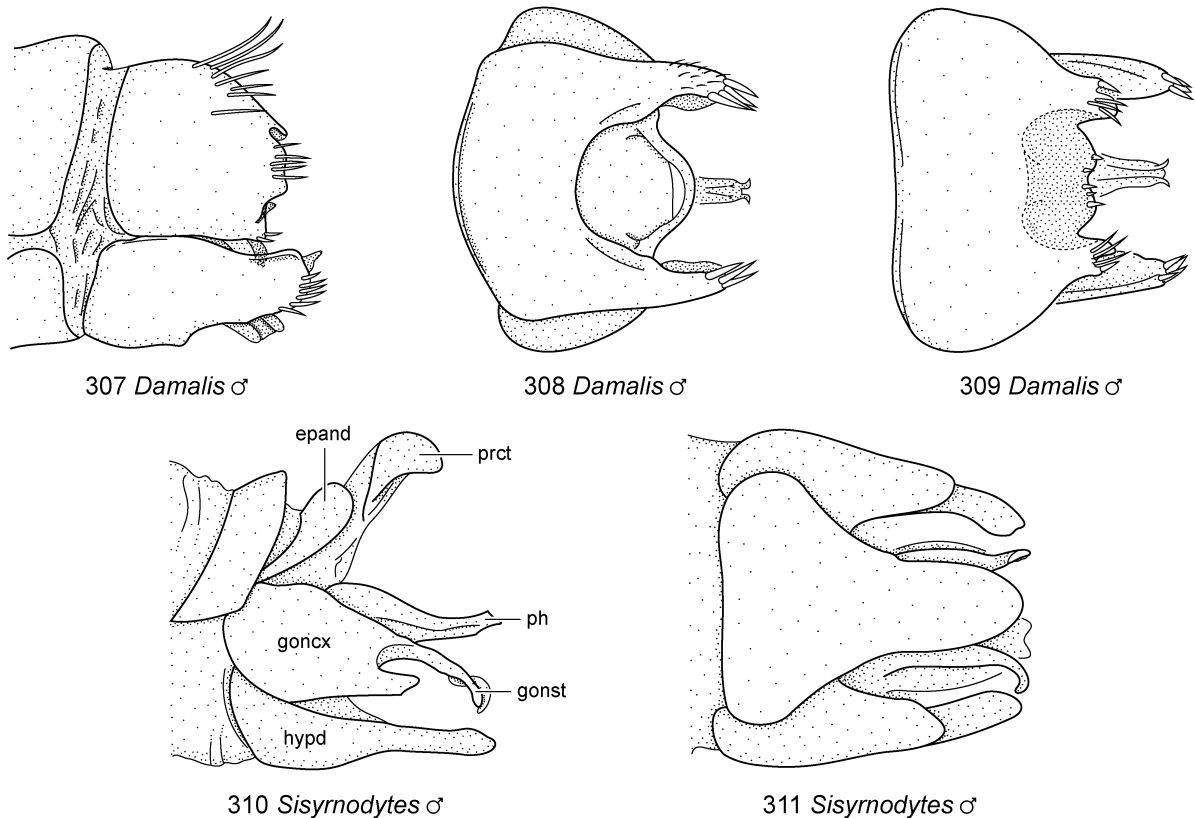
231, 232), confined to Southern Africa (Namibia). The species inhabits desert and semi-desert habitats and adults perch on the ground. Oviposition probably takes place on or in vegetation.

Trichardis Hermann (Laphriinae). A genus of 28 small- to medium-sized, bee-like species (Figs 40, 41, 233, 234), occurring in the Afrotropical and Palaearctic Regions. Twenty-five species occur in the Afrotropics (Londt 2008b), that are widespread throughout sub-Saharan Africa, reported from Southern Africa (Botswana, Lesotho, Mozambique, Namibia, South Africa and Zimbabwe), Central Africa (Chad, Democratic Republic of Congo and Malawi), East Africa (Eritrea, Ethiopia, Kenya, Somalia and Tanzania), the southern Arabian Peninsula (United Arab Emirates and Yemen (incl. Socotra Is. and Abd al Kuri Is.)) and West Africa (Burkina Faso, Côte d'Ivoire, Gambia, Mali, Niger, Nigeria and Senegal). There are also unpublished records from Djibouti. The genus inhabits grassland, Fynbos, savanna, semi-desert and woodland habitats and adults perch on the ground and on stones. Oviposition takes place in sand or soil. Other useful references include Bosák & Hradský (2011), Bosák *et al.* (2014), Geller-Grimm (2002), Londt (2010b) and Oldroyd (1974). Londt (2008b) provided an identification key to 25 Afrotropical species.

Trichoura Londt (Willistoninae). An endemic genus of seven small-sized species (Figs 68, 235, 236), confined to Southern Africa (South Africa). The genus was described by Londt (1994b) and reviewed by Londt & Dikow (2016). Species inhabit grassland, savanna and semi-desert habitats and adults perch on the ground or on low vegetation (Fig. 68). Oviposition takes place in sand or soil. Londt & Dikow (2016) provided an identification key to the seven species.

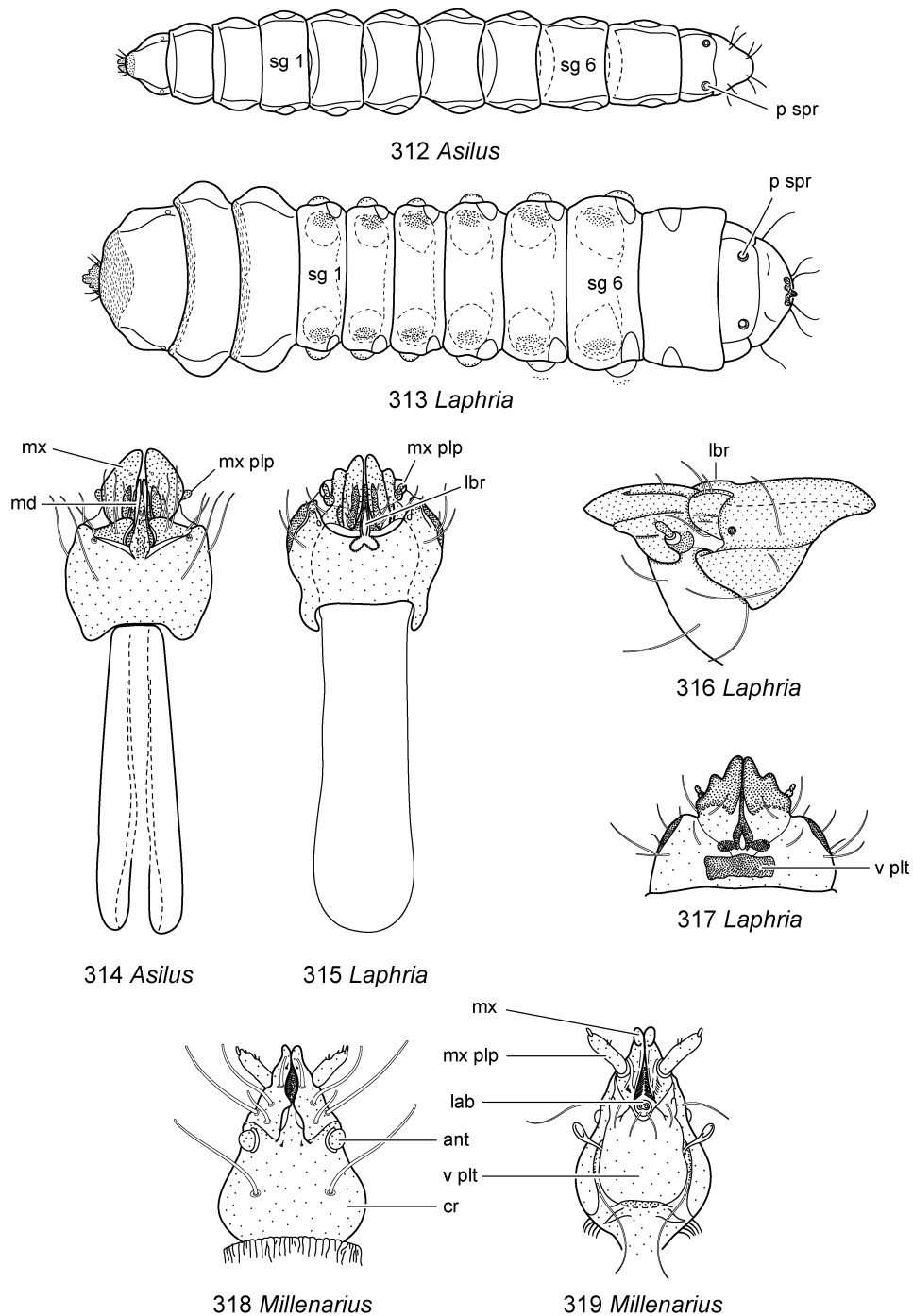
Tsacasiella Lehr (Asilinae). An endemic genus of eight medium- to large-sized species reviewed by Tsacas (1969), who described most of the species in *Neomochtherus* and Londt (2002b). The genus is recorded from Southern Africa (Botswana, Namibia and Zimbabwe), Central Africa (Democratic Republic of Congo, Malawi and Zambia) and East Africa (Kenya and Rwanda). The genus inhabits forest, savanna and woodland habitats and adults perch within grass, shrubs and bushes. Oviposition probably takes place on or in vegetation. Londt (2002b) provided an identification key to the eight species.

Tuberconspicus Tomasovic (Asilinae). An endemic monotypic genus, with the single medium-sized species, *T. aethiopicus* Tomasovic, 2014, confined to East Africa (Ethiopia) (Tomasovic 2014). The species is morphologically similar to



Figs 48.307–311. Male terminalia of Asilidae (Trigonimiminae and Willistoninae): (307) *Damalis neavei* Londt, lateral view; (308) same, dorsal view; (309) same, ventral view; (310) *Sisyrnodytes apicalis* Oldroyd, lateral view; (311) same, ventral view. Figs 307–309 (after Londt 1989a, figs 118–120), Figs 310, 311 (after Londt 2009a, figs 8, 9).

Abbreviations: epand – epandrium; goncx – gonocoxite; gonst – gonostylus; hypd – hypandrium; ph – phallus; prct – proctiger.



Figs 48.312–319. Larval features of Asilidae: (312) larval habitus of *Asilus crabroniformis* L., dorsal view (non-Afrotropical); (313) same, *Laphria gibbosa* L., dorsal view (non-Afrotropical); (314) head capsule and rod of *A. crabroniformis*, dorsal view; (315) same, *L. gibbosa*, dorsal view; (316) same, head capsule, lateral view; (317) same, ventral view; (318) head capsule of *Millenarius dichaeus* Hull, dorsal view; (319) same, ventral view. Figs 312–317 (after Melin 1923, figs 171, 160, 172, 131–133), Figs 318, 319 (after Londt & Harris 1987, figs 6, 7).

Abbreviations: ant – antenna; cr – cranium; lab – labium; lbr – labrum; md – mandible; mx – maxilla; mx plp – maxillary palpus; p spr – posterior spiracle; sg – segment; v plt – ventral plate.

species of the diverse genus *Promachus*. The habitat and ecology of the species remain unknown.

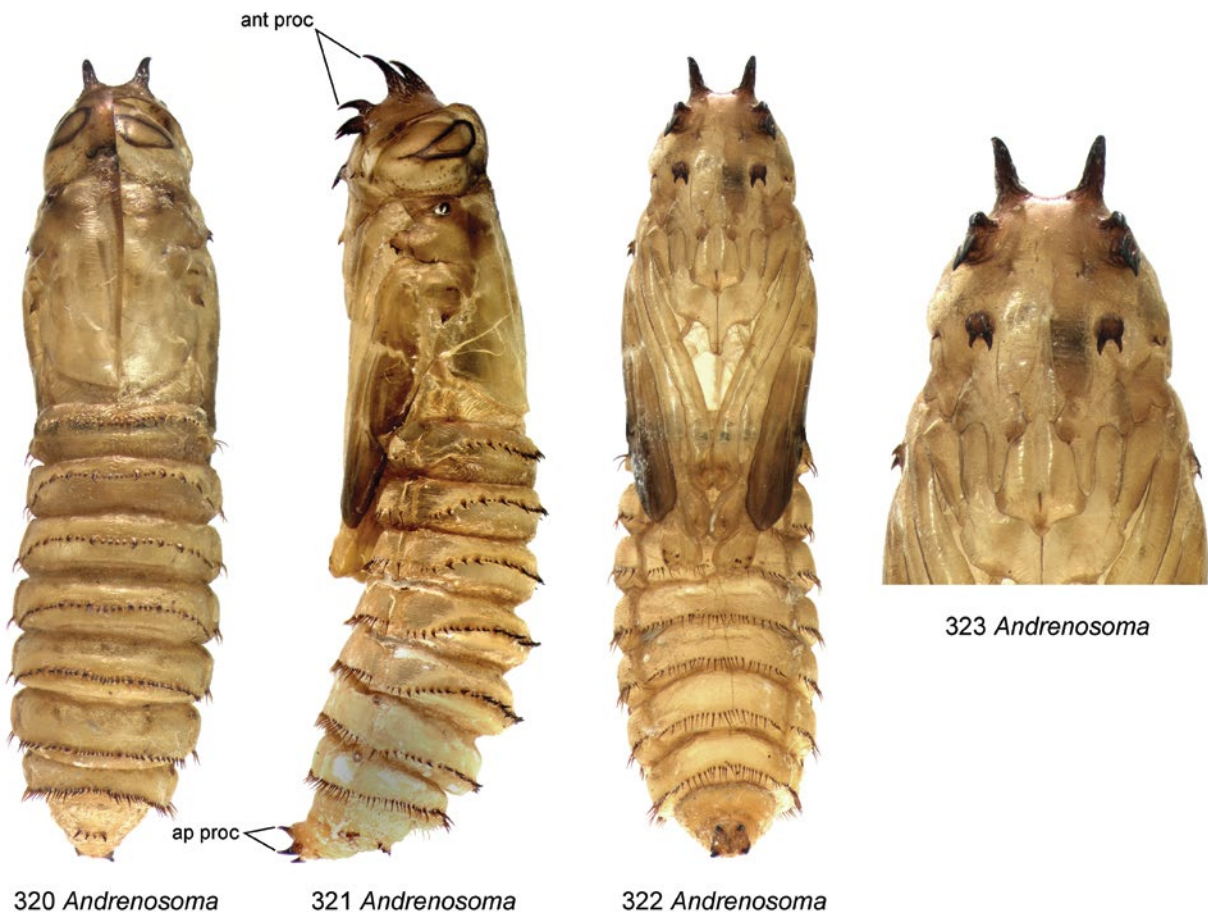
***Turkmenomyia* Paramonov** (Stichopogoninae). A genus of four small-sized species, occurring in the Afrotropical and Palearctic Regions. A single species, *T. paramonovi* Bosák & Hradský, 2011, occurs in the Afrotropics, confined to the southern Arabian Peninsula (United Arab Emirates) (Bosák & Hradský 2011: 751). *Turkmenomyia* has been treated as a synonym of *Eremodromus* Zimin (Geller-Grimm 2004; Lehr 1979) and was reinstated to full generic status for Palearctic species (Bosák & Hradský 2011: 751). The biology of the species remains unknown, but is probably similar to *Stichopogon*, inhabiting semi-desert habitats and adults perching on the ground. Oviposition takes place in sand or soil.

***Valiraptor* Londt** (Asilinae). An endemic genus of four medium- to large-sized species (Londt 2002b), confined to Southern Africa (Namibia and South Africa). The genus inhabits forest, grassland, savanna and woodland habitats and adults probably perch within grass, shrubs and bushes. Oviposition takes place

on or in vegetation. Londt (2002b) provided an identification key to the four species.

***Wadipogon* Bosák & Hradský** (Brachyrhopalinae). A genus of three small-sized species, occurring in the Afrotropical and Palearctic Regions. The genus is primarily distributed in Egypt, with two species in the Afrotropics, *W. pulchrum* (Eflatoun, 1937) and *W. szpilai* Bosák & Hradský, 2011, confined to the southern Arabian Peninsula (United Arab Emirates) (Bosák & Hradský 2011: 739). The biology remains unknown, but the genus probably inhabits semi-desert habitats and adults probably perch on the ground. Oviposition takes place in sand or soil. Other useful references include Eflatoun (1937). No identification key to Afrotropical species is currently available.

***Zelamyia* Londt** (Asilinae). An endemic monotypic genus, with the single small-sized species, *Z. alyctus* Londt, 2005, confined to Southern Africa (South Africa) (Londt 2005a). The genus inhabits Fynbos habitats and adults probably perch within and/or at the tips of shrubs and bushes. Oviposition probably takes place on or in vegetation.



Figs 48.320–323. Pupal features of Asilidae: (320) pupal habitus of *Andrenosoma cruentum* (McAtee), dorsal view (non-Afrotropical); (321) same, lateral view; (322) same, ventral view; (323) same, detail of anterior section, ventral view. Figs 320–323 (photographs © J. Barnes).

Abbreviations: ant proc – antennal process; ap proc – apical process.

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