

## Order Diptera, family Ephydriidae

### A conspectus on shore-flies from the United Arab Emirates

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#### INTRODUCTION

Among families of acalyptrate Diptera, the Ephydriidae demonstrate exceptional diversity, with nearly 1900 species worldwide (Mathis & Zatwarnicki, 1995). The family, more commonly known as shore or brine flies, also exhibits considerable adaptive evolution, prompting Oldroyd (1964: 188–189), a noted British dipterist, to write that the Ephydriidae are “...nothing if not versatile...” and that this family of flies is “...in the full flower of its evolution, and as such they offer attractive material for study.” We concur with Oldroyd and submit this conspectus to document the family's richness and evolutionary diversity in the United Arab Emirates. We hasten to add, however, that numerous taxa remain to be collected and/or described.

The diversity exhibited by shore-flies includes more than species richness, as Oldroyd alluded. Although most shore-fly species are aquatic or semi-aquatic as immatures, feeding as browsers or filter feeders, the larvae of others are terrestrial, feeding as leaf miners, parasitoids in spider eggs, predators in clusters of frog eggs, or being saprophagous on carrion, feces, and stranded snails. Many species have adapted to such inhospitable environments as sulphurous hot springs, highly alkaline or saline lakes, and, perhaps most notably, to exposed pools of crude petroleum (Foote, 1995). With a few notable exceptions, however, the family's natural history, the immature stages in particular, largely awaits discovery and documentation. Thus, an objective of this conspectus is to encourage further research on all aspects of the rich and versatile natural history of this family.

Most species recorded from the UAE are widespread, usually being known from other countries of the Arabian Peninsula. There are only a few endemic shore-flies in the United Arab Emirates. Of the 71 species recorded from the UAE thus far, eight are apparently endemics, and 66 represent new country records. Although the shore-fly fauna of UAE has never been treated comprehensively, the research published here had its genesis and basis in the works of others. Much of this history and effort were presented earlier (Mathis, 1991).

The shore-fly fauna of the UAE largely remained undocumented until this paper, although species that we report herein have mostly been documented in papers that deal with greater geographic areas, such as the Palaearctic Region as a whole, or in revisionary papers that deal with taxa at the generic or tribal level. In a world catalogue, Mathis & Zatwarnicki (1995), listed a single species, *Actocetor indicus* (Wiedemann, 1824), and more recently, as part of a paper on the biogeography of southern Africa, Kirk-Spriggs & McGregor (2009) listed four additional species from the UAE: *Athyroglossa argyrata* Hendel, 1931; *Chlorichaeta albipennis* (Loew, 1848) (misidentification of *C. tuberculosa* Becker, 1922); *Elephantinosoma chumi* Becker, 1903; and *Scatella stagnalis* (Fallén, 1813) (misidentification of *S. tenuicosta* Collin, 1930). Kirk-Spriggs & McGregor (2009) also recorded *Eremotrichoma perspicendum* (Becker, 1903) from Oman. Those records were based on specimens in the National Museums and Galleries of Wales, Cardiff, U.K.

Examples of revisionary papers are *Ochthera* Latreille, 1802 (Clausen, 1977, 1980), and in more recent decades, several revisions have included species recorded herein from the UAE

and have contributed directly to this paper. These revisions include the following: *Brachydeutera* Loew, 1862 (Mathis & Ghorpadé, 1985), *Placopsidella* Kertész, 1901 (Mathis, 1986b), *Hecamede* Haliday in Curtis, 1837 (Mathis, 1993), *Clasiopella* Hendel, 1914 (Mathis, 1994), *Notiphila* Fallén, 1810 (Krivosheina, 1998), *Actocetor* Becker, 1903 (Dikow & Mathis, 2002), *Paralimna* Loew, 1862, subgenus *Phaiosterna* Cresson, 1916 (Mathis & Zatwarnicki, 2002), and *Glenanthe* Haliday, 1839 (Zatwarnicki & Mathis, 2012).

Reviews of nearby shore-fly faunas that have contributed to our knowledge of the UAE fauna are those of the Republic of the Seychelles (Mathis & Zatwarnicki, 2003). Catalogues summarize what is known about faunas. Cogan's catalogue (1984) of the Palaearctic Region, however, recorded no species from the UAE, and the world catalogue of Mathis & Zatwarnicki (1995), as noted earlier, included only a single species, *Actocetor indicus* (Wiedemann), from the UAE.

This faunistic treatment is organized according to the sequence of higher taxonomic categories that comprise the classification of the family proposed by Zatwarnicki (1992). We follow the synonymy of Philygriini with Hyadinini by Hollmann-Schirmacher (1998). Placement of *Risa* Becker, 1907, in Psilopini is based on an unpublished study of A. Freidberg, M. Kotrba, and W.N. Mathis and is tentative, awaiting further research and clarification.

## METHODS AND MATERIALS

We have provided keys to all taxonomic categories from subfamily to species to facilitate identification of specimens and retrieval of further information, which is mostly accessible at the species level and by searching on a species' name. In addition, we have written diagnostic characters for each species. Our treatment of new species includes a more complete description and diagnosis. For all species treated herein, we have noted the specific locality, as available from label data that accompany the specimens and field notes, the depository of the specimens and the number of specimens we have examined by sex.

The descriptive terminology, with the exceptions noted in Mathis (1986) and Mathis & Zatwarnicki (1990a) and below, follows that published in the '*Manual of Nearctic Diptera*' (McAlpine, 1981). Although some specimens of shore-flies are large with body lengths of over 5 mm, most are small, some less than 1 mm in length, and study and illustration of the male terminalia required use of a compound microscope. We use the term basal flagellomere for the large antennomere beyond the pedicel. We prefer this term over 'first flagellomere' as there may be more than one flagellomere involved, and basal does not imply a number or numbers. We likewise do not use 'postpedicel' (Stuckenberg, 1999) for this antennomere because at least the multisegmented arista is beyond the pedicel in addition to the large antennomere, and postpedicel is thus ambiguous and lacking precision. We have followed the terminology for most structures of the male terminalia that other workers in Ephydriidae have used (see references in Mathis (1986) and Mathis & Zatwarnicki (1990a, 1990b)), such as surstylus, which in Discomyzini and Dryxini is divided into a presurstylus (surstylus) and postsurstylus (clasper). Zatwarnicki (1996) has suggested that the pre- and postsurstylus correspond with the pre- and postgonostylus and that the subepandrial plate is the same as the medandrium.

Four head and two venational ratios that are used in the diagnoses are defined below (all ratios are averages of three specimens (the largest, smallest, and one other):

- Frons width-to-length ratio is the frons width divided by the frons length. The length is measured from the anterior margin of the frons to the posterior margin of the posterior ocelli. Width is measured at the level of the anterior ocellus.

- Face width-to-height ratio is the narrowest width between the eyes divided by the height.
- Eye width-to-height ratio is the eye width divided by the eye height, where both measurements are the longest distances taken with the eye oriented laterally.
- Gena-to-eye ratio: Genal height (immediately below maximum eye height)/eye height.
- Costal vein ratio is the straight line distance between the apices of veins  $R_{2+3}$  and  $R_{4+5}$  divided by the distance between the apices of veins  $R_1$  and  $R_{2+3}$ .
- M vein ratio is the straight line distance along vein M between crossvein dm-cu and r-m divided by the distance apicad of crossvein dm-cu.

Specimens for this study are preserved in the National Museum of Natural History, Smithsonian Institution, Washington, D. C. (USNM), National Museums and Galleries of Wales, Cardiff, Wales, United Kingdom (NMWC), private collection of Jens-Hermann Stuke, Leer, Germany (CJHS), and private collection of Tadeusz Zatwarnicki, Opole, Poland (CTZ). We also studied numerous type specimens that were borrowed and are deposited elsewhere. These include (acronyms that are used in the text are noted first):

AMNH	American Museum of Natural History, New York, USA
ANSP	Academy of Natural Sciences of Philadelphia, Pennsylvania, USA
BMNH	The Natural History Museum (formerly the British Museum (Natural History)), London, UK
CJHS	Private collection of Jens-Hermann Stuke, Leer, Germany
CME	Private collection of Martin Ebejer, Cardiff, UK
CTZ	Private collection of Tadeusz Zatwarnicki, Opole, Poland
DCSA	Dipterorum Collectionis Strobl, Admont, Austria
DEI	Deutsches Entomologisches Institut, Müncheberg, Germany
ENSA	École Nationale Supérieure Agronomique de Montpellier, Montpellier, France
HNHM	Hungarian Natural History Museum, Budapest, Hungary
HUS	Hokkaido University, Sapporo, Hokkaido, Japan
IRSNB	Institut Royal de Sciences Naturelles, Bruxelles, Belgium
MAED	Ministry of Agriculture of Egypt, Doqqi, Egypt
MCM	Museo Civico di Storia Naturale de Milano, Milan, Italy
MCV	Museo Civico di Storia Naturale de Venezia, Venice, Italy
MMB	Moravian Museum, Brno, Czech Republic
MNHN	Muséum National d'Histoire Naturelle, Paris, France
MRAC	Musée Royal de l'Afrique Centrale, Tervuren, Belgium
MZUF	Museo Zoologico "La Specola", Florence, Italy
NMI	National Museum of Ireland, Dublin, Ireland
NMW	Naturhistorisches Museum, Wien, Austria
NMWC	National Museums and Galleries of Wales, Cardiff, Wales, UK
NRS	Naturhistoriska Riskmuseet, Stockholm, Sweden
UMO	University Museum, Oxford University, Oxford, UK
UZMC	Zoologisk Museum, Copenhagen, Denmark
ZIL	Zoological Institute, Lund University, Lund, Sweden
ZISP	Zoological Institute, Academy of Sciences, St. Petersburg, Russia
ZMA	Instituut voor Taxonomische Zoologie, Amsterdam, Netherlands (moved in 2011 to Naturalis Biodiversity Center = RMNH, Leiden)
ZMHU	Zoologisches Museum, Humboldt Universität, Berlin, Germany
ZMUM	Zoological Museum, Moscow University, Moscow, Russia.

Abbreviations used: UAE = United Arab Emirates; NARC = National Avian Research Centre; AvH = leg. A. van Harten; JCD = leg. J.C. Deeming; JHS = leg. J.-H. Stuke; TZ = leg. T. Zatwarnicki; WNM = leg. W. Mathis

## SYSTEMATIC ACCOUNT

Family **Ephydriidae** Zetterstedt, 1837**Key to the subfamilies of Ephydriidae**

- 1 Fronto-orbital setae reclinate and proclinate or absent; medial facial area and lower facial margin without setae; facial setae inserted in more or less vertical series, parallel with parafacial setae; subcranial cavity small to large ..... **2**
- Fronto-orbital setae laterocline and usually conspicuous; medial facial area and lower facial margin setose, the latter often with long setae (if not, costa short, extended to  $R_{4+5}$ ); insertions of facial series of setae convergent above; subcranial cavity large and cavernous ..... **Ephydrinae**
- 2 Presutural or sutural dorsocentral seta inconspicuous or absent ..... **3**
- Presutural or sutural dorsocentral seta present, conspicuous ..... **6**
- 3 Arista pectinate, with branches sometimes pale and difficult to discern ..... **4**
- Arista bare to macropubescent; if pectinate, hairs short, about equal to arista width at base ..... **5**
- 4 Prescutellar acrostichal setae large (subequal to posterior dorsocentral seta), inserted widely apart (distance between them subequal to that between either prescutellar and the posterior dorsocentral seta on the same side) and usually in front of intra-alar seta; reclinate fronto-orbital seta usually inserted behind larger, proclinate fronto-orbital seta ... ..... **Discomyzinae**
- Prescutellar acrostichal setae small (about 1/2 to 2/3 length of posterior dorsocentral seta), inserted close together (distance between about 1/2 that between either prescutellar and posterior dorsocentral seta on the same side) and behind or aligned with intra-alar seta; reclinate fronto-orbital seta usually inserted slightly anterior to larger, proclinate fronto-orbital seta ..... **Gymnomyzinae**, in part
- 5 Posterior notopleural seta inserted at much higher level than anterior seta ..... **Gymnomyzinae**, in part
- Posterior notopleural seta inserted near ventral margin and at same level as anterior seta (tribe Hyadinini) ..... **Ilytheinae**, in part
- 6 Posterior notopleural seta at same level as anterior seta ..... **Hydrelliinae**, in part
- Posterior notopleural seta inserted conspicuously above level of anterior seta ..... **7**
- 7 Wing at tip of vein  $R_{4+5}$  slightly pointed; eye bearing short, interfacetal setulae (tribe Atissini) ..... **Hydrelliinae**, in part
- Wing rounded at apex; eye setulae absent or inconspicuous ..... **Ilytheinae**, in part

Subfamily **Discomyzinae** Acloque**Key to the tribes of Discomyzinae from the UAE**

- 1 Vein  $R_{2+3}$  close to costal vein beyond end of vein  $R_1$ ; crossvein dm-cu with sharp angle .... **Discomyzini** Acloque, in part
- Vein  $R_{2+3}$  well separated from costal vein; crossvein dm-cu nearly straight or shallowly arched, not angulate ..... **2**
- 2 Face strongly and coarsely sculptured on at least lower 1/2; facial setae short, the longest at most  $\frac{3}{4}$  as long as its distance from opposite seta; base of  $R_{4+5}$  bearing 2–4 setulae on dorsum ..... **Discomyzini** Acloque, in part

- Face usually smooth, if finely striate the longest facial seta at least as long as its distance from opposite seta; base of R<sub>4+5</sub> lacking setulae on dorsum ..... **Psilopini** Cresson

Tribe **Discomyzini** Acloque, 1897

### Key to the genera of Discomyzini from the UAE

- 1 Wing generally dark with a pattern of white spots ..... **Actocetor** Becker
- Wing hyaline or with anterior margin darkened but not spotted ..... **Clasiopella** Hendel

Genus **Actocetor** Becker, 1903

*Actocetor* Becker, 1903: 169. Type species: *Ephydra margaritata* Wiedemann, 1830 (= *Notiphila indica* Wiedemann, 1824), by original designation; 1926: 28–29 [review of Palaearctic species]. Cogan, 1984: 139 [Palaearctic catalogue]. Mathis & Zatwarnicki, 1995: 21–23 [world catalogue]. Dikow & Mathis, 2002: 249–290 [revision].

***Actocetor (Actocetor) indicus*** (Wiedemann, 1824)

Plate 1, Figures 1–9

*Notiphila indica* Wiedemann, 1824: 58 [\*‘India orient.’; LT ♀ (designated by Dikow & Mathis, 2002: 264), UZMC].

*Actocetor indicus*. Cogan & Wirth, 1977: 328 [generic combination]. Mathis & Zatwarnicki, 1995: 22 [world catalogue]. Dikow & Mathis, 2002: 261–271 [revision]. Mathis & Zatwarnicki, 2003: 592–596 [review, Seychelles]. Dawah & Abdullah, 2006: 386 [fauna, Saudi Arabia].

*Ephydra margaritata* Wiedemann, 1830: 594 [Egypt; LT ♀ (designated by Dikow & Mathis, 2002: 264); NMW]. Dikow & Mathis, 2002: 261 [synonymy].

*Actocetor margaritatus*. Becker, 1903: 170 [generic combination]. Stower et al., 1958: 27 [scavenger in egg pods of desert locusts]. Greathead, 1963: 452 [reared from damaged egg pods of desert locusts].

*Actocetor beckeri* Hendel, 1917: 41 [preoccupied, de Meijere, 1916; South Africa. Cape Province: Algoa Bay; HT ♂, NMW].

*Actocetor hendeli* de Meijere, 1924: 202 [replacement name for *Actocetor beckeri* Hendel, 1917, not de Meijere, 1916]. Dikow & Mathis, 2002: 261 [synonymy].

*Actocetor margaritatus panelii* Frey, 1958b: 46 [Cape Verde Islands. São Vicente: Rib. Julião. Boa Vista: Rabil. São Tiago: Rib. Charco; ST ♂♀, MZH]. Dikow & Mathis, 2002: 261 [synonymy].

Specimens examined from the UAE and Oman: Ajman, 25°25.9'N 55°29.4'E, dunes with mangrove, *Avicennia marina*, 6♂, 4♀, 11.iii.2008, JHS. Ad-Dhaid, 24°17'N 55°53'E, water trap, 1♂, 24–30.v.2006, AvH. Al-Ajban, 24°35.8'N 55°00.2'E, Malaise trap, 1♀, 1.iv–2.v.2006, AvH. Kalba, 25°06'N 56°21.5'E, beach, 1♀, 3.iii.2010, TZ. Khor Fakkan, 25°22.1'N 56°20.9'E, beach, 1♂, 1♀, 11.iii.2010, WNM. Masafi, 25°18.9'N 56°07.8'E, farm, 1♀, 17.iii.2008, JHS. Ra's al-Khaimah, 25°47.9'N 56°04.3'E, farm, 2♂, 16.iii.2008, JHS. S of Ra's al-Khaimah, coast, 25°43.7'N 55°52.4'E, 5♂, 6♀, 11.iii.2008, JHS. Sharjah. 25°21.8'N 55°26.2'E, 1♂, 2♀, 8.iii.2010, WNM. Sharjah Desert Park, 25°16.9'N 55°41.4'E, 4♂, 12.iii.2008, JHS. Um al-Quwain, 25°31.4'N 55°31.4'E, beach, 28.ii.2010, 1♂, WNM. Wadi Asimah, 25°24.1'N 56°08.2'E, 435 m, 1♀, 8.iii.2010, TZ. Wadi Hayl, 25°04.8'N 56°13.5'E, 1♂, 1♀, 15.iii.2008, JHS. Wadi Mirba, 25°16.22'N 56°16.7'E, mountain oasis, 4♂, 3♀, 13.iii.2008, JHS. Wadi Safad, 25°13.1'N 56°17.6'E, 3♂, 3♀, 13.iii.2008, JHS. Wadi Safad, 25°13.3'N 56°18.3'E, 140 m, 1♀, 11.iii.2010, WNM. Wadi Shawkah, 25°06.4'N 56°02.7'E, reservoir, 1♂, 1♀, 14.iii.2008, JHS. Wadi al-Sidr, 25°24.7'N 56°05.1'E, farm, 2♂, 2♀, 17.iii.2008, JHS. OMAN: Marmul Desert Project, 18°02.2'N 55°02.5'E, swept from lucerne, 4♂, 2♀, xi.1992, JCD. Masīra Island, B.E.R.S. camp, 20°25'N 58°50'E, 3♂, 4♀, 5–7.vi.1995, leg. S.P. Dance. Muscat, Wattayah, 23°36.6'N 58°30.6'E, 1♂, 2♀, 15–17.iv.1988, leg. M.D. Gallagher.

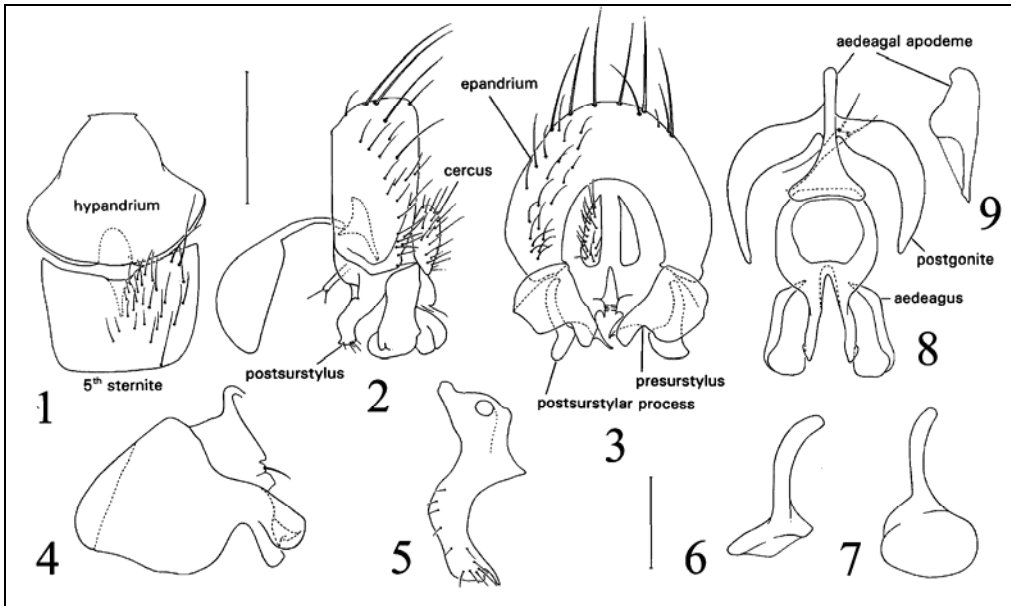
Diagnosis: This species is distinguished from congeners by the following combination of characters: Moderately small to medium-sized shore-flies, body length 2.20–3.80 mm. Head: Arista with 9–12 dorsal rays. Gena high, higher than height of pedicel, gena-to-eye ratio 0.21–0.36. Thorax: Mesonotum densely microtomentose, tannish grey to whitish grey, pleura whitish to silvery grey; 2 more or less short, dark brown bars may be present anteriorly,

separated by gap equal to distance between prescutellar acrostichal setae (sometimes fused posteromedially, mesonotum in these specimens pale brown); rings at bases of larger setae (prescutellar acrostichal, posterior dorsocentral, and basal scutellar setae) usually not dark brown; scutellum with apical 1/4–1/3 dark brown, basal portion concolorous with posterior portion of scutum. Wing normally developed with wide anal angle; alula narrow, band-like, bearing long setulae (length twice height of alula) along posterior margin; vein  $R_{4+5}$  bearing 5–6 setae basad of crossvein r-m; wing pattern as follows: Cell c with basal 1/2 white; cell  $r_1$  with 2 spots, 1 sub-basal, subrectangular spot and 1 subapical rectangular to trapezoidal spot; cell  $r_{2+3}$  with 2 spots, basal spot in line with spot in cell  $r_1$ , apical spot, transversely oval/rectangular, immediately apicad of merger of vein  $R_{2+3}$  with costa; cell  $r_{4+5}$  with subcircular, medial spot, in line with crossvein dm-cu, and an apical spot (some specimens with a trace of a 3rd sub-basal spot); discal cell with a wide, U-shaped, basal spot (apical arm sometimes constricted) and a subapical, transversely oval-rectangular spot, sometimes divided into 2 circular spots; cell m with a transversely oval-rectangular spot near middle; cell  $cua_1$  with a large, basal rectangular white and a subapical, transversely trapezoidal spot, vein  $CuA_1$  straight; costal vein ratio 0.54–0.72; M vein ratio 0.84–1.0. Halter stem yellow; knob whitish-yellow and distinctly clubbed. Legs generally whitish-yellow to yellow; forecoxa and base of femora sometimes with whitish-grey to grey microtomentum laterally. Abdomen: Mostly shiny, grey microtomentum almost always present and as follows: Base of tergite 1 with thin band; tergite 4 with wide, anterior band; sometimes with thin, lateral bands on tergites 3 and 5 or with medial spot on 3rd tergite; colour generally metallic, dark blue to black, often with yellow to yellowish-red at anterior and/or posterior margins or sometimes entirely yellowish-red. Sternites 3, 4 rectangular, broad, 1–2 times longer than wide; sternite 5 of male trapezoidal with medial weakness or slight indentation on concave posterior margin. Male terminalia (Figs 1–9): Epandrium higher than wide; presurstylus large, ventromedial surface with a small emargination, bearing 2 round to oval lobes medially; postsurstylus much longer than wide, bearing 3–4, apical setulae, apex bilobed with a small, digitiform, medial, pointed process; postsurstylar process distinctly spatulate, rounded process, shaped like an halter; aedeagus as a subrectangular ring basally from which a lateral phalange extends apically; aedeagal apodeme in lateral view subtriangular with angle at attachment with base of aedeagus extended and acutely formed; postgonite in ventral view as a sickle-shaped process, broader toward attachment with aedeagal apodeme; pregonite short, simple, bearing 2 setulae apically; hypandrium broadly and deeply pouch-like.

Natural history: In the UAE, similar to what was reported from the Seychelles (Mathis & Zatwarnicki, 2003), the majority of specimens were associated with sandy areas with sparse to no vegetation that were surrounded by or in close proximity to grass covered habitats. Occasionally this species was found associated with organic debris and other garbage that has accumulated at the high tide mark on sandy beaches.

Larvae of this species apparently feed on varied sources of highly organic debris, probably as saprophages. Dr. Amnon Freidberg (pers. comm.) successfully reared this species on a medium of domestic cat dung in Israel, and Stower et al. (1958) and Greathead (1963) reared adults in Eritrea from damaged egg pods of desert locusts (*Schistocerca gregaria* (Forskål, 1775)).

Observations on mating behaviour: Date: 16.viii.1986 (Saturday). Time: 10:30 am. Weather: Temperature about 30°C, very slightly breezy, sunny. Location: Beach at Herzliyya, Israel. Shaded area at base of hill, mostly a dune, immediately adjacent to beach (spray belt). Hill covered with *Oenothera* sp. (introduced; Onagraceae) and *Pancratium maritimum* L. (Amaryllidaceae). Observers: A. Freidberg and W.N. Mathis.



Figures 1–9. Structures of the male preabdomen and terminalia of *Actocetor indicus* (Wiedemann). 1: Fifth sternite and hypandrium, ventral view (only left side showing setae); 2: Epandrium, cerci, presurstylus, postsurstylus, gonite, and hypandrium, lateral view; 3: Same, posterior view; 4: Presurstylus, posterior view. 5: Postsurstylus, lateral view; 6: Postsurstylar process, posterior view; 7: Same, posteroventral view; 8: Aedeagus, phallapodeme, dorsal view; 9: Phallapodeme, lateral view. Scale bar equals 0.3 mm for Figs 1–3 and 0.1 mm for Figs 4–9.

Several specimens were observed running over the sandy substrate, primarily in the shade. Their wings were parted at about  $80^\circ$  and occasionally the wings were quickly moved in a scissoring motion. A few females were observed to tap the substrate with their abdomens, perhaps searching for ovipositional sites. When a male came within 5–7 cm of a female, he would immediately pursue her and attempted to mount, apparently without any pre-copulatory behaviour. Mounting was brief, usually 5 seconds or less (range 3–15 seconds based on 4 observations). For one pair we observed the tips of both abdomens touching but could not see if the genitalia of the male engaged those of the female (we assume that they did). After dismounting, the pair would face each other and touch their extended proboscises intermittently for 10–20 seconds. While thus touching, the male and/or female would scissor its wings, the opposite sex would remain essentially stationary, with its wings parted at nearly  $150^\circ$ . We could not determine whether trophallaxis occurred with the touching of proboscises. While touching proboscises there was apparently some foreleg-to-head touching. Remarks: Remarkably, Wiedemann described this species twice and in two different genera. As species of *Actocetor* are striking and unlikely to be overlooked, we suspect that Wiedemann failed to examine specimens in his own collection (he may have returned some specimens and did not have ready access to them, did not consult his previously published description, or his memory faltered). Regardless, our study of Wiedemann's primary types clearly has revealed that the syntypes of both names are conspecific, with *A. indicus* having priority as the senior synonym. In view of the widespread distribution of this species,

particularly in the Afrotropical Region, it is unfortunate that the senior synonym, *A. indicus*, alludes to an area on the periphery of this species' distribution where it may represent an introduction.

Distribution: Afrotropical Region: Angola, Botswana, Cameroon, Cape Verde Islands (São Vicente), Democratic Republic of Congo, Eritrea, Ethiopia, Gambia, Ivory Coast, Kenya, Namibia, Nigeria, Rwanda (literature), Senegal, Seychelles (La Digue, Mahé, Praslin), Sierra Leone, Socotra Island, South Africa (Eastern Cape, KwaZulu-Natal, Mpumalanga, Northern Province), Sudan, Tanzania, Uganda, Zimbabwe; Oriental Region: India (Karnataka, Tamil Nadu), Malaysia, Sri Lanka. In the Palaearctic Region known from Canary Islands (Gran Canaria, Tenerife), Spain, Egypt, Israel, Saudi Arabia and Oman; now UAE.

Genus *Clasiopella* Hendel, 1914

*Clasiopella* Hendel, 1914: 109. Type species: *Clasiopella uncinata* Hendel, 1914, original designation. Mathis, 1994: 454–465 [revision]. Mathis & Zatwarnicki, 1995: 23 [world catalogue].

*Clasiopella uncinata* Hendel, 1914

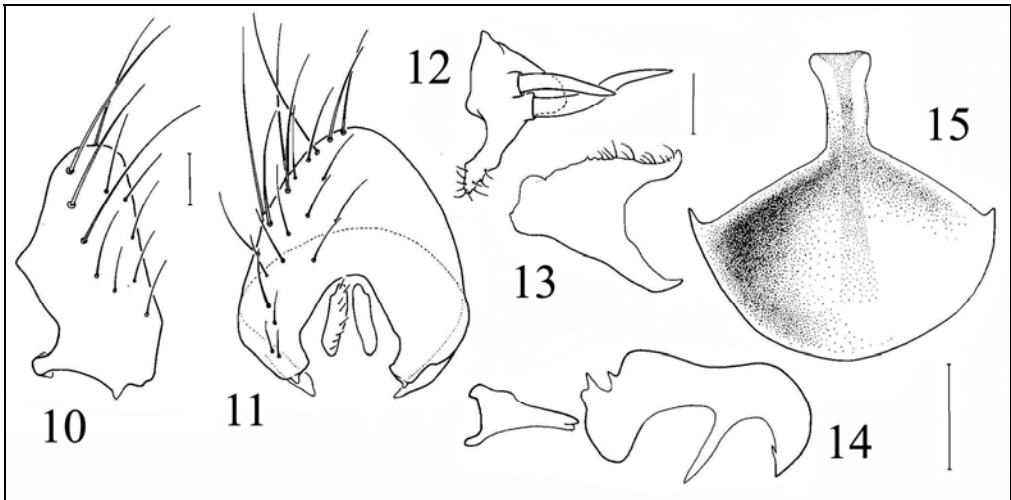
Plate 3, Figures 10–15

*Clasiopella uncinata* Hendel, 1914: 110 [Taiwan. Anping; LT ♀ (designated by Mathis, 1994: 460), DEI]. Mathis, 1994: 457–463 [revision]. Mathis & Zatwarnicki, 1995: 23 [world catalogue].

Specimens examined from the UAE: Ajman, 25°25.9'N 55°29.4'E, 10♂, 11♀, 16.ix–25.xi.2006, water trap, AvH. Ajman, 25°25.7'N 55°30.1'E, mangrove, 2♂, 28.ii–13.iii.2010, WNM. Khor Kalba, 25°00.9'N 56°21.6'E, mangrove, 1♂, 2♀, 4.iii.2010, WNM, TZ.

Diagnosis: This species is distinguished from *C. australis* Mathis, 1994, by the following combination of characters: Small to moderately small shore-flies, body length 1.4–2.2 mm; mostly dark coloured except for legs and wings. Head: Frons with width about twice height, black, subshiny (especially mesofrons), with thin grey microtomentum, especially anteriorly and on parafrons; ocelli arranged in equilateral triangle, with distance between posterior ocelli much greater than between either posterior ocellus and anterior ocellus; ocellar setae well developed, proclinate, mostly parallel. Antenna brownish-black, in some specimens paler toward base of basal flagellomere; arista with 9–11 dorsal rays. Face in lateral view generally arched forward, short portion near midheight and slightly ventrad more protruding and broadly carinate (best seen in profile), black, thinly (dorsal 2/3) to densely (ventral 1/3) invested with white microtomentum; bearing 2 larger facial setae, both inclinate, and a smaller setula posteroventrally. Eye height-to-width ratio 0.75. Gena very short, eye-to-cheek ratio 0.10, concolorous with ventral portion of face; genal seta well developed, length subequal to medial vertical seta. Clypeus black with whitish microtomentum. Palpus black. Thorax: Generally brownish-black to black; mesonotum subshiny, moderately invested with brown microtomentum, microtomentum extended laterally to dorsal angle of notopleuron; postpronotum, notopleuron, and pleural region with whitish-grey microtomentum, denser on postpronotum and katepisternum. Legs mostly yellow; forecoxa whitish-yellow; apical tarsomeres brown; forefemur with 2–3 long setae along posteroventral margin, longer setae greater than width of femur. Wing hyaline, faintly infusate, generally brownish; vein R<sub>2+3</sub> relatively short, costal vein ratio averaging 0.85; M vein ratio averaging 0.5. Abdomen: Male terminalia (Figs 10–15): Epandrial process extended from anteroventral angle, comparatively long, curved ventrally; dorsal process of surstylus in lateral view not much more broadly developed than ventral process, apex of dorsal process rounded with tooth-like medioapical process, medial surface of dorsal process irregular, with 2 pointed bumps; ventral surstylar process shallowly sinuous, gradually tapered to acutely pointed apex; aedeagus in lateral view curved forward at apical 1/3, apex acutely pointed, bearing subapical, lateral, narrow, prong-like process with orientation similar to that of apical 1/3 of aedeagus, basal portion of





Figures 10–15. Structures of the male terminalia of *Clasiopella uncinata* (Hendel). 10: Epandrium, lateral view; 11: Epandrium and cerci, ventral view; 12: Presurstylus, lateral view; 13: Postsurstylus, lateral view; 14: Aedeagus and phallopodeme, lateral view; 15: Hypandrium, ventral view. Scale bar = 0.1 mm.

aedeagus with rounded lobe laterally; aedeagal apodeme narrowly triangular in lateral view; postsurstylus very distinctive, with a rounded medial lobe, ventral process, and 2 greatly enlarged setae; ventral process of postsurstylus in lateral view almost straight but with irregular margins, bearing setulae apically and subapically; 2 greatly enlarged setae of clasper inserted laterad of medial lobe, dorsal seta smaller, nearly straight, ventral seta sinuous; gonite more or less triangular in dorsal view, with a short, medial lobe bearing 2 apical setulae; basal portion of hypandrium very narrow, width less than that of aedeagus.

Natural history: Tenorio (1980: 286) found adults on vegetation along the margins of freshwater ponds, frequently in association with adults of *Psilopa girschneri* von Röder, 1889.

Remarks: This species, although apparently originating in the Australasian/Oceanian and/or Oriental Regions, is now widespread in the tropics, occurring in the African tropics (first recorded by Cresson, 1946b: 256), New World tropics (primarily in the Caribbean area) (Mathis, 1994), and now in the Palearctic Region. Cresson (1945, 1946a, 1946b) noted that the specimens he studied from Midway Island, the Caribbean, and Kenya were interceptions from airplanes, which is a further indication that this species was probably introduced to these areas.

Distribution: Afrotropical Region: Kenya, Madagascar. Australasian/Oceanian Region: Australia (Queensland), Guam, Hawaiian Islands (Hawaii, Midway Island, Molokai, Oahu), Northern Marianas. Nearctic Region: United States (Florida). Neotropical Region: Belize, Colombia (possibly), Mexico (TAB), Tobago, West Indies (Barbados, British West Indies, Dominica, Dominican Republic, Grenada, Jamaica, Puerto Rico). Oriental Region: Philippines, Sri Lanka, Taiwan, Vietnam. In the Palearctic Region now recorded for the first time, from the UAE.

Tribe **Psilopini** Cresson, 1942

**Key to the genera of Psilopini from the UAE**

- 1 Face distinctly carinate, sometimes carina somewhat pointed; mouthparts moderately to distinctly geniculate. Wing often milky white; costa short, extended to vein R<sub>4+5</sub>; crossvein dm-cu absent. Mouthparts distinctly geniculate, labellum equal to haustellum; reclinate fronto-orbital seta reduced or lacking ..... **2**
  - Face mostly flat or shallowly arched, lacking a distinct carina; mouthparts not geniculate (slightly so in *Rhynchopsilopa*). Wing hyaline to lightly infusate, sometimes with darkened base or darkened patches, usually not milky white; costa long, extended to vein M; crossvein dm-cu present. Mouthparts moderately geniculate, length of labellum slightly more than half haustellum; reclinate fronto-orbital seta well developed, subequal to lateral vertical seta ..... **3**
- 2 All 3 fronto-orbital setae (rarely 2 or 4) proclinate, small, hair-like, equal or subequal in size ..... *Achaetorisa* Papp
  - Anterior fronto-orbital seta about 2–3 times longer than middle fronto-orbital seta, inclinate; posterior fronto-orbital seta usually reclinate, occasionally proclinate, usually as long as anterior fronto-orbital setae, occasionally as long as middle fronto-orbital seta ..... *Risa* Becker
- 3 Face distinctly carinate, sometimes carina somewhat pointed; mouthparts moderately to distinctly geniculate. Wing often milky white; costa short, extended to vein R<sub>4+5</sub>; crossvein dm-cu absent. Mouthparts distinctly geniculate, labellum equal to haustellum; reclinate fronto-orbital seta reduced or lacking ..... **4**
  - Face mostly flat or shallowly arched, lacking a distinct carina; mouthparts not geniculate (slightly so in *Rhynchopsilopa*). Wing hyaline to lightly infusate, sometimes with darkened base or darkened patches, usually not milky white; costa long, extended to vein M; crossvein dm-cu present. Mouthparts moderately geniculate, length of labellum slightly more than half haustellum; reclinate fronto-orbital seta well developed, subequal to lateral vertical seta ..... **5**
- 4 All 3 fronto-orbital setae (rarely 2 or 4) proclinate, small, hair-like, equal or subequal in size ..... *Achaetorisa* Papp
  - Anterior fronto-orbital seta about 2–3 times longer than middle fronto-orbital seta, inclinate; posterior fronto-orbital seta usually reclinate, occasionally proclinate, usually as long as anterior fronto-orbital setae, occasionally as long as middle fronto-orbital seta ..... *Risa* Becker
- 5 Arista at most with 3–4 dorsal rays; distance between reclinate and larger proclinate fronto-orbital setae greater than between reclinate seta and medial vertical seta; setae generally pale ..... *Scoliocephalus* Becker
  - Arista with at least 5–6 dorsal rays; reclinate and proclinate fronto-orbital setae much closer together than reclinate seta and medial vertical setae; setae generally dark ..... **6**
- 6 Antennal base arising from anterodorsal corner of head, at level with dorsal margin of eye; scape oriented obliquely dorsad, pedicel and basal flagellomere oriented ventrad, forming acute to right angle with scape; only proclinate fronto-orbital seta present; antenna greatly elongate, length greater than eye height, basal flagellomere 3–5 times longer than high ..... *Rhynchopsilopa* Hendel
  - Antennal base arising lower on head; scape oriented anteriorly to obliquely ventrad, pedicel and basal flagellomere in more or less same ventroclinate plane, forming very obtuse angle with scape; reclinate and proclinate fronto-orbital setae present; antenna normally developed or only slightly elongate, length shorter than eye height, length of basal flagellomere about twice its height ..... **7**

- 7 Vein  $R_{2+3}$  close to costa beyond end of vein  $R_1$ ; crossvein dm-cu with sharp angle at middle ..... *Clanoneurum* Becker
- Vein  $R_{2+3}$  well separated from costa; crossvein dm-cu mostly straight or shallowly arched, not angulate ..... 8
- 8 Face with transverse striae ..... *Leptopsilopa* Cresson
- Face smooth, lacking transverse striae ..... 9
- 9 Pedicel conical, broader apically, without dorsoapical lobe, dorsoapical seta weak (at most 1/3 as long as basal flagellomere); basal flagellomere from 2–4 times as long as high ..... *Ceropsilopa* Cresson
- Pedicel short and subtriangular, with dorsoapical lobe and bearing well-developed dorsoapical spine (at least half as long as basal flagellomere); basal flagellomere at most twice as long as high ..... *Psilopa* Fallén

Genus *Achaetorisa* Papp, 1980

*Achaetorisa* Papp, 1980: 420, 421 [as a genus]. Type species: *Achaetorisa brevicornis* Papp, 1980: 421 [monotypy]. Cogan, 1984: 178 [Palaeartic catalogue].

*Achaetorisa salsolae* Mathis & Zatwarnicki **sp. nov.**

Plate 2, Figures 16–19

Type material: The holotype male is labelled “N. of Ajman, salt marsh, water trap 16.ix–12.x.2006, A. van Harten.” The holotype is double mounted (glued to a paper triangle), is in good condition, and is deposited in NMWC. Forty-five paratypes (14♂, 31♀; NMWC, USNM) bear the locality data as the holotype but with dates from 15.iii–22.ix. 2006, 2007, 2009. Other paratypes are as follows: 7♂, 12♀, ar-Rafah, 25°43.7'N 55°52.5'E, 17.iii.2009, water trap, leg. C. Schmid-Egger.

Type locality: United Arab Emirates, N of Ajman (25°25.7'N 55°30.1'E; salt marsh).

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small shore-flies, body length 1.25–1.40 mm. Head: Structure: Face moderately high, with prominent carina; antennal ratio 1/3–2/5; basal flagellomere ratio 1.5; arista hairs very short; labellar ratio 1.5. Colouration: Antenna as for genus, but antenna and arista often brownish; palpus black; head otherwise black, without distinct microtomentum. Chaetotaxy: Setae long, medial-to-lateral vertical setal ratio 1.5–3.0; fronto-orbital setae 3 (rarely 2 or 4), proclinate, small, hair-like, equal or subequal in size. Thorax: Scutum sparsely microtomentose. Prescutellar acrostichal setae lacking; 1 anepisternal seta present; scutellar disc lacking setulae. Wing: Costal setulae few and sparse [15/13 12/11 15/16 14/16 12/15, total = 139, average 13.9]. Wing length: 1.00–1.15 mm. Halter knob yellow. Legs as in generic description. Abdomen: Entirely dark. Male: Male terminalia (Figs 16–19): Epandrium in posterior view as an inverted U, dorsal arch thin, lateral arms becoming gradually wider ventrally, in lateral view with posterior margin nearly straight, anterior scalloped with a pointed projection between scallops; cercus in posterior view narrowly rectangular with corners rounded except for slightly projected mediodorsal angle, uniformly setulose, in lateral view elongate, narrow, wider dorsally; surstylus in posterior view irregularly triangular, somewhat fused basally with ventral epandrial margin, thereafter ventrally tapered to narrowly rounded point, oriented slightly medially, bearing 2–3 setulae toward apex, in lateral view peg-like, evenly tapered from base to rounded apex; aedeagus in ventral view elliptical, elongate, in lateral view funnel-shaped, elongate, moderately narrow, wide basally, tapered to pointed apex; phallapodeme partially fused to base of aedeagus, in ventral view T-shaped with robust crossbar, in lateral view arched with short, narrow keel; other internal structures (gonites, presurstylus, subepandrial plate) derived with loss and/or fusion of structures; subepandrial plate as a bar-like, transverse band, postsurstylus (clasper) fused laterally to subepandrial plate, projected ventrally laterally as tapered processes, in ventral view acutely

pointed, in lateral view narrowly rounded at apex; hypandrium in ventral view a wide plate, especially basally, tapered on anterior half to bluntly, shallowly arched anterior margin, in lateral view elongate, narrow, bar-like except for narrowly tapered anterior margin. Female: Tergites 6 and 7 bearing a few small setulae, lacking row of long, fringe-like setulae along posterior margin; tergite 8 entire, bare; sternite 8 kidney-shaped in ventral view with emargination directed posteriorly (length/width ca. 0.7), lacking protrusion, posterolateral corners slightly more strongly sclerotized; anterior third bearing about 22 very short, stout, black setae, these not arranged in distinct rows; posterior portion bearing very sparse setulae submarginally; subanal plate lacking; ventral receptacle with paired tubular appendages; cerci short, rounded.

Natural history: This shore-fly species is associated with *Salsola rosmarinus*.

Etymology: The specific epithet, '*salsolae*', has reference to the generic name of the associated plant genus, which is in the family Amaranthaceae.

Distribution: Only known from the UAE.

Genus *Ceropsilopa* Cresson, 1917

*Ceropsilopa* Cresson, 1917: 340. Type species: *Ceropsilopa nasuta* Cresson, 1917, original designation.

Mathis & Zatwarnicki, 1995: 30–32 [world catalogue].

### Key to the species of *Ceropsilopa* from the UAE

- 1 Face polished with metallic, bluish-black luster. Mesonotum black ..... *C. violacea* (Canzoneri & Meneghini)
- Face microtomentose, whitish microtomentum on yellowish background. Mesonotum yellow ..... *C. vanharteni* Mathis & Zatwarnicki **sp. nov.**

*Ceropsilopa vanharteni* Mathis & Zatwarnicki **sp. nov.**

Plate 5, Figures 20–24

Type material: The holotype male is labelled "U. Arab Emirates. Ras Al-Khaimah (25°46'N, 55°53.6'E)[.] 18 March 2010[.] Wayne N. Mathis/USNM ENT 00118274 [plastic bar code label]/HOLOTYPE ♂ *Ceropsilopa vanharteni* Mathis & Zatwarnicki USNM [red]." The holotype is double mounted (minuten pin in a plastic block), is in very good condition (lateral vertical setae missing), and is deposited in the USNM. Five paratypes (2♂, 3♀; USNM) bear the same label data as the holotype. Other paratypes are as follows: 2♂, 4♀, Ra's al-Khaimah, 25°46'N 55°53.6'E, 13–18.iii.2010, TZ.

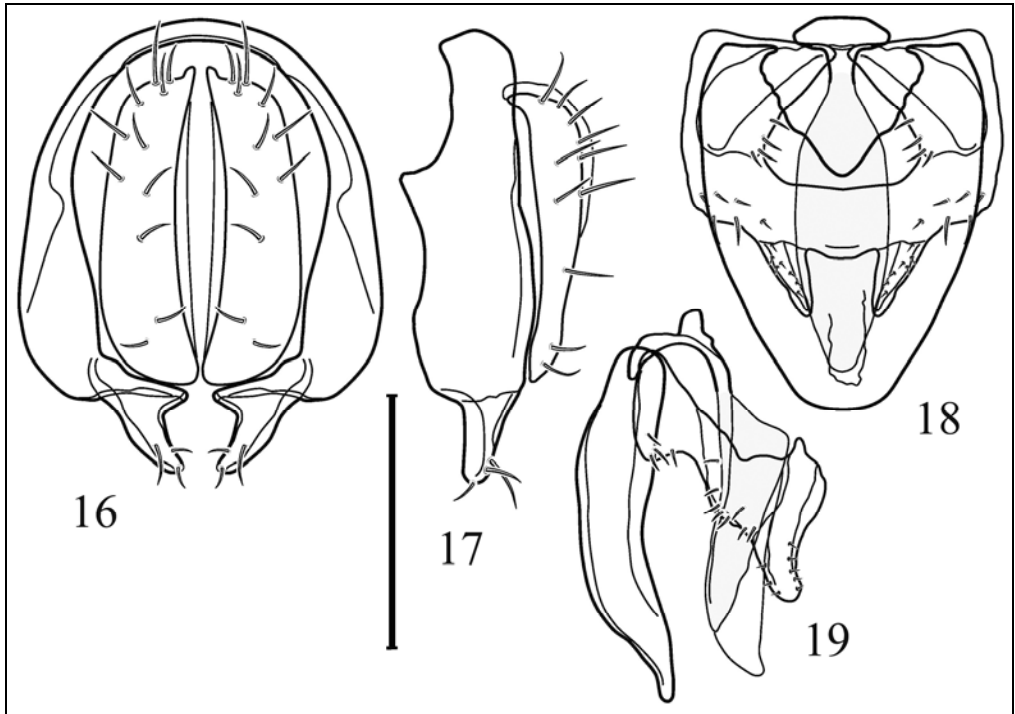
Type locality: United Arab Emirates, Ra's al-Khaimah (25°46'N 55°53.6'E).

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small shore-flies, body length 1.30–1.70 mm. Head: Frons generally yellow; mesofrons with some darker colouration on lateral portions; reclinate fronto-orbital seta well developed, conspicuously longer than adjacent proclinate seta, subequal to lateral vertical seta; 2 proclinate fronto-orbital seta, anterior seta almost laterad of large reclinate seta; much smaller posterior proclinate seta about 1/3 length of anterior seta, inserted posteriad of reclinate seta; lateral vertical seta about 3/4 length of medial vertical seta. Antenna generally yellowish, scape and pedicel yellow; basal flagellomere yellow basally, apical portion faintly brownish to faintly blackish-yellow; length of basal flagellomere only slightly longer than height; arista bearing 6–7 dorsal rays. Face and gena microtomentose, whitish.

Thorax: Mesonotum generally yellow; scutellum slightly darker, faintly brownish to blackish; pleural areas mostly yellow except for a black spot toward the anterodorsal corner of the katepisternum. Wing hyaline; wing ratio 0.43–0.45; costal vein ratio 0.92–0.95; M vein ratio 0.49–0.57. Legs generally yellow; apical tarsomeres darker, more brownish. Abdomen:



Plates 1–3. Habitus, anterolateral view. 1: *Actocetor (Actocetor) indicus* (Wiedemann); 2: *Achaetorisa salsolae* Mathis & Zatwarnicki sp. nov.; 3: *Clasiopella uncinata* Hendel. Photographs: T. Zatwarnicki.



Figures 16–19. Male terminalia of *Achaetorisa salsolae* Mathis & Zatwarnicki sp. nov. 16: Epandrium, cerci, and presurstyli, posterior view; 17: Same, lateral view; 18: Aedeagus (shaded), phallapodeme, gonite, postsurstylus, subepandrial plate, and hypandrium, ventral view; 19: Same, lateral view. Scale bar = 0.1 mm.

Generally yellow except for shiny black tergite 5 and in some specimens medial vitta of tergite 4. Male terminalia (Figs. 20–24): Epandrium in posterior view as an inverted U, arms slightly wider laterally, in lateral view roughly rectangular, height about 3 times width, slightly wider on ventral half; cercus in posterior view hemispherical, medial margin nearly straight, in lateral view broadly lunate, rather evenly setulose; surstylus in posterior view more or less rectangular with corners rounded and becoming narrower medially, in lateral view nearly quadrate, bearing several setulae ventrally; aedeagus in lateral view narrowly funnel-like, wide basally, apical half narrow, parallel-sided, apex rounded, in ventral view pentagonal with length of base and lateral margins subequal, length about half longer, lateroapical margins, narrowly pointed apically; pregonites in lateral view truncate, apex bearing 4 setulae; postgonite in lateral view digitiform, curved apically, moderately rounded apically, base with projection, length slightly less than basal width of aedeagus minus projection, in ventral view narrowly pointed apically; phallapodeme in lateral view triangular with keel and right angle, in ventral T-shaped with short, narrow wings at midheight; hypandrium in lateral view L-shaped, widest at angle, in ventral view shallowly and broadly U-shaped.

Remarks: This species is similar to *C. fisseli* Canzoneri, 1981 (**comb. nov.**), but the thorax of *C. fisseli* is completely yellow, lacking a black spot.

Etymology: The specific epithet, ‘*vanharteni*’, is a genitive patronym to honour our

colleague, friend, and manager of the UAE Insect Project. It is our pleasure to recognize our association with him and all of his efforts to foster discovery of the fauna from the United Arab Emirates.

Distribution: Only known from the UAE.

***Ceropsilopa violacea*** (Canzoneri & Meneghini, 1969)

*Psilopa (Psilopa) violacea* Canzoneri & Meneghini, 1969: 176 [Zaire. Albert National Park: May ya Moto; HT ♂, MRAC]. Mathis & Zatwarnicki, 1995: 47 [world catalogue].

*Ceropsilopa violacea*. Canzoneri & Rampini, 1996: 13 [generic combination].

Specimens examined from the UAE: Al-Ain, Mubazzarah, hot spring, 24°06.4'N 55°44.8'E, 2♂, 5♀, 16.iii.2010, WNM. Ra's al-Khaimah, 25°46'N 55°53.6'E, 7♂, 6♀, 13–18.iii.2010, WNM, TZ.

Diagnosis: This species is distinguished from its congeners by the following combination of characters: Head: Frons black, generally lightly invested with sparse, whitish microtomentum, subshiny, except for polished areas laterad of ocellar triangle. Antenna generally black; pedicel with some paler, yellowish colouration apicodorsally; arista bearing 7–8 dorsal rays; basal flagellomere black, elongate, length almost 3 times height, apex rounded. Face polished with metallic bluish-black reflections; gena with whitish microtomentum. Thorax: Mesonotum black; pleural areas brownish-yellow, becoming gradually more yellowish ventrally. Wing hyaline to very faintly infusate; crossvein dm-cu white to whitish-yellow; wing ratio 0.42–0.43; costal ratio 0.89–0.93; M vein ratio 0.48–0.58. Legs yellow with only apical tarsomere in some specimens slightly darker, brownish-yellow. Abdomen: Basal tergites yellow, tergites 4 and 5 becoming yellowish-brown to brown.

Distribution: Afrotropical Region: Gambia, Kenya, Senegal, Zaire. In the Palearctic Region only known from the UAE.

Genus ***Clanoneurum*** Becker, 1903

*Clanoneurum* Becker, 1903: 165. Type species: *Discomyza infumatum* Becker, 1903 (= *Discomyza cimiciformis* Haliday, 1855), monotypy. Cogan, 1984: 143 [Palearctic catalogue]. Mathis & Zatwarnicki, 1995: 32–34 [world catalogue].

***Clanoneurum cimiciforme*** (Haliday, 1855)

Plate 7

*Discomyza cimiciforme* Haliday, 1855: 124 [Great Britain and Ireland. Quar Abbey, Isle of Wight and River Owenberg, Cork; ST (sex ?), NMI].

*Clanoneurum cimiciforme*. Becker 1903: 165 [generic combination]; 1926: 24 [synonymy]. Cogan, 1984: 143 [Palearctic catalogue]. Mathis & Zatwarnicki, 1995: 33 [world catalogue].

*Clanoneurum infumatum* Becker, 1903: 165 [Egypt. “Birket-el-Karûn in der Oase Fayûm”]; ST ♂, ZMHU]. Cresson, 1925: 243 [synonymy].

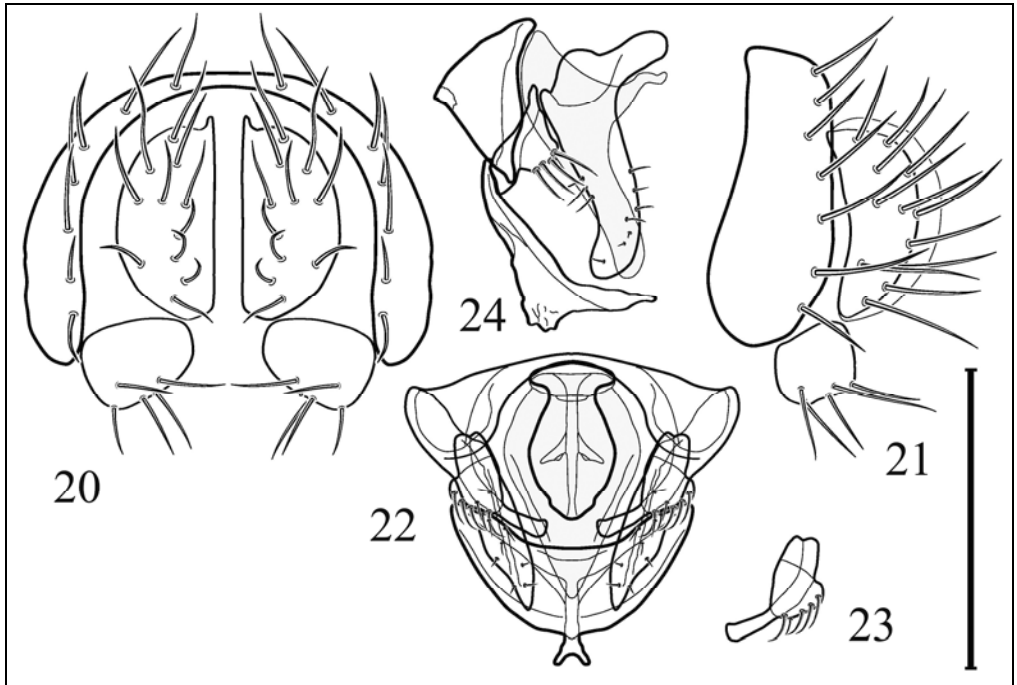
*Heringium ephydrinum* Enderlein, 1934: 193 [Corsica. Gravanata; LT (designated by Papp, 1979: 101), ZMHU]. Cresson, 1936: 269 [synonymy].

*Discomyzoides longicornis* Becker, 1926: 23 [Russia. Transkaspien; ST (sex ?), ZMHU]. Cresson, 1936: 269 [synonymy].

*Clanoneurum longicornis*. Hendel, 1933: 50 [generic combination].

Specimens examined from the UAE: Ajman, industrial area, 25°21.8'N 55°28.4'E, 1♂, 2♀, 17–18.iii.2010, leg. K. Mahmood & WNM.

Diagnosis: This species is distinguished from its congeners by the following combination of characters: Small to moderately small shore-flies, body length 1.50–2.35 mm; generally black with shiny metallic green to coppery reflections. Head: Head in lateral view twice as high as wide, somewhat flattened on anterior surface; mesofrons, fronto-orbits, and face distinctly and strongly rugose; vertex sharply creased. Scape and apex of basal flagellomere black, otherwise yellow to reddish-yellow, basal flagellomere pointed apically; dorsal aristal rays 8–11. Eye very elongate-oblique to almost vertical. Thorax: Anepisternum strongly rugose.



Figures 20–24. Male terminalia of *Ceropsilopa vanharteni* Mathis & Zatwarnicki sp. nov. 20: Epandrium, cerci, and presurstyli, posterior view; 21: Same, lateral view; 22: Aedeagus (shaded), phallapodeme, pregonite, postgonite, and hypandrium, ventral view; 23: Gonite, ventral view; 24: Aedeagus (shaded), phallapodeme, gonite, and hypandrium, lateral view. Scale bar = 0.1 mm.

Wing infusate, sometimes more darkly so toward base; venation as in generic description. Halter brownish-black. Femora and tibiae except apices black; tarsi and apex of tibiae yellow to tawny. Abdomen: Tergites uniformly black, very sparsely microtomentose, mostly shiny with metallic luster.

Natural history: This species, like congeners, seems to have a relationship with plants of the family Chenopodiaceae, particularly *Suaeda*. The immature stages, however, are unknown.

Distribution: Palearctic Region: Algeria, Austria, Belgium, Bulgaria, “Caucasus”, Croatia, Canary Islands, Egypt, France, Germany, Great Britain, Hungary, Ireland, Israel, Italy, Morocco, Poland, Romania, Russia (European Territory), Slovakia, Spain; now UAE.

#### Genus *Leptopsilopa* Cresson, 1922

*Leptopsilopa* Cresson, 1922: 136. Type species: *Psilopa similis* Coquillett, 1900, by original designation. Mathis & Zatwarnicki, 1995: 35–37 [world catalogue]; 2006: 85–138 [revision of New World species].

#### *Leptopsilopa pollinosa* (Kertész, 1901)

Plate 4

*Ephygrobia pollinosa* Kertész, 1901: 81 [Singapore; ST (sex ?), HNHM].

*Psilopa* (*Leptopsilopa*) *pollinosa*. Cresson, 1945: 69 [generic combination].

*Leptopsilopa pollinosa*. Cresson, 1925: 251 [generic combination]. Mathis & Zatwarnicki, 1995: 36–37 [world catalogue].

Specimens examined from the UAE and Oman: Al-Ajban, 24°35.8'N 55°00.2'E, 245 m, 2♂, 1♀,



15.iii.2010, WNM. Hatta, dam, 24°47.7'N 56°06.3'E, 365 m, 1♂, 1.iii.2010, WNM. Khor Fakkan, 25°22.1'N 56°20.9'E, beach, 1♀, 11.iii.2010, WNM. NARC, near Sweihan, 24°24'N 55°26'E, 1♀, 14.iii–2.iv.2005, light trap, AvH. Sharjah, 25°21.8'N 55°26.2'E, 2♂, 1♀, 8.iii.2010, WNM. Sharjah Desert Park, 25°16.9'N 55°41.4'E, 2♂, 3♀, 29.iii–6.iv.2005, light trap, AvH. Wadi Asimah, 435 m, 25°24.1'N 56°08.2'E, 1♂, 8.iii.2010, WNM. Wadi Hayl, 245 m, 25°04.9'N 56°13.5'E, 1♀, 6.iii.2010, TZ. Wadi Madaq, 390 m, 25°20.8'N 56°05.5'E, 2♀, 3–8.iii.2010, WNM. Wadi Safad, 140 m, 25°13.3'N 56°18.3'E, 1♂, 11.iii.2010, WNM. Wadi Shawkah, reservoir, 25°06.4'N 56°02.7'E, 1♀, 10.iii.2008, JHS. OMAN: Dhofar, Khor Rawri, 17°02.2'N 54°26.1'E, 1♂, 12.xi.1992, on *Scirpus marina*, JCD.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small to moderately small shore-flies, body length 1.00–1.70 mm. Head: Frons bluish-black, subshiny, very thinly microtomentose. Antenna generally black, base of basal flagellomere sometimes brown of even brownish-orange, especially medially; arista bearing 7–8 dorsal rays. Face subshiny mediovertically, greenish-black to black, bordered laterally by greyish microtomentum; face bearing 1 prominent, inclinate seta, inserted at ventral 1/8; 1 much smaller seta ventrad, length about 1/3 that of dorsal seta. Thorax: Wing, including veins, pale, mostly hyaline. Foreleg generally black, foretarsus brownish-black; mid- and hindlegs black except for mostly yellowish tarsi, apical tarsomere black. Abdomen: Black, mostly shiny.

Remarks: As Mathis & Zatwarnicki (2006) noted, none of the Old World species now placed in *Leptopsilopa* may be congeneric with those from the New World. Although the generic placement of this species may be doubtful, we continue to recognize it in *Leptopsilopa* because the Old World species are very inadequately known, especially structures of the male and female terminalia.

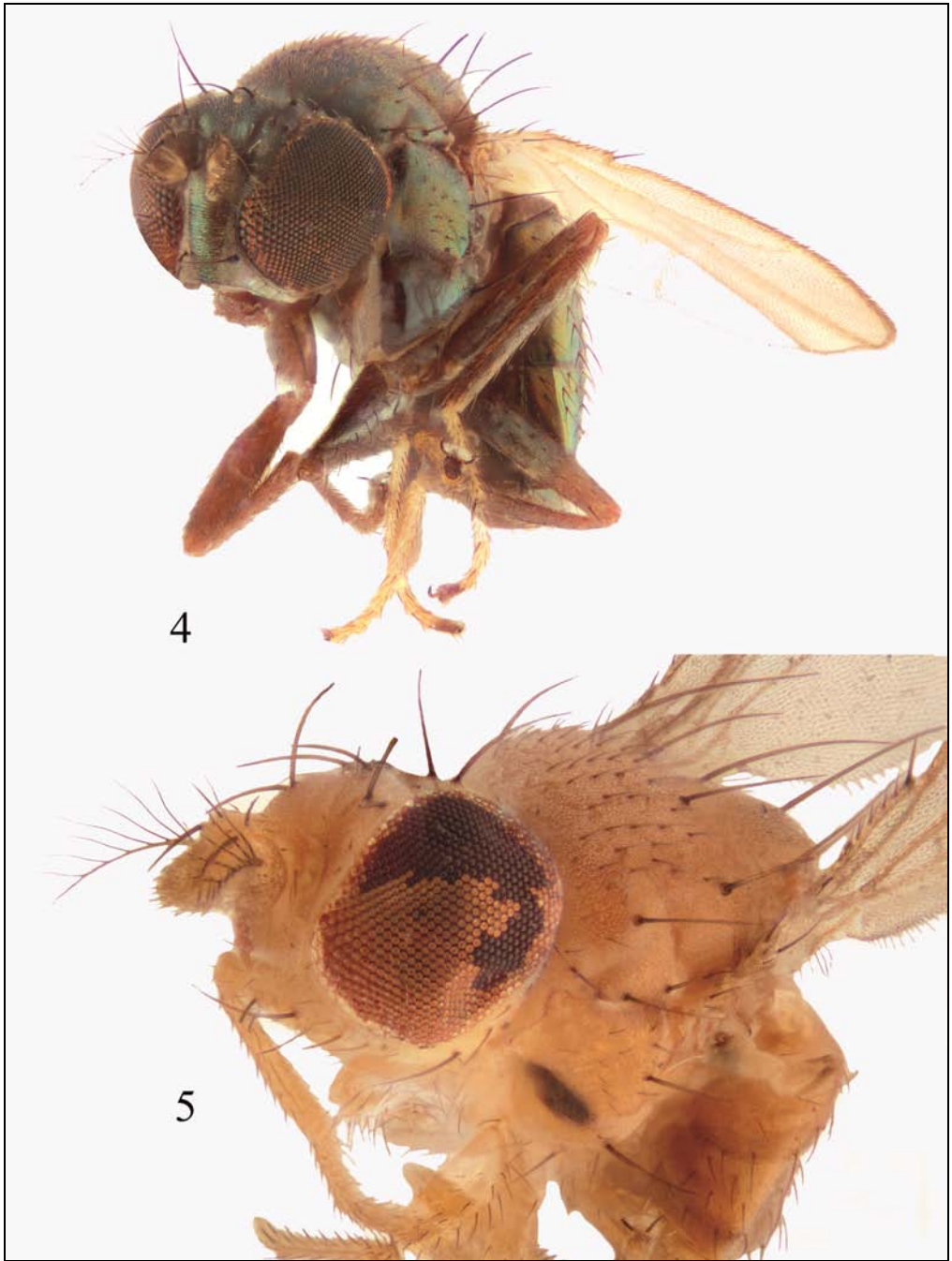
Distribution: Australasian/Oceanian Region: Australia (Queensland), American Samoa, Fiji, Papua New Guinea (New Guinea), Solomon Islands, Tonga; Oriental Region: India, Micronesia, Philippines, Sri Lanka, Taiwan; Palaearctic Region: Oman, UAE.

Genus *Psilopa* Fallén, 1823

*Psilopa* Fallén, 1823: 6. Type species: *Notiphila nitidula* Fallén, 1813, subsequent designation by Rondani, 1856: 132. Becker, 1926: 31–38 [review, Palaearctic Region]. Cogan, 1984: 139–142 [Palaearctic catalogue]. Mathis & Zatwarnicki, 1995: 37–47 [world catalogue].

### Key to the species of *Leptopsilopa* and *Psilopa* from the UAE

- 1 At least midfacies shiny, lacking microtomentum ..... 2
- Face microtomentose, sometimes sparsely ..... 3
- 2 Face mostly shiny, contrasted with densely microtomentose parafacial; face microsculptured with transverse microgrooves. Pedicel brown to black. Foreleg, including tarsi, black, mid- and hindtarsus mostly yellow, only apical tarsomere darkened ..... *L. pollinosa* (Kertész)
- Face with pair of more or less expanded shiny patches, usually with distinct microtomentum in middle; face lacking transverse grooves, polished. Pedicel yellow to yellowish-orange. Tarsi yellow ..... *P. rutilans* Canzoneri & Meneghini
- 3 Wing with conspicuous black, transverse band (from costa through crossvein dm-cu to vein CuA<sub>1</sub>); apex of wing with isolated black markings. Frons black, shiny, contrasted with densely grey microtomentose face; 1 well developed and 1 conspicuously smaller facial seta. Legs mostly yellowish-brown ..... *P. maritima* (Perris)
- Wing lacking black band and isolated markings at apex. Other characters variable ..... 4



Plates 4–5. Habitus, anterolateral view. 4: *Leptopsilopa pollinosa* (Kertész); 5: *Ceropsilopa vanharteni* Mathis & Zatwarnicki sp. nov. Photographs: T. Zatwarnicki.

- 4 Wing with anterior margin blackish-brown, including cells sc and r2+3 and cloud over crossvein dm-cu. Mesonotum reddish-brown, pleural region more yellowish. Face yellowish-brown. Coxae and femora yellow to yellowish-brown, fore- and hindtibiae blackish-brown, midtibia yellowish-brown; foretarsus black, mid- and hindtarsus mostly yellow, apical tarsomere brown ..... *P. rufithorax* (Becker)
- Wing with anterior margin hyaline, not black, through cells sc and r2+3. Thorax generally black. Other characters variable ..... 5
- 5 Crossvein dm-cu enshrouded within darkened cloud ..... 6
- Crossvein dm-cu not enshrouded ..... 8
- 6 Femora and tibiae mostly black to blackish-brown ..... *P. fratella* (Becker)
- Legs yellow ..... 7
- 7 Basal 1–3 tergites yellow ..... *P. nervimaculata* (Becker)
- Tergites black ..... *P. biskrae* (Becker)
- 8 Femora and usually tibiae generally black ..... 9
- Femora and tibiae generally yellow ..... *P. nilotica* (Becker)
- 9 Scape and especially pedicel yellow; frons and face very sparsely microtomentose, subshiny to shiny ..... *P. rutilans* Canzoneri & Meneghini
- Antenna mostly black; frons and face moderately microtomentose, dull to subshiny ..... 10
- 10 Arista bearing 7–8 dorsal rays; 2 prominent facial setae, ventral seta over half length of dorsal seta. Tibiae concolorous with femora, black ..... *P. aequalipes* (Becker)
- Arista bearing 5 dorsal rays; 1 prominent facial seta, ventral seta much less than half length of dorsal seta. Tibiae slightly lighter than femora, brownish-black, tibial apices yellowish ..... *P. aenigma* Mathis & Zatwarnicki **sp. nov.**

***Psilopa aenigma* Mathis & Zatwarnicki **sp. nov.****

Figures 25–28

Type material: The holotype male is labelled “U. Arab Emirates. Wadi Shawkah (25°6.3'N, 56°2.8'E; 300 m), 27 Feb 2010[,] Wayne N. Mathis/USNM ENT 00118299 [plastic bar code label]/HOLOTYPE ♂ *Psilopa aenigma* Mathis & Zatwarnicki USNM [red].” The holotype is double mounted (minuten pin in a plastic block), is in excellent condition, and is deposited in the USNM. Twenty paratypes (18♂, 2♀; USNM) have the same label data as the holotype. Other paratypes are as follows: 5♂, 1♀, Wadi Shawkah, 265 m, road, 25°06.3'N 56°01.6'E, 10.iii.2010, WNM.

Other specimens examined: Al-Ain, Mubazzarah, hot spring, 24°06.4'N 55°44.8'E, 1♀, 16.iii.2010, WNM. N of Ajman, mangrove, 25°25.7'N 55°30.1'E, 1♂, 18.iii.2010, TZ. Hatta dam, 24°47.7'N 56°06.3'E, 365 m, 1♀, 1.iii.2010, WNM. Um al-Quwain, beach, 25°31.4'N 55°31.4'E, 3♂, 28.ii–18.iii.2010, WNM, TZ.

Type locality: United Arab Emirates. Wadi Shawkah (25°06.3'N 56°02.8'E; 300 m, reservoir).

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small shore-flies, body length 1.00–1.55 mm. Head: Mostly black. Frons almost as microtomentose as face, faintly subshiny. Antenna mostly black; pedicel in some specimens with some apical brownish-orange colouration; arista with 5–7 dorsal rays. Face black with sparse, grey microtomentum; 1 prominent facial setae, inserted ventrad of midfacial height, a much smaller, more ventral seta, at most 1/2 of dorsal seta. Thorax: Generally black, very sparsely microtomentose, mostly subshiny. Wing mostly hyaline, lacking darkened bands or clouds. Tibia and femora mostly black; apices of tibiae yellowish; tarsi mostly yellowish, apical tarsomere darker. Abdomen: Tergites very sparsely microtomentose, subshiny to shiny black. Male terminalia (Figs 25–28): Epandrium moderately robustly developed, in posterior view as a rounded, inverted U, band across dorsum thinner than lateral arms, arms wider subventrally, width equal to width of a cercus, ventral margin blunt; in lateral view robust, very shallowly curved, narrowly subrectangular, widest at ventral 1/3, ventral margin broadly rounded; cercus in posterior view broadly oval

with dorsum and venter rounded, in lateral view more or less rod-like with ventral margin rounded and dorsum pointed; presurstylus well developed, in posterior view length twice height, subrectangular, with mediobasal acutely pointed spur, in lateral view width only slightly longer than height, broadly and roundly oval; postsurstylus robust, prominent, in ventral view broadly blade-like with short, narrow tang, uniformly setose, in lateral view broadly digitiform, basal 1/4 angled, narrowed sub-basally, basal margin concave, apex bluntly rounded; pregonite and postgonite fused, in lateral view with slender, more elongate base (postgonite), pregonite portion as an extended lobe, short, bearing 2 apical setulae, in ventral view pregonite lobe shorter and more robustly developed than more slender, tapered, postgonite; subepandrial plate in lateral view much longer than wide, slender, twice angulate, forming a slender Z, in ventral view aedeagus in lateral view slipper-like, longer than high, blunt basally, straight, bearing a short lobe-like process and midlength dorsally, in ventral view longer than wide, broadly ovate, base rounded, apical margin slightly projected medially; phallapodeme in lateral view roughly triangular with extension toward aedeagal base tapered and narrowly projected, keel short, in ventral view T-shaped, base of stem expanded slightly laterally; hypandrium in lateral view pocket-like, narrowed basally, thereafter anteriorly expanded, subquadrate, in ventral view as a broad, shallowly curved band with posterior margin emarginate and much wider anterior margin broadly rounded. Remarks: This species is very similar to *P. nigrifella* Stenhammar, 1844, and study of structures of the male terminalia may be needed to distinguish between these two species.

**Etymology:** The specific epithet, '*aenigma*', is of Latin derivation and means puzzling or secret, referring to the near cryptic status of this species.

**Distribution:** Only known from the UAE.

***Psilopa aequalipes* (Becker, 1907)**

*Ephygrobia aequalipes* Becker, 1907: 397 [Algeria. Biskra; ST ♂♀, ZMHU].

*Psilopa aequalipes*. Bezzi, 1914b: 180 [generic combination]. Becker, 1926: 33 [review, Palearctic Region]. Cogan, 1984: 140 [Palearctic catalogue]. Mathis & Zatwarnicki, 1995: 38 [world catalogue].

Specimens examined from the UAE: Al-Ain, Mubazzarah, hot spring, 24°06.4'N 55°44.8'E, 2♂, 2♀, 16.iii.2010, WNM. N of Ajman, mangrove, 25°25.7'N 55°30.1'E, 4♂, 3♀, 28.ii–13.iii.2010, WNM, TZ. Hatta, dam, 24°47.7'N 56°06.3'E, 365 m, 2♂, 1.iii.2010, WNM. Ra's al-Khaimah, 25°46'N 55°53.6'E, 1♂, 18.iii.2010, WNM. Um al-Quwain, beach, 25°31.4'N 55°31.4'E, 2♂, 28.ii.2010, WNM. Um al-Quwain, roadside pond, 25°29.6'N 55°33.3'E, 1♂, 15.iii.2010, WNM. Wadi Shawkah, 300 m, reservoir, 25°06.3'N 56°02.8'E, 21♂, 27.ii.2010, WNM. Wadi Shawkah, 265 m, road, 25°06.3'N 56°01.6'E, 8♂, 2♀, 10.iii.2010, WNM.

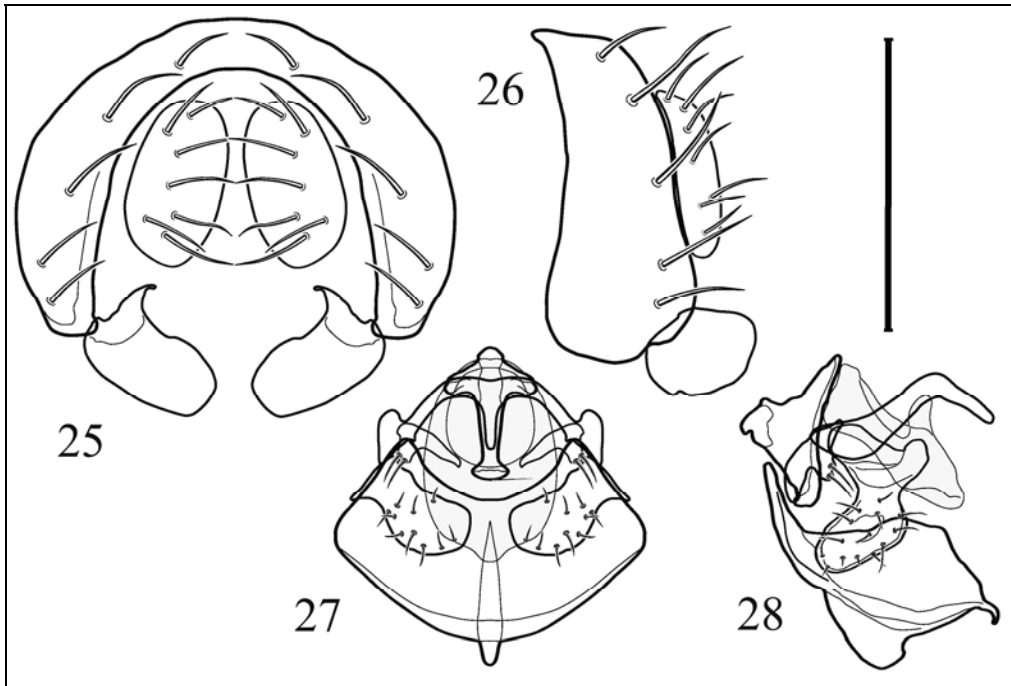
**Diagnosis:** This species is distinguished from congeners by the following combination of characters: Small shore-flies, body length 1.35–1.95 mm. Head: Mostly black. Frons very sparsely microtomentose, mostly subshiny black. Antenna black; arista with 7–8 dorsal rays. Face with grey microtomentum; 2 prominent facial setae, ventral seta greater than half length of dorsal seta, both ventrad of midfacial height. Thorax: Wing hyaline, lacking darkened bands or clouds. Legs generally black except for mostly yellowish tarsi; apical tarsomere brown to blackish-brown. Abdomen: Tergites black.

**Distribution:** Palearctic Region, known from Canary Islands, Algeria, Egypt, and now UAE.

***Psilopa biskrae* (Becker, 1907)**

*Ephygrobia leucostoma* variety *biskrae* Becker, 1907a: 397 [Algeria. Biskra; ST ♂♀, ZMHU].

*Psilopa biskrae*. Becker, 1926: 33 [generic combination, revised status]. Cogan, 1984: 139 [Palearctic catalogue]. Mathis & Zatwarnicki, 1995: 39 [world catalogue].



Figures 25–28. Male terminalia of *Psilopa aenigma* Mathis & Zatwarnicki sp. nov. 25: Epandrium, cerci, and presurstyli, posterior view; 26: Same, lateral view; 27: Aedeagus (shaded), phallapodeme, gonite, postsurstylus, subepandrial plate, and hypandrium, ventral view, 28: Same, lateral view. Scale bar = 0.1 mm.

Specimens examined from the UAE: Al-Ain, Mubazzarah, hot spring, 24°06.4'N 55°44.8'E, 1♂, 16.iii.2010, WNM.

**Diagnosis:** This species is distinguished from congeners by the following combination of characters: Small shore-flies, body length 1.30 mm. Head: Mostly black. Frons mostly sparsely whitish to greyish microtomentose, subshiny, anterior margin more densely microtomentose. Antenna mostly yellow except for dorsoapical black portion of basal flagellomere; arista with 7–8 dorsal rays. Face with grey microtomentum; 2 prominent facial setae, ventral seta over half length of dorsal seta, both inserted ventrad of midfacial height. Thorax: Wing mostly hyaline except for conspicuously darkened cloud over crossvein dm-cu and to a lesser extent over crossvein r-m. Legs mostly yellow, apical tarsomere brown. Abdomen: Tergites black.

**Remarks:** Gatt & Ebejer (2003) have suggested that this species may represent a species complex based on their study of specimens from the Maltese Islands.

**Distribution:** Palearctic Region, known from Algeria, Malta, Italy, and now UAE.

***Psilopa fratella* (Becker, 1903)**

*Ephygrobia fratella* Becker, 1903a: 159 [Egypt. “Alexandrien” (= El Iskandariya), and Canary Islands: Teneriffe; LT ♂ (designated by Stuke, 2012a: 216), ZMHU].

*Psilopa fratella*. Bezzi, 1908: 185 [generic combination]. Becker, 1926: 34 [review, Palearctic Region]. Mathis & Zatwarnicki, 1995: 40 [world catalogue]. Stuke, 2012a: 216 [fauna of Madeira Islands; lectotype designation].

Specimens examined from the UAE: Al-Ajban, 24°35.8'N 55°00.2'E, 245 m, 1♀, 15.iii.2010, WNM. Wadi Shawkah, reservoir, 25°06.4'N 56°02.7'E, 2♂, 1♀, 14.iii.2008, JHS. Wadi Shawkah, 265 m, road, 25°06.3'N 56°01.6'E, 1♂, 27.ii.2010, WNM.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small shore-flies, body length 1.55 mm. Head: Mostly black. Frons mostly sparsely whitish to greyish microtomentose, anterior margin more densely microtomentose. Antenna mostly black; arista with 6–7 dorsal rays. Face with grey microtomentum; 1 prominent facial seta, ventral seta less than half length of dorsal seta, both inserted ventrad of midfacial height. Thorax: Wing mostly hyaline except for conspicuously darkened cloud over crossvein dm-cu. Legs mostly black except for yellowish tarsomeres, apical tarsomere brown. Abdomen: Tergites black.

Distribution: Palaearctic Region: Canary Islands, Madeira Islands, Egypt; now also UAE.

***Psilopa maritima*** (Perris, 1847)

Plate 3

*Hydrellia maritima* Perris, 1847: 494 [France. Le pré salé à la Teste; ST (sex ?), ENSA (apparently lost)].

*Psilopa maritima*. Loew, 1873: 306 [generic combination]. Becker, 1926: 35 [review, Palaearctic Region]. Cogan, 1984: 140 [Palaearctic catalogue]. Mathis & Zatwarnicki, 1995: 42 [world catalogue].

*Ephygrobia maritima*. Becker, 1896: 139 [generic combination].

Specimens examined from the UAE: Al-Ain, Mubazzarah, 24°06.4'N 55°44.8'E, 6♂, 4♀, 16.iii.2010, TZ; 1♂, 2♀, 16.iii.2010, WNM. N of Ajman, 25°25.9'N 55°29.4'E, 1♂, 1♀, 11–25.xi.2006, water trap, AvH. Ajman, industrial area, 25°21.8'N 55°28.4'E, 1♂, 10.iii.2010, TZ. Fujairah, 25°12.8'N 56°21.5'E, light trap, 4♂, 1♀, 5.iii–5.vi.2005, AvH. Hatta, 28°49'N 56°07'E, light trap, 2♂, 2♀, 4–26.iv.2006, AvH. Khor al-Khuwair, 25°58.2'N 56°03.3'E, light trap, 1♂, 2♀, 7.iv–5.vi.2006, AvH. Wadi Shawkah, 265 m, road, 25°06.3'N 56°01.6'E, 1♀, 10.iii.2010, WNM. Wadi Shawkah, 25°06.4'N 56°02.7'E, 1♂, 20.iii.2007, leg. F. Menzel; 1♀, 10.iii.2008, JHS.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small to moderately small shore-flies, body length 1.85–2.35 mm. Head: Frons largely black shiny, only anterior portion and fronto-orbits greyish microtomentose. Antenna mostly dark but basal flagellomere in some specimens yellowish ventrobasally; arista bearing 7–10 dorsal rays. Face microtomentose, whitish-grey, more thinly so medially; bearing 1 prominent seta and 1 much smaller ventrad, more ventral seta less than half length of dorsal seta. Thorax: Wing with distinctive maculation pattern on an otherwise hyaline wing; subapical, narrow, transverse band at level of crossvein dm-cu; basal band partial at level of crossvein r-m, extended basally; apex of veins R<sub>4+5</sub> and M with linear, blackish cloud; vein R<sub>2+3</sub> with subapical, short stump vein, thereafter angled sharply to costa. Legs generally yellow except for mostly black hindtibia, black medial area occupying 1/2–2/3 length of tibia, apices yellow; apical 1–2 tarsomeres brown to blackish-brown. Abdomen: Black, shiny; tergite 1 often with some yellowish colouration.

Distribution: Palaearctic Region: Bulgaria, France, Italy, Spain; and now also UAE.

***Psilopa nervimaculata*** (Becker, 1910)

*Ephygrobia nervimaculata* Becker, 1910: 154 [Yemen. Aden; ST (2♂), ANSP, NMW].

*Psilopa nervimaculata*. Becker, 1926: 35 [review; generic combination]. Mathis & Zatwarnicki, 1995: 43 [world catalogue].

*Clesiopella nervimaculata*. Cresson, 1925: 249 [generic combination].

*Psilopa rufibasis* Collin, 1949: 213 [Egypt. Bahrein, Siwa, Lake Karoun; ST 22♂, 32♀, BMNH (labelled as a holotype and paratypes)]. Mathis & Zatwarnicki, 1995: 46 [world catalogue]. **Syn. nov.**

Specimens examined from the UAE: Al-Ain, Mubazzarah, hot spring, 24°06.4'N 55°44.8'E, 6♂, 4♀, 16.iii.2010, WN & TZ. Al-Ajban, 24°35.8'N 55°00.2'E, 245 m, 1♂, 2♀, 15.iii.2010, WNM. Ajman,

industrial area, 25°21.8'N 55°28.4'E, 3♂, 3♀, 12–17.iii.2010, WNM, TZ. N of Ajman, mangrove, 25°25.7'N 55°30.1'E, 1♂, 2♀, 13.iii.2010, WNM. Ra's al-Khaimah, 25°46'N 55°53.6'E, 1♂, 18.iii.2010, WNM. Um al-Quwain, beach, 25°31.5'N 55°31.5'E, 1♂, 18.iii.2008, JHS. Wadi Shawkah, 265 m, road, 25°06.3'N 56°01.6'E, 1♂, 1♀, 28.ii–10.iii.2010, WNM.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small to moderately small shore-flies, body length 1.80–2.40 mm. Head: Mostly black; frons variably sparsely microtomentose, dull to at most subshiny. Antenna dark, scape and basal flagellomere black; pedicel brownish-black, some specimens faintly yellow dorsally; arista with 7–8 dorsal rays. Face with grey microtomentum; 2 prominent facial setae, both ventrad of midfacial height. Thorax: Wing mostly hyaline to faintly infusate except for conspicuous, darkened clouds over crossveins r-m and dm-cu. Forecoxa whitish-yellow, rest of legs yellow; apical tarsomere usually darkened. Abdomen: Tergites 1–3 and anterior margin of tergite 4 mostly yellow to reddish-brown laterally; posterior portion of tergite 4 and all of tergite 5 black.

Distribution: Afrotropical Region: Yemen; Palaearctic Region: Algeria, Egypt; now also UAE.

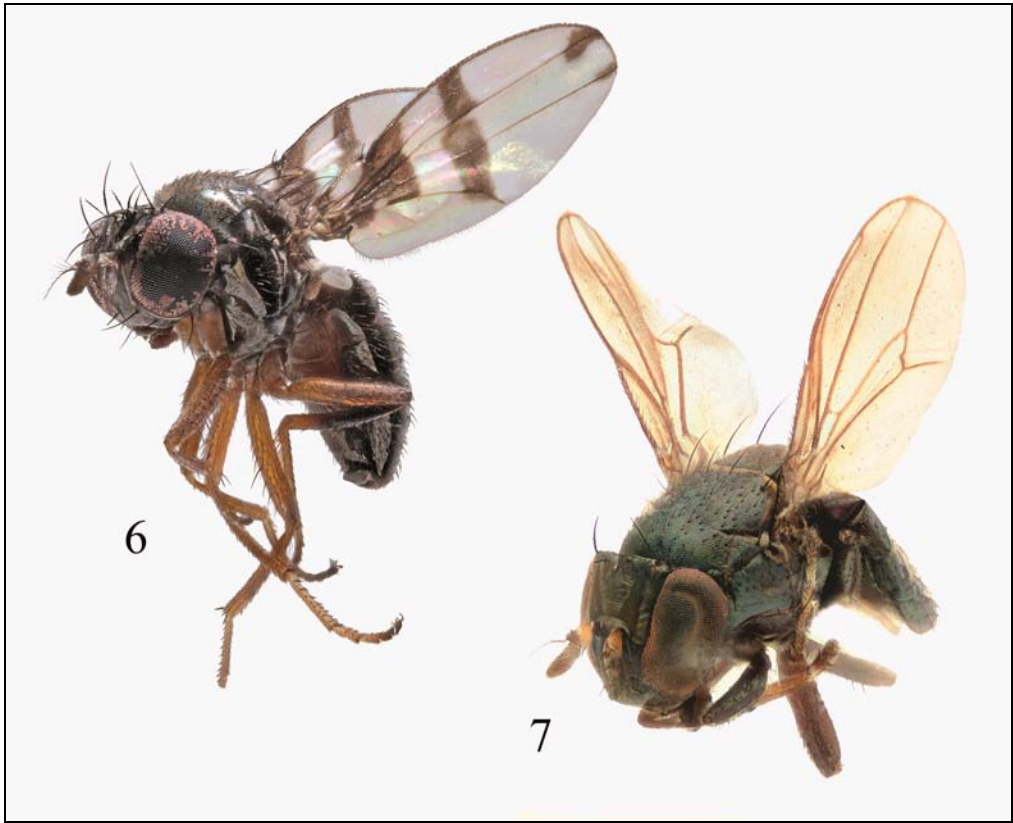
### *Psilopa nilotica* (Becker, 1903)

*Phygrobia nilotica* Becker, 1903: 157 [Egypt. “Nilthal” (=Nile valley); ST ♂♀, ZMHU].

*Psilopa nilotica*. Bezzi, 1908: 189 [generic combination]. Becker, 1926: 36 [review, Palaearctic Region]. Dawah & Abdullah, 2006: 386 [fauna, Saudi Arabia]. Cogan, 1984: 141 [Palaearctic catalogue]. Mathis & Zatwarnicki, 1995: 43–44 [world catalogue].

*Psilopa flavipalpis* Becker & Stein, 1912: 650 [Iran. “Beludshistan, aus der Oase Megas und vom Dorfe Sarbas, von der Makranküste des Indischen Ozeans”; ST ♂♀, ZISP]. Cogan, 1984: 141 [synonymy].

Specimens examined from the UAE and Oman: Al-Ain, Mubazzarah, hot spring, 24°06.4'N 55°44.8'E, 1♀, 16.iii.2010, WNM. Al-Ajban, 24°35.8'N 55°00.2'E, 2♂, 4♀, 1.iii–30.xi.2005, on Rhodes grass, 2006, JCD, AvH; 1♂, 1♀, vegetable garden, 1.iii.2006, JCD; 2♀, 245 m, 15.iii.2010, WNM. Ajman, industrial area, 25°21.8'N 55°28.4'E, 7♂, 10♀, 10–12.iii.2010, WNM, TZ. N of Ajman, mangrove, 25°25.7'N 55°30.1'E, 1♀, 13.iii.2010, WNM. Bithnah, 25°11'N 56°14'E, 1♂, 2.i–31.xii.2005, light trap, AvH. SSW of ad-Dhaid, 24°17'N 55°53'E, 1♂, 24–30.v.2006, water trap, AvH. Desert farm, 25°07.9'N 55°45.1'E, 6♂, 7♀, 12.iii.2008, JHS. Dubai, Mushrif Park, 25°12.9'N 55°26.7'E, 1♀, 23.ii.2006, JCD. Hatta, dam, 24°47.7'N 56°06.3'E, 365 m, 2♂, 4♀, 1.iii.2010, WNM, TZ. 7 km S of al-Jazirat al-Hamra, 25°39.6'N 55°45.1'E, 1♂, 4♀, 1.xii.2004, yellow water trap, AvH. Kalba, beach, 25°06'N 56°21.5'E, 2♂, 3♀, 3.iii.2010, WNM. Khor Fakkan, beach, 25°22.1'N 56°20.9'E, 1♂, 3♀, 11.iii.2010, WNM. Masafi, farm, 25°18.9'N 56°07.8'E, 1♂, 17.iii.2008, J.-H. Stuke. Ar-Rafah, mangrove, 25°43.7'N 55°52.5'E, 2♀, 13.x.2010, WNM. Ra's al-Khaimah, farm, 25°47.9'N 56°04.3'E, 1♂, 14♀, 16.iii.2008, JHS. Ra's al-Khaimah, 25°46'N 55°53.6'E, 1♂, 13.iii.2010, WNM. Sharjah, 25°21'N 55°24'E, 1♀, 1–31.i.2005, light trap, AvH. Sharjah Desert Park, 25°16.9'N 55°41.4'E, 1♂, 8♀, 25.i–20.xi.2004, 2005, 2006, 2008, JCD, AvH, JHS (JHS, NMWC). Sharjah National Park, 25°18.9'N 55°32.2'E, 2♂, 4♀, 12.iii.2008, JHS. Sharm, beach, 25°28.9'N 56°21.7'E, 1♀, 17.iii.2010, WNM. NARC, near Sweihan, 24°24'N 55°26'E, 1♂, 2–30.iv.2005, light trap, AvH. Um al-Quwain, park at beach, 25°35.4'N 55°34'E, 2♀, 18.iii.2008, JHS; salt marsh, 25°32'N 55°32.2'E, 2♂, 18.iii.2008, JHS; beach, 25°31.4'N 55°31.4'E, 1♀, 28.ii.2010, WNM. Wadi Asimah, 435 m, 25°24.1'N 56°08.2'E, 4♀, 8.iii.2010, WNM, TZ. Wadi Bih, dam; 25°48'N 56°04.4'E, 1♂, 1–19.i.2010, water trap, AvH; 115 m, 1♂, 1♀, 9.iii.2010, WNM. Wadi Hayl, 245 m, 25°04.9'N 56°13.5'E, 3♂, 3♀, 6.iii.2010, WNM. Wadi Madaq, 390 m, 25°20.8'N 56°05.5'E, 9♂, 1♀, 3–8.iii.2010, WNM. Wadi Safad, 25°13.1'N 56°17.6'E, 1♀, 13.iii.2008, JHS; 140 m, 1♂, 11.iii.2010, WNM. Wadi Shawkah, reservoir, 25°06.4'N 56°02.7'E, 19♂, 11♀, 10–14.iii.2008, JHS; 265 m, road, 25°06.3'N 56°01.6'E, 11♂, 2♀, 27.ii.2010, WNM; 300 m, reservoir, 14♂, 6♀, 27.ii.2010, WNM, TZ. Wadi Wurayah, 210 m, 25°23.9'N 56°16.2'E, 2♂, 17.iii.2010, WNM. OMAN: Muscat, Bawsher Tunes, 2 km inland, 23°32.3'N 58°22.4'E, 11♂, 31♀, 8.ii.1990, leg. M.J. Ebejer.



Plates 6–7. Habitus, anterolateral view. 6: *Psilopa maritima* (Perris); 7: *Clanoneurum cimiciforme* (Haliday). Photographs: T. Zatwarnicki.

**Diagnosis:** This species is distinguished from congeners by the following combination of characters: Small shore-flies, body length 1.25–1.95 mm. Head: Mostly black. Frons moderately sparsely microtomentose, microtomentum denser toward anterior margin. Antenna yellow, especially scape and pedicel, basal flagellomere brownish-yellow to brown; arista with 8–10 dorsal rays. Face with grey microtomentum; 1 prominent facial seta, inserted ventrad of midfacial height, a much smaller seta ventrad, length at most 1/3 more dorsal seta. Thorax: Wing hyaline. Legs yellow to faintly yellowish-brown; apical tarsomere sometimes brownish-yellow to brown. Abdomen: Tergites black, largely shiny, microtomentum lacking or at most very sparse.

**Distribution:** Afrotropical: Sudan, Ethiopia; Palearctic: Afghanistan, Algeria, Egypt, Iran, Italy, Saudi Arabia, Tunisia, and now Oman and UAE.

***Psilopa rufithorax* (Becker, 1903)**

*Ephygrobia rufithorax* Becker, 1903: 158 [Egypt. “Kairo” (= Al-Qāhira); ST ♂♀, ZMHU].

*Psilopa rufithorax*. Becker, 1926: 38 [generic combination, review, Palearctic Region]. Cogan, 1984: 142 [Palearctic catalogue]. Mathis & Zatwarnicki, 1995: 46 [world catalogue].

Specimens examined from the UAE and Oman: Al-Ain, Mubazzarah, hot spring, 24°06.4'N 55°44.8'E, 1♂, 16.iii.2010, WNM. Ajman, industrial area, 25°21.8'N 55°28.4'E, 7♂, 4♀, 10–17.iii.2010, WNM,



TZ. N of Ajman, dunes with mangrove, *Avicennia marina*, 25°25.9'N 55°29.4'E, 1♀, 11.iii.2008, JHS; 2♂, 13.iii.2010, WNM; 1♀, 11–25.xi.2006, water trap, AvH. Hatta, 28°49'N 56°07'E, 1♀, 4–11.iv.2006, light trap, AvH. Ar-Rafah, mangrove, 25°43.7'N 55°52.5'E, 3♂, 9–13.iii.2010, WNM, TZ. S of Ra's al-Khaimah, coast, 25°43.7'N 55°52.4'E, 1♂, 11.iii.2008, JHS. Sharjah, 25°21'N 55°24'E, light trap), 2♀, 31.i–23.vii.2005, AvH. Sharjah Desert Park, 25°16.9'N 55°41.4'E, 1♂, 28.ii.2006, JCD; 1♀, 20.x–8.xi.2005, AvH. NARC, near Sweihan, 24°24'N 55°26'E, 1♂, 2♀, 14.iii–30.iv.2005, light trap, AvH. Um al-Quwain, park at beach and salt marsh, 25°35.4'N 55°34'E, 1♂, 4♀, 18.iii.2008, JHS; 3♂, 5♀; 28.ii–18.iii.2010, WNM, TZ. Wadi al-Sidr, farm, 25°24.7'N 56°05.1'E, 1♂, 17.iii.2008, JHS. Wadi Shawkah, reservoir, 25°06.4'N 56°02.7'E, 1♀, 14.iii.2008, JHS; 265 m, road, 1♂, 27.ii.2010, WNM. Wadi Wurayah farm, 25°23'N 56°19'E, 1♀, 2–19.iii.2009, water trap, AvH. OMAN: 4 km W of Barka, 23°41.3'N 57°48.4'E, 1♀, 4.iii.1993, on Rhodes grass, leg. M.D. Gallagher. Dhofar, Khor Taqah, 17°02'N 54°24.5'E, 1♂, 5♀, 12.xi.1992, JCD. Muscat, near Seeb Airport, coastal reed, marsh, 23°36.7'N 58°18.4'E, 1♀, 8.ii.1990, leg. M.J. Ebejer.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small shore-flies, body length 1.30–1.65 mm. Head: Frons generally black with shiny mesofrons and most of fronto-orbits; anterolateral areas of frons dull, charcoal black. Antenna generally black but with apices of pedicel with yellowish-orange colouration; arista bearing 4–5 dorsal rays. Face mostly yellow, thinly microtomentose, greyish-white to white, more thinly microtomentose medially; face bearing 1 prominent seta and a small seta ventrad, ventral seta about half length of more dorsal seta. Thorax: Mesonotum reddish-brown. Wing with anterior margin and area over crossveins *rm* and *du-cu* darkened, blackish-brown; darkened cloud over crossvein *dm-cu*. Coxae and femora generally yellow; fore- and hindfemora largely blackish, midfemur yellowish; foretarsus blackish; mid- and hindtarsi yellowish, apical tarsomeres darkened. Abdomen: Tergites mostly to entirely black, shiny.

Distribution: Afrotropical Region: Gambia, Senegal; Palaearctic Region: Algeria, Egypt, Iran, and now Oman and the UAE.

### *Psilopa rutilans* Canzoneri & Meneghini, 1972

*Psilopa rutilans* Canzoneri & Meneghini, 1972: 145 [Italy. Lido di Volano; HT ♂, MCV]. Cogan, 1984: 142 [Palaearctic catalogue]. Mathis and Zatwarnicki, 1995: 46 [world catalogue].

Specimens examined from the UAE: N of Ajman, 25°25.9'N 55°29.4'E, 2♂, 9♀, 21.ix–25.xii 2006, 2007, water trap, AvH.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small shore-flies, body length 1.65–1.95 mm. Head: Frons very sparsely microtomentose, mostly bare, subshiny to shiny. Scape and especially pedicel yellow; basal flagellomere blackish; arista bearing 6–7 dorsal rays. Face mostly sparsely whitish to greyish microtomentose except for 2 small, oval areas on either side of the median at mid height; face bearing 1 prominent, inclinate seta, inserted at ventral 1/3. Thorax: Wing, including veins, pale, hyaline. Femora black; tibiae darkened medially, especially foretibia, mid- and hindtibiae more yellowish; tarsi, including apical tarsomere, yellow. Abdomen: Black; basal tergites sparsely invested with whitish to greyish, fine microtomentum, subshiny; tergites 4–5 mostly bare, shiny.

Distribution: Palaearctic Region: Italy, and now UAE.

### Genus *Rhynchopsilopa* Hendel, 1913

*Rhynchopsilopa* Hendel, 1913: 96. Type species: *Rhynchopsilopa magnicornis* Hendel, by original designation and monotypy; 1931: 69 [review]. Wirth, 1968: 37–46 [revision]. Cogan, 1984: 142 [Palaearctic catalogue]. Mathis & Zatwarnicki, 1995: 47–49 [world catalogue].

### *Rhynchopsilopa nitidissima* Hendel, 1931

*Rhynchopsilopa nitidissima* Hendel, 1931: 69 [Egypt. Suez; ST ♂♀, depository unknown]. Wirth, 1968:

44 [redescription]. Cogan, 1984: 142 [Palaeartic catalogue]. Freidberg & Mathis, 1985: 17–18 [proboscis]. Mathis & Zatwarnicki, 1995: 48 [world catalogue].

Specimens examined from the UAE: Wadi Hayl, 245 m, 25°04.9'N 56°13.5'E, 2♂, 6.iii.2010, WNM, TZ. Wadi Maidaq, 390 m, 25°20.8'N 56°05.5'E, 2♀, 8.iii.2010, TZ. Wadi Shawkah, 25°06.4'N 56°02.7'E, 21♂, 4♀, 2.i–2.viii.2007, 2008, water trap, AvH.

Diagnosis: Small to moderately small shore-flies, body length 1.80–2.80 mm; body polished black with metallic blue-violet reflections and short, appressed setae. Head: Frons, except for narrow mesofrons, shiny; eye margin below antennal base lacking microtomentose white spot; palpi yellowish-brown. Thorax: Only postsutural dorsocentral seta present; anepisternum entirely shiny. Halter whitish-yellow. Forefemur dark except at extreme base; tibiae dark, mostly brown; basitarsomeres yellowish. Wing mostly hyaline, tinged slightly yellowish-brown; posterior crossvein arcuate; costal vein ratio 2.3; M vein ratio 1.4. Abdomen: Polished black with greenish luster, violet at base of tergites. Setation sparse, short, and suberect.

Remarks: A female is labelled “Route Suez (5<sup>a</sup> tour) 15 2. 21 [15 Feb 1921] [handwritten]/Coll. Alfieri Etypte/Rhynchopsilopa n. sp. [handwritten] det. Hendel/Coll. Hendel.” The female is double mounted (minuten pin in disk), is in good condition, and is in WIEN (drawer 23/23 in right corner, cabinet 24).

Distribution: Palaeartic Region: Egypt, Israel, Jordan, now also UAE.

### Genus *Scoliocephalus* Becker, 1903

*Scoliocephalus* Becker, 1903: 173. Type species: *Scoliocephalus pallidisetsis* Becker, by monotypy.

Steyskal, 1968: 113–114 (review of Palaeartic species, figures of wings and head). Cogan, 1984: 133 [Palaeartic catalogue]. Mathis & Zatwarnicki, 1995: 49 [world catalogue].

### *Scoliocephalus pallidisetsis* Becker, 1903

Plate 9

*Scoliocephalus pallidisetsis* Becker, 1903: 174 [Egypt. “Alexandrien” (= El Iskandaryia); HT ♀, ZMHU]. Steyskal, 1968: 113 [review]. Cogan, 1984: 133 [Palaeartic catalogue]. Mathis & Zatwarnicki, 1995: 49 [world catalogue].

*Psiloposoma depressa* Frey, 1958a: 55 [Canary Islands. Fuerteventura: Chilegua; LT (sex ?; designated by Zatwarnicki, 1991: 312), MZH]. Zatwarnicki, 1991: 312 [synonymy].

Specimens examined from the UAE: Al-Ajban, 24°35.8'N 55°00.2'E, 4♀, 29.i–28.xii.2005, 2006, 2010, AvH, K. Mahmood. Ajman, industrial park, 25°21.8'N 55°28.4'E, 9♂, 15♀, 10–12.iii.2010, WNM, TZ. Um al-Quwain, roadside pond, 25°29.6'N 55°33.3'E, 4♂, 5♀, 15.iii.2010, WNM.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Head: Frons with silvery white to whitish-grey microtomentum. Face silvery white with some yellowish area ventrolaterally. Antenna yellow; arista with 3–4 dorsally branching rays. Thorax: Mesonotum silvery white to whitish-grey microtomentose. Abdomen: Tergites 3–5 of male and posterior portion of tergite 2 shiny, with dark blue to bronzish-metallic reflections, some specimens with shiny portion more extensive.

Remarks: All specimens were collected by sweeping *Tamarix*, especially the inflorescences. Kirk-Spriggs (1987) described *S. caboverdensis* from the Cape Verde Islands, a species apparently endemic to those islands, from *Suaeda* (Amaranthaceae), *Zygophyllum* (Zygophyllaceae), and *Prosopis* (Fabaceae) in addition to *Tamarix* (Tamaricaceae). The only common dominator among these plants is a tolerance to saline soil conditions, such as those along maritime embayments.

Distribution: Palaeartic Region: Canary Islands, Egypt, Israel, Libya, Spain, and now UAE.

### Genus *Risa* Becker, 1907

*Risa* Becker, 1907: 404. Type species: *Risa longirostris* Becker, 1907: 404 [monotypy]. Hennig, 1937:

75 [redescription]. Papp, 1984: 178 [Palaeartic catalogue]. Mathis & Zatwarnicki, 1998: 550 [generic key].

***Risa longirostris* Becker, 1907**

Plate 10

*Risa longirostris* Becker, 1907: 404 [Algeria. Biskra; LT ♂ (designated by Papp, 1977: 187); ZMHU].

Papp, 1977: 187 [redescription; lectotype designation]. Cogan, 1984: 178 [Palaeartic catalogue].

Ozerov, 1992: 152 [key].

*Risa nartshukae* Ozerov, 1984: 946 [Uzbekistan. Ayakguzhumdy (40 km E of Dzhingilydy); HT ♂, ZMUM]; 1992: 152 [synonymy with *R. longirostris* Becker].

Specimens examined from the UAE: Ajman, industrial park, 25°21.8'N 55°28.4'E, 1♂, 1♀, 12.iii.2010, TZ. N of Ajman, 25°25.7'N 55°30.1'E, 11♂, 23♀, 1.x–25.xi 2006, 2007, water trap, AvH; salt marsh, 2♂ [1 dissected]; 7♀, 15.v–25.x 2006, 2007, 2008, water trap, AvH.

Diagnosis: Small shore-flies, body length 1.40–1.70 mm. Head: Structure: Face moderately low, with prominent carina; antennal ratio about 1/2, basal flagellomere ratio 2–2.5; arisal hairs barely visible; labellar ratio 1.5. Colouration: Antenna as for genus; arista mostly whitish, yellowish at base; palpus black; head otherwise black, with small parafacial spot of microtomentum. Chaetotaxy: Setae generally long, medial-to-lateral vertical setal ratio 1.5; fronto-orbital setae dissimilar, anterior seta well developed, proclinate to mesocline, posterior seta distinctly larger than middle seta and always reclinate. Thorax: Scutum heavily whitish microtomentose. Prescutellar acrostichal setae well developed; 2 anepisternal setae present; scutellar disc bearing sparse, scattered setulae. Wing: Costal setulae numerous and dense (more than 40 on distalmost section of costa) [actually counted: 69/68 68/66]. Wing length: 1.25–1.55 mm. Halter knob yellow. Abdomen: Entirely dark. Male: Sternites bearing several randomly scattered setulae; sternite 3 three times longer than wide, obovate, posterior margin wider than anterior margin; sternite 4 distinctly wider at posterior margin, anterior margin narrowly pointed, twice as long as wide; sternite 5 as wide as long, narrowed at anterior margin, broadly rounded, posterior margin shallowly concave. Male sternite 1 shallowly W-shaped with arms broadly developed, lacking prominent setulae; sternite 2 V-shaped, anterior wide, anteromedial emargination relatively shallow, bearing sparse setulae; sternite 3 ovate, wider posteriorly, bearing sparse setulae; sternite 4 narrowly triangular, much wider posteriorly, somewhat pointed anteriorly, with several setulae; sternite 5 about as wide as long, narrower anteriorly, posterior margin nearly straight, bearing several setulae. Male terminalia: Epandrium narrow, band-like dorsally, in lateral view widest at midheight; cerci higher than wide, somewhat fused posterolaterally with epandrium, dorsomedial angle minutely pointed; surstylus apparently fused with ventral margin of epandrium, bearing several setulae; clasper with apical portion narrow, in lateral view curved, somewhat pointed apically; subepandrial plate apparently greatly reduced or lacking; aedeagus in lateral view with narrow base, thereafter broadly expanded, in ventral view with apical 3/4 mostly parallel-sided, then tapered to rounded apex; phallapodeme greatly reduced, a small process at base of aedeagus, a flat, curved, slightly twisted extension from base of phallapodeme; hypandrium large, shallowly pocket-like, in ventral view subcordate, base with medial emargination, tapered toward anterior margin, anterior margin broadly rounded. Female: Tergites 6–7 bearing row of fringe-like, long setulae along posterior margin; tergite 8 entire, bare; sternite 8 transversely oval (length/width ca. 0.6); middle of sternite 8 with a strong, transverse, rounded protrusion separating setulose anterior 3/4 of sternite from bare posterior portion; anterior portion more sclerotized, bearing 2 irregular rows of about 18 stout, black setae toward anterior margin; pointed apices of setae curved anteriorly; posterior portion bearing dense fringe of long, apically hooked setulae; subanal plate present, triangular; ventral receptacle lacking paired tubular appendages; cerci long.

Natural history: This species is associated with *Suaeda palaestina* and *Seidlitzia rosmarinus*.

Remarks: This is the most widespread species in the genus, being known from North Africa, the Middle East, and central Asia. Hennig's (1937) and Papp's (1977) redescriptions were based on the type series, comprising a male (designated as a lectotype by Papp) and a female. It is noteworthy that Hennig's figure (1937: Fig. 75) appears to represent an unusual specimen. It shows two inclinate long anterior fronto-orbital setae (in addition to the two anterior fronto-orbital setae) and a relatively short labella that is subequal to the length of the ventral margin of the head. Papp (1977) selected as lectotype the specimen drawn by Hennig, reiterated the chaetotactic character, but said that the labella were longer. The normal chaetotactic character for *R. longirostris* is only one inclinate fronto-orbital seta. In view of other kinds of chaetotactic variation noted in this species, however, the holotype is considered to represent an unusual case of such variation.

Distribution: Palaearctic Region: Algeria, Egypt, Israel, ?Mongolia, Turkmenistan, and now UAE.

Subfamily **Hydrelliinae** Robineau-Desvoidy

### Key to the tribes of Hydrelliinae from the UAE

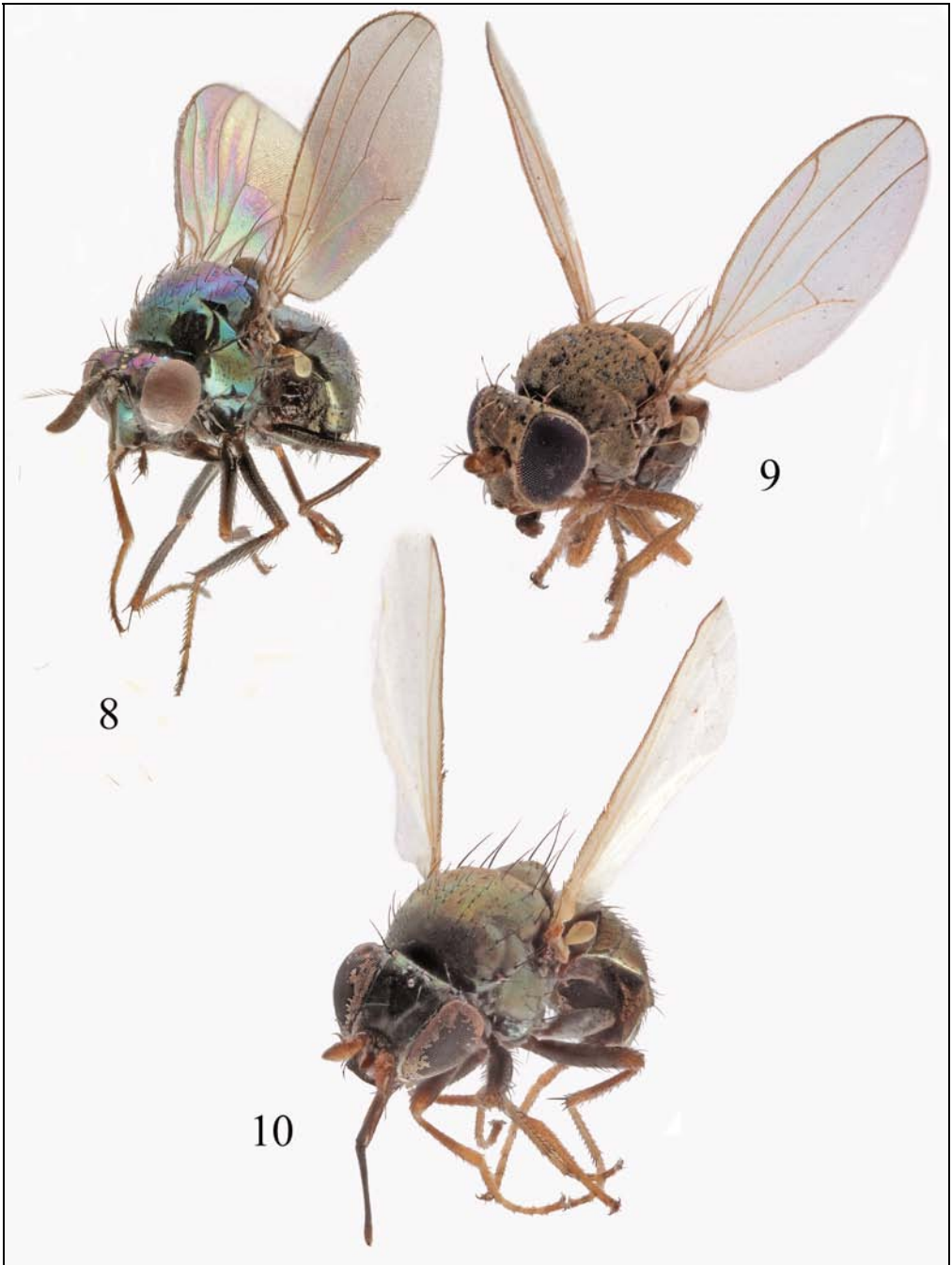
- 1 Posterior notopleural seta inserted conspicuously above level of anterior seta ..... **Atissini** Cresson
- Posterior notopleural seta at same level as anterior seta ..... **2**
- 2 Eye bearing short, dense setulae; ocellar setae seldom as strong as pseudopostocellar setae, usually much weaker; postsutural supra-alar seta usually short, not longer than posterior notopleural seta ..... **Hydrelliini** Robineau-Desvoidy
- Eye appearing bare; ocellar setae stronger than the weak pseudopostocellar setae; postsutural supra-alar setae strong, longer than posterior notopleural seta ..... **3**
- 3 Costa extended to vein M; dorsocentral setae 4 (1+3) or 1 (0+1) ..... **Dryxini** Zatwarnicki
- Costa extended to vein R<sub>4+5</sub>; dorsocentral setae 3 (1+2) ..... **Notiphilini** Fallén

Tribe **Atissini** Cresson, 1942

Atissini Cresson, 1942: 103. Type genus: *Atissa* Haliday in Curtis, 1837. Mathis & Zatwarnicki, 1995: 54–60 [world catalogue].

### Key to the genera of Atissini from the UAE

- 1 Antenna in moderately to very deep cavities ..... **Asmeringa** Becker
- Antenna at most in rather shallow depressions ..... **2**
- 2 Posterior notopleural seta at level distinctly dorsad of anterior seta; face in lateral view concave or protrudent ..... **3**
- Posterior notopleural seta at nearly same level as anterior seta, only slightly dorsad; face in lateral view mostly vertical, straight ..... **4**
- 3 Face in lateral view concave, most prominent at ventral facial margin, lacking dorsally curved setae ..... **Atissa** Haliday
- Face convex in lateral view, protrudent, prominent just ventrad of antennal bases, bearing large, dorsally curved setae near facial prominence ..... **Ptilomyia** Coquillett
- 4 Intrafrontal setae absent; ocellar setae moderately well developed, in ocellar triangle, sometimes just laterad of anterior ocellus; pseudopostocellar setae greatly reduced, hair-like ..... **Subpelignus** Papp



Plates 8–10. Habitus, anterolateral view. 8: *Rhynchopsilopa nitidissima* Hendel; 9: *Scoliocephalus pallidisetis* Becker; 10: *Risa longirostris* Becker. Photographs: T. Zatwarnicki.

- Intrafrontal setae well developed, proclinate; ocellar setae reduced, in ocellar triangle; pseudopostocellar setae moderately well developed, usually slightly divergent ..... 5
- 5 Gena comparatively low, less than half eye height. Acrostichal setulae in 2 rows .....  
..... *Schema* Becker
- Gena high, over half eye height. Acrostichal setulae in 4 rows ..... *Cerobothrium* Frey

Genus *Asmeringa* Becker, 1903

*Asmeringa* Becker, 1903: 174. Type species: *Asmeringa inermis* Becker, by monotypy]. Steyskal, 1968: 110 [review, figure of head, Egypt]. Mathis, 1984a: 67–79 [revision]. Cogan, 1984: 134 [Palaeartic catalogue]. Mathis & Zatwarnicki, 1995: 54–55 [world catalogue].

**Key to the species of *Asmeringa* from the UAE**

- 1 Frons with about 4 small but conspicuous, longitudinal rows of pale setulae .....  
..... *A. aspinalli* Mathis & Zatwarnicki **sp. nov.**
- Frons very sparsely setulose, setulae generally not evident or in longitudinal rows ..... 2
- 2 Gena shorter, more or less 1/3 eye height; body frequently generally brownish, especially head .....  
..... *A. nana* Mathis & Zatwarnicki **sp. nov.**
- Gena higher, usually 1/2 or more of eye height; body generally grey, especially head .....  
..... *A. inermis* Becker

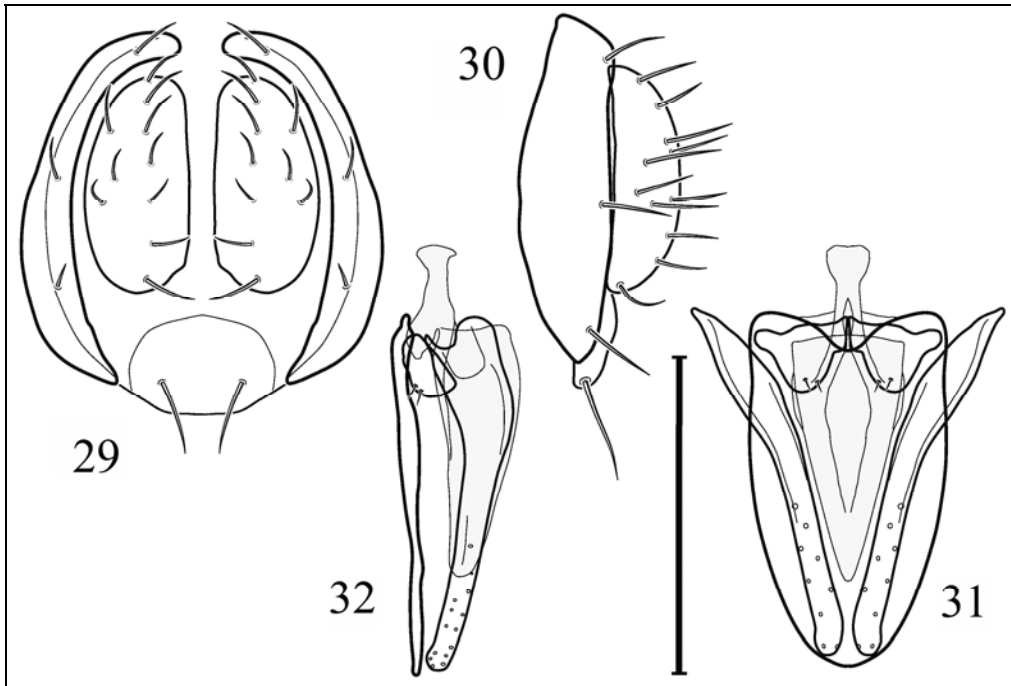
*Asmeringa aspinalli* Mathis & Zatwarnicki **sp. nov.**

Figures 29–32

Type material: The holotype male is labelled “U. Arab Emirates. Qurayya (25°12.6'N, 56°21.6'E; beach), 4 Mar 2010, Wayne N. Mathis/USNM ENT 00118302 [plastic bar code label]/HOLOTYPE ♂ *Asmeringa aspinalli* Mathis & Zatwarnicki USNM [red].” The holotype is double mounted (minuten pin in a block of plastic), is in excellent condition, and is deposited in the USNM. Sixteen paratypes (14♂, 2♀; USNM) bear the same label data as the holotype. Other paratypes are as follows: 4♂, 7♀, Qurayya, beach, 25°12.6'N 56°21.6'E, 3.iii.2010, WNM, TZ. 3♂, 5♀, ar-Rafah, mangrove, 25°43.7'N 55°52.5'E, 9.iii.2010, WNM, TZ. 19♂, 13♀, Um al-Quwain, beach, 25°31.4'N 55°31.4'E, 28.ii.2010, WNM, TZ.

Type locality: United Arab Emirates. Qurayya (25°12.6'N 56°21.6'E; beach).

Diagnosis: This species is distinguished from congeners by the following combination of characters: Minute to small shore-flies, body length 0.90–1.60 mm; generally densely grey to greyish-brown microtomentose, darker dorsally; setae and setulae generally black. Head: Cephalic setae generally poorly developed; frontal setae lacking, setulae greatly reduced, sparse, inconspicuous; no apparent ocellar setae; fronto-orbital setulae very small, moderately numerous; lateral and medial vertical setae greatly reduced but usually evident, lateral vertical seta sometimes not evident. Frons with vertex brown, extended ocellar triangle tan, parafrons grey, fronto-orbit silvery white; ocellar triangle narrowly isosceles with distance between posterior ocelli conspicuously less than between either posterior ocellus and anterior ocellus. Antenna dark, especially basal flagellomere; antenna inserted in deep antennal grooves; antennal bases moderately widely separated, interval between 1.5–2 times width of pedicel. Eye broadly and irregularly oval, oriented at oblique angle, conspicuously setulose. Gena high, gena-to-eye ratio 0.40–0.42. Oral margin very shallowly sinuous in lateral view with posterior 2/3 shallowly angled dorsally anteriorly and anterior 1/3 shallowly angled ventrally; clypeus mostly concealed. Thorax: Mesonotum mostly greyish-brown, slightly greyer laterally. Thoracic setae black, moderately developed; presutural seta barely evident; prescutellar acrostichal setae, postermost dorsocentral seta and 2 scutellar setae although reduced evident; acrostichal setulae in 2 rows, barely evident. Wing: Faintly milky white; rather bluntly rounded apically; costal vein ratio 0.75–0.82; M vein ratio 0.43–0.48. Darkened cloud over crossvein dm-cu pronounced, conspicuous. Femora and tibiae mostly grey, apices



Figures 29–32. Male terminalia of *Asmeringa aspinalli* Mathis & Zatwarnicki sp. nov. 29: Epandrium, cerci, and presurstyli, posterior view; 30: Same, lateral view; 31: Aedeagus (shaded), phallapodeme, pregonite, postgonite, and hypandrium, ventral view; 32: Same, lateral view. Scale bar = 0.1 mm.

yellowish; tarsi yellow. Abdomen (Figs 29–32): Dorsal gap between epandrial arms moderately wide in posterior view, almost half width of cercus in posterior view, epandrial arm narrow dorsally, becoming gradually wider ventrally then tapered to acute point on apical 1/8, in lateral view with anterior margin shallowly arcuate, posterior margin nearly straight, ventral half tapered to acute point, dorsal margin nearly truncate; cercus in posterior view ovate, medial margin straight, lateral margin arcuate, height about twice width, uniformly setose, in lateral view elongate, semihemispherical, nearly straight; fused presurstylar plate in posterior view wider than high, irregularly ovate, ventral margin truncate medially, bearing 2 setulae, in lateral view bar-like, higher than wide; aedeagus and phallapodeme not fused, aedeagus in ventral view narrowly triangular, elongate, length over twice basal width, basal margin truncate, in lateral view funnel-shaped, elongate, tapered toward apex, basal margin truncate; phallapodeme in ventral view capitate apically, thereafter slightly expanded toward base, in lateral view length nearly twice width, expanded at each apex, narrowed medially; postsurstylus in ventral view bar-like, narrow, slightly wider basally, sides very shallowly sinuous, base pointed, apex narrowly rounded, in lateral view funnel-like, apex nearly parallel-sided, base twice width of ventral extension, with basal, wide notch; pregonite in ventral view widely and shallowly triangular, bearing 2 short setulae at ventral apex, in lateral view length nearly twice length, irregularly rectangular, subapically bearing setulae; hypandrium in ventral view twice as long as wide, narrowly emarginate medially along basal margin, apical 1/3 slightly tapered to broadly rounded anterior apex, in lateral view very narrowly rod-like, very slender, straight.

Etymology: The species epithet, '*aspinalli*', is a genitive patronym to honour Simon Aspinall (1958–2011) who stressed the importance of the environment and its conservation in the United Arab Emirates.

Distribution: Only known from the UAE.

***Asmeringa inermis* Becker, 1903**

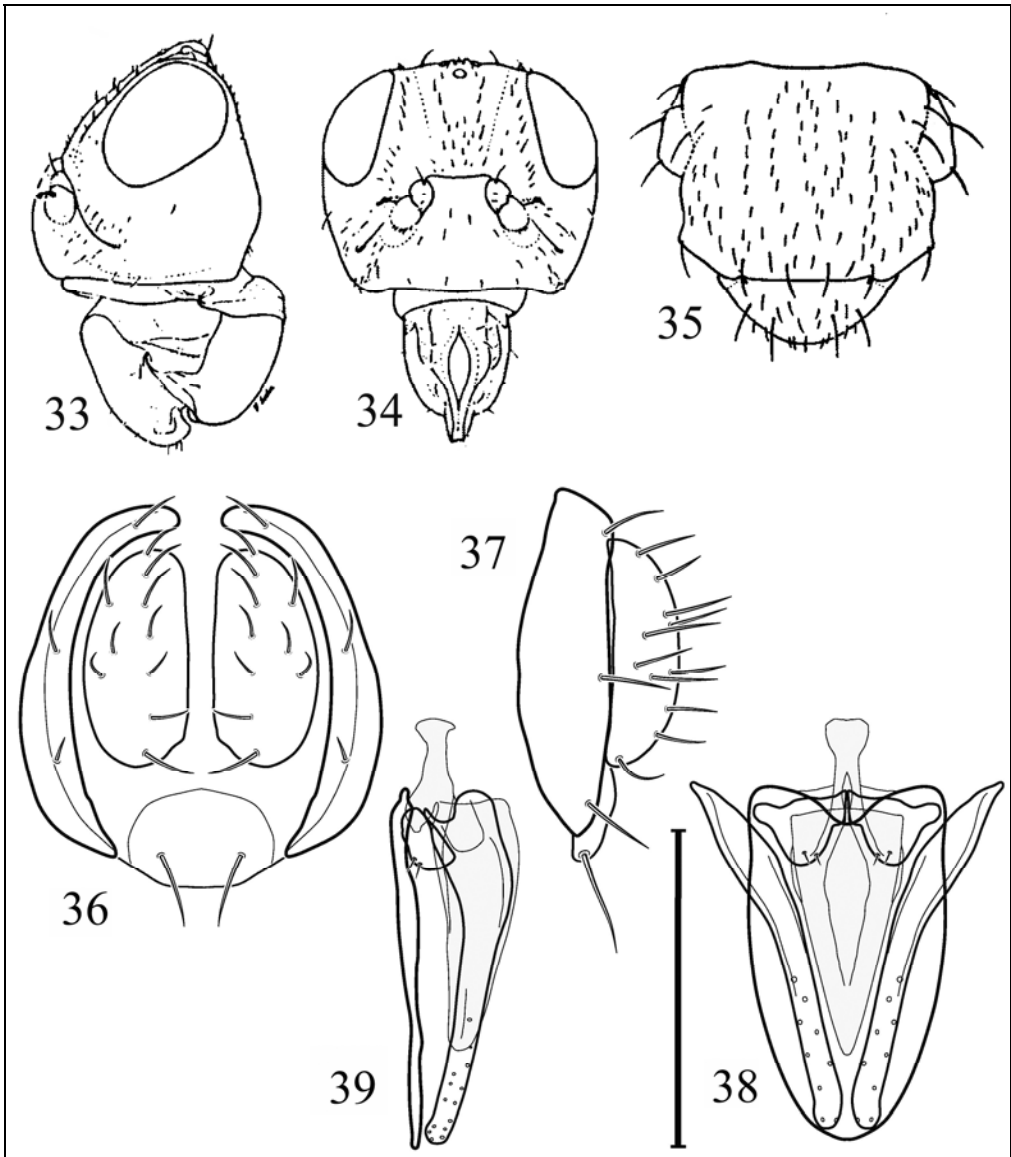
Figures 33–39

*Asmeringa inermis* Becker, 1903: 174 [Egypt. "Alexandrien" (= El Iskandariya); LT ♀ (designated by Mathis, 1984a: 71), ZMHU]; 1905: 205 [Palearctic catalogue]; 1926: 103 [revision, figures of head]. Mathis, 1984a: 71–74 [revision]. Cogan, 1984: 134 [Palearctic catalogue]. Mathis & Zatwarnicki, 1995: 54 [world catalogue].

Specimens examined from the UAE: Ar-Rafah, mangrove, 25°43.7'N 55°52.5'E, 20♂, 7♀, 9–13.iii.2010, WNM, TZ. Qurayya, beach, 25°12.6'N 56°21.6'E, 16♂, 3–4.iii.2010, WNM, TZ. Sharm, beach, 25°28.9'N 56°21.7'E, 8♂; 17.iii.2010, WNM. Um al-Quwain, beach, 25°31.4'N 55°31.4'E, 4♂, 28.ii.2010, WNM, TZ.

Diagnosis: Small shore-flies, body length 1.15–1.75 mm. Head (Figs 33–34): Cephalic setae generally poorly developed; frontal setae lacking, setulae greatly reduced, sparse, inconspicuous; no apparent ocellar setae; fronto-orbital setulae small, numerous; lateral vertical seta either lacking or greatly reduced; medial vertical seta much reduced but evident. Frons mostly brownish-grey, especially from vertex and through extended ocellar triangle, anterolaterally more greyed. Antenna dark-coloured, especially basal flagellomere; antenna inserted into deep facial cavities, antennal bases widely separated, about twice width of pedicel. Gena moderately high, gena-to-eye ratio 0.53–0.65. Oral margin nearly straight. Thorax (Fig. 35): Generally grey; mesonotum mostly concolorous with frons, mostly grey but occasionally light tan to tannish-grey. Thoracic setae generally poorly developed; presutural seta barely evident; other setae as in generic description, but much reduced; apical scutellar setae pale, concolorous with other setae. Wing bluntly rounded apically; costal vein ratio 0.72; M vein ratio 0.42. Femora and tibiae mostly greyish, concolorous; tarsi pale, yellowish. Abdomen: Tergite 5 of male subequal to length of tergite 4, triangular, pointed apically. Male terminalia (Figs 36–39): Dorsal gap between epandrial arms narrow in posterior view, less than 1/4 width of cercus in posterior view, epandrial arm narrow dorsally, becoming gradually becoming wider ventrally then tapered to moderately acute point on apical 1/8, in lateral view with both anterior and lateral margins nearly straight, very slightly tapered from dorsum to ventral margin, ventral apex moderately narrowly rounded, dorsal margin nearly truncate; cercus in posterior view ovate, medial and lateral margins almost straight, height slightly more than twice width, uniformly setose, in lateral view elongate, bar-like, slightly arcuate; fused presurstylar plate in posterior view widely triangular, wider than high, ventral margin pointed medially, bearing 4 setulae in 2 approximate bundles toward anterolateral pointed margin, in lateral view irregularly triangular, wider than high, acutely ventrally; aedeagus and phallapodeme not fused, aedeagus in ventral view narrowly triangular, moderately elongate, length nearly twice basal width, basal margin trifurcate, medial process much wider than either lateral process, in lateral view slipper-like, moderately elongate, very gradually tapered toward apex, basal margin truncate and with a narrow, moderately elongate process; phallapodeme in ventral view as a wide, inverted Y, stem capitate apically, in lateral view length nearly twice width, extended process narrow, slightly recurved apically; postsurstylus in ventral view robustly bar-like, moderately narrow, slightly wider basally, sides very shallowly sinuous, base pointed, apex rounded, in lateral view bar-like, nearly parallel-sided, base very slightly expanded and shallowly curved, basal 1/4 tapered to acute point; pregonite in ventral view as 2 short, narrow extensions, each bearing a short setula, in lateral view length about equal to length, apically as 2 short, extensions, each bearing a





Figures 33–39. 33–35: Head and thorax of *Asmeringa inermis* Becker. 33: Head, lateral view; 34: Head, anterior view; 35: Thorax, dorsal view. 36–39: Male terminalia. 36: Epandrium, cerci, and fused surstylar plate, posterior view; 37: Same, lateral view; 38: Aedeagus (shaded), phallapodeme, postsurstylus, pregonite, and hypandrium, ventral view; 39: Same, lateral view. Scale bar = 0.1 mm.

setula; hypandrium in ventral view about as wide as long, lateral margins tapered toward broadly rounded anterior margin, posterior margin with a medial, rounded notch, in lateral view rod-like, moderately slender, straight.

Remarks: This species is distinguished from congeners by the widely separated antennae, which are dark coloured and lie within deep facial grooves, by the nearly straight oral margin,

by the comparatively weakly developed setae, by the comparatively small M vein ratio, and by the leg colouration. The conformation of the male terminalia is also distinctive. Considerable variation in size and colouration is evident among the specimens studied. Although most specimens are mostly grey, the mesonotum, and to an extent the frons, of many are faintly tan to distinctly light brownish.

Distribution: Palaearctic Region: Bulgaria, Egypt, Ethiopia, France, Greece, Israel, Italy, Morocco, Spain, and now UAE.

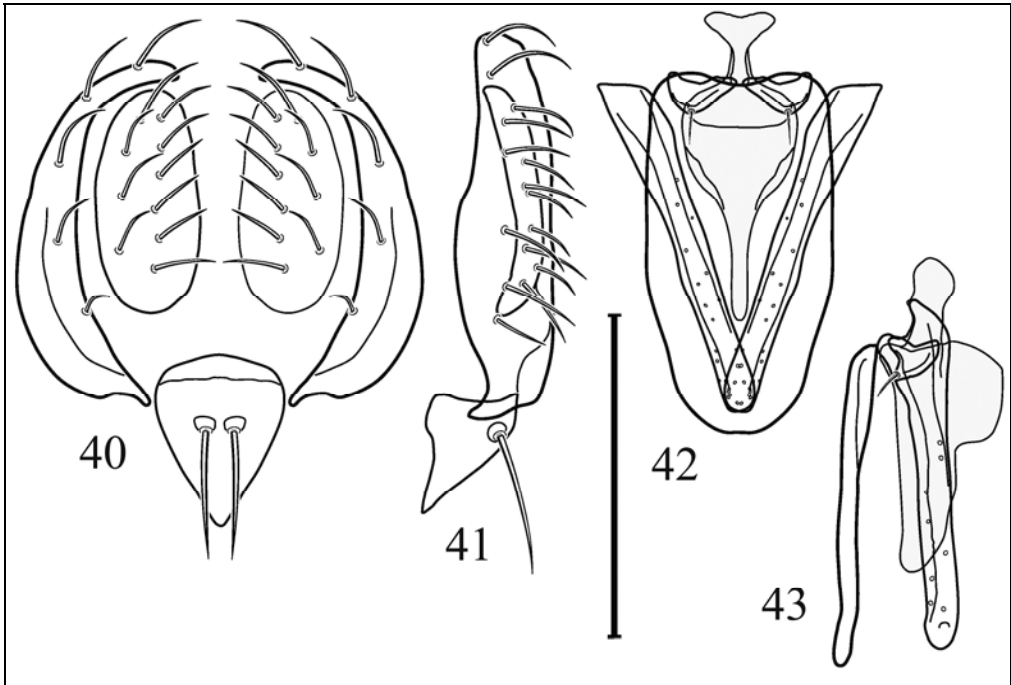
*Asmeringa nana* Mathis & Zatwarnicki sp. nov.

Plate 12, Figures 40–43

Type material: The holotype male is labelled “U. Arab Emirates. Qurayya (25°12.6'N, 56°21.6'E; beach), 3 Mar 2010, Wayne N. Mathis/USNM ENT 00118301 [plastic bar code label]/HOLOTYPE ♂ *Asmeringa nana* Mathis & Zatwarnicki USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in the USNM. Eleven paratypes (9♂, 2♀; USNM) bear the same label data as the holotype. Other paratypes are as follows: 11♂, 5♀, Ar-Rafah mangrove, 25°43.7'N 55°52.5'E, 9.iii.2010, WNM, TZ. 1♂, 4♀, Khor Fakkan, beach, 25°22.1'N 56°20.9'E, 11.iii.2010, WNM, TZ. 3♂, 2♀, Khor Kalba, mangrove, 25°00.9'N 56°21.6'E, 4.iii.2010, WNM, TZ. 6♂, 8♀, Qurayya, beach, 25°12.6'N 56°21.6'E, 4.iii.2010, WNM, TZ.

Type locality: United Arab Emirates. Qurayya (25°12.6'N 56°21.6'E; beach).

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small to moderately small shore-flies, body length 1.70–2.30 mm; generally densely grey to dark grey microtomentose; setae and setulae generally black. Head: Cephalic setae generally poorly developed; frontal setae lacking, setulae greatly reduced, sparse, inconspicuous; no apparent ocellar setae; fronto-orbital setulae very small, moderately numerous; medial and lateral vertical setae greatly reduced but usually evident, lateral vertical seta sometimes not evident. Frons with vertex and extended ocellar triangle light brownish-grey, anterolateral areas mostly grey; ocellar triangle equilateral or with distance between posterior ocelli slightly less than between either posterior ocellus or anterior ocellus. Antenna dark, especially basal flagellomere; antenna inserted in deep antennal grooves; antennal bases widely separated, interval between 1.5–2.0 times width of pedicel. Eye broadly and irregularly oval, oriented at oblique angle, conspicuously setulose. Gena high, gena-to-eye ratio 0.35–0.37. Oral margin very shallowly sinuous in lateral view with posterior 2/3 shallowly angled dorsally anteriorly and anterior 1/3 shallowly angled ventrally; clypeus mostly concealed. Thorax: Mesonotum mostly light brownish-grey, slightly greyer laterally. Thoracic setae black, moderately developed; presutural seta barely evident; prescutellar acrostichal setae, postermost dorsocentral seta and 2 scutellar setae although reduced evident; acrostichal setulae in 2 rows, barely evident. Wing: Faintly milky white; rather bluntly rounded apically; costal vein ratio 0.63; M vein ratio 0.61 Darkened cloud over crossvein dm-cu pronounced, conspicuous. Legs yellow, concolorous. Abdomen: Male terminalia (Figs 40–43): Dorsal gap between epandrial arms wide in posterior view, almost equalling width of cercus in posterior view, epandrial arm narrow dorsally, becoming gradually wider ventrally then recurved and tapered to narrow point on apical 1/8, in lateral view with anterior margin shallowly and unevenly sinuous, posterior margin nearly straight, ventral apex curved anteroventrally, pointed; cercus in posterior view ovate, sides nearly parallel-sided, height about twice width, uniformly setose, in lateral view bar-like, shallowly arched, parallel-sided; fused presurstylar plate in posterior view triangular, higher than wide, dorsal 2 angles rounded, ventral vertex acutely pointed, bearing 2 long setulae, in lateral view irregularly triangular, higher than wide; aedeagus and phallapodeme fused, aedeagus in ventral view capitate, basal portion as wide as high, thereafter ventrally abruptly narrowed to slender, parallel-sided projection, in lateral view with basal portion irregularly quadrate,



Figures 40–43. Male terminalia of *Asmeringa nana* Mathis & Zatwarnicki sp. nov. 40: Epandrium, cerci, and presurstyli, posterior view; 41: Same, lateral view; 42: Aedeagus (shaded), phallapodeme, pregonite, postgonite, and hypandrium, ventral view; 43: Same, lateral view. Scale bar = 0.1 mm.

ventral extension about half width as basal portion, tapered to rounded, ventral apex; phallapodeme in ventral view as a T-bar apically, in lateral view length about twice width, sides shallowly sinuous; postsurstylus in ventral view bar-like, narrow slightly wider basally, sides very shallowly sinuous, base truncate, apex rounded, in lateral view bar-like, nearly parallel-sided, base wider than ventral extension, with basal, wide notch; pregonite in ventral view widely and shallowly triangular, bearing a single setula at ventral apex, in lateral view triangular, wider basally, apex bearing setula; hypandrium in ventral view twice as long as wide, shallowly concave along basal margin, apical 1/3 slightly tapered to broadly rounded anterior apex, in lateral view narrowly rod-like, very slender, straight.

Etymology: The species epithet, ‘*nana*’, is of Latin derivation and means small, referring to the small size of this species.

Distribution: Only known from the UAE.

#### Genus *Atissa* Haliday, 1837

*Atissa* Haliday in Curtis, 1837: 281 [Published in synonymy, first made available in Haliday, 1839: 401]. Type species: *Ephydra pygmaea* Haliday, 1833, monotypy. Cresson, 1942: 110 [review]. Mathis & Zatwarnicki, 1995: 55–57 [world catalogue].

## Key to the species of *Atissa* from the UAE

- 1 Femora and tibiae grey, concolorous with pleural area ..... *Atissa pygmaea* (Haliday)  
 – Legs, including coxae, yellow ..... *Atissa vanharteni* Mathis & Zatwarnicki **sp. nov.**

### *Atissa pygmaea* (Haliday, 1833)

*Ephydra pygmaea* Haliday, 1833: 174 [Great Britain. Northern Ireland. Down: Holywood; ST (1 specimen), NMI].

*Hydrellia (Atissa) pygmaea*. Haliday, 1839: 404 [generic combination].

*Atissa pygmaea*. Haliday in Walker, 1856: 345 [generic combination]. Cogan, 1984: 129 [Palaeartic catalogue]. Mathis & Zatwarnicki, 1995: 56 [world catalogue].

Specimens examined from the UAE: Al-Ain, truck road, 210 m, 24°05.4'N 55°37.7'E, 6♂, 3♀, 16.iii.2010, WNM, TZ. Al-Ajban, 245 m, 24°35.8'N 55°00.2'E, 1♂, 15.iii.2010, WNM. N of Ajman, dunes with *Avicennia marina*, 25°25.85'N 55°29.39'E, 2♀, 11.iii.2008, JHS; mangrove, 6♂, 1♀, 28.ii.2010, WNM. Ajman, industrial area, 25°21.8'N 55°28.4'E, 9♂, 7♀, 28.ii–12.iii.2010, WNM, TZ. Desert Farm, 25°07.9'N 55°45.1'E, 1♂, 2♀, 12.iii.2008, JHS. Hatta dam, 365 m, 24°47.7'N 56°06.3'E, 4♂, 1♀, 1.iii.2010, WNM, TZ. Kalba, beach, 25°06'N 56°21.5'E, 1♂, 1♀, 3.iii.2010, WNM, TZ. Khor Kalba, mangrove, 25°00.9'N 56°21.6'E, 3♂, 4.iii.2010, WNM. Qurayya, beach, 25°13.6'N 56°21.5'E, 1♂, 13.iii.2008, JHS; beach, 1, 4.iii.2010, WNM. Ra's al-Khaimah, farm, 25°47.91'N 56°04.29'E, 1♂, 1♀, 16.iii.2008, JHS. Ra's al-Khaimah, 25°46'N 55°53.6'E, 4♂, 13.iii.2010, WNM. Sharjah, behind University, on water, 25°17.6'N 55°27.8'E, 1♂, 1♀, 24.ii.2005, AvH. Sharjah Desert Park, 25°16.9'N 55°41.4'E, 1♂, 2♀, 12.iii.2008, JHS; 1♂, 2♀, 20.i–6.iv.2005, yellow pan trap, AvH. Sharjah National Park, 25°18.9'N 55°32.2'E, 8♂, 6♀, 12.iii.2008, JHS. NARC, near Sweihan, 24°24'N 55°26'E, 1♀, 14–28.iii.2005, light trap, AvH; Um al-Quwain, beach, 25°13.6'N 56°21.5'E, 13.iii.2008, 1♀, JHS; beach, 9♂, 28.ii.2010, WNM. Wadi Asimah, 435 m, 25°24.1'N 56°08.2'E, 8.iii.2010, 7♂, 11♀, WNM, TZ. Wadi Hayl, 25°04.8'N 56°13.5'E, 1♂, 1♀, 15.iii.2008, JHS; 245 m, 2♂, 1♀, 6.iii.2010, WNM, TZ. Wadi Madaq, 25°19.7'N 56°07.2'E, 1♂, 15.iii.2008, JHS. Wadi Madaq, 390 m, 25°20.8'N 56°05.5'E, 7♂, 1♀, 3–8.iii.2010, WNM. Wadi Mirba, mountain oasis, 25°16.22'N 56°16.68'E, 1♂, 13.iii.2008, JHS. Wadi Safad, 140 m, 25°13.3'N 56°18.3'E, 3♂, 6♀, 11.iii.2010, WNM, TZ. Wadi Shawkah, reservoir, 25°06.41'N 56°02.67'E, 7♂, 5♀, 10–14.iii.2008, JHS; reservoir, 300 m, 12♂, 2♀, 27.ii.2010, WNM, TZ; road, 265 m, 16♂, 4♀, 27.ii.2010, WNM; Wadi Wurayah, 25°24'N 56°17'E, 1♂, 12–14.iv.2005, leg. T. Pape.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small shore-flies, body length 1.50 mm; colouration mostly grey to dark brownish-grey dorsally, not whitish-microtomentose; setation black, generally well developed. Head: Proclinate fronto-orbital setae 1 or sometimes 2. Antenna yellow except for dorsum of basal flagellomere and blackish arista. Maxillary palpus yellow to greyish-yellow. Thorax: Mesonotal acrostichal and dorsocentral setulae in 4 rows (2 rows on each side), bearing a prescutellar acrostichal seta and a similar sized, posterior dorsocentral seta. Legs generally grey; femora and tibiae mostly grey; foretarsus yellowish-grey to grey. Abdomen: Tergites fasciate, grey posteriorly, anterior fascia with less microtomentum, subshiny, brownish-black. Male terminalia: Hypandrium in ventral view generally wide, urn-shaped, wider posteriorly, anterior margin rounded and bearing a subapical, prominent, very slender spur projected ventrally, posterior margin with 3 rather abrupt angles on each side, medial with a divergent, narrow process; surstyli in lateral view very broad basally, abruptly narrowed to pointed apex that is curved anteriorly; gonite longer than surstylus and curved in same plane; aedeagus in posterior view broad, nearly parallel-sided, very slightly tapered toward apex until just before abrupt taper to apical point.

Remarks: Typical of many shore-fly species that occur along maritime beaches, this species is very widespread. Despite being tiny, specimens of *Atissa* are often quite widely distributed.

Distribution: Afrotropical: Kenya, Senegal, Sierra Leone; Nearctic: United States (Alaska);

Palearctic: Algeria, Austria, Azores, Belgium, Bulgaria, Canary Islands, Croatia, Egypt, France, Germany, Great Britain, Hungary, Ireland, Italy, Japan (Honshu), Morocco, Netherlands, Romania, Spain, Sweden, Syria, Tunisia, Ukraine, and now UAE.

*Atissa vanharteni* Mathis & Zatwarnicki **sp. nov.**

Plate 11, Figures 44–47

Type material: The holotype male is labelled “U. Arab Emirates. Ajman (25°25.7'N, 55°30.1'E; mangrove)[,] 13 March 2010[.] Wayne N. Mathis/USNM ENT 00118292 [plastic bar code label]/HOLOTYPE ♂ *Atissa vanharteni* Mathis & Zatwarnicki USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in the USNM. Six paratypes (4♂, 2♀; USNM) bear the same label data as the holotype. Other paratypes (18♂, 16♀; CTZ, USNM) bear the same locality data as the holotype but with 28 Feb 2010 as the date or T. Zatwarnicki as the collector.

Type locality: United Arab Emirates. N of Ajman (25°25.7'N 55°30.1'E; mangrove).

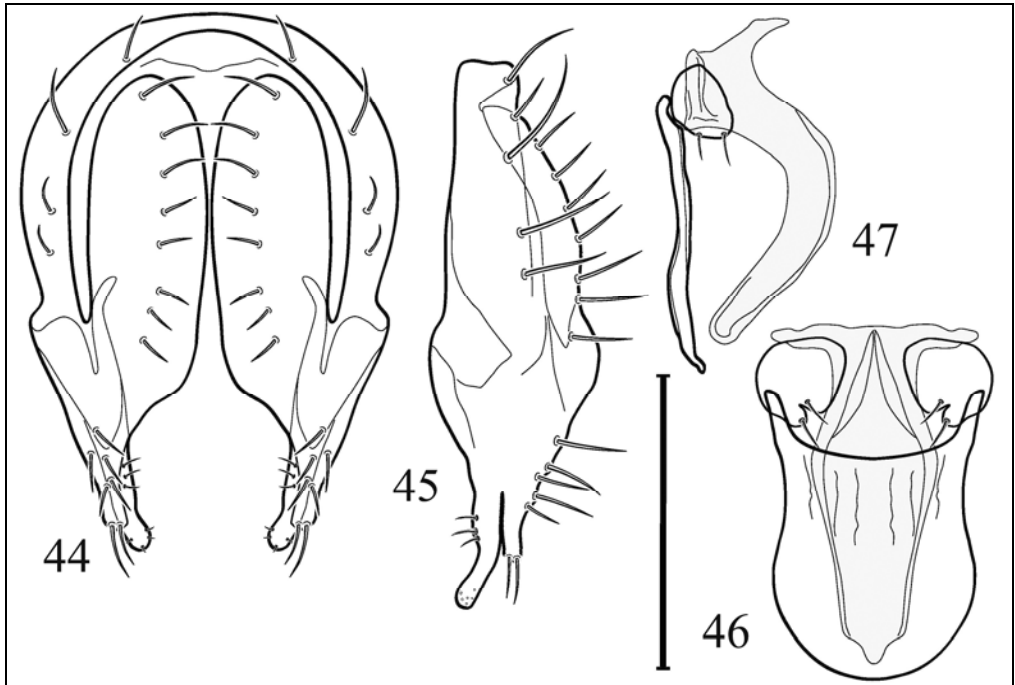
Diagnosis: This species is distinguished from congeners, especially *A. pygmaea*, by the following combination of characters: Minute to small shore-flies, body length 0.80–1.40 mm; colouration mostly greyish-yellow to yellow, brownish-grey dorsally, not whitish-microtomentose; setation black, generally moderately well developed. Head: Proclinate fronto-orbital setae 2. Antenna yellow. Maxillary palpus yellow. Thorax: Mesonotal acrostichal and dorsocentral setulae in 4 rows (2 rows on each side); acrostichal setulae sparse, 4–5 setulae, rows widely set apart; dorsocentral setulae numerous anteriorly, thereafter posteriorly sparse; bearing a very slightly larger prescutellar acrostichal seta and a similar sized, posterior dorsocentral seta. Wing with large blackish spot over crossvein dm-cu. Legs generally yellow; femora sometimes slightly greyish to blackish dorsally; tibiae and tarsi yellow. Abdomen: Tergites fasciate, grey posteriorly, anterior fascia with less microtomentum, subshiny, brownish-black. Male terminalia (Figs 44–47): Epandrium in posterior view as a broad, inverted U-shaped structure, arms and dorsal connection narrow, bearing sparse setulae; cercus in posterior view fused ventrolaterally with medial epandrial margin, large oval with lateral margins more or less parallel-sided, bearing vertical row of short setulae, in lateral view shallowly arched, rod-like structure; surstylus in lateral view very broad basally, bifurcate ventroapically, posterior arm shorter than anterior arm, narrowed ventrally to digitiform process to pointed, bearing 2 setulae apically; anterior process of surstylus longer, curved ventroanteriorly, slightly spatulate, bare on digitiform portion; aedeagus in lateral view with basal, narrow, acutely pointed process at nearly right angle to rest of aedeagus, otherwise aedeagus conspicuously arched, tapered slightly to bluntly rounded apex, basally with phallopodeme fused with base of aedeagus, in ventral view with wide T-shaped base, crossbar narrowly bar-like, straight, thereafter ventrally with moderately narrow neck then flared to widest point at just before midlength, thereafter tapered to apex, apex with a medial, narrow, pimple-like structure; gonite in lateral view irregularly and broadly ovate, broadly rounded apex bearing 2 setulae, in ventral view rounded but bifurcate with narrow, shallow slit, each lobe bearing a setula; hypandrium in ventral view generally wide, urn-shaped, slightly wider posteriorly, anterior margin broadly rounded, posterior margin emarginate, in lateral view slender, nearly parallel-sided, elongate.

**Etymology:** The species epithet, ‘*vanharteni*’, is a genitive patronym to honour our friend, Antonius van Harten, whose tireless labour, constant encouragement, and enduring patience led to the field work and now to this publication on the shore-flies of the UAE.

**Distribution:** Only known from the UAE.

Genus *Cerobothrium* Frey, 1958

*Cerobothrium* Frey, 1958b: 38. Type species: *Cerobothrium ptahi* Frey, 1958a, original designation. Mathis & Zatwarnicki, 1995: 57 [world catalogue].



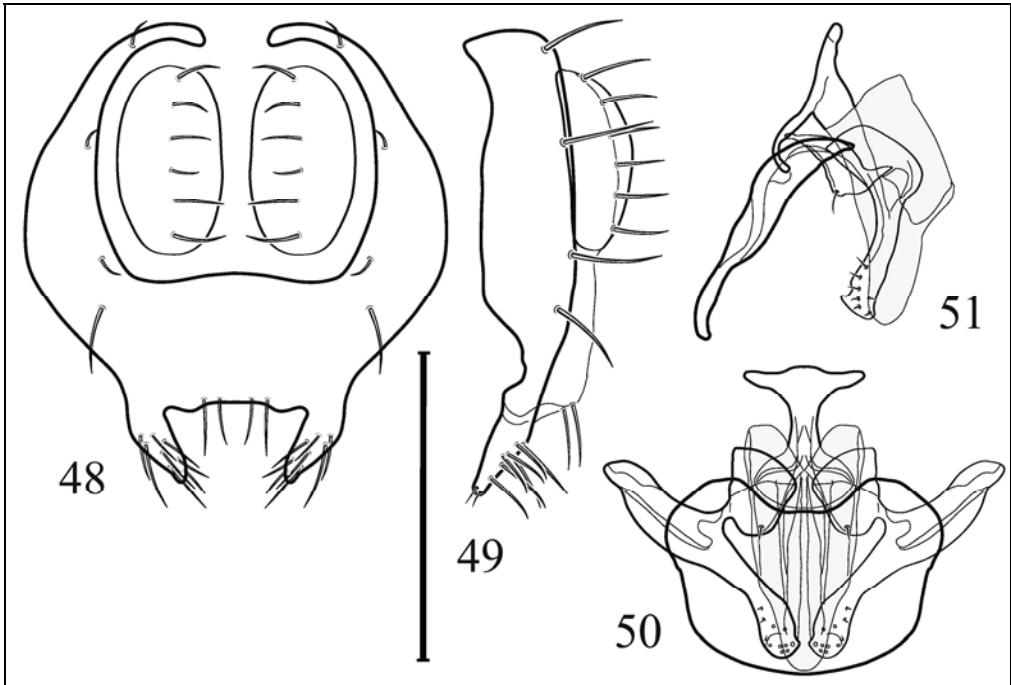
Figures 44–47. Male terminalia of *Atissa vanharteni* Mathis & Zatwarnicki sp. nov. 44: Epandrium, cerci, and surstyli, posterior view; 45: Same, lateral view; 46: Aedeagus (shaded), phallapodeme, gonite, and hypandrium, ventral view; 47: Same, lateral view. Scale bar = 0.1 mm.

***Cerobothrium khorkalba* Mathis & Zatwarnicki sp. nov.**

Plate 15, Figures 48–51

Type material: The holotype male is labelled “U. Arab Emirates. Khor Kalba (25°00.9'N, 56°21.6'E; mangrove), 4Mar2010[,] Wayne N. Mathis/USNM ENT 00118260 [plastic bar code label]/HOLOTYPE ♂ *Cerobothrium khorkalba* Mathis & Zatwarnicki USNM [red].” The holotype is double mounted (minuten pin in a plastic block), is in excellent condition, and is deposited in the USNM. Eleven paratypes (9♂, 8♀; CTZ, USNM) bear the same label data as the holotypes or have T. Zatwarnicki as the collector. Other paratype is as follows: 1♀, Um al-Quwain, beach, 25°13.6'N 56°21.5'E, 13.iii.2008, JHS. Type locality: United Arab Emirates. Khor Kalba (25°00.9'N 56°21.6'E; mangrove).

Diagnosis: This species is distinguished from congeners by the following combination of characters: Minute to small shore-flies, body length 0.80–1.05 mm; mostly brown to greyish-brown dorsally, tan to grey laterally. Head: Mesofrons and fronto-orbits greyish-brown, contrasted with whitish-grey parafrons. Antenna mostly brownish-black; pedicel with some, yellowish-orange colouration apically; basal flagellomere yellowish-orange ventrobasally, especially medially; arista bearing 3 short branches. Face and gena mostly unicolorous, silvery white, densely microtomentose, faintly tannish ventrally; gena high, gena-to-eye ratio 0.62–0.65. Clypeus densely whitish-grey microtomentose on black background; maxillary palpus yellow. Thorax: Mesonotum mostly brown to greyish-brown except for whitish-grey to grey margins, especially anteriorly, colouration of scutellar disc sometimes darker; pleural areas unicolorous, grey. Acrostichal setulae in uniseriated, pale coloured, except for enlarged, blackish, prescutellar pair. Wing faintly lacteous; apex, at vein  $R_{4+5}$ , pointed; costal vein heavily sclerotized to vein  $R_{4+5}$ , thereafter to vein M weakly sclerotized; costal vein along



Figures 48–51. Male terminalia of *Cerobothrium khorkalba* Mathis & Zatwarnicki sp. nov. 48: Epandrium, cerci, and surstyli, posterior view; 49: Same, lateral view; 50: Aedeagus (shaded), phallapodeme, pregonite, postgonite, and hypandrium, ventral view; 51: Same, lateral view. Scale bar = 0.1 mm.

section III distinctly arched; costal vein ratio 1.09–1.25, with costal section II slightly shorter than section III; M vein ratio 0.42–0.43. Femora and tibiae invested with whitish-grey to grey microtomentum, except for yellowish apices; tarsi mostly yellowish. Abdomen: Tergites whitish-grey with faint bluish tinge; posterior margin pale, usually yellowish to whitish-yellow. Male terminalia (Figs 48–51): Epandrium in posterior view becoming very narrow dorsally, discontinuous medially across dorsum, becoming much wider ventrally, ventral 1/3 transversely fused, forming a transverse genital plate, broadly bifurcate ventrally with projections from ventrolateral corners, each projection setulose, tapered, narrowly pointed apically, basal margin within gap between bifurcation nearly straight, very shallowly and evenly sinuous, bearing a few setulae, in lateral view with dorsal 2/3 nearly parallel-sided, thereafter ventrally narrowed to elongate, narrow projection, anterior margin irregular, posterior margin very shallowly obtuse, tapered to pointed apex; cercus in posterior view broadly oval, setulae in a vertical row, in lateral view semihemispherical; aedeagus with basal half in lateral view rectangular, apical half tapered to rounded apex, in ventral view tubular, deeply incised basally, apical 1/3 tapered to rounded apex; postgonite in lateral view elongate, apical portion parallel-sided, truncate apically with subapical notch, bearing short setulae on apical 1/4, connected medially with pregonites, base with a transverse bar, in ventral view oriented obliquely, elongate, narrow, rounded apically, less rounded basally; pregonites in lateral view with a single setulae at shallow, broad, slight, subapical projection, longer than

wide, in ventral view with apical, rounded prominence bearing a setula, slightly longer than wide; hypandrium in lateral view elongate, narrow, straight, wider basally, in ventral view rounded rectangular, wider than long, posterior portion wider, posterior margin excavate medially.

**Etymology:** The species epithet, '*khorkalba*', refers to the type locality and is a noun in apposition.

**Distribution:** Only known from the UAE.

Genus *Ptilomyia* Coquillett, 1900

*Ptilomyia* Coquillett, 1900b: 261 [type species: *Ptilomyia enigma* Coquillett, by original designation].

Cogan, 1984: 129 [Palaeartic catalogue]. Mathis & Zatwarnicki, 1995: 57–59 [world catalogue].

***Ptilomyia shoka* Mathis & Zatwarnicki sp. nov.**

Figures 52–55

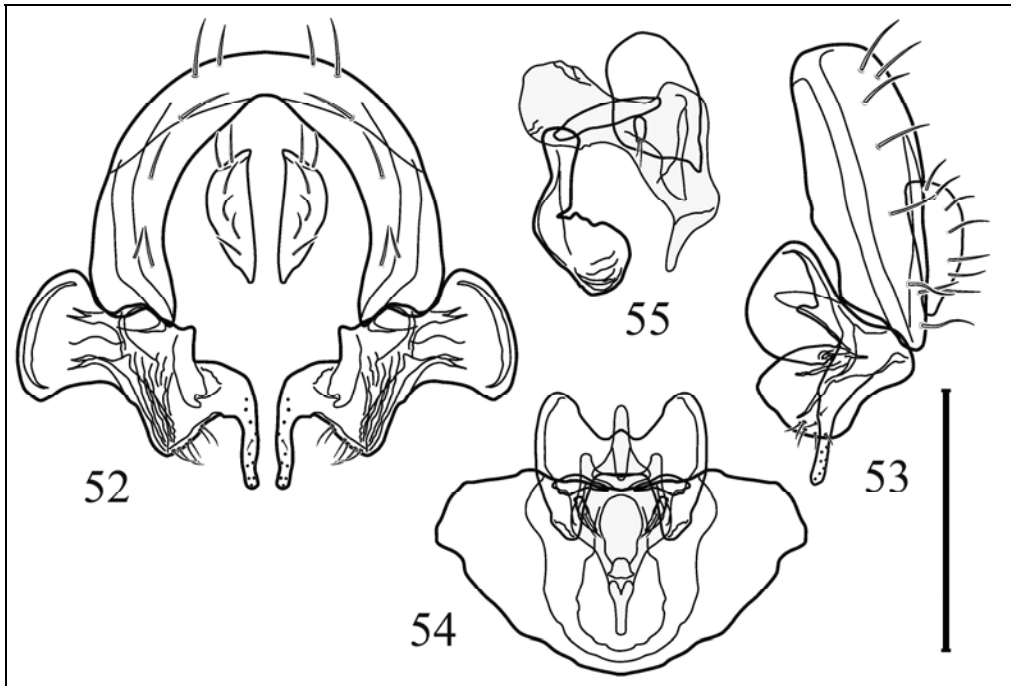
**Type material:** The holotype male of *Ptilomyia shoka* is labelled "United Arabian Emirates, Al Khari [Khari], Shoka lake (25°06.41'N, 056°02.67'E), 10.03.2008 [10 Mar 2008], [J.-H.] Stuke leg. 1233/HOLOTYPE ♂ *Ptilomyia shoka* Mathis & Zatwarnicki ZMHU [red]." The holotype is double mounted (minuten in a block of plastic), is in excellent condition (abdomen removed, dissected, parts in a vial that is on a separate pin), and is deposited in the ZMHU.

**Type locality:** United Arab Emirates. Al Khari, Shoka lake (25°06.41'N 56°02.67'E).

**Diagnosis:** This species is distinguished from congeners by the following combination of characters: Wing length 1.00 mm (abdomen removed before body length was measured); body generally with heavy investment of grey to tan microtomentum. Head: Dorsal 2 facial setae mostly inclinate, next seta posteroventrad porrect to shallowly curved, slightly dorsoinclinate; maxillary palpus yellow. Gena-to-eye height ratio 0.18. Thorax: Acrostichal setulae in 4 rows on anterior half of scutum, in 2 rows on posterior half, presutural pair slightly wider apart than distance from setal base to scutellar suture; lacking a well-developed, presutural or sutural dorsocentral seta. Wing hyaline, lacking transverse bands or pattern; crossvein dm-cu lacking infuscation; apex slightly pointed, greatest length and point at end of vein R<sub>3+4</sub>; costal section II slightly less than section III, costal vein ratio 1.16; M vein ratio 0.62. Abdomen: Tergites generally unicolorous, grey; tergites lacking distinctive, whitish-grey spots along lateral margins. Male terminalia (Figs 52–55): Epandrium in posterior view as an inverted U, mostly evenly thick but slightly wider ventrally and narrowest at dorsomost point, in lateral view narrowly rectangular with ventral margin tapered, with narrowly rounded apex; cercus in posterior view lunate, ventral taper narrower than dorsal one, in lateral view as an inverted drop (obpyriform), setulae along length; surstylus irregularly shaped, in posterior view with lateral margin widest, shallowly rounded, thereafter medially tapered then widened then narrowed with medial portion vertical, narrowly linear, essentially parallel-sided, ventral margin deeply and angularly sinuous, triangular projection at midlength, medial surface bearing tiny setulae, in lateral view as 2 broad, rounded lobes with medial surface of ventral lobe giving rise to narrow, digitiform process; aedeagus in lateral view more or less thickly L-shaped, apex conspicuously narrowed, digitiform, base broadly and bluntly rounded, in ventral view tapered apically and basally, medial portion quadrate with ventral margin emarginate; pregonite slightly longer than wide, bearing 2 apical setulae; postgonite in lateral view moderately narrowly elongate, somewhat bar-like, slightly narrowed at each apex; hypandrium in lateral view almost L-shaped, narrower basally than apically, in ventral view with width almost twice length, widest sub-basally, anterior margin broadly and irregularly rounded, posterior margin shallowly sinuous, nearly straight.

**Etymology:** The species epithet, '*shoka*', refers to the type locality and is a noun in apposition.





Figures 52–55. Male terminalia of *Ptilomyia shoka* Mathis & Zatwarnicki sp. nov. 52: Epandrium, cerci, and surstyli, posterior view; 53: Same, lateral view; 54: Aedeagus (shaded), phallapodeme, pregonite, postgonite, and hypandrium, ventral view; 55: Same, lateral view. Scale bar = 0.1 mm.

Distribution: Only known from the UAE.

Genus *Schema* Becker, 1907

*Schema* Becker, 1907: 302. Type species: *Schema minuta* Becker, by monotypy]. Cogan, 1984: 130 [Palearctic catalogue]. Mathis & Zatwarnicki, 1995: 59–60 [world catalogue].

*Schema acrosticalis* (Becker, 1903)

Plate 13

*Atissa acrosticalis* Becker, 1903a: 163 [Egypt. “Alexandrien” (= El Iskandariya); ST ♂♀, ZMHU].

*Atissa durrenbergensis acrosticalis* Canzoneri, 1981: 208 [subspecific status].

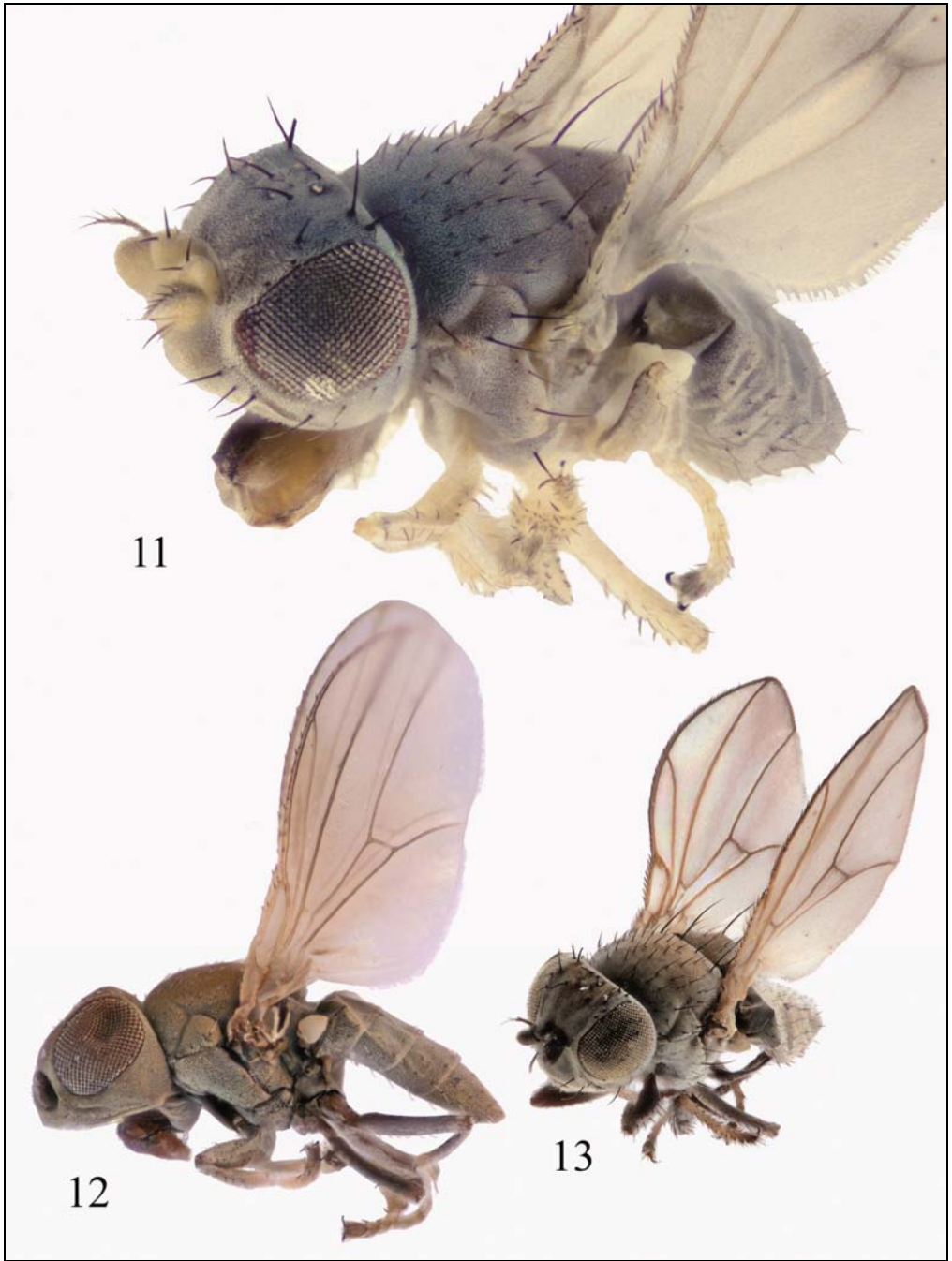
*Schema acrosticalis*. Cogan, 1984: 130 [generic combination].

*Pelignus acrosticalis*. Giordani Soika, 1956b: 105 [generic combination].

*Pseudoedenops soikana* Giordani Soika, 1950: 253 [nomen nudum].

*Pseudoedenops soikana* Séguy, 1951a: 5 [Algeria. Tougourt; ST ♂♀, MNHN]. Giordani Soika, 1956b: 105 [synonymy].

Specimens examined from the UAE: N of Ajman, mangrove, 25°25.7'N 55°30.1'E, 11♂, 3♀, 28.ii.2010, WNM, TZ. Ajman, industrial area, 25°21.8'N 55°28.4'E, 19♂, 6♀, 10–17.iii.2010, WNM, TZ. Al-Ain, Mubazzarah, hot spring, 24°06.4'N 55°44.8'E, 1♂, 1♀, 16.iii.2010, WNM. Al-Ain, truck road, 210 m, 24°05.4'N 55°37.7'E, 5♂, 16.iii.2010, WNM, TZ. Al-Ajban, 24°35.8'N 55°00.2'E, 4♂, 1♀, 15.iii–22.v.2006, Malaise trap, AvH, WNM (NMWC, USNM). Qurayya, beach, 25°12.6'N 56°21.6'E, 12♂, 10♀, 13.iii.2008, JHS; beach, 2♂, 3♀, 3–4.iii.2010, WNM. Ar-Rafah, mangrove, 25°43.7'N 55°52.5'E,



Plates 11–13. Habitus, anterolateral view. 11: *Atissa vanharteni* Mathis & Zatzwarnicki sp. nov.; 12: *Asmeringa nana* Mathis & Zatzwarnicki sp. nov.; 13: *Schema acrosticalis* (Becker). Photographs: T. Zatzwarnicki.

1♂, 13.iii.2010, WNM. Sharjah, behind University, on water, 25°17.6'N 55°27.8'E, 4♂, 24.iii.2005, AvH. Sharjah Desert Park, 25°16.9'N 55°41.4'E, 1♂, 1♀, 29.iii–6.iv.2005, light trap, AvH. Qurraya, beach, 25°13.6'N 56°21.5'E, 12♂, 10♀, 13.iii.2008, JHS. Um al-Quwain, roadside pond, 25°29.6'N 55°33.3'E, 1♂, 15.iii.2010, WNM. Um al-Quwain, beach, 25°31.4'N 55°31.4'E, 11♂, 5♀, 28.ii.2010, WNM, TZ. Um al-Quwain, salt marsh, 25°32'N 55°32.2'E, 1♂, 3♀, 18.iii.2008, JHS. Wadi Hayl, 245 m, 25°04.9'N 56°13.5'E, 1♀, 6.iii.2010, WNM. Wadi Madaq, 390 m, 25°20.8'N 56°05.5'E, 2♀, 8.iii.2010, WNM. Wadi Shawkah, reservoir, 25°06.3'N 56°02.8'E, 1♂, 2♀, 10–14.iii.2008, JHS; reservoir, 300 m, 1♂, 1♀, 27.ii.2010, TZ; road, 265 m, 3♂, 1♀, 27.ii.2010, WNM.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small shore-flies, body length 1.25–1.40 mm; mostly grey to greyish-brown species. Head: Mesofrons and fronto-orbits greyish-brown, contrasted with whitish- to bluish-grey parafrons. Antenna mostly brownish-black; pedicle with some, yellowish-orange colouration apically; arista bearing 3 short branches. Face and gena unicolorous, silvery white, densely microtomentose; gena high, eye-to-cheek ratio 0.34. Maxillary palpus yellow. Thorax: Mesonotum mostly greyish-brown except for whitish-grey to grey margins, especially anteriorly, colouration of scutellar disc sometimes darker; pleural areas unicolorous, grey. Acrostichal setulae in two rows. Wing faintly lacteous; apex, at vein R<sub>4+5</sub>, pointed; costal vein heavily sclerotized to vein R<sub>4+5</sub>, thereafter to vein M weakly sclerotized; costal vein along section III distinctly arched; costal vein ratio 1.1, with costal section II slightly shorter than section III; M vein ratio 0.68. Femora and tibiae invested with whitish-grey to grey microtomentum, except for yellowish apices; tarsi mostly yellowish. Abdomen: Tergites whitish-grey with faint bluish tinge; posterior margin pale, usually yellowish to whitish-yellow. Male terminalia: Epandrium very narrow dorsally, becoming much wider ventrally, ventral margin broadly rounded; cerci moderate wide, broadly oval; genital plate (sclerotized membrane between surstyli) with ventral margin bilobed, lobes pointed; presurstylus short, length subequal to that of cerci, length over twice width, slightly pointed apically, bearing setulae; postsurstylus tubular, wider basally, tapered to rounded point apically, shallowly recurved; aedeagus tubular, simple, parallel-sided, apex bevelled; phallapodeme fused with base of aedeagus; hypandrium long and narrow, parallel-sided over most of length, anterior margin slightly wider submarginally, then narrowed to point anteriorly, arrowhead-shaped.

Remarks: Although we have included Great Britain in the distribution of this species based on previous records, this country is an obvious outlier, and the specimens should be re-examined. We often deal with sampling error in collections available to us, however, and the records from Great Britain could be accurate.

Distribution: Palearctic Region: Algeria, Bulgaria, Egypt, Great Britain, Spain, Syria, and now UAE.

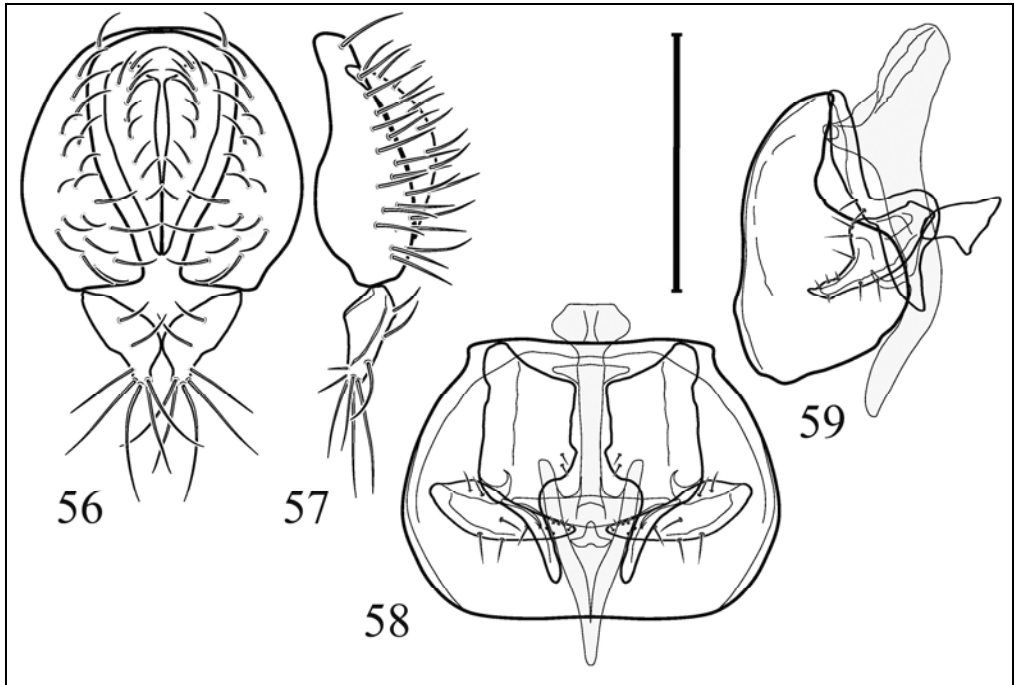
### Genus *Subpelignus* Papp, 1983

*Subpelignus* Papp, 1983: 209. Type species: *Subpelignus hortobagyensis* Papp, 1983, original designation. Mathis & Zatwarnicki, 1995: 60 [world catalogue]; 1998: 552 [annotation in key to Palearctic genera].

### *Subpelignus maculipennis* Mathis & Zatwarnicki sp. nov.

Plate 14, Figures 56–59

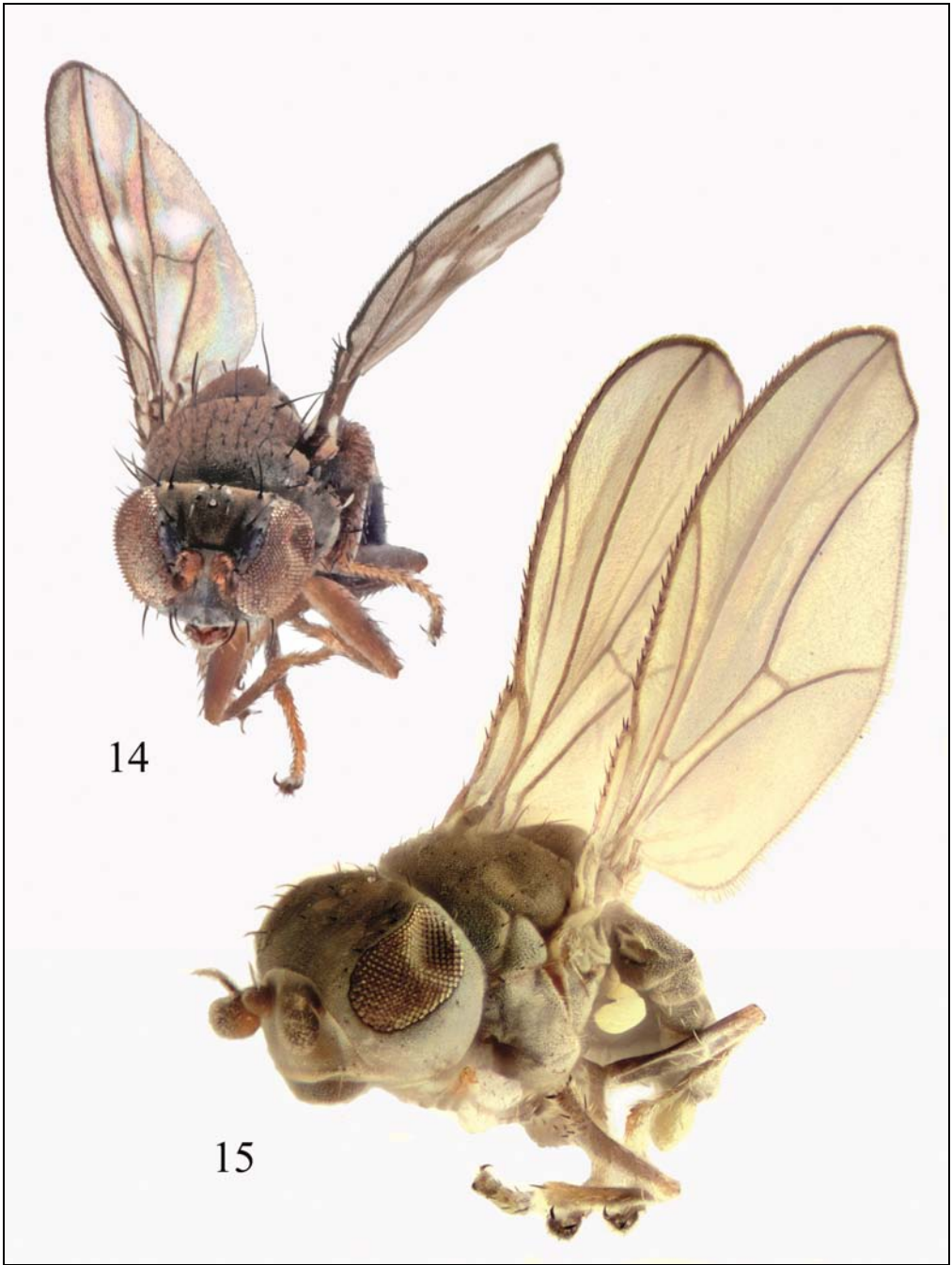
Type material: The holotype male is labelled “U. Arab Emirates. Ajman (industrial area; 25°21.8'N, 55°28.4'E), 10 Mar 2010[.] Wayne N. Mathis/USNM ENT 00118293 [plastic bar code label]/HOLOTYPE ♂ *Subpelignus maculipennis* Mathis & Zatwarnicki USNM [red].” The holotype is double mounted (minuten pin in a block of plastic), is in excellent condition, and is deposited in the USNM. Paratypes are as follows: 1♀, N of Ajman, 25°25.9'N 55°29.4'E, 21.ix–21.x.2007, water trap, AvH. 1♀, Um al-Quwain, roadside pond, 25°29.6'N 55°33.3'E, 15.iii.2010, TZ.



Figures 56–59. Male terminalia of *Subpelignus maculipennis* Mathis & Zatwarnicki sp. nov. 56: Epandrium, cerci, and surstyli, ventral view; 57: Same, lateral view; 58: Aedeagus (shaded), phallapodeme, gonite, and hypandrium, ventral view; 59: Same, lateral view. Scale bar = 0.1 mm.

Type locality: United Arab Emirates. Ajman (25°21.8'N 55°28.4'E; industrial area).

Diagnosis: This species is distinguished from congeners by the following combination of characters: Head: Frons generally microtomentose, two toned; fronto-orbits wide, grey; mesofrons uniformly brownish tan; anterior proclinate fronto-orbital seta large, length about 2/3 that of reclinate seta, aligned laterally with reclinate seta; posterior proclinate fronto-orbital seta less than half length of anterior seta. Scape and pedicel yellow; basal flagellomere brown dorsobasally, otherwise yellow; arista blackish-brown with 6–7 dorsally branching rays; longest rays subequal to length of basal flagellomere. Face relatively narrow, width at narrowest point between eyes slightly more than length of antenna; face shallowly carinate vertically; face mostly blackish with investment of whitish-grey microtomentum. Gena short, height less than half height of basal flagellomere. Maxillary palpus yellowish-brown to yellow. Thorax: Mesonotum greyish-brown, becoming more brown posteriorly; scutellum entirely brown; pleural areas greyish-brown, slightly less microtomentose than mesonotum. Wing mostly darkened, infuscate with 3 white spots aligned transversely, one spot in cells  $R_{2+3}$ ,  $R_{4+5}$ , and M just apicad of crossvein dm-cu. Forecoxa brown to yellowish-brown medially and apically; femora and tibiae greyish-brown, apices yellowish; tarsi mostly yellowish, apical tarsomere brown. Abdomen: Generally black, subshiny, with thin investment of greyish-brown microtomentum; posterior margins of tergites more greyish. Male terminalia (Figs 56–59): Epandrium in posterior view very narrow dorsally but connected, becoming much wider, in lateral view moderately narrow dorsally, becoming wider, rounded; cercus in posterior view elongate, tapered ventrally, ventral apex narrowly



Plates 14–15. Habitus, anterolateral view. 14: *Subpelignus maculipennis* Mathis & Zatwarnicki sp. nov.; 15: *Cerobothrium khorkalba* Mathis & Zatwarnicki sp. nov. Photographs: T. Zatwarnicki.

angulate, dorsal margin rounded, in lateral view lunate; surstylus in posterior view oriented obliquely, 4–5 setulae at apex of short, apical, narrow prominence longer than others, in lateral view higher than wide, widest sub-basally, thereafter tapered to narrowly blunt ventral apex, apex bearing longer setulae; aedeagus wide basally in lateral view immediately tapered to elongate, narrow, gently angulate process, in ventral view narrowed basally with abrupt broadening at midlength then tapered to very narrow apex; postgonite in lateral view with length about twice length, widest at midlength, thereafter apically narrowed to almost parallel-sided process, in ventral view narrow laterally and more so medially, length 2.5 times width; pregonite elongate in lateral view narrow basally, then abruptly wide, then tapered to sharply pointed apex, in ventral view with basal 2/3 rectangular, thereafter apically tapered to digitiform process; subepandrial plate in lateral view narrow laterally, becoming wider posteriorly, in ventral view bar-like but with lateral extensions tapered; hypandrium in lateral view deeply and broadly pocket-like, rounded, in ventral view as a large rectangular sclerite, wide anteriorly, anterior margin straight, lateral margins shallowly arched, posterior margin straight.

Remarks: This species is somewhat anomalous compared to other congeners, including at least one undescribed species, especially in structures of the male terminalia. Although somewhat reduced, this species retains separate pre- and postgonites and a subepandrial plate. In other congeners, there is only a pregonite (no postgonite or subepandrial plate), and the fusion of the phallopodeme to the base of the aedeagus is more complete, forming a single, elongated, unified structure. Externally, however, this species has the features of *Subpelignus*, although again, the wing of this species is unique, in being generally infuscated with a pattern of distinctly white spots.

Etymology: The species epithet, '*maculipennis*', is of Latin derivation and refers to the spotted or maculate wing of this species.

Distribution: Only known from the UAE.

Tribe **Dryxini** Zatwarnicki, 1992

### Key to the genera of Dryxini from the UAE

- 1 Long facial setae 2–3, length subequal to combined length of pedicel and basal flagellomere, if 2 setae, these well separated, dorsal seta at about midheight, ventral closer to oral margin than dorsal seta. R stem vein bearing 1–3 (usually 2) setulae on dorsum ..... *Oedenopiforma* Cogan
- Long facial seta 1 (if longer setae present they are not as long or as separated as above, usually arranged in a somewhat vertical series of short setulae). R stem vein lacking setulae ..... *Paralimna* Loew

Genus *Oedenopiforma* Cogan, 1968

*Oedenopiforma* Cogan, 1968: 319 [as a subgenus of *Paralimna*; type species: *Paralimna madecassa* Giordani Soika, 1956, original designation]. Mathis & Zatwarnicki, 1995: 117 [world catalogue, accorded generic status]; 2002: 42–51 [revision].

*Oedenopiforma vockerothi* Mathis & Zatwarnicki, 2012 Plate 17, Figures 60–66

*Oedenopiforma vockerothi* Mathis & Zatwarnicki, 2012: 89 [United Arab Emirates: Hatta Dam (24°47.7'N, 56°06.3'E; 365 m); HT ♂; USNM].

Type material: The holotype male is labelled "U. Arab Emirates. Hatta Dam (24°47.7'N, 56°06.3'E; 365 m), 1 Mar 2010[,] Wayne N. Mathis/USNM ENT 00285980 [plastic bar code label]/HOLOTYPE ♂

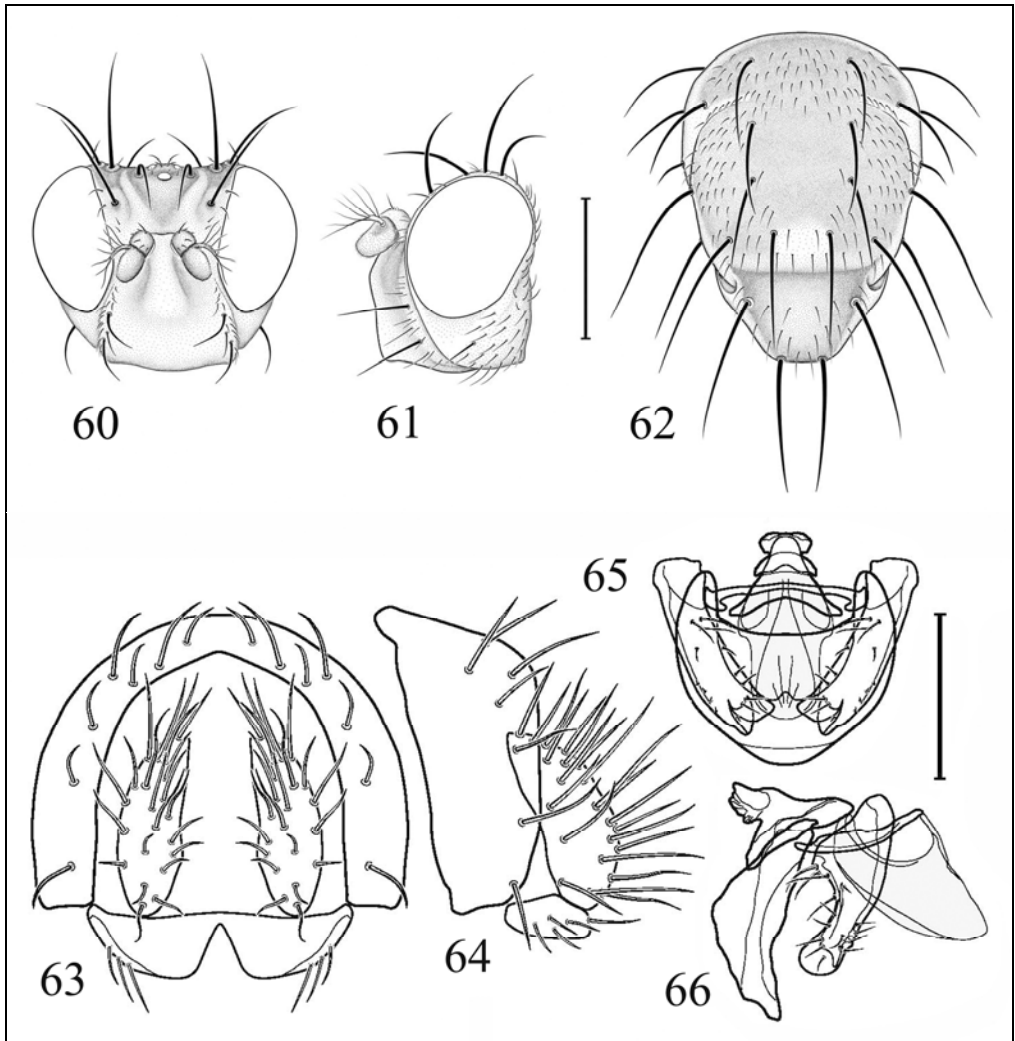
*Oedenopiforma vockerothi* Mathis & Zatwarnicki, USNM [red].” Two male and one female paratypes bear the same label data as the holotype. Other paratypes are as follows: 1♀, Wadi Maidaq, 390 m, 25°20.8'N 56°05.5'E, 8.iii.2010, TZ. 3♀, Wadi Shawkah, reservoir, 300 m, 25°06.3'N 56°02.8'E, 27.ii.2010, WNM, TZ.

Type locality: United Arab Emirates. Hatta dam (24°47.7'N 56°06.3'E; 365 m). We collected behind the dam at Fort Hatta, especially where there were some short, emergent plants around isolated pools.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small to moderately small shore-flies, body length 1.80–2.85 mm. Head (Figs 60–61): Paravertical seta moderately well developed, about 1/3 length of medial vertical seta. Frons brown across vertex and usually extended to ocellar triangle, anterior portion of frons whitish-grey to grey. Antenna black; arista with 6–9 dorsal rays. Face sexually dimorphic; face of male yellowish to brownish-grey, especially dorsally, densely microtomentose, but not appearing velvety; face of female whitish-grey to grey; facial series of setae 2. Gena-to-eye ratio 0.29–0.30. Thorax (Fig. 62): Mesonotum broadly brown to rusty brown medially, becoming greyer laterally through postpronotum and notopleural area; anepisternum concolorous with mesonotum or slightly lighter in colouration, otherwise pleural areas grey. Stem vein bearing 2 (rarely 1 or 3) setulae dorsally along posterior margin, length of each about equal to width of vein at level of insertion; costal vein ratio 0.30–0.36; M vein ratio 0.95–0.97. Legs mostly black; tarsi blackish-red ventrally; forefemur of female bearing row of tiny, tooth-like setulae along apical half of anteroventral surface, males row inconspicuous, barely evident; forefemur of male lacking row of long, fine, pale, ventrally oriented setulae along anteroventral surface. Abdomen: Male terminalia (Figs 63–66): Epandrium in posterior view slightly wider than high, dorsal portion with numerous, evenly scattered setulae, ventrally extended arms broad, in lateral view subrectangular, wider dorsally than ventrally; cercus in posterior view semihemispherical to nearly obclavate with rounded corners, narrowly pointed dorsally, ventral margin rounded, densely setulose, especially medially, in lateral view semihemispherical; presurstylus in posterior view with sclerotized portion small, bar-like, horizontal, in lateral view horizontal, bar-like, length twice height, setulose; postsurstylus in lateral view large, robust, long, moderately narrow apically, nearly straight, not distinctly curved, apical half nearly parallel-sided, digitiform, bearing setulae along lateral margins and especially ventrobasally, base wide, in ventral view subrectangular, length 4 times width, nearly parallel-sided, apex bifurcate; aedeagus relatively simple, in lateral view slipper-like with dorsobasal portion broad and deeply excavate, apex broadly pointed, in ventral view with apical half parallel-sided, apex broadly rounded, basal portion parallel-sided; phallapodeme in lateral view with keel irregular, pointed, extended processes about equal in length, relatively short; subepandrial sclerite in ventral view transversely elongate, very narrow, nearly straight, only lateral apices enlarged, in lateral view very narrow and shallowly curved; hypandrium in ventral view a moderately wide U-shaped process, narrowly sclerotized around margins only, in lateral view shallowly pocket-like, anterior and posterior apices pointed.

Remarks: We anticipate that this species will be found in other countries in the Middle East. For example, we would not be surprised to discover that specimens from Iran that were previously listed as *O. argentea* (Cogan, 1968) (Mathis & Zatwarnicki, 2002) are this species. Natural history: All specimens from the type series were collected by sweeping close to the surface of muddy to sandy shores associated with small, natural, freshwater oases or reservoirs in otherwise very arid habitats.

Distribution: Only known from the UAE.



Figures 60-66. *Oedenopiforma vockerothi* Mathis & Zatwarnicki. 60-62: Head and thorax. 60: Head, anterior view; 61: Same, lateral view; 62: Thorax, dorsal view. Bar scale = 0.5 mm. 63-66: Male terminalia. 63: Epandrium, cerci, and presurstyli, posterior view; 64: Same, lateral view; 65: Aedeagus, phallapodeme, postsurstylus, subepandrium sclerite, hypandrium, ventral view; 66: Same, lateral view. Bar scale = 0.1 mm.

Genus *Paralimna* Loew, 1862

*Paralimna* Loew, 1862: 138. Type species: *Paralimna appendiculata* Loew, 1862 (= *Notiphila punctipennis* Wiedemann, 1830), monotypy. Mathis & Zatwarnicki, 1995: 118-127 [world catalogue].

**Key to the subgenera of *Paralimna* from the UAE**

- 1 Body generally dark coloured, dark brown to greyish-brown; eye distinctly higher than wide; gena short, usually slightly less than length of basal flagellomere .....  
 ..... *Phaiosterna* Cresson





Plates 16–17. Habitus, anterolateral view. 16: *Paralimna (Paralimna) hirticornis* de Meijere; 17: *Oedenopiforma vockerothi* Mathis & Zatwarnicki. Photographs: T. Zatwarnicki.

- Body colouration contrastingly bicoloured, silvery white to grey and dark brown; eye round, about as wide as high; gena high, height usually greater than length of basal flagellomere ..... *Paralimna* Loew

***Paralimna (Paralimna) hirticornis* de Meijere, 1913**

Plate 16

*Paralimna hirticornis* de Meijere, 1913: 65 [Indonesia. Saonet, near Waigoe Island; HT ♀, ZMA].

Mathis & Zatwarnicki, 1995: 120–121 [world catalogue].

*Paralimna nitens* Bezzi, 1914a: 332 [Philippines. Luzon: Los Baños, Laguna; ST ♂♀, MCM]. Cresson, 1929: 191 [synonymy].

Specimens examined from the UAE: Bithnah, 25°11'N 56°14'E, 1♂, 1♀, 2.ii–31.xii.2005, 2006, light trap, AvH. Khor Fakkan, beach, 25°22.1'N 56°20.9'E, 9♂, 5♀, 11.iii.2010, WNM, TZ. Sharjah–Khor Kalba, near tunnel, 1♂, 2♀, 7–22.iii.2006, light trap, AvH. Wadi Asimah, 435 m, 25°24.1'N 56°08.2'E, 4♂, 3♀, 8.iii.2010, WNM, TZ. Wadi Hayl, 245 m, 25°04.9'N 56°13.5'E, 12♂, 2♀, 6.iii.2010, WNM, TZ. Wadi Madaq, 25°19'N 56°08'E, 4♀, 26.xii–20.ii.2006, 2007, Malaise trap, AvH; Wadi Safad, 140 m, 25°13.3'N 56°18.3'E, 1♂, 1♀, 11.iii.2010, WNM.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small to medium-sized shore-flies, body length 2.90–3.80 mm, generally dark brown dorsally, grey laterally. Head: Frons generally blackish-brown to black but partially mottled with some lighter coloured spots, usually grey; ventral portion of fronto-orbits densely microtomentose, black, appearing velvety, forming a wide, transverse band through face at level of antennal bases, with a silvery grey spot at dorsal and ventral end of velvety black area on fronto-orbits. Antenna black, likewise microtomentose, and depending on view, also velvety black; arista bearing 12 dorsal rays. Face with dorsal portion between antennal bases velvety black, thereafter ventrally uniformly silvery grey to grey; gena concolorous with ventral 3/4 of face; face with 2 prominent, inclinate setae and several much smaller setulae ventrad, larger setae at midheight; gena high, gena-to-eye ratio 0.45–0.50. Thorax: Mesonotum largely dark brown but with grey partial stripe through anterior acrostichal track and through medial portion of dorsocentral track; anterior half of scutellum grey, apical half dark brown, lateral margin blackish; pleural areas, including postpronotum and notopleuron grey. Wing uniformly faintly infusate, pale brown. Legs with darkened femora and tibiae, usually greyish-black; tarsi reddish to yellowish-orange, apical 2–3 tarsomeres blackish, especially dorsally; male forefemur with row of flattened setae on posteroventral surface, but not closely set. Abdomen: Tergites mostly grey but each tergite with brown anterior fascia or spots.

Distribution: Australasian/Oceanian Region: Indonesia (Irian Jaya). Oriental Region: Burma, India, Nepal, Pakistan, Philippines (Luzon, Mindanao, Palawan), Sri Lanka, Taiwan; Palaearctic Region: UAE.

***Paralimna (Phaiosterna) bicolor* (Macquart, 1851)**

Figures 67–69

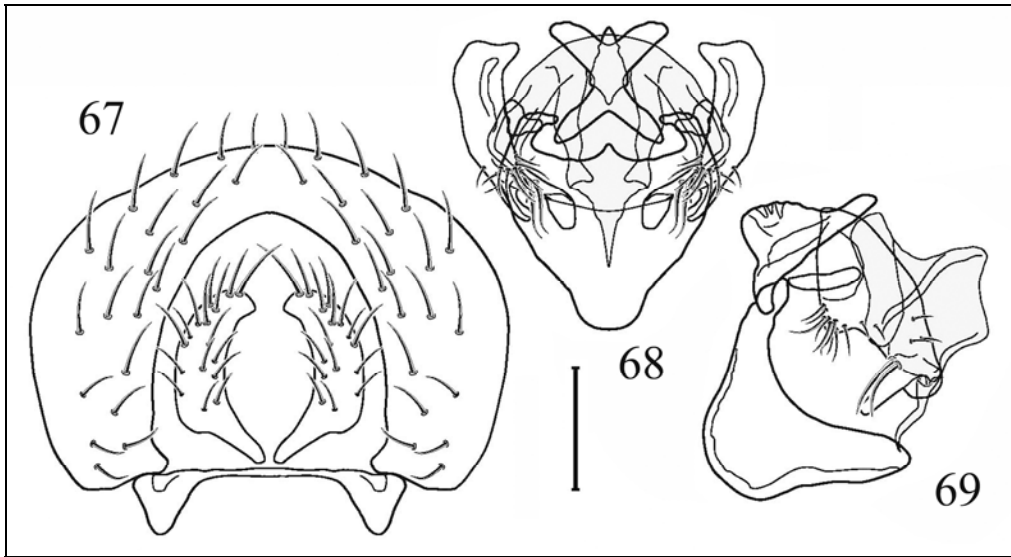
*Ephydra bicolor* Macquart, 1851: 303 (276) [“Egypte”; LT ♀ (designated by Wirth, 1975: 40), UMO].

*Paralimna bicolor*. Wirth, 1975: 40–41 [generic combination, lectotype designation].

*Paralimna (Phaiosterna) lineata* in part of authors, not de Meijere [misidentification]. Mathis & Zatwarnicki, 1995: 127 [world catalogue].

*Paralimna (Phaiosterna) vidua* Giordani Soika, 1956a: 124. Cogan, 1968: 325 [synonymy with *P. aequalis* Cresson, 1929]; 1980: 663 [synonymy with *P. lineata* de Meijere, 1908]. Mathis & Zatwarnicki, 2002: 69–72 [synonymy].

Specimens examined from the UAE and Oman: Al-Ain, Mubazzarah, hot spring, 24°06.4'N 55°44.8'E, 1♂, 16.iii.2010, WNM. Ajman, industrial area, 25°21.8'N 55°28.4'E, 1♀, 17.iii.2010, WNM. Bithnah, 25°11'N 56°14'E, 1♀, 12.vii–9.ix.2006, Malaise trap, AvH. Khor Fakkan, beach, 25°22.1'N 56°20.9'E, 10♂, 7♀, 11.iii.2010, WNM, TZ. NARC, near Sweihan, 24°24'N 55°26'E, 1♂, 16.xi–21.xii.2005, light trap, AvH. Qurayya, beach, 25°12.6'N 56°21.6'E, 1♀, 4.iii.2010, WNM. Wadi Asimah, 435 m,



Figures 67–69. Male terminalia of *Paralimna (Phaiosterna) bicolor* (Macquart). 67: Epandrium, cerci, and presurstyli, posterior aspect; 68: Internal male terminalia, ventral aspect; 69: Same, lateral aspect. Bar scale = 0.1 mm.

25°24.1'N 56°08.2'E, 1♀, 8.iii.2010, WNM; Wadi Madaq, 390 m, 25°20.8'N 56°05.5'E, 1♀, 8.iii.2010, TZ. Wadi Shawkah, reservoir, 300 m, 25°06.3'N 56°02.8'E, 2♀, 27.ii.2010, WNM, TZ; road, 265 m, 5♂, 27.ii.2010, WNM. OMAN: Muscat, al-Ansab, 23°33.7'N 58°20'E, 1♀, 27.xii.1989, leg. M.J. Ebejer, CME.

**Diagnosis:** This species is distinguished from congeners, especially those of the subgenus *Phaiosterna*, by the following combination of characters: Small to moderately small shoreflies, body length 1.95–2.90 mm; generally dark, whitish-grey to brown species, moderately densely to densely microtomentose, dorsum appearing dull to slightly subshiny, especially mesonotum. Head: Generally greyish-brown. Basal flagellomere bearing long fringe of whitish setulae along dorsum and dorsal portion of apex, length setulae greater than half height of basal flagellomere. Face uniformly coloured, greyish-yellow, subdued, lacking lighter coloured areas on darker background. Eye-to-gena ratio 0.21–0.25. Thorax: Generally whitish-grey to brown; mesonotum moderately dense grey to brown microtomentose, appearing dull to very slightly subshiny, usually with conspicuous, darker brown, longitudinal stripes medially, between dorsocentral setae. Costal vein ratio 0.48–0.50; vein M ratio 0.82–0.89. Foreleg of male lacking long, slender setulae. Abdomen: Slightly lighter in colour than mesonotum, mostly grey; anterior portion of tergites fasciate, darker grey to brown, less microtomentose. Male terminalia (Figs 67–69): Epandrium in posterior view as an inverted U, moderately wide with width dorsally slightly less than that of lateral arms, with dorsal margin of cercal cavity narrowly rounded; cercus broadly pointed dorsally and narrowly projected and pointed ventromedially, medial margin concave in posterior view; presurstyli narrowly connected medially, forming a nearly straight, long band at ventral margin of cerci, produced ventrolaterally as wide, triangular-shaped projections; postsurstylus in lateral view with anterior margin wider and swollen medially, bearing several setulae medially, bifurcate apically, anterior lobe longer and only slightly narrower, posterior lobe in lateral view broadly

rounded, truncate apically; aedeagal apodeme with keel asymmetrical, more angulate toward hypandrium; aedeagus in lateral view narrowly triangular, in posterior view with base subrectangular, apex broadly rounded to truncate medially, in lateral view with a pointed lobe near middle along posterior surface; becoming wider subapically, thereafter narrowed to narrow extension that is acutely pointed apically; lateral aedeagal processes robust, parallel-sided throughout length, narrowly rounded apically; hypandrium deeply invaginated, pocket-like. Remarks: Our study of specimens of *Phaiosterna* from the Old World indicates a single species, *P. bicolor*, occurring in the Afrotropical and Palaearctic Regions. The other three names that have been used for these regions (Cogan, 1980) are synonyms or represent misidentifications (see species synonymy). One available name, *P. vidua*, was originally determined to be conspecific with *P. lineata*, a valid species that occurs in the Oriental and Australasian/Oceanian Regions, not the Afrotropical Region. Our conclusions are based on dissection and study of structures of the male terminalia of numerous Afrotropical specimens (Madagascar, Seychelles, and Cameroon).

Distribution: Afrotropical Region: Aldabra, Burundi, Cameroon, Democratic Republic of Congo, Ethiopia, Gambia, Ghana, Kenya, Madagascar, Namibia, Nigeria, Seychelles (Cousin, Mahé), Sudan, Tanzania, Uganda, Yemen; Australasian/Oceanian Region: Papua New Guinea; Palaearctic Region: Egypt, and now Oman and UAE.

Tribe **Hydrelliini** Robineau-Desvoidy

Genus **Hydrellia** Robineau-Desvoidy, 1830

*Hydrellia* Robineau-Desvoidy, 1830: 790. Type species: *Hydrellia communis* Robineau-Desvoidy, 1830 (= *Notiphila griseola* Fallén, 1813), subsequent designation, Duponchel in d'Orbigny, 1845: 743. Mathis & Zatwarnicki, 1995: 61–96 [world catalogue].

### Key to the species of *Hydrellia* from the UAE

- 1 Mesonotum only slightly darker than pleural areas, greenish to tannish-grey generally, lacking a contrasted, lateral, mesonotal stripe; anepisternum uniformly unicolorous ..... *H. elegans* Dahl
- Mesonotum with broad medial portion mostly brown, contrasted distinctly with lateral mesonotal, greyish stripe from postpronotum through notopleuron; anepisternum golden tan dorsally, gradually becoming greyer ventrally ..... *H. latipalpis* Cresson

***Hydrellia elegans*** Dahl, 1973

Plate 18, Figures 70–74

*Hydrellia elegans* Dahl, 1973: 349 [Afghanistan. Herat: Bala Murghab; HT ♂, MMB]. Zatwarnicki, 1991: 315–316 [revision, male terminalia]. Mathis & Zatwarnicki, 1995: 69 [world catalogue]. Deeming, 2002: 51 [review; Gambia, Nigeria].

*Hydrellia bucciarellii* Canzoneri & Meneghini, 1975b: 221 [Iran. Khorramshahr, Shatt Arab; HT ♂, MCV]. Zatwarnicki, 1991: 315 [synonymy].

Specimens examined from the UAE: Ra's al-Khaimah, 25°46'N 55°53.6'E, 19♂, 4♀, 13–18.iii.2010, WNM, TZ.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small to moderately small shore-flies, body length 1.50–2.15 mm. Head: Frons, including parafrons and fronto-orbits greyish tan microtomentose; ocellar setae present; 2 fronto-orbital setae, anterior seta proclinate, posterior seta reclinate. Antenna with scape and pedicel brownish-black; basal flagellomere with yellowish-orange base, apicodorsal areas darkened; arista with 6–8 dorsal rays. Face in anterior view densely silvery white microtomentose with shiny luster, in lateral view nearly vertical; maxillary palpus yellowish,



Plate 18: *Hydrellia elegans* Dahl, habitus, anterolateral view. Photograph: T. Zatwarnicki.

spathulate. Thorax: 1 presutural and 2–3 postsutural dorsocentral setae; mesonotum generally greenish-grey to tannish-grey, slightly darker than pleural areas but lacking a lateral, mesonotal stripe; anepisternum unicolorous, faintly greenish to bluish-grey. Wing length 1.70–2.10 mm. Legs generally yellow; femora with some light, whitish-grey microtomentum; apical tarsomeres gradually becoming darker, apical tarsomere brown, some specimens with only apical tarsomere darkened. Abdomen: Male terminalia (Figs 70–74): Although somewhat similar to *H. valida*, this species has a medial emargination slightly narrower and deeper; fused surstylus only slightly longer than wide, deeply and narrowly incised ventromedially, each side process bifurcate, medial lobe of bifurcation longer than lateral lobe; aedeagus in ventral view 2.5 times longer than wide, apically trifurcate, medial extension longer than either lateral prong, in lateral view with basal, U-shaped emargination, thereafter angled to deep bifurcation, longer, posterior lobe elongate, narrow, tapered to narrow point, anterior lobe slightly arched, subapically tapered to broad apex; phallapodeme in ventral and lateral views elongate, narrow, complicated apically; postgonite in ventral view clavate; hypandrium (fused with sternite 5) twice as wide as long, posterior margin with 2 medial prongs, each tapered to a point, creating a short, moderately narrow pocket. Distribution: Palearctic Region: Afghanistan, Iran, Jordan, and now UAE.

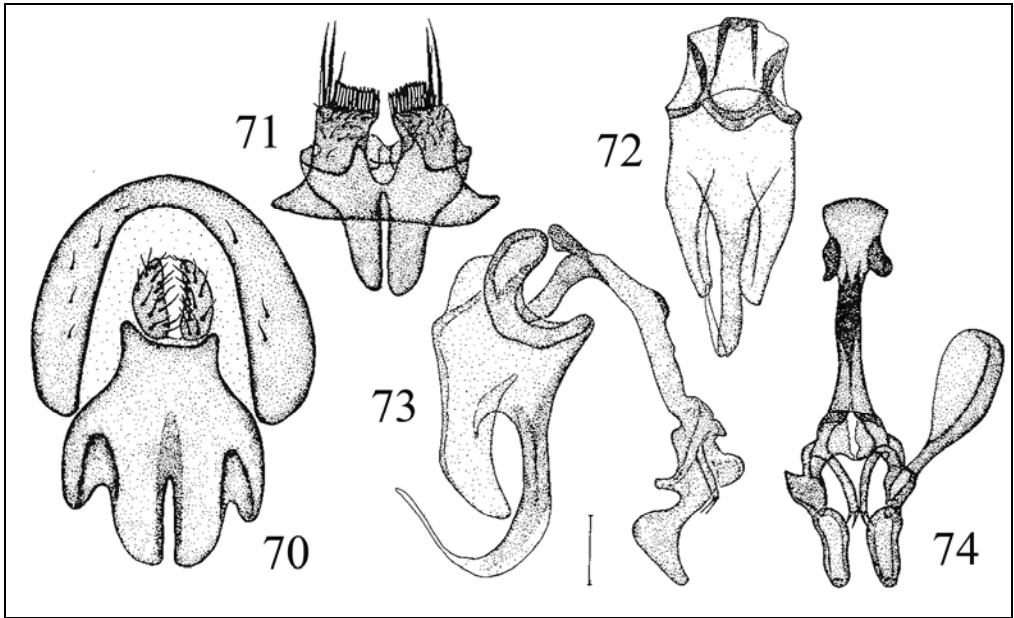
***Hydrellia latipalpis*** Cresson, 1943

Figures 75–77

*Hydrellia latipalpis* Cresson, 1943a: 4 [Sri Lanka. Colombo; HT ♀, ANSP (6660)]. Zatwarnicki, 1988: 602–603 [revision]. Mathis & Zatwarnicki, 1995: 79–80 [world catalogue]. Dawah & Abdullah, 2006: 387 [fauna, Saudi Arabia].

*Hydrellia latipalpus* Cresson, 1948: 4 [lapsus calami].

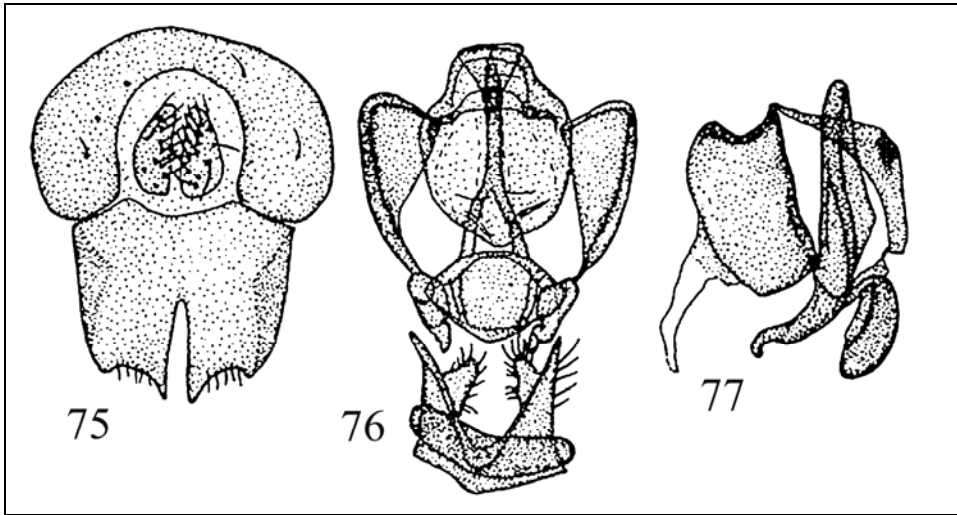
*Hydrellia binotata* Canzoneri & Meneghini, 1969: 126 [Zaire. Albert National Park: Kitondo, près Gandjo (2000 m); HT ♂, MRAC]. Deeming, 2002: 54 [synonymy].



Figures 70–74. Male terminalia of *Hydrellia elegans* Dahl. 70: External male genitalia, ventral view; 71: Hypandrium, and fifth sternite, ventral view; 72: Aedeagus, dorsal view; 73: Aedeagus, phallopodeme, pre- and postgonite, lateral view; 74: Aedeagal apodeme, pre- and postgonites (without right postgonite), ventral view.

Specimens examined from the UAE: Khor Kalba, near tunnel, 24°59'N 56°14'E, 1♂, 1–3.v.2006, light trap, AvH. Wadi Bih, dam, 115 m, 25°48'N 56°04.4'E, 16♂, 5♀, 9.iii.2010, WNM.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small to moderately small shore-flies, body length 1.60–2.15 mm. Head: Frons mostly light grey to bluish-grey microtomentose, parafrons darker brown; ocellar seta present; 2 fronto-orbital setae, anterior seta proclinate, posterior seta reclinate. Antenna with scape and pedicel brownish-black; basal flagellomere with yellowish-orange base, apicodorsal areas darkened; arista with 7–8 dorsal rays. Face in anterior view mostly silvery to whitish-yellow or tan, grey immediately ventral of antennae and ventral areas with some faint golden tinges, in lateral view nearly vertical; maxillary palpus yellowish, spatulate. Thorax: Dorsocentral seta 1, no postsutural setae although setulae present. Mesonotum conspicuously darker generally than pleural areas, not densely microtomentose, largely brown with some faint, more greyish-brown areas, contrasted with grey, lateral, mesonotal stripe extended from postpronotum through notopleuron and onto supra-alar area; anepisternum faintly golden tan dorsally, becoming gradually greyer ventrally. Wing length 1.55–1.80 mm. Legs generally yellow; femora with some light, whitish grey microtomentum; apical tarsomeres gradually becoming darker, apical tarsomere brown, some specimens with only apical tarsomere darkened. Abdomen: Male terminalia (Figs 75–77): Epandrial arch broadlyconnected dorsally in posterior view; cerci semi-hemispherical, setulae especially evident toward medial margin; fused surstylar plate in posterior view more or less quadrate, lateral margins only very slightly tapered toward ventral margin, ventral margin as symmetrical lobes on either side of a moderately deep, narrow, medial cleft, either lobe



Figures 75–77. Male terminalia of *Hydrellia latipalpis* Cresson. 75: external male genitalia; 76: internal male genitalia, ventral view; 77: Same, lateral view

shallowly scalloped and projected at medial angle to acute point; aedeagus in ventral view only slightly longer than wide, quadrate base relatively narrow, thereafter apically twice width of base, very gradually tapered to obtusely pointed apical margin, basiphallus in lateral view with more or less rectangular base, dorsal margin emarginate with membranous distiphallus; phallosome in lateral view boomerang-shaped, slightly obtusely angled, in ventral view medially mostly linear, expanded at both ends; postgonite in lateral view generally elongate, slender, apex recurved, in ventral view moderately wide on basal half, thereafter apically abruptly narrowed; hypandrium (fused with sternite 5) in ventral view with deep V-shaped posterior emargination and nearly straight anterior margin.

Distribution: Afrotropical Region: Cape Verde Islands, Mauritius, Zaire; Oriental Region: Nepal, Sri Lanka; Palearctic Region: Oman, Saudi Arabia, and now UAE.

#### Tribe **Notiphilini** Bigot, 1853

##### Genus *Notiphila* Fallén, 1810

*Notiphila* Fallén, 1810: 22. Type species: *Notiphila cinerea* Fallén, 1813, subsequent designation of Westwood, 1840: 153]. Cogan, 1984: 144–147 [Palearctic catalogue]. Mathis & Zatwarnicki, 1995: 97–115 [world catalogue]. Krivosheina, 1998: 31–63 [revision, Old World species].

##### *Notiphila flava* Dahl, 1973

*Notiphila flava* Dahl, 1973: 351 [Afghanistan. Nengrahar: Kama, Jalalabad (40 km N, 800 m); HT ♂, MMB]. Mathis & Zatwarnicki, 1995: 107 [world catalogue]. Krivosheina, 1998: 41–43 [revision]; 2001: 78–79 [revision, Oriental fauna].

*Notiphila iranica* Canzoneri & Meneghini, 1979: 209 [Iran. Khorramshahr, Shatt Arab; HT ♂, MCV]. Krivosheina, 1998: 41 [synonymy].

Specimens examined from the UAE: Sharjah Desert Park, 25°17'N 55°42'E, 3♂, 29.iii–12.vi.2005, light trap, AvH; 4♂, 30.iv–15.vii 2005, 2008, light trap, AvH. Wadi Shawkah, 27°08'N 56°01'E, 1♂, 31.x–27.xi.2006, water trap, AvH; reservoir, 25°06.4'N 56°02.7'E, 1♀, 14.iii.2008, water trap, JHS.

Diagnosis: This species is distinguished from congeners, especially *N. impunctata* de Meijere, 1908, by the following combination of characters: Medium-sized shore-flies, body length

3.80 mm; generally grey. Head: Frontal ratio 0.67; golden; 1 reclinate seta, 1 proclinate setula. Antenna yellow; basal flagellomere darkened apically. Face grey; 3 well-developed facial setae; gena moderately high; gena-to-eye ratio 0.34. Thorax: Generally grey; 2 brownish medial stripes; anepisternum with brownish spot; halter yellow. Midcoxa with 1 long seta; midfemur lacking posteroventral row of closely set setulae; tibiae yellow; midtibia with 3 dorsal setae. Abdomen: Dorsum with 4 narrow, widely separated spots. Male terminalia: Epandrium in posterior view narrowed laterally at level ventrad of cerci; presurstylar plate in posterior view with short, lateral extensions, ventral margin concave on both sides, medially with a distinct, rounded notch; aedeagus in lateral view L-shaped, basal arm tapered to acute point, extended arm narrowly digitiform, rounded apically; phallapodeme in lateral view triangular, curved, tapered toward aedeagal base. Distribution: Palaearctic Region: Afghanistan, Iran, Oman, Pakistan, and now UAE.

Subfamily **Gymnomyzinae** Latreille

### Key to the tribes of **Gymnomyzinae** from the UAE

- 1 Arista bare to macropubescent, if pectinate, rays shorter than 1/2 width of basal flagellomere ..... 2
  - Arista pectinate dorsally ..... 3
- 2 Posterior margin of gena sharply angulate; body extensively shiny black, although with some grey to whitish microtomentum on dorsum; a single notopleural seta, inserted near posterior angle ..... **Gymnomyzini**, in part
  - Posterior margin of gena broadly rounded onto occiput; body densely invested with microtomentum, generally dull coloured; usually with 2 notopleural setae, posterior seta inserted at level above anterior seta ..... **Lipochaetini**
- 3 Foreleg raptorial, with forefemur greatly enlarged and foretibia ended in a large spur ..... **Ochtherini**
  - Foreleg normal, forefemur slender, foretibia not ended in a large spur ..... 4
- 4 Posterior margin of gena sharply angulate; gena with fine pale setulae ..... 5
  - Posterior margin of postgena meeting occiput at obtuse and broadly rounded angle; postgena usually with coarse black setulae; body shiny to dull ..... 6
- 5 Scutellum with 2 pairs of marginal setae; body mostly shiny black ..... **Gymnomyzini**, in part
  - Scutellum with 3 pairs of marginal setae; body mostly dull, whitish to greyish ..... **Hecamedini**, in part
- 6 Posterior notopleural seta inserted much farther dorsad from notopleural suture than anterior seta ..... **Hecamedini**, in part
  - Anterior and posterior notopleural setae inserted equidistant from notopleural suture ..... **Discocerinini**

Tribe **Discocerinini** Cresson, 1925

### Key to the genera of **Discocerinini** from the UAE

- 1 Notopleuron bare of setulae ..... 2
  - Notopleuron setulose in addition to 2 large setae ..... 3
- 2 Postsutural supra-alar seta strong, distinct, longer than posterior notopleural seta. Face with dorsoclininate seta at lower lateral extremity ..... **Diclasiopa** Hendel



- Postsutural supra-alar seta very short or absent, if distinguishable distinctly shorter than posterior notopleural seta. Face without dorsoclinate seta at lower lateral extremity .....  
..... *Hecamedoides* Hendel
- 3 Face with secondary series of dorsolaterally inclined setae laterad to primary series .....  
..... *Polytrichophora* Cresson
- Face lacking secondary series of setae or suggested only by medially inclined setulae .....  
..... *Orasiopa* Zatwarnicki & Mathis

Genus *Diclasiopa* Hendel, 1917

*Diclasiopa* Hendel, 1917: 42. Type species: *Hecamede xanthocera* Loew, 1869 (= *Discocerina lacteipennis* Loew, 1862), original designation. Mathis & Zatwarnicki, 1995: 163–164 [world catalogue]; 2001: 20 [generic diagnosis].

*Diclasiopa niveipennis* (Becker, 1896)

Plate 19

*Clasiopa niveipennis* Becker, 1896: 162 [Poland. “Oderwald aus Schlesien” (= Malczyce, Silesia); ST ♀, ZMHU].

*Diclasiopa niveipennis*. Becker, 1926: 46 [generic combination]. Mathis & Zatwarnicki, 1995: 164 [world catalogue].

*Discocerina (Diclasiopa) niveipennis*. Canzoneri & Meneghini, 1975a: 41 [generic combination].

Specimens examined from the UAE: Hatta dam, 365 m, 24°47.7'N 56°06.3'E, 1♂, 1♀, 1.iii.2010, WNM. Kalba, beach, 25°06'N 56°21.5'E, 1♂, 3♀, 3.iii.2010, WNM, TZ. Wadi Hayl, 25°04.8'N 56°13.5'E, 1♂, 15.iii.2008, JHS. Wadi Madaq, 25°20.8'N 56°05.5'E, Malaise trap, 1♀, 27.vi–29.vii.2006, AvH. Wadi Safad, 140 m, 25°13.3'N 56°18.3'E, 1♂, 3♀, 11.iii.2010, WNM. Wadi Shawkah, reservoir, 25°06.4'N 56°02.7'E, 1♂, 10.iii.2008, JHS; reservoir, 300 m, 2♂, 2♀, 27.ii.2010, WNM.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Head: Face and parafacial of ♂ silvery white; lateral vertical series of facial setae moderately well developed, longest seta about half length of setae in medial row, inserted between level of medial setae. Thorax: Postsutural supra-alar seta 1, moderately well developed, length about equal to presutural supra-alar seta. Abdomen: Tergite 3 short, compared to tergite 2 and conspicuously shorter than tergite 4. Male terminalia: Epandrium in posterior view as an oval, slightly blunter when dorsally compared to ventral margin; in lateral view elongate, with posterior margin very shallowly arched, nearly straight, anterior margin projected anteriorly at midlength to right-angled point; cercus in posterior view attached ventrolaterally to medial wall of cercal cavity, in lateral view elongate, very slender; aedeagus in lateral view slender, elongate, curved apically; phallapodeme in lateral view with wide, enlarged, knob-like keel; gonite in lateral view elongate, thin, shallowly curved toward acutely pointed apex; hypandrium in ventral view V-shaped, arms relatively narrow, no wider than cercus.

Distribution: Afrotropical Region: Kenya, Sudan; Palaearctic Region: Algeria, Armenia, Croatia, Czech Republic, Hungary, Israel, Italy, Morocco, Poland, Romania, Spain, Yugoslavia, and now UAE.

Genus *Hecamedoides* Hendel, 1917

*Hecamedoides* Hendel, 1917: 41. Type species: *Psilopa glaucella* Stenhammar, 1844, original designation. Mathis & Zatwarnicki, 1995: 179–182 [world catalogue]; 2001: 32–33 [generic diagnosis].

Key to the species of *Hecamedoides* from the UAE

- 1 Fore- and midtibiae yellow, contrasted with grey femora; abdomen microtomentose, grey ..... *H. costatus* (Loew)

- Fore- and midtibiae grey, concolorous with femora; abdomen very sparsely microtomentose, black, subshiny to shiny ..... *H. infantinus* (Becker)

***Hecamedoides costatus*** (Loew, 1860)

Plate 20

*Hecamede costata* Loew, 1860: 14 [Turkey. Constantinople; ST ♀, ZMHU].

*Clasiopa costata*. Becker, 1896: 160 [generic combination].

*Hecamedoides costatus*. Becker, 1926: 45 [generic combination]. Cogan, 1984: 138 [Palaeartic catalogue]. Mathis & Zatwarnicki, 1995: 179 [world catalogue].

*Discocerina* (*Hecamedoides*) *costata*. Giordani Soika, 1956b: 106 [generic combination].

Specimens examined from the UAE: Hatta dam, 365 m, 24°47.7'N 56°06.3'E, 1♂, 1.iii.2010, TZ. Wadi Shawkah, road, 265 m, 25°06.3'N 56°01.6'E, 1♂, 27.iii.2010, WNM; reservoir, 300 m, 25°06.3'N 56°02.8'E, 1♀, 27.ii.2010, WNM.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Moderately small shore-flies, body length 2.20–2.70 mm. Head: Frons tan to greyish tan. Face grey. Thorax: Pleural area whitish grey. Costal vein ratio 0.30. Fore- and midtibiae yellow, contrasted with grey femora; hindtibia grey medially, basally and apically yellow. Abdomen: Tergites densely microtomentose, dull, grey. Male terminalia: Combined structures generally elongate, in posterior view height nearly twice width; epandrium in posterior view generally oval in outline, narrowed dorsally, in lateral view with posterior margin obtusely angulate, anterior margin produced at midlength, thereafter ventrally recurved before rounded ventral margin, generally bearing numerous setulae; cercus semicircular dorsally, fused ventrally with medial margin of cercal cavity; aedeagus in lateral view tubular, very shallowly angulate or arched; phallapodeme in lateral view with extended keel well developed, as long as high; gonite in lateral view wide as base, thereafter apically narrowly tapered and sinuous, acutely pointed apically, bearing 1 setula subapically; hypandrium in lateral view thin, elongate, widest at midlength, tapered thereafter in both directions.

Distribution: Afrotropical Region: Cape Verde Islands, Kenya, Rwanda, Sierra Leone, South Africa (Cape Province), Sudan; Palaeartic Region: Algeria, Austria, Bulgaria, Croatia, Czech Republic, France, Germany, Greece, Hungary, Italy, Poland, Romania, Spain, Turkey, and now UAE.

***Hecamedoides infantinus*** (Becker, 1924)

Figures 78–81

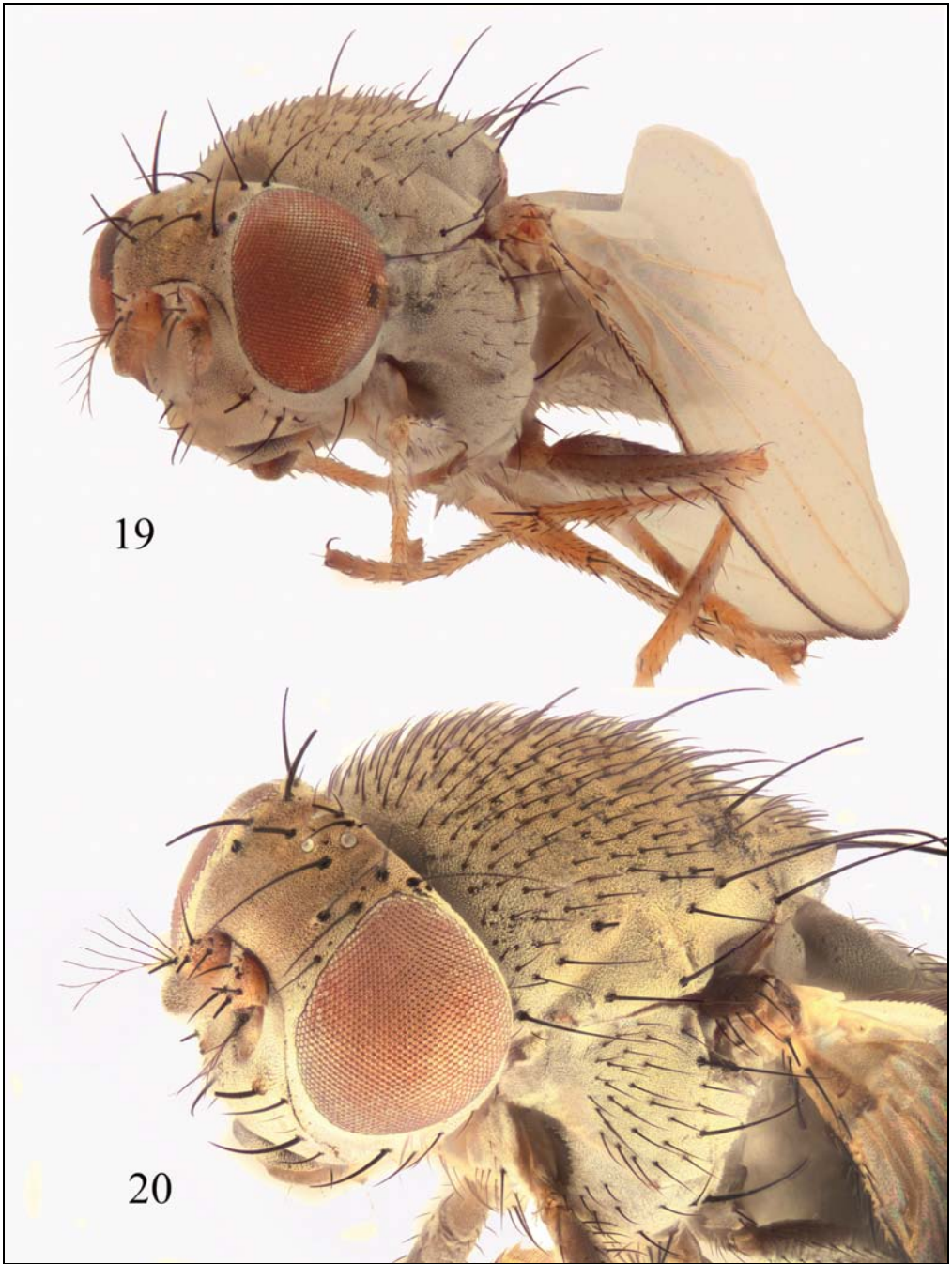
*Discocerina infantina* Becker, 1924: 93 [Taiwan. Taihoku; HT ♂, DEI].

*Hecamedoides infantinus*. Cogan & Wirth, 1977: 327 [generic combination]. Zatwarnicki, 1991: 310–311 [revision]. Mathis & Zatwarnicki, 1995: 180–181 [world catalogue].

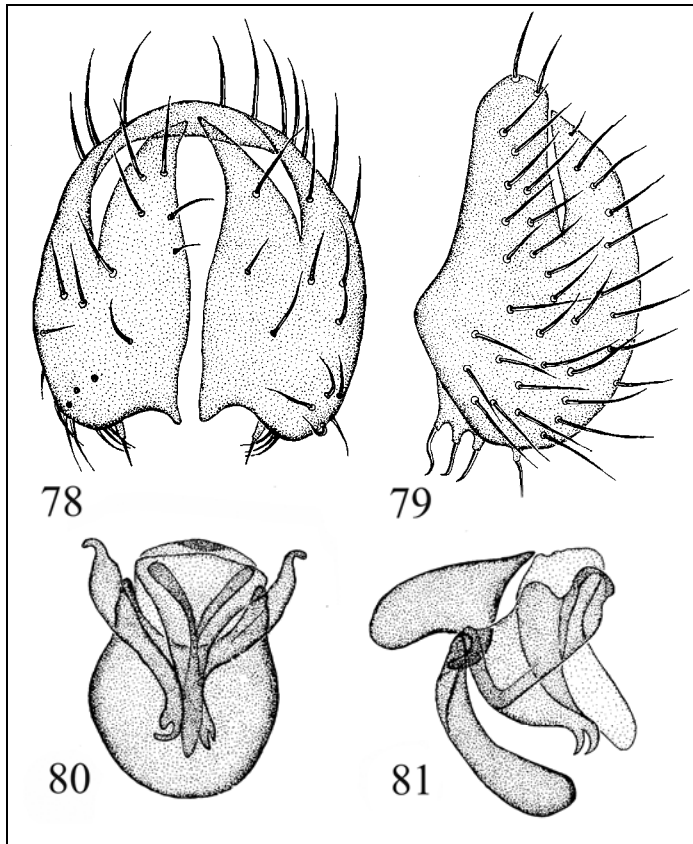
*Hecamedoides sinensis* Cresson, 1939: 6 [China. Fochow (Fukien); HT ♂, BMNH]. Zatwarnicki, 1991: 310 [synonymy].

Specimens examined from the UAE: Hatta dam, 365 m, 24°47.7'N 56°06.3'E, 1♂, 1.iii.2010, WNM. Wadi Hayl, 245 m, 25°04.9'N 56°13.5'E, 6.iii.2010, 1♂, WNM. Wadi Safad, 140 m, 25°13.3'N 56°18.3'E, 1♂, 11.iii.2010, TZ. Wadi Shawkah, road, 265 m, 25°06.3'N 56°01.6'E, 1♂, 1♀, 10.iii.2010, WNM; reservoir, 300 m, 25°06.3'N 56°02.8'E, 2♂, 27.ii.2010, WNM, TZ. Wadi Wurayah, 25°24'N 56°17'E, 1♀, Malaise trap, 14–26.xi.2006, AvH, NMWC.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small to moderately small shore-flies, body length 1.40–2.05 mm. Head: Frons mostly brownish grey, ocellar triangle and narrow fronto-orbits tan. Face grey, bearing 2 prominent setae. Thorax: Pleural area blackish to brownish grey. Costal vein ratio 0.45, costal section II more than twice section III. Femora and tibiae grey; tarsi yellow except for brown apical tarsomere. Abdomen: Tergites uniformly black, subshiny to shiny. Male terminalia (Figs 78–81): Epandrium in posterior view as an inverted U, ventral portion with fused cerci thickly developed, ventral margin deeply undulated with a short, medial, sharply pointed



Plates 19–20. Habitus, anterolateral view. 18: *Diclasiopa niveipennis* (Loew); 19: *Hecamedoides costatus* (Loew). Photographs: T. Zatwarnicki.



Figures 78–81. Male terminalia of *Hecamedoides infantinus* (Becker). 78: Epandrium, and cerci, ventral view; 79: Same, lateral view; 80: Internal male genitalia (aedeagus, phallapodeme, gonite, hypandrium), ventral view; 81: Same, lateral view.

process, in lateral view with 4 setulae arising from moderately long, narrow bases, posterior setulae more separated from anterior 3 setulae; cerci extensively fused ventrolaterally with medial, epandrial margin; aedeagus in lateral view tubular, generally curved, wider basally, tapered to rounded apex, in ventral view as an elongate triangle, lateral margins shallowly concave, base shallowly convex, nearly truncate; phallapodeme in lateral view with keel prominently developed, very shallowly curved, almost parallel-sided, broadly rounded apically, extension toward hypandrium recurved, extension toward aedeagal base acutely pointed, short, in ventral view Y-shaped with extended, narrow base; gonite in lateral view irregularly triangular, narrowed apex bifid, in ventral view shallowly sinuous, elongate, narrow, apex bifid, basal process, narrow, short, recurved; hypandrium in lateral view elongate, curved, forming shallow concavity, rounded anteriorly, pointed posteriorly, in ventral view robustly U-shaped with well developed, thick base and short, pointed arms, posterior margin conspicuously emarginate.

Distribution: Oriental Region: China (Fukien), Taiwan. Now recorded for the first time from the Palearctic region, from the UAE.

Genus *Orasiopa* Zatwarnicki & Mathis, 2001

*Orasiopa* Zatwarnicki & Mathis, 2001: 39. Type species: *Orasiopa millennica* Zatwarnicki & Mathis, 2001, original designation. Zatwarnicki, 2002: 297–317 [revision].

### Key to the species of *Orasiopa* from the UAE

- 1 Face, anepisternum, and anepimeron shiny, contrasted with dull, microtomentose notopleuron ..... *O. mera* (Cresson)  
 – Face, anepisternum, and anepimeron microtomentose, dull, similar to notopleuron .....  
 ..... *O. opa* Zatwarnicki

*Orasiopa mera* (Cresson, 1939)

Plate 21, Figures 82–84

*Discocerina mera* Cresson, 1939: 6 [Taiwan. Takao (= Kao-hsiung); HT ♀, ANSP (6573)]. Mathis & Zatwarnicki, 1995: 169 [world catalogue].

*Orasiopa mera*. Zatwarnicki & Mathis, 2001: 40 [generic combination].

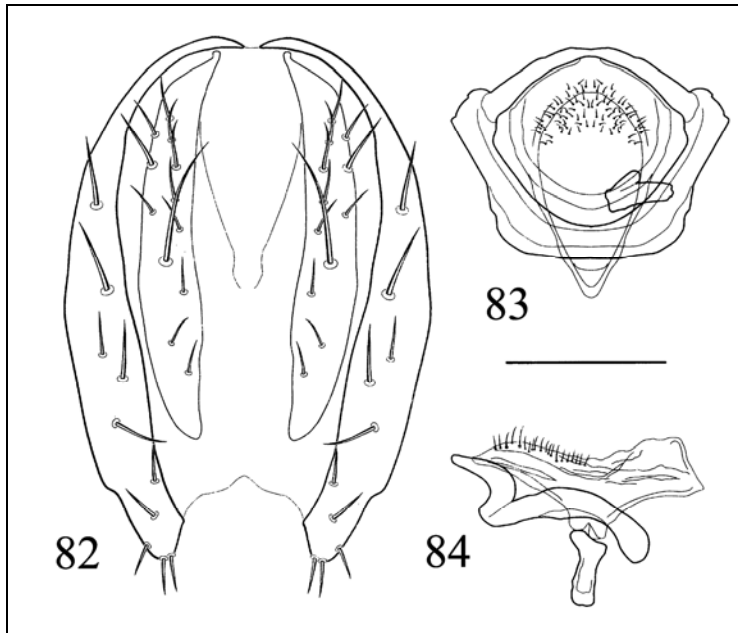
Specimens examined from the UAE: N of Ajman, 25°25.9'N 55°29.4'E, 3♂, 6♀, 1.ix–22.xi.2007, water trap, AvH. Khor Kalba, mangrove, 25°00.9'N 56°21.6'E, 1♂, 3♀, 4.iii.2010, WNM, TZ; lagoon, 4♂, 6♀, 10.iii.2008, JHS. Ar-Rafah, mangrove, 25°43.7'N 55°52.5'E, 10♂, 5♀, 9–13.iii.2010, WNM. S of Ra's al-Khaimah, coast, 25°43.7'N 55°52.4'E, 2♂, 11.iii.2008, JHS.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Specimens, except for tarsi, sparsely black. Head: Facial series of setae 3–4; face entirely black, subshiny to shiny, sparsely invested with whitish microtomentum, lacking vertical stripes; parafacials narrow, lacking setulae, black, concolorous with face; frons black but with sparse investment of whitish microtomentum, especially on anterior margin, lacking metallic blue or green stripes. Thorax: Mesonotum sparsely microtomentose, subshiny; supra-alar seta present; and anterior notopleural seta inserted in anterior notopleural angle; anepisternum and anepimeron shiny, contrasted with dull, microtomentose notopleuron. Legs, including coxae, black except for yellowish tarsi. Abdomen: Male terminalia (Figs 82–84): Epandrium symmetrical, in dorsal view oval in outline, 1.4 times longer than wide, setulose mostly in anterior area (5–6 setae) and along its length; cercus distinctly elongate, in dorsal view 5.5 times longer than wide; hypandrium-gonites complex without setula, in dorsal view pentagonal in outline, fused posteriorly; in lateral view hypandrium-gonites complex narrow and arcuate with attached C-shaped gonites; aedeagus symmetrical, in dorsal view triangular with broadly rounded posterior margin, with posterior section covered with short hairs, in lateral view aedeagus elongated with dorsal margin sinuous and ventral margin W-shaped forming two small rounded projections medially; phallopodeme not attached to hypandrium, in dorsal view irregular.

Remarks: This species was originally described from specimens collected in the Orient (Taiwan and Japan), and it has now been recorded from the Caribbean (Mathis, 1997) and Brazil (W. Mathis, pers.observ.), which is a rather remarkable range extension for any shore-fly species. Its occurrence in the West Indies and Belize, the latter at the western edge of the Caribbean, suggests this species will be found to be circumcaribbean specifically and in the New World generally.

Natural history: This species is usually found in saline habitats that are associated with the maritime coast.

Distribution: Afrotropical Region: Aldabra, Seychelles; Australasian/Oceanian Region: Australia (New South Wales, Queensland), Caroline Islands, Eniwetok Atoll, Fiji, Gilbert Islands, Guam, Hawaiian Islands, Marianas Islands, Marshall Islands, Papua New Guinea (Papua New Guinea, Bismarck Archipelago), Solomon Islands, Society Islands, Tahiti; Nearctic Region: Bermuda; Neotropical Region: Belize, Brazil (Paraná), Trinidad, West



Figures 82–84. Male terminalia of *Orasiopa mera* (Cresson). 82: Epandrium and cerci, ventral view; 83: Internal structures of male terminalia (aedeagus [shaded], phallapodeme, gonite, hypandrium), ventral view; 84: Same, lateral view. Scale bar = 0.1 mm.

Indies (Barbados, Cuba, Dominican Republic, Grand Cayman, Grenada, Jamaica, Puerto Rico, St. Lucia, St. Vincent; Oriental Region: Malaya, Ryukyu Islands, Taiwan, Thailand, Vietnam. Palearctic: Japan (Shikoku), and now UAE.

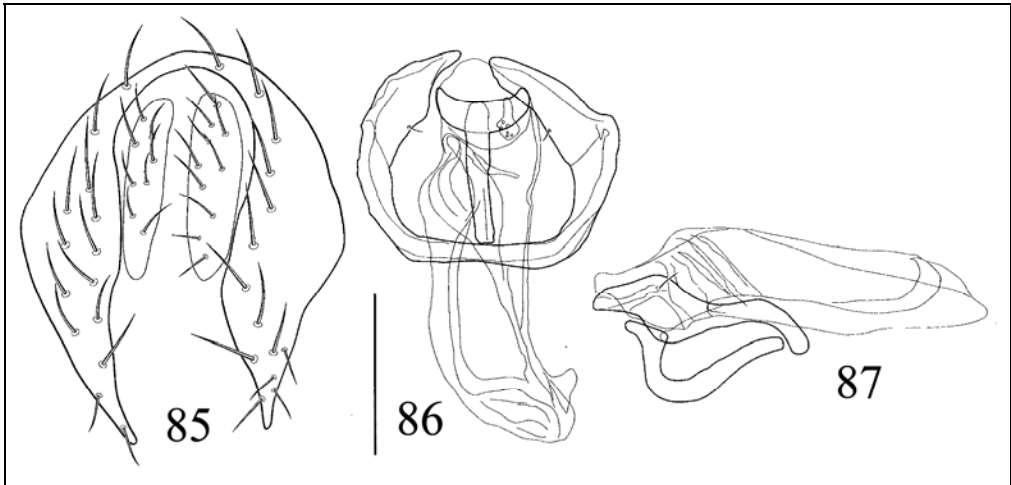
***Orasiopa opa* Zatwarnicki, 2002**

Figures 85–87

*Orasiopa opa* Zatwarnicki, 2002: 312 [Thailand. Chumphon: Chumphon Cabana; HT ♂, IRSNB].

Specimens examined from the UAE: Khor Kalba, mangrove, 25°00.9'N 56°21.6'E, 2♀, 4.iii.2010, WNM. Ra's al-Khaimah, mangrove, 25°46'N, 55°53.6'E, 3♂, 8♀, 27.ii.2006, JCD, NMWC.

Diagnosis: This species is distinguished from congeners, especially *O. rapkap* Zatwarnicki, 2002, by the following combination of characters: Small shore-flies, body length 1.55 mm. Head: Frons generally black, shimmering, frontal vittae more brownish and microtomentose. Antenna uniformly black; arista bearing 6–7 dorsal rays. Face subshiny black, moderately microtomentose; gena-to-eye ratio 0.09. Thorax: Legs black with tarsi mostly yellowish, two black apical tarsomeres of foretarsus, one black apical tarsomere of mid- and hindtarsus. Abdomen: Tergites unicolorous black, subshiny; subterminal setae twice as long as tergal setation. Fourth tergite of male slightly longer than third. Male terminalia (Figs 85–87): Epandrium asymmetrical, in dorsal view; rhomboidal in outline, both arms tapered in form of a triangle, but right arm wider than the left and bears more setae; epandrium is complete posteriorly, posterior margin of cercal cavity without incision, setae distributed along whole length of epandrium; cerci elongate, in dorsal view 4.5 times longer than wide; hypandrium/gonites complex with setulae on posteroventral margin, in dorsal view separated posteriorly, U-shaped, wider than long, its length is 0.6 of aedeagus, anterior margin is nearly straight, gonite attached to hypandrium on whole width; in lateral view hypandrium-gonites



Figures 85–87. Male terminalia of *Orasiopa opa* Zatwarnicki. 85: Epandrium and cerci, ventral view; 86: Internal structures of male terminalia (aedeagus [shaded], phallapodeme, gonite, hypandrium), ventral view; 87: Same, lateral view. Scale bar = 0.1 mm.

complex is S-shaped with broadened posterior portion; aedeagus asymmetrical, in dorsal view, band-like with rounded apices, 3.3 times longer than wide, generally J-shaped turned to right with subapical lateral projection on right side, from left side in 113 from the base rounded lateral projection; in lateral view aedeagus elongated, with parallel ventral and dorsal margin, irregularly terminated posteriorly, anteriorly tapered forming rounded apex; phallapodeme in dorsal view T-shaped with lateral arms rounded posteriorly; in lateral view phallapodeme band-like S-shaped with short posterior curve.

Remarks: This is the first record of this species outside of Asia and represents a connection of that fauna with that from the UAE.

Distribution: Australasian/Oceanian Region: Indonesia (Irian Jaya); Oriental Region: Brunei, Malaysia, Singapore, Thailand; first record from the Palearctic Region, from the UAE.

#### Genus *Polytrichophora* Cresson, 1924

*Polytrichophora* Cresson, 1924: 161. Type species: *Polytrichophora agens* Cresson, 1924: 161, original designation. Mathis & Zatwarnicki, 1995: 183–186 [world catalogue]; 2001: 50 [generic diagnosis].

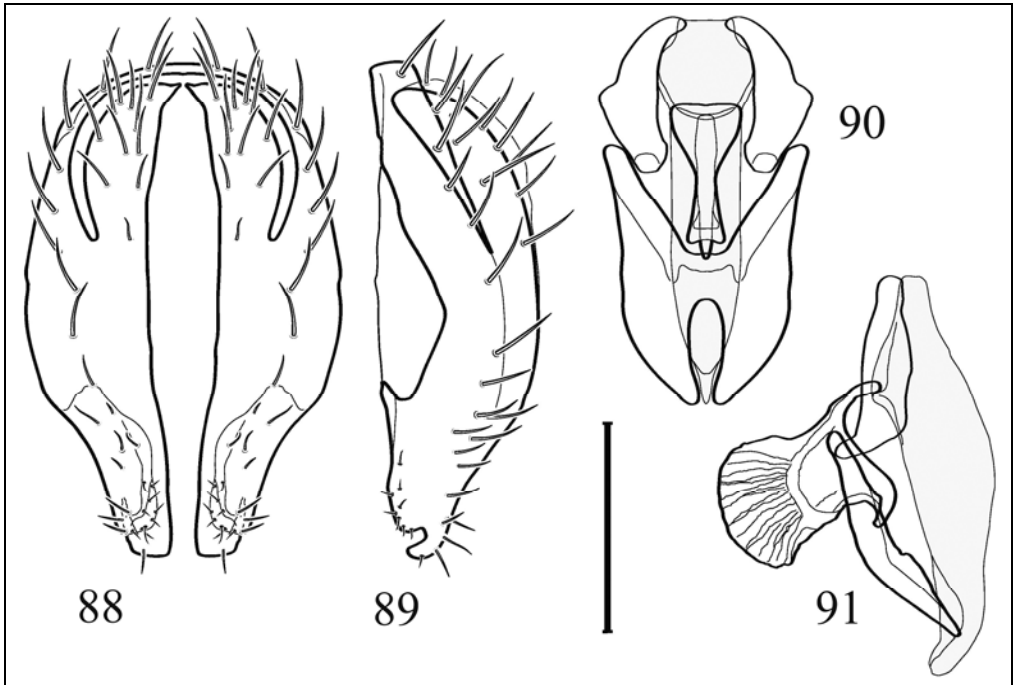
#### *Polytrichophora mira* Ebrahim et al., 2007

Plate 22, Figures 88–91

*Polytrichophora mira* Ebrahim et al., 2007: 263 [Egypt. Qena: Armant; HT ♂, PPIE].

Specimens examined from the UAE: Wadi Hayl, 25°04.9'N 56°13.5'E, 245 m, 6.iii.2010, 1♀, WNM, USNM. Wadi Shawkah, 25°06.3'N 56°02.8'E, 300 m, 27.ii.2010, 1♂, 5♀, WNM & TZ, USNM & CTZ.

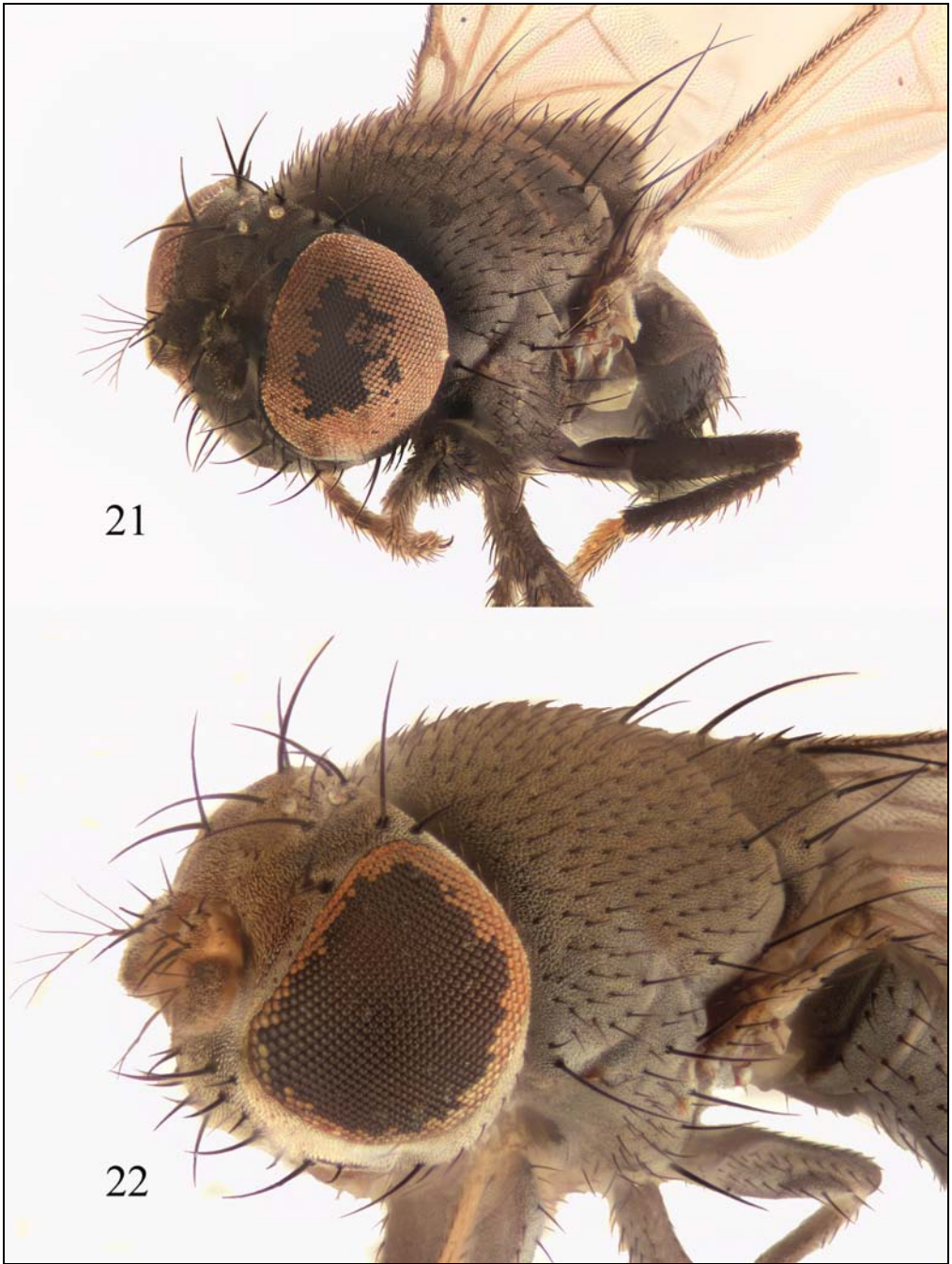
Diagnosis: This species is distinguished from congeners by the following combination of characters: Small shore-flies, body length 1.50–1.85 mm. Head: Frons dull, heavily microtomentose, blackish grey to grey anteriorly. Antenna mostly yellow to yellowish-orange, anterior portion of pedicel and dorsal area of basal flagellomere blackish; arista with 5 dorsal rays. Face at narrowest point about equal to combined length of pedicel and basal flagellomere; face densely microtomentose, mostly whitish grey with subshiny luster; parafacial microtomentose, white, parafacial with gradual ventral dilation, becoming 2 times wider ventrally than dorsally; gena very short, gena-to-eye ratio 0.08–0.09. Thorax:



Figures 88–91. Male terminalia of *Polytrichophora mira* Ebrahim et al. 88: Epandrium and cerci, posterior view; 89: Same, lateral view; 90: Internal structures of male terminalia (aedeagus [shaded], phallapodeme, gonite, hypandrium), ventral view; 91: Same, lateral view. Scale bar = 0.1 mm.

Mesonotum mostly microtomentose, grey anterolaterally, otherwise brownish grey, subshiny; pleural area grey. Anterior margin of wing lacking spine-like setae; costal vein ratio 0.64–0.84; M vein ratio 0.53–0.55. Forefemur grey, concolorous with pleural area, lacking row of short, stout setae along anteroventral surface; tibiae mostly yellowish, hindtibia grey at midlength; basal tarsomeres yellow, apical 1–2 brown. Abdomen: Tergites dull to partially subshiny, blackish grey medially to lighter grey laterally; 4th and 5th tergites of male lacking conspicuously longer setulae along posterior margin; 5th tergite narrowly truncate posteriorly. Male terminalia (Figs 88–91): Epandrium thinly connected dorsally above cerci, in posterior view irregularly elliptical, wide dorsally, ventral 1/4 tapered, bearing setulae, especially dorsally, in lateral view hemispherical, ventral margin with subapical, anterior notch, apex broadly hook-like; cercus in posterior view attached ventrolaterally to medial margin of epandrium, in lateral view arched like posterior margin of epandrium; aedeagus in lateral view elongate, narrow, base nearly flat but angled almost in plane with orientation of aedeagus generally, thereafter slightly narrowed then becoming wider, widest at midlength, thereafter tapered gradually to anteriorly curved, narrowly rounded apex, in ventral view elongate, narrow, with basal 2/3 near parallel-sided, apical 1/3 tapered gradually to narrowly pointed apex; gonite in lateral view bar-like with extension toward aedeagus with small, anteriorly directed process, extension toward base of aedeagus with a narrowly rounded apex, in ventral view as a shallowly curved, irregularly bar-like process, widest and slightly projected at midlength, both ends rounded, extension toward aedeagal base more narrowly rounded; phallapodeme in lateral with a large, rounded rectangular keel, apical margin





Plates 21–22. Habitus, anterolateral view. 21: *Orasiopa mera* (Cresson); 22: *Polytrichophora mira* Ebrahim et al. Photographs: T. Zatwarnicki.

shallowly curved, in ventral view like an hour-glass, base toward aedeagal base wider; hypandrium in lateral view elongate, narrow, rod-like, very shallowly angulate, in ventral view deeply V-shaped with vertex portion robustly developed and incised medially.

Distribution: Palearctic: Egypt, Jordan, and now UAE.

Tribe **Gymnomyzini** Latreille, 1829

### Key to the genera of *Gymnomyzini* from the UAE

- 1 Anterior and posterior notopleural setae present ..... 2
- Anterior notopleural seta lacking ..... *Chlorichaeta* Becker
- 2 Forefemur lacking any stout setae along ventral surface; a prescutellar acrostichal seta present or absent ..... *Trimerogastra* Hendel
- Forefemur with a stout seta along posteroventral surface toward apical 1/3; lacking prescutellar acrostichal setae ..... *Athyroglossa* Loew

Genus *Athyroglossa* Loew, 1860

*Athyroglossa* Loew, 1860: 12. Type species: *Notiphila glabra* Meigen, 1830, monotypy. Mathis & Zatwarnicki, 1990a: 103–133 [revision of western Palearctic species]; 1995: 130–135 [world catalogue].

### Key to the subgenera of *Athyroglossa* from the UAE

- 1 Mesonotal setulae in regular rows; forefemur without posteroventral, spine-like setulae; arisal rays relatively short, length of longest rays about 1/2 or less height of basal flagellomere ..... Subgenus *Parathyroglossa* Hendel
- Mesonotal setulae in irregular rows; forefemur bearing 3–7, short, posteroventral, spine-like setulae; arisal rays relatively long, length of longest rays equal or greater than half height of basal flagellomere ..... Subgenus *Athyroglossa* Loew

### Key to the species of the subgenus *Athyroglossa* from the UAE

- 1 Face wide, width equal to combined length of pedicel and basal flagellomere. Wing immaculate, without slightly darkened clouds over crossveins. Foretarsus with apical 2 tarsomeres black..... *A. argyrata* Hendel
- Face narrow, width only slightly greater than length of basal flagellomere; conspicuous rugose. Wing with slightly darkened cloud over crossvein dm-cu. Foretarsus yellow ..... *A. vorticis* (Becker)

*Athyroglossa (Athyroglossa) argyrata* Hendel, 1931

Figures 92–94

*Athyroglossa (Ochtheroidea) argyrata* Hendel, 1931: 67 [Egypt. Wadi Edeib (Gebel Elba); HT ♂, Efflatoun collection (depository unknown, ? Cairo)].

*Athyroglossa (Athyroglossa) argyrata*. Cogan, 1984: 127 [Palearctic catalogue]. Mathis & Zatwarnicki, 1990a: 108–110 [revision]; 1995: 130 [world catalogue]. Kirk-Spriggs & McGregor, 2009 [biogeographic study, United Arab Emirates].

Specimens examined from the UAE and Oman: Wadi Hayl, 25°04.8'N 56°13.5'E, 4 ex., 15.iii.2008, JHS; 245 m, 1♀, 6iii.2010, WNM. Wadi Madaq, 390 m, 25°20.8'N 56°05.5'E, 4♂, 5♀, 3.iii.2010, WNM; 3♂, 4♀, 2.i–26.xii 2005, 2006, Malaise trap AvH; 4♂, 3♀, 5.iii.2005, yellow water traps, AvH. Wadi Safad, 140 m, 25°13.3'N 56°18.3'E, 5♂, 2♀, 11.iii.2010, WNM, TZ. Wadi Shawkah, reservoir, 25°06.4'N 56°02.7'E, 4 ex., 10.iii.2008, JHS. Wadi Mirba, mountain oasis, 25°16.2'N 56°16.7'E, 1 ex.,

13.iii.2008, JHS. Wadi Wurayah, 210 m, 25°23.9'N 56°16.2'E, 3♂, 1♀, 17.iii.2010, WNM; 3♂, 1♀, 12–14.iv.2005, leg. T. Pape. OMAN: 17 km NW of Ibra, 23°01.8'N 58°12.4'E, 2♂, 1♀, 30.xii.1994, leg. B. Skule.

Diagnosis: Small to moderately small shore-flies, body length 1.85–2.60 mm. Head: One proclinate fronto-orbital seta, subequal to reclinate seta; frons mostly uniformly smooth, shiny, except for triangular to oval area anterior of ocelli, microtomentose; pseudopostocellar setae poorly developed, about 1/4 length of ocellar setae; ocelli arranged to form an equilateral triangle. Antenna with ratio of dark to pale colouration variable, but usually with considerable pale colouration, yellowish red, basoventrally; arista with 8–9 dorsal rays, length of longer rays subequal to width of basal flagellomere. Antennal groove bare ventrally to distinctly whitish microtomentose dorsally; lower 2/3 of face shallowly transversely arched, with medial area microsculptured, laterally with incomplete grooves where setae arise, some specimens with whitish microtomentose area paralleling parafacials; parafacials with whitish microtomentum along anteroventral margin of eye; gena-to-eye ratio 0.18. Thorax: Mesonotum microtomentose, less densely microtomentose posteriorly and laterally; scutellum microtomentose, slightly concave anteriorly; mesonotal setae inconspicuous. Wing with area surrounding crossvein dm-cu hyaline, otherwise veins yellowish; costal vein ratio 0.26; M vein ratio 0.53. Halter pale, whitish to yellowish. Legs mostly black; each with basal 3–4 tarsomeres yellowish to whitish; mid and hindtibiae more or less yellow apically; forefemur with 4 short, spine-like setae posteroventrally along apical 1/4. Abdomen: Dorsum of tergite 1, most of 2, 3, and 4 microtomentose, otherwise bare, shiny. Male terminalia (Figs 92–94): Width of epandrium in posterior view nearly equal to height of combined length of surstyli and epandrium; surstylus in lateral view tapered gradually to evenly rounded apex; hypandrium in lateral view, slender, dorsoventrally flattened.

Remarks: This species is similar to *A. nudiuscula* Loew, 1860, and *A. kaplanae* Mathis & Zatwarnicki, 1990, but can be distinguished from them and other congeners by the diagnosis above, especially the following characters: Antenna mostly blackish but with considerable yellowish-red colouration; arisal rays relatively long, subequal to width of basal flagellomere; mesonotal setulae in irregular rows; wing hyaline, veins immediately associated with crossvein dm-cu blackish, otherwise pale, yellowish; halter yellowish to whitish; legs mostly black, apex of tibiae and basal 2–3 tarsomeres yellowish; and conformation of male terminalia.

Distribution: Afrotropical Region: Niger, Sierra Leone, Sudan; Palaearctic Region: Egypt, Israel, Oman, UAE.

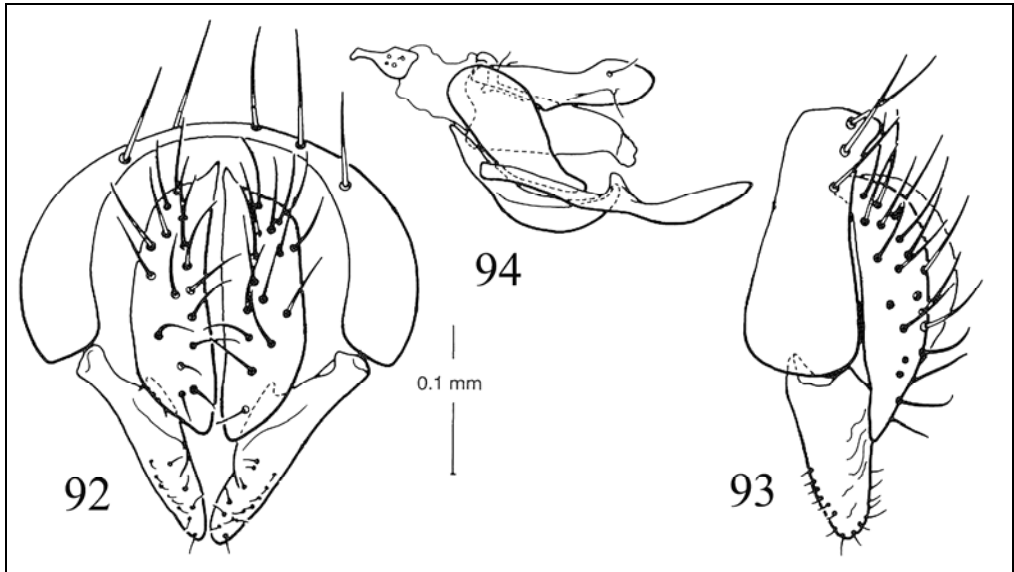
### *Athyroglossa (Athyroglossa) vorticis* (Becker, 1903)

*Discomyza vorticis* Becker, 1903: 164 [Egypt. "Insel Philae"; ST ♂♀, ZMHU].

*Athyroglossa vorticis*. Mathis & Zatwarnicki, 1995: 134 [world catalogue; generic combination].

Specimens examined from the UAE: Wadi Hayl, 25°04.8'N 56°13.5'E, 2♂, 15.iii.2008, JHS; 245 m, 3♂, 6.iii.2010, WNM. Wadi Mirba, mountain oasis, 25°16.22'N 56°16.68'E, 2♂, 13.iii.2008, JHS.

Diagnosis: Small shore-flies, body length 1.55–1.90 mm. Head: One anterior proclinate fronto-orbital seta, about half length of reclinate seta, and 1 posterior proclinate setula, about 1/3 length of proclinate seta; reclinate fronto-orbital seta well developed, although length less than lateral vertical seta; frons mostly bare anteriorly, shiny black, posterior portions thinly microtomentose, subshiny; pseudopostocellar setae poorly developed, about 1/4–1/3 length of ocellar setae; ocelli arranged to form an equilateral triangle. Antenna with ratio of dark to pale colouration variable, but usually with scape and pedicel black; basal flagellomere more heavily microtomentose, appearing greyish; arista with 9–10 dorsal rays, length of longer rays subequal to height of basal flagellomere. Face relatively narrow, width at narrowest gap only



Figures 92–94. Male terminalia of *Athyroglossa (Athyroglossa) argyrata* Hendel. 92: Epandrium, cerci, and surstyli, ventral view; 93: Same, lateral view; 94: Aedeagus, phallapodeme, ejaculatory apodeme, postgonite, pregonite and hypandrium, lateral view. Scale bar = 0.1 mm.

slightly greater than length of basal flagellomere; dorsal portion of face largely smooth, shiny black, except for whitish grey microtomentose antennal grooves; ventral half of face deeply sculptured with transverse and vertical grooves, medial groove comparative wide, granular, shiny; parafacials with whitish microtomentum along anteroventral margin of eye; gena-to-eye ratio 0.11–0.15. Thorax: Mesonotum sparsely microtomentose, subshiny; scutellum more microtomentose than scutum, slightly concave, lateral setae subequal; mesonotal setae inconspicuous. Wing with area surrounding crossvein dm-cu faintly darkened, brownish to blackish, otherwise veins yellowish; costal vein ratio 0.33–0.35; M vein ratio 0.53–0.59. Halter pale, whitish to yellowish. Legs with femora mostly black; foretibia black; mid- and hindtibia yellowish; tarsi whitish-yellow basally to brownish-yellow apically; forefemur with 1–2 short, stout setae at apical 1/3 along posteroventral surface. Abdomen: Tergites thinly microtomentose, mostly subshiny to shiny.

Distribution: Palearctic Region: Egypt, and now UAE.

***Athyroglossa (Parathyroglossa) hayliensis* Mathis & Zatwarnicki sp. nov.**

Plate 23, Figures 95–99

Type material: The holotype male is labelled “U. Arab Emirates. Wadi Hayl (25°04.9'N, 56°13.5'E; 245 m), 6 Mar 2010[,] Wayne N. Mathis/USNM ENT 00118273 [plastic bar code label]/HOLOTYPE ♂ *Athyroglossa (Parathyroglossa) hayliensis* Mathis & Zatwarnicki USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in the USNM. Seventeen paratypes (20♂, 12♀; CTZ, USNM) bear the same locality label data as the holotype or have T. Zatwarnicki as the collector. Other paratypes are as follows: 1♂, 1♀, near Munay, 390 m, 25°00.8'N 56°05.9'E, 14.iii.2010, TZ. 20 ex., Qurraya, beach, 25°13.6'N 56°21.5'E, 13.iii.2008, JHS. 4 ex., Um al-Quwain, salt marsh, 25°32'N 55°32.2'E, 18.iii.2008, JHS. 1♂, Wadi Maidaq, 390 m, 25°20.8'N 56°05.5'E, 8.iii.2010, WNM. 1♀, Wadi Safad, 140 m, 25°13.3'N 56°18.3'E, 11.iii.2010, TZ. 3 ex., Wadi

Shawkah, reservoir, 25°06.4'N 56°02.7'E, 10–14.iii.2008, JHS.

Type locality: United Arab Emirates. Wadi Hayl (25°04.9'N 56°13.5'E; 245 m).

Diagnosis: Small to moderately small shore-flies, body length 1.30–2.20 mm. Head: Two proclinate fronto-orbital setae, both short, less than length of pseudopostocellar setae; no reclinate, fronto-orbital seta; frons mostly uniformly smooth, shiny; pseudopostocellar setae well developed, about 1/2–3/4 length of ocellar setae; ocelli arranged to form an isosceles triangle, distance between posterior pair greater. Antenna blackish; arisal rays relatively short, length of longest rays slightly more than arisal width at base; antennal groove bare ventrally to thinly microtomentose dorsally. Face shiny black, with small patch of whitish-grey microtomentum in antennal groove close to base of antenna; face in lateral view distinctly protrudent, angulate, with vertex of angle rounded, carinate between antennal grooves; face shallowly grooved ventrally; parafacials bare; gena high, gena-to-eye ratio 0.27–0.36. Thorax: Mesonotum uniformly invested with brown microtomentum, appearing subshiny to dull; acrostichal setulae moderately conspicuous, arranged in 2 rows; also row of dorsocentral setulae. Halter dark brown to black. Wing unicolorous, mostly faintly lacteous; costal vein ratio 0.29–0.43; M vein ratio 0.36–0.41. Halter generally brownish-black. Legs concolorous, each with coxae, femora, tibiae, and apical 2 tarsomeres black; basitarsomeres whitish-yellow to yellow; forefemur lacking posteroventral spine-like setulae. Abdomen: Dorsum of tergites minutely microsculptured, otherwise mostly bare, shiny; tergites 3, 4 of male long, length subequal; tergite 5 of male short, triangular, with subapical depression, depression granulate. Male terminalia (Figs 95–99): Epandrium in posterior view as in inverted U with sides of about equal width, in lateral view robustly developed, height not quite twice width, widest subventrally, ventral margin broadly rounded; cercus in posterior narrowly ovate, medial margin nearly straight, narrowly pointed dorsally, rounded ventrally, in lateral view semihemispherical, uniformly setulose; surstylus in lateral view triangular, length only slightly longer than basal width, pointed ventrally, in posterior view elongate, with length 2.5 times width, rounded apically; aedeagus in lateral view mostly a simple tube, mostly parallel-sided, apical 1/4 tapered to a narrow point, in ventral bullet-shaped, length about twice width, pointed apically; phallapodeme in lateral view elongate, arched, keel moderately developed, in ventral view as an I with basal bar much less robust than apical bar; ejaculatory apodeme in lateral view as a tear drop with tail wide and curved; in ventral view narrowly elliptical; gonite narrowly triangular in ventral view tapered to a narrow, apical point, length 3 times width; hypandrium in lateral view triangular with lateral margins concave, in ventral view as a robust, widely open U.

Etymology: The species epithet, '*hayliensis*', is a Latinized name that refers to the type locality, Wadi Hayl.

Distribution: Only known from the UAE.

### Genus *Chlorichaeta* Becker, 1922

*Chlorichaeta* Becker, 1922: 73. Type species: *Chlorichaeta tuberculosa* Becker, by monotypy]. Cogan, 1984: 127–128 [Palaeartic catalogue]. Mathis & Zatwarnicki, 1993: 55–76 [revision]; 1995: 136–137 [world catalogue].

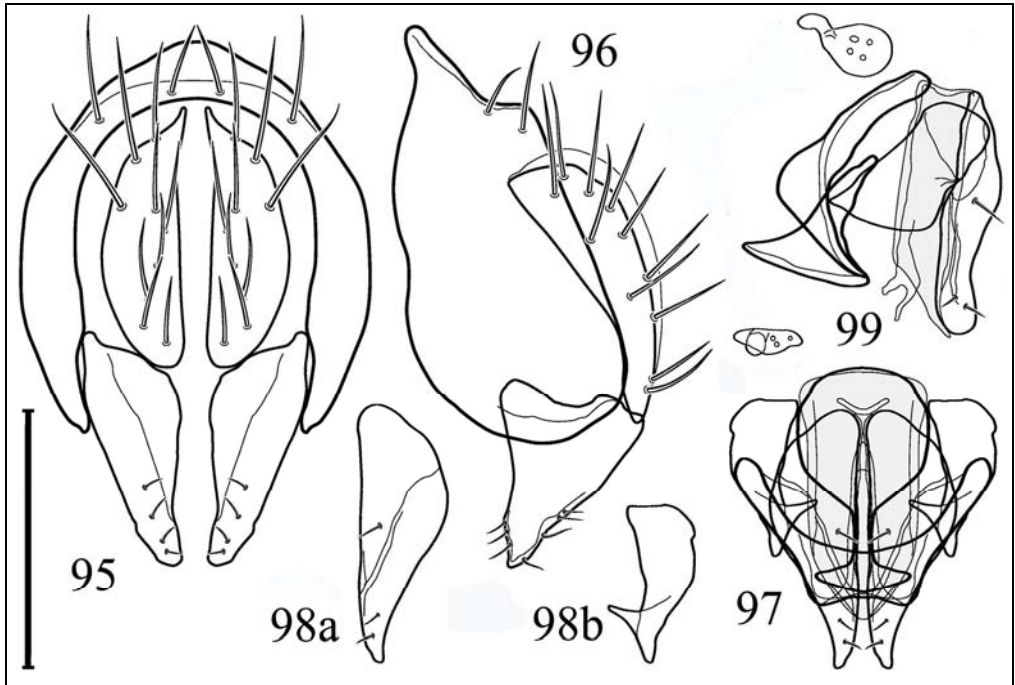
### *Chlorichaeta tuberculosa* Becker, 1922

Plate 24, Figures 100–104

*Chlorichaeta tuberculosa* Becker, 1922: 74 [Sudan. Khartoum: Sennar; LT (sex ♀; designated by Cresson, 1925: 234), NMW]. Mathis & Zatwarnicki, 1993: 70–75 [revision]; 1995: 137 [world catalogue].

*Chlorichaeta albipennis* of authors, nec Loew, 1848 [misidentification in part]. Kirk-Spriggs & McGregor, 2009 [biogeographic study, United Arab Emirates]

Specimens examined from the UAE: Al-Ajban, 245 m, 24°35.8'N 55°00.2'E, 4♂, 15.iii.2010, WNM;



Figures 95–99. Male terminalia of *Athyroglossa* (*Parathyroglossa*) *hayliensis* Mathis & Zatwarnicki sp. nov. 95: Epandrium, cerci, and surstyli, ventral view; 96: Same, lateral view; 97: Aedeagus (shaded), phallapodeme, ejaculatory apodeme, postgonite, pregonite and hypandrium, ventral view; 98: Left pre- (a) and postgonite (b), separated, ventral view; 99: Aedeagus (shaded), phallapodeme, ejaculatory apodeme, postgonite, pregonite and hypandrium, lateral view. Scale bar = 0.1 mm.

5♂, 4♀, 26.iii–17.x 2005, 2006, Malaise trap, AvH. N of Ajman, 25°25.9'N 55°29.4'E, 2♂, 1♀, 16.ix–22.x.2006, water trap, AvH. SSW of ad-Dhaid, 24°17'N 55°53'E, 2♂, 24–30.v.2006, water trap, AvH. 7 km S of al-Jazirat al-Hamra, 25°39.6'N 55°45.1'E, yellow water trap, 1♂, 1.xii.2004, AvH. Sharjah, 25°21.8'N 55°26.2'E, 1♂, 8.iii.2010, WNM. Sharjah Desert Park, 25°16.9'N 55°41.4'E, 1♂, 1♀, 28.ii–8.xi 2005, 2006, light trap, AvH & JCD. Um al-Quwain, beach, 25°31.4'N 55°31.4'E, 2♀, 28.ii.2010, WNM; beach, 1♂, 18.iii.2008, JHS. Wadi Asimah, 435 m, 25°24.1'N 56°08.2'E, 3♀, 8.iii.2010, WNM, TZ. Wadi Shawkah, reservoir, 25°06.4'N 56°02.7'E, 1♂, 10.iii.2008, JHS; reservoir, 300 m, 1♂, 27.ii.2010, 2♀, 14.iii.2010, TZ. Wadi Wurayah, 25°24'N 56°17'E, 1♂, 14.xi–4.xii.2007, Malaise trap, AvH.

Diagnosis: This species is very similar to *C. africana* Mathis & Zatwarnicki, 1993, but is distinguished from the latter and other congeners of the *albipennis* group by the following combination of characters: Scutellum bearing 2 large, marginal setae on each side that arise from tubercles; scutum and scutellum about equally microsculptured and coloured; hindbasitarsomere almost entirely brownish-black to black; and surstylus in lateral view distinctly and more or less evenly curved anteroventrally, tapered gradually and evenly to acutely pointed apex. Small to moderately small shore-flies, body length 1.65–2.70 mm. Head (Figs 100–104): Mesofrons, especially extended ocellar triangle, smooth, shiny, very similar to parafrons; parafacials with silvery-white to white microtomentum arranged as 2 patches, dorsal patch much smaller, a spot laterad of pedicel, ventral patch long, linear, length equal to combined length of pedicel and basal flagellomere. Gena high, eye-to-cheek ratio averaging

0.52. Thorax: Mesonotum mostly black, shiny, some specimens with faint, bronzish luster on scutum; scutum and scutellum with similar texture, both at most lightly granulose, bearing 2 pairs of marginal setae that arise from tubercles. Halter pale, whitish-yellow to yellow. Costal vein ratio averaging 0.64; vein M ratio averaging 0.58. Foretarsi black; hindbasitarsomere entirely dark coloured, blackish-brown to brown. Abdomen: Male terminalia: Length of epandrium + surstyli in posterior view 1.5 times width; lateral margins of surstylus straight to concave towards apex in posterior view, in lateral view distinctly and evenly tapered to narrowly rounded apex, curvature in lateral view anteroventrad, distinctly more so than curvature of epandrium; hypandrium short, curved in lateral view with anteromedial portion more or less parallel with basiphallus and tapered toward apex, dorsal portion (= fused pregonite) trapezoid, more than twice width of anteromedial portion; aedeagal apodeme distinctly enlarged toward attachment with hypandrium; postgonite evenly lunate in lateral view; distiphallus longer than basiphallus, gently curved along basal 2/3 in lateral view, recurved apically, lateral projections from base long, length equal to narrowed portion of aedeagal apodeme, at base of process with a short membranous lobe that bears a few finger-like serrations.

Distribution: Afrotropical Region: Angola, Cape Verde Islands, Ethiopia, Ghana, Kenya, Malawi, Mozambique, Nigeria, South Africa, Sudan, Tanzania, Yemen (including Socotra); Australasian/Oceanian Region: Guam, Hawaiian Islands. Oriental Region: India, Sri Lanka, Thailand, Vietnam; Palearctic Region: Afghanistan, Algeria, Bulgaria, Canary Islands, Egypt, Greece, Israel, Italy, Oman, UAE.

Genus *Trimerogastra* Hendel, 1914

*Trimerogastra* Hendel, 1914: 110. Type species: *Trimerogastra cincta* Hendel, 1914, original designation. Mathis & Zatwarnicki, 1995: 142 [world catalogue]; 2004: 89–108 [revision].

*Trimerogastra cincta* Hendel, 1914

Plate 26, Figures 105–108

*Trimerogastra cincta* Hendel, 1914: 111 [Taiwan. Anping; LT ♂ (designated by Mathis & Zatwarnicki, 2004: 97), DEI]. Cresson, 1925: 241 [discussion of status]; 1945: 51 [review]. Mathis & Zatwarnicki, 1995: 142 [world catalogue]; 2004: 97–100 [revision].

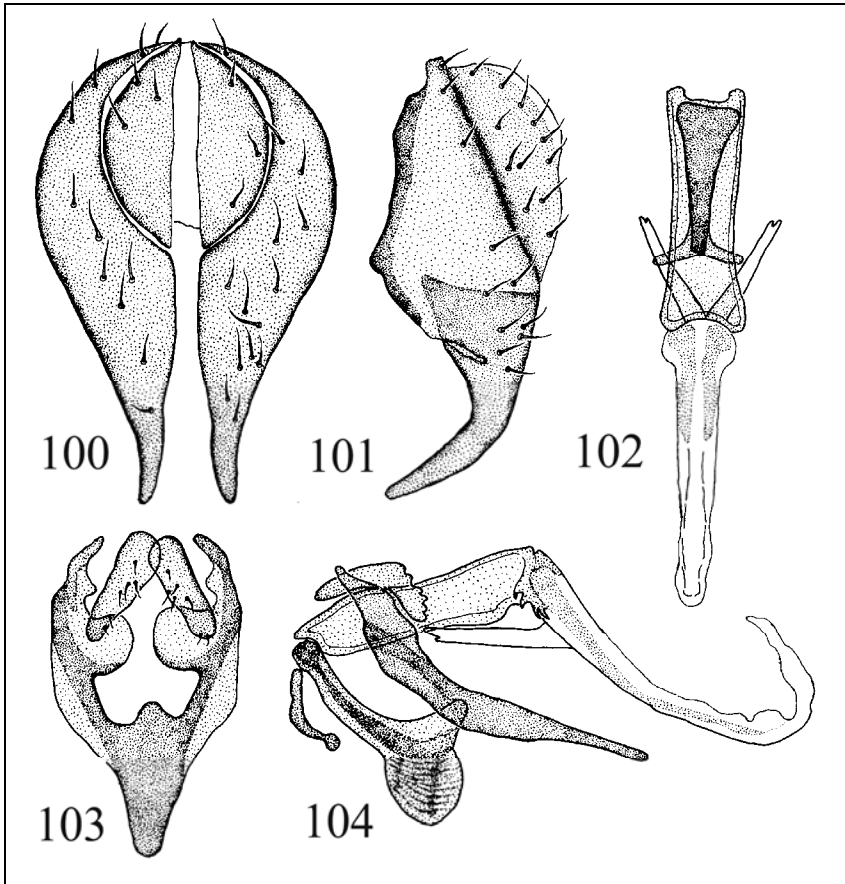
Specimens examined from the UAE: N of Ajman, mangrove, 25°25.7'N 55°30.1'E, 17♂, 5♀, 28.ii–13.iii.2010, WNM, TZ; 2♂, 2♀, 11–25.xi.2006, water trap, AvH. Khor Kalba, mangrove, 25°00.9'N 56°21.6'E, 13♂, 7♀, 4.iii.2010, WNM, TZ. Ar-Rafah, mangrove, 25°43.7'N 55°52.5'E, 2♂, 9.iii.2010, WNM.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small shore-flies, body length 1.35–1.90 mm. Head: Posterior fronto-orbital seta obliquely posterolatero-clinate to latero-clinate, length conspicuously longer than anterior proclinate seta; distance between anterior and posterior seta greater than distance between posterior ocelli. Arista bearing 3–4, short hairs, longest hair shorter than height of basal flagellomere. Gena relatively short, about 1/4 eye height and less than height of basal flagellomere; gena-to-eye ratio 0.25–0.28. Thorax: Prescutellar acrostichal seta present; scutellum broadly trapezoidal, wider than long, posterior margin relatively narrow, surface similar to scutum; apical setae long, length subequal to scutellar length. Vein R<sub>2+3</sub> shallowly arched, especially subapically, moderately short; length of costal section II about 1.4 times longer than section III; costal vein ratio 0.70–0.71; M vein ratio 0.44–0.48. Femora and tibiae black, essentially concolorous with katapisternum. Abdomen: Tergites 3–4 fasciate, anterior portion whitish grey microtomentose, posterior portion very sparsely microtomentose. Male terminalia (Figs 105–108): Epandrium in posterior view as an inverted U, rounded, in lateral



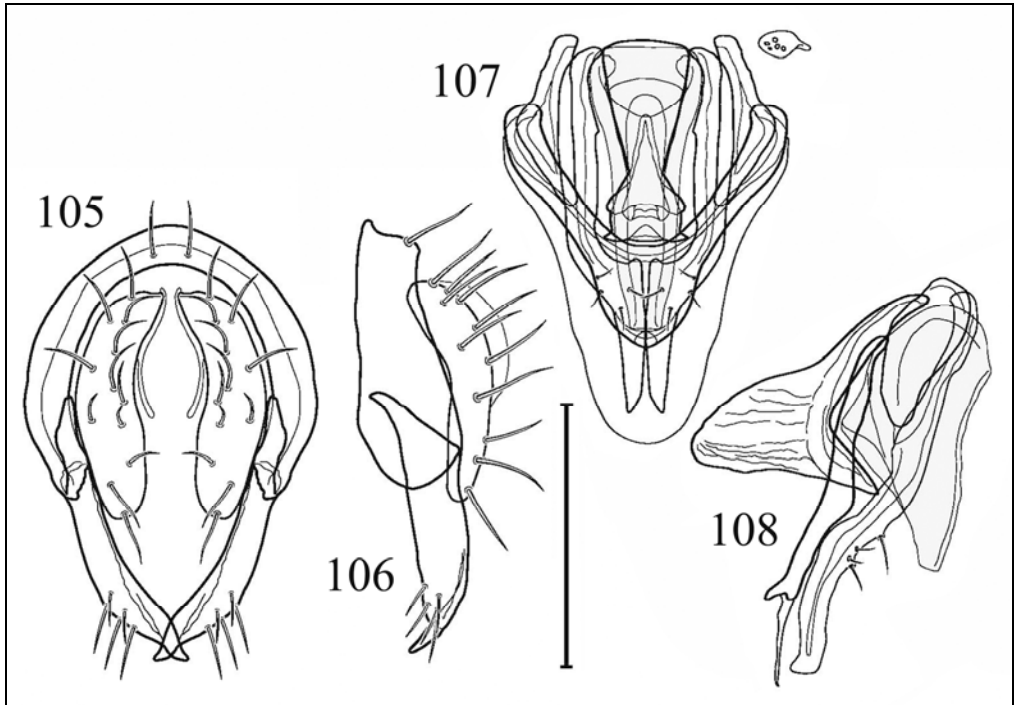
Plates 23–24. Habitus, anterolateral view. 23: *Athyroglossa* (*Parathyroglossa*) *hayliensis* Mathis & Zatwarnicki sp. nov.; 24: *Chlorichaeta tuberculosa* Becker. Photographs: T. Zatwarnicki.





Figures 100–104. Male terminalia of *Chlorichaeta tuberculosa* Becker. 100: Epandrium, cerci, and surstylus, ventral view; 101: Same, lateral view; 102: Aedeagus and phallapodeme, ventral view; 103: Pregonite, postgonite and hypandrium, ventral view; 104: Aedeagus, phallapodeme, ejaculatory apodeme, pregonite, postgonite and hypandrium, lateral view.

view gradually becoming wider ventrally, ventral margin rounded; cercus in posterior view semihemispherical, slightly more sclerotized dorsomedially and with a dorsomedial, short projection, otherwise parallel-sided, shallowly curved; surstylus in posterior view long and narrow, as long as height of epandrium, apical 1/3 turned medially, this portion bearing longer setulae, acutely pointed apically; aedeagus in ventral view with base about twice width of apex, apex truncate, in lateral view wide basally, apical half tapered to narrow and truncate apex; phallapodeme in lateral view with extended keel asymmetrically triangular, rounded, projected erectly; postgonite in lateral view elongate, narrow, step-curved medially, bearing 3–4 setulae at midlength, apex truncate, in ventral view curved medially just beyond midlength, more sharply angulate medially; pregonite linearly triangular in ventral view, irregularly oval in lateral view; hypandrium in ventral view V- to Y-shaped, with wide extended anteromedial process and narrow, posterolateral arms, in lateral view elongate and narrow.



Figures 105–108. Male terminalia of *Trimerogastra cincta* Hendel. 105: Epandrium, cerci, and surstylus, posterior view; 106: Same, lateral view; 107: Aedeagus (shaded), phallapodeme, gonites, hypandrium, ejaculatory apodeme, ventral view; 108: Same (not including ejaculatory apodeme), lateral view. Scale bar = 0.1 mm.

Remarks: Although originally described from specimens collected in Taiwan, this species is much more widespread, as noted below.

Distribution: Afrotropical Region: Cameroon, Nigeria, Sierra Leone; Australasian/Oceanian Region: Belau, Hawaiian Islands (Kahoolawe, Oahu, Midway); Nearctic Region: United States (Maryland, Virginia); Neotropical Region: Brazil (Paraná), Panama; Oriental Region: India (Tamil Nadu), Malaysia, Singapore, Sri Lanka, Taiwan, Thailand; Palaeartic Region: Israel, Japan (Hokkaido, Honshu, Shikoku, Kyushu), and now UAE.

Tribe **Hecamedini** Mathis, 1991

#### Key to the genera of Hecamedini from the UAE

- 1 Oral opening large, gaping; only reclinate fronto-orbital seta present; anteroventral margin of face essentially flat, at same level with rest of oral margin; clypeus broad; katepisternal seta lacking ..... *Elephantinosoma* Becker
- Oral opening narrow; usually both a reclinate and proclinate fronto-orbital seta present; anteroventral margin of face emarginate with narrow clypeus exposed within facial emargination; katepisternal seta usually present ..... 2
- 2 Scutellum bearing 3 marginal setae; postgenal margin sharp; gena high, over 1/2 eye height ..... *Hecamede* Haliday

- Scutellum bearing 2 marginal setae; postgenal margin rounded; gena short, less than 1/2 eye height ..... **3**
- 3** Palpus mostly yellow; prescutellar acrostichal setae greatly reduced or absent; 1 katapisternal seta; face with 1 large lateral seta ..... *Eremotrichoma* Giordani Soika
- Palpus blackish; 1 pair of prescutellar acrostichal setae, well developed; 2 katapisternal setae, the 2nd seta smaller and inserted below larger seta; face with 2 or more large lateral setae ..... *Allotrichoma* Becker

Genus *Allotrichoma* Becker, 1896

*Allotrichoma* Becker, 1896: 121. Type species: *Hecamede lateralis* Loew, 1860, by original designation]. Cogan, 1984: 131–132 [Palaeartic catalogue]. Mathis & Zatwarnicki, 1995: 149–154 [world catalogue]. Krivosheina & Zatwarnicki, 1997: 291–310 [revision of some Old World species].

### Key to the species of *Allotrichoma* from the UAE

- 1** Cerci lyre-like with laterally bowed, elongate, narrow, ventral extensions *A. biroi* Cresson
  - Cerci more robustly developed, fused with ventral margin of epandrium and perhaps with surstyli, not bowed laterally ..... **2**
- 2** Gonite L-shaped with basal, digitiform extension *A. hatta* Mathis & Zatwarnicki **sp. nov.**
  - Gonite with elongate, funnel-like shape ..... *A. choanum* Mathis & Zatwarnicki **sp. nov.**

*Allotrichoma (Allotrichoma) biroi* Cresson, 1929

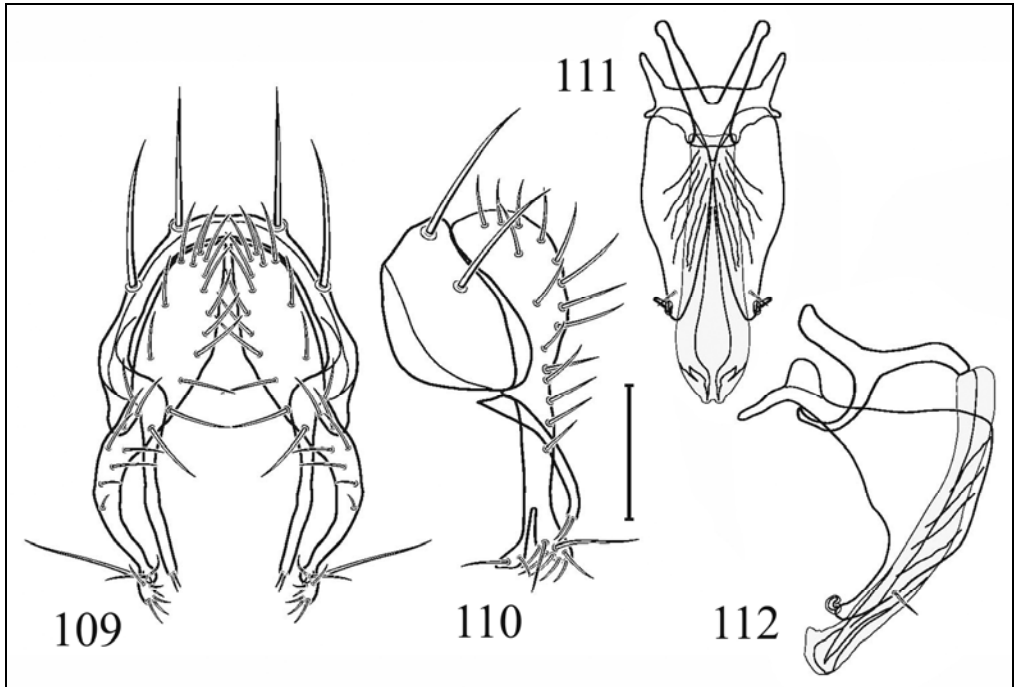
Figures 109–112

*Allotrichoma biroi* Cresson, 1929: 174 [India. Bombay; HT ♂, HNHM]. Mathis & Zatwarnicki, 1995: 150 [world catalogue]. Krivosheina & Zatwarnicki, 1997: 297–299 [revision]. Dawah & Abdullah 2006: 390 [fauna, Saudi Arabia].

*Allotrichoma (Allotrichoma) ralloi* Canzoneri, 1987: 87 [Sudan. Omdurman; HT ♂, MCV]. Krivosheina & Zatwarnicki, 1997: 297 [synonymy].

*Allotrichoma abiatense* Canzoneri, 1988: 3 [Ethiopia. Lake Abiata, Addis Ababa (83 mi S); HT ♂, ZIL]. Krivosheina & Zatwarnicki, 1997: 297 [synonymy].

Specimens examined from the UAE: Al-Ain, truck road, 210 m, 24°05.4'N 55°37.7'E, 1♂, 16.ii.2010, WNM. Al-Ain, Mubazzarah, hot spring, 24°06.4'N 55°44.8'E, 2♂, 16.iii.2010, WNM. Al-Ajban, 245 m, 24°35.8'N 55°00.2'E, 5♂, 15.iii.2010, WNM; 1♂, 10–17.x.2005, Malaise trap, AvH (MNBC); vegetable garden, 2♂, 1.iii.2006, JCD. Ajman, industrial area, 25°21.8'N 55°28.4'E, 13♂, 12♀, 10–17.iii.2010, WNM, TZ. Desert Farm, 25°07.9'N 55°45.1'E, 3♂, 12.iii.2008, JHS. Dubai, Mushrif Park, 25°12.9'N 55°26.7'E, 1♂, 23.ii.2006, JCD. Hatta dam, 365 m, 24°47.7'N 56°06.3'E, 11♂, 3♀, 1.iii.2010, WNM, TZ. 7 km S of al-Jazirat al-Hamra, 25°39.6'N 55°45.1'E, 1♂, 1.xii.2004, yellow water trap, AvH; Kalba, beach, 25°06'N 56°21.5'E, 1♂, 3.iii.2010, TZ. 2 km S of Khor Kalba, mangroves, 25°06'N 56°22'E, 1♂, 26.ii.2006, JCD. Masafi, farm, 25°18.9'N 56°07.8'E, 1♂, 17.iii.2008, JHS. Ra's al-Khaimah, 25°46'N 55°53.6'E, 3♂, 13.iii.2010, WNM. Ra's al-Khaimah, farm, 25°47.9'N 56°04.3'E, 3♂, 16.iii.2008, JHS. Sharjah, 25°21.8'N 55°26.2'E, 3♂, 8.iii.2010, WNM. Sharjah Desert Park, 25°16.9'N 55°41.4'E, 2♀, 28.ii.2006, JCD; 3♂, 6–28.xii.2006, pitfall trap, AvH. Sharjah National Park, 25°18.9'N 55°32.2'E, 3♂, 12.iii.2008, JHS. Wadi Asimah, 435 m, 25°24.1'N 56°08.2'E, 10♂, 1♀, 8.iii.2010, WNM, TZ. Wadi Bih, dam, 115 m, 25°48'N 56°04.4'E, 3♂, 9.iii.2010, WNM. Wadi Hayl, 245 m, 25°04.9'N 56°13.5'E, 11♂, 6.iii.2010, WNM; 11♂, 15.iii.2008, JHS. Wadi Maidaq, 25°19.7'N 56°07.2'E, 3♂, 15.iii.2008, JHS. Wadi Maidaq, 390 m, 25°20.8'N 56°05.5'E, 9♂, 3.iii.2010, WNM; 3♂, 27.vi–29.vii.2006, yellow water traps, AvH. Wadi Safad, 140 m, 25°13.3'N 56°18.3'E, 5♂, 1♀, 11.iii.2010, WNM, TZ. Wadi Shawkah, reservoir, 25°06.4'N 56°02.7'E, 30♂, 10–14.iii.2008, JHS; road, 265 m, 29♂, 27.ii.2010, WNM; reservoir, 300 m, 33♂, 2♀, 27.ii.2010, WNM, TZ. Wadi al-Sidr, farm, 25°24.7'N 56°05.1'E, 1♂, 17.iii.2008, JHS. Wadi Wurayah, 210 m, 25°23.9'N 56°16.2'E, 2♂, 17.iii.2010, WNM.



Figures 109–112. Male terminalia of *Allotrichoma (Allotrichoma) biroi* Cresson. 109: Epandrium, cerci, surstylus, posterior view; 110: Same, lateral view; 111: Aedeagus, phallapodeme, gonite, hypandrium, ventral view; 112: Same, lateral view. Scale bar = 0.1 mm.

**Diagnosis:** This species is distinguished from congeners by the following combination of characters: Small shore-flies, body length 1.40–1.85 mm. Head: Frons and face golden grey; fronto-orbits and gena grey. Antenna black with grey microtomentum; arista bearing 4 dorsal rays. Medial facial carina above facial prominence shallow; labella broad, fleshy, shorter than mediproboscis; clypeus microtomentose, usually black. Gena-to-eye ratio 0.27. Thorax: Presutural supra-alar seta present. Pleural area lacking stripes. Wing with costal vein ratio 0.30–0.34; M vein ratio 0.41–0.45. Femora black with grey microtomentum; tibiae yellow with grey median band; tarsi yellow except for darkened apical tarsomeres. Abdomen: Tergites brownish grey. Male terminalia (Figs 109–112): Epandrium in posterior view angularly rounded on dorsal half, dorsum nearly flat; epandrium in lateral view with anterior and posterior margins curved, relatively wide dorsally; cercus in posterior view broadly pointed dorsomedially, gradually broadened ventrally then abruptly curved or arched laterally and ventrally as a slightly tapered, elongate, arched process that bears numerous moderately long setulae, with a shallow, subapical lobe, apex thumb-like; cercus in lateral view nearly straight, wider dorsally, ventral half nearly parallel-sided, apex broadened and moderately deeply bifurcate, bearing moderately long setulae; surstyli (ventral extensions of epandrium) in posterior view as parallel, narrow processes that bears 2 setulae on apical portion; surstylus in lateral view elongate, narrow, arched, nearly parallel-sided, apical portion bearing 2 short setulae anteriorly and apically; aedeagus in ventral view elongate, narrowly ovate, slightly

expanded toward apex, in lateral view elongate, somewhat lunate; phallapodeme in lateral view narrowly triangular, as 3 prongs from core, keel 3 times longer than wide; gonite in ventral view narrowly triangular, tapered from base to apex, narrowly rounded apically and bearing a tiny, curved process and a subapical setula, in lateral view widely triangular, wide basally, gently but distinctly arched, more so apically, tapered to apex, apex narrowly rounded and bearing a tiny, curved process.

Distribution: Oriental Region: India; Palaearctic Region: Israel, Oman, Saudi Arabia, Sudan, and now UAE.

*Allotrichoma (Allotrichoma) choanum* Mathis & Zatwarnicki **sp. nov.**

Plate 25, Figures 113–117

Type material: The holotype male is labelled “U. Arab Emirates. Wadi Hayl (25°04.9'N, 56°13.5'E; 245 m), 6 Mar 2010[,] Wayne N. Mathis/USNM ENT 00118294 [plastic bar code label]/HOLOTYPE ♂ *Allotrichoma (Allotrichoma) choanum* Mathis & Zatwarnicki USNM [red].” The holotype is double mounted (minuten pin in a plastic block), is in excellent condition, and is deposited in the USNM.

Six paratypes (6♂, CTZ, USNM) bear the same locality label data as the holotype or have T. Zatwarnicki as the collector. One other paratype as follows: 1♂, Khor Kalba near tunnel, 24°59'N 56°14'E, 3–18.v.2006, light trap, AvH.

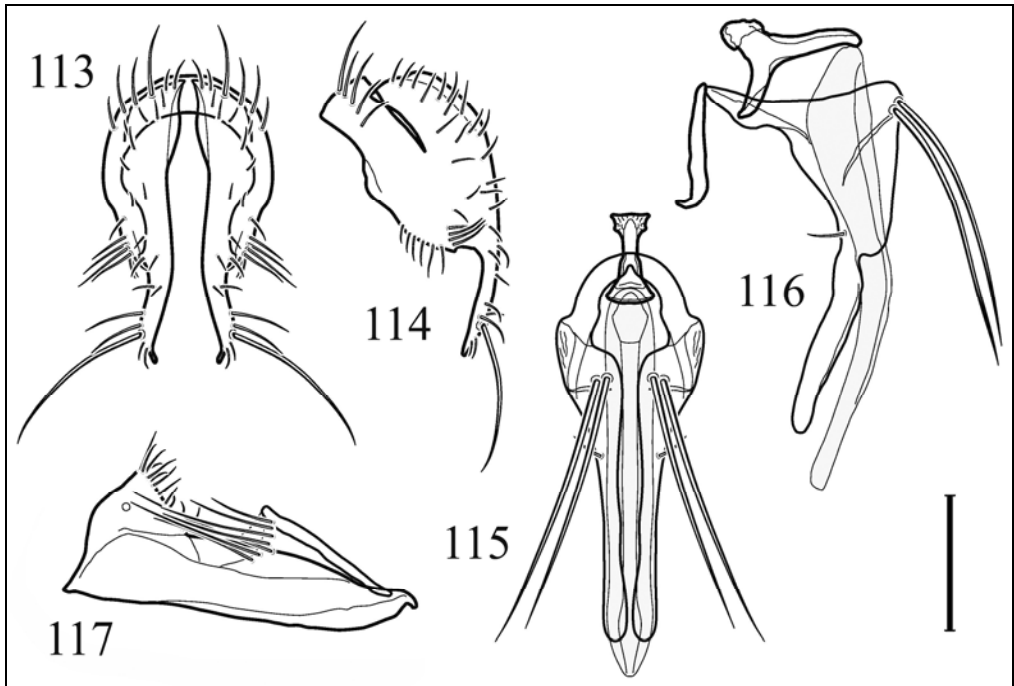
Type locality: United Arab Emirates. Khor Kalba (24°59'N 56°14'E; near tunnel; light trap).

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small shore-flies, body length 1.25–1.40 mm. Head: Medial facial carina above facial prominence shallow; labella broad, fleshy, shorter than mediproboscis; clypeus microtomentose, usually grey. Thorax: Presutural supra-alar seta present. Wing with costal vein ratio 0.37–0.40; M vein ratio 0.38–0.41. Abdomen: Tergites greyish-brown, becoming grey laterally and on underside. Male terminalia (Figs 113–117): Epandrium in posterior view as a narrow, inverted U, in lateral view rectangular dorsally, ventrally fused with ventrolateral margin of cercus; cercus in posterior view elongate, narrow, widest sub-basally, medial margin shallowly sinuous, lateral margin slightly produced at midheight as a shallow, obtusely angulate point, apically with narrow, thinly digitiform apex, in lateral view with posterior margin somewhat evenly arched, apical 1/3 much narrowed, parallel-sided, acutely pointed apically, bearing a few shorter setulae and at least one elongate setula; aedeagus in lateral view elongate, narrow, obtusely angulate at midlength, narrowly funnel-shaped, apical half parallel-sided, blunt at apex, in ventral view elongate, tubular, lateral margins parallel-sided, pointed apically; phallapodeme in lateral view trigonal with sides excavated, producing digitiform extensions, keel narrowly developed, in ventral view expanded at each end, medial 2/3 narrow; gonite in lateral view narrowly triangular, much longer than wide, posterobasal angle bearing two elongate setulae, a notch at midlength along posterior margin, anterior margin at midlength with a short setula, in ventral view elongate, wider basally, each extension narrow, parallel-sided; hypandrium in lateral view narrow, length not greater than maximum width of phallapodeme in lateral view.

Remarks: This species is closely related to *Allotrichoma schulleri* Canzoneri, 1982: 58 [Sierra Leone. Northern Province: Bumbuna; HT ♂, MCV] but is distinguished from it by the shape of structures of the male terminalia.

Etymology: The species epithet, ‘*choanum*’, is of Greek derivation and means funnel-like, referring to the narrow, funnel-like shape of the gonite and aedeagus.

Distribution: Only known from the UAE.



Figures 113–117. Male terminalia of *Allotrichoma (Allotrichoma) choanum* Mathis & Zatwarnicki sp. nov. 113: Epandrium, cerci, surstylus, posterior view; 114: Same, lateral view; 115: Aedeagus, phallapodeme, gonite, hypandrium, ventral view; 116: Same, lateral view; 117: Male sternite 5 flap and medial process, lateral view. Scale bar = 0.1 mm.

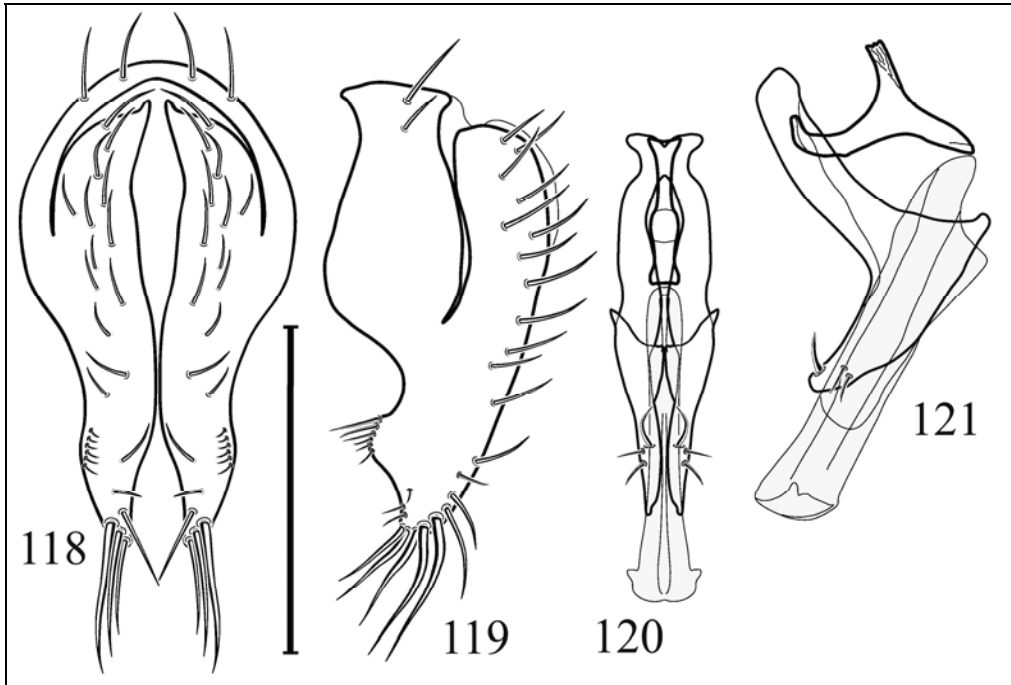
***Allotrichoma (Allotrichoma) hatta* Mathis & Zatwarnicki sp. nov.**

Figures 118–121

Type material: The holotype male is labelled “U. Arab Emirates. Hatta Dam (24°47.7'N, 56°06.3'E; 365 m), 1 Mar 2010[,] Wayne N. Mathis/USNM ENT 00118295 [plastic bar code label]/HOLOTYPE ♂ *Allotrichoma (Allotrichoma) hatta* Mathis & Zatwarnicki USNM [red].” The holotype is double mounted (minuten pin in a plastic block), is in excellent condition, and is deposited in the USNM. One paratype (1♂, USNM) bears the same locality label data as the holotype. Two other paratypes as follows: 2♂, Wadi Shawkah, 300 m, reservoir, 25°06.3'N 56°02.8'E, 27.iii.2010, WNM, TZ.

Type locality: United Arab Emirates. Hatta dam (24°47.7'N 56°06.3'E; 365 m).

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small shore-flies, body length 1.45 mm. Head: Medial facial carina above facial prominence shallow; labella broad, fleshy, shorter than mediproboscis; clypeus microtomentose, usually grey. Thorax: Presutural supra-alar seta present. Wing with costal vein ratio 0.42–0.43; M vein ratio 0.40–0.46. Abdomen: Tergites brownish grey dorsally, becoming greyer laterally. Male terminalia (Figs 118–121): Epandrium, cerci and perhaps fused surstyli forming a robust complex; epandrium in posterior view ovate dorsally, lateral margins conspicuously arched and sinuous ventrally, ventral portion (? extension of cerci and perhaps surstyli) narrowed, forming robust extensions, these pointed apically and bearing 4–5 large setulae apically, in lateral view more or less rectangular with sinuous lateral margins; cercus fused ventrolaterally with medial wall of cercal cavity, dorsal portion robustly developed, bearing numerous setulae; ventral portion of complex (? surstylus and cercus)



Figures 118–121. Male terminalia of *Allotrichoma (Allotrichoma) hatta* Mathis & Zatwarnicki sp. nov. 118: Epandrium, cerci, surstylus, posterior view; 119: Same, lateral view; 120: Aedeagus, phallapodeme, gonite, hypandrium, ventral view; 121: Same, lateral view. Scale bar = 0.1 mm.

robustly developed with broad anterior bulge bearing several short setulae, posterior margin very shallowly curved, from bulge to apex tapered to moderately narrowly rounded apex, apex bearing 4–5 larger setulae, some robustly developed; aedeagus in lateral view elongate, moderately narrow, straight, nearly parallel-sided, broadly rod-like, in ventral view elongate, lateral margins irregularly sinuous, apex cap-like; gonite in lateral view L-shaped with long, digitiform basal projection toward phallapodeme, other length elongate, tapered to point from more robust base, bearing 2–3 subapical, short setulae; phallapodeme in lateral view trigonal with sides excavated, producing digitiform extensions, keel narrowly developed, truncate apically, in ventral view (Fig. ?) slightly expanded at each end, lateral margin sinuous.

**Eymology:** The species epithet, ‘*hatta*’, is a noun in apposition and refers to the type locality, the site of a dam in the UAE.

**Distribution:** Only known from the UAE.

#### Genus *Elephantinosoma* Becker, 1903

*Elephantinosoma* Becker, 1903: 179. Type species: *Elephantinosoma chnumi* Becker, by designation of Cresson, 1946b: 249]. Cogan, 1984: 131 [Palaeartic catalogue]. Mathis & Deeming, 1987: 562–570 [revision]. Mathis & Zatwarnicki, 1995: 156 [world catalogue].

#### *Elephantinosoma chnumi* Becker, 1903

*Elephantinosoma chnumi* Becker, 1903: 180 [Egypt. “Insel Elephantine”; LT ♂ (designated by Mathis & Deeming, 1987: 567), ZMHU]. Cogan, 1984: 131 [Palaeartic catalogue]. Mathis & Deeming,

Plate 29, Figures 122–127

1987: 566–569 [revision]. Mathis & Zatwarnicki, 1995: 156 [world catalogue]. Kirk-Spriggs & McGregor, 2009 [biogeographic study, United Arab Emirates].

Specimens examined from the UAE: Al-Ain, truck road, 210 m, 24°05.4'N 55°37.7'E, 3♂, 16.iii.2010, WNM. Al-Ajban, 24°35.8'N 55°00.2'E, 1♂, 2♀, 1.iv–2.v.2006, Malaise trap, AvH. Ajman, industrial park, 25°21.8'N 55°28.4'E, 26♂, 15♀, 10.iii.2010, WNM, TZ. N of Ajman, mangrove, 25°25.7'N 55°30.1'E, 1♀, 13.iii.2010, WNM; 1♂, 2♀, 1.ix–22.x.2006, 2007, water trap, AvH. Desert farm, 25°07.9'N 55°45.1'E, 4♂, 1♀, 12.iii.2008, JHS. Kalba, beach, 25°06'N 56°21.5'E, 1♂, 3.iii.2010, TZ. Khor Fakkan, beach, 25°22.1'N 56°20.9'E, 7♂, 11.iii.2010, WNM. Sharjah Desert Park, 25°16.9'N 55°41.4'E; 5♂, 3♀, 6–28.xii.2006, pitfall trap, AvH. Wadi Shawkah, reservoir, 25°06.4'N 56°02.7'E, 1♂, 1♀, 10–14.iii.2008, JHS.

Diagnosis: Small to moderately small shore-flies, body length 1.80–2.65 mm. Head (Figs 122–124): Frons mostly light tan to brown, sometimes with fronto-orbits greyish to whitish grey. Antenna blackish; arista with 4–5 dorsal rays. Face mostly white to silvery white; dorsal facial carina concolorous with frons or slightly more golden. Gena concolorous with face. Thorax (Fig. 125): Mesonotum mostly concolorous with frons to dorsum or notopleuron, sometimes with darker stripes through major setal tracks (acrostichal and dorsocentral); area from postpronotum through notopleuron whitish grey; dorsum of anepisternum concolorous with mesonotum, otherwise pleura uniformly whitish grey. Wing with ratios as follows: Costal ratio averaging 0.41; vein M ratio averaging 0.43. Legs with femora mostly whitish grey, concolorous with pleura, tibiae slightly lighter, and tarsi yellowish except for apical 1–3 (some specimens with all tarsomeres except for basitarsomere dark coloured). Abdomen: Dorsum tergites 1 and 2 lightly tannish, remaining tergites light tannish grey to silvery grey depending on angle of view. Male terminalia (Figs 126–127): Epandrium with ventral apex more broadly pointed in posterior and lateral view.

Remarks: This species is very similar to *E. cogani* Mathis & Deeming, 1987, and is distinguished from the latter by the shape of the male terminalia, especially the more broadly rounded apices of the epandrium as seen in posterior and lateral views. In addition, the colour of abdominal tergites three through five of *E. chnumi* is duller, with a slight bluish tinge.

The colouration of the dorsum exhibits some age dimorphism, as noted previously for the genus generally. In addition, however, some specimens have distinct, darker brown stripes through the major setal tracks of the mesonotum. As the genitalia of these specimens do not differ from those that lack stripes and because we have not discovered other distinguishing characters, this variation is considered to be intraspecific.

Distribution: Afrotropical Region: Sudan; Palearctic Region: Afghanistan, Algeria, Canary Islands, Egypt, Israel, Morocco, UAE.

Genus *Eremotrichoma* Giordani Soika, 1956

*Elephantinosoma* Becker, in part, 1903: 179. Cresson, 1946b: 248–249 [review]. Cogan, 1980: 657 [Afrotropical catalogue].

*Allotrichoma* in part, Collin, 1949: 203–206. Cogan, 1984: 131 [Palearctic catalogue].

*Eremotrichoma* Giordani Soika, 1956b: 104. Type species: *Elephantinosoma perspiciendum* Becker, 1903, by original designation]. Mathis, 1986a: 131–137 [revision]. Mathis & Zatwarnicki, 1995: 156–157 [world catalogue].

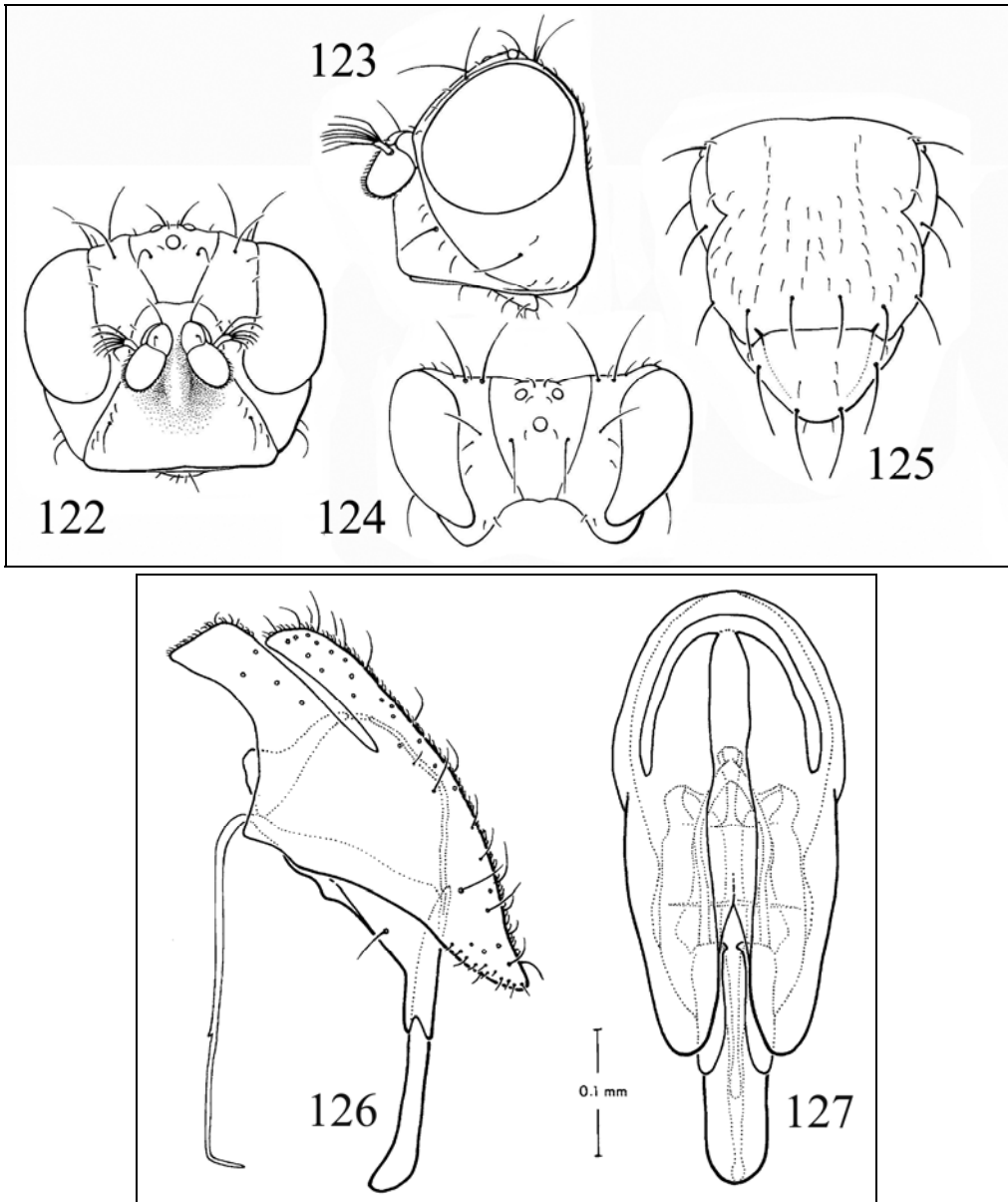
*Eremotrichoma perspiciendum* (Becker, 1903)

Plate 26, Figures 128–129

*Elephantinosoma perspiciendum* Becker, 1903: 180 [Egypt. “Insel Elephantine”; LT ♂ (designated by Mathis, 1986a: 133), ZMHU]; 1926: 95 [review; figures].

*Allotrichoma perspiciendum*. Cresson, 1929: 176 [generic combination]. Collin, 1949: 203–205 [discussion]. Cogan, 1984: 132 [Palearctic catalogue]. Mathis, 1986a: 132–133 [revision]. Mathis & Zatwarnicki, 1995: 157 [world catalogue].





Figures 122–127. *Elephantosoma chnumi* Becker. 122: Head, anterior view; 123: Same, lateral view; 124: Same, dorsal view; 125: Thorax, dorsal view. 126–127: Male terminalia. 126: Lateral view; 127: Ventral view. Scale bar = 0.1 mm.

*Eremotrichoma perspicendum*. Mathis & Zatwarnicki, 1995: 157 [generic combination]. Dawah & Abdullah, 2006: 389 [fauna, Saudi Arabia]. Kirk-Spriggs & McGregor, 2009 [biogeographic study, Oman].

Specimens examined from the UAE: Al-Ain, truck road, 210 m, 24°05.4'N 55°37.7'E, 4♂, 16.iii.2010, WNM. Al-Ain, Mubazzarah, hot spring, 24°06.4'N 55°44.8'E, 2♂, 16.iii.2010, WNM. Al-Ajban, 245 m, 24°35.8'N 55°00.2'E, 2♂, 15.iii.2010, WNM. Ajman, industrial area, 25°21.8'N 55°28.4'E, 11♂, 1♀, 10–17.iii.2010, WNM, TZ. N of Ajman, salt marsh, 25°25.9'N 55°29.4'E, 2♂, 16.ix–12.x.2006, water trap, AvH. Dubai, Mushrif Park, 25°12.9'N 55°26.7'E, 1♂, 2♀, 23.ii.2006, JCD. Kalba, beach, 25°06'N 56°21.5'E, 10♂, 1♀, 3.iii.2010, WNM, TZ. Khor Kalba, mangrove, 25°00.9'N 56°21.6'E, 2♂, 2♀, 4.iii.2010, WNM. Sharjah Desert Park, 25°16.9'N 55°41.4'E, 3♂, 3♀, 6–28.xii.2006, pitfall trap, AvH; 1♀, 28.ii.2006, JCD. Wadi Madaq, 25°20.8'N 56°05.5'E, 3♂, 1♀, 8.iii–8.v 2006, 2010, AvH, WNM (NMWC, USNM). Wadi Safad, 140 m, 25°13.3'N 56°18.3'E, 1♂, 11.iii.2010, WNM. Wadi Shawkah, road, 265 m, 25°06.3'N 56°01.6'E, 9♂, 27.ii–10.iii.2010, WNM. Wadi Wurayah, 210 m, 25°23.9'N 56°16.2'E, 1♂, 17.iii.2010, WNM.

Diagnosis: Small shore-flies, body length 1.20–1.90 mm. Head: Silvery-grey fronto-orbital band narrow, not much wider than an ocellus, its colouration contrasted with golden-tan facial colouration above and between antennal bases. Thorax: Mesonotal colouration light tan to slightly golden, gradually becoming more greyish ventrolaterally through postpronotum and notopleuron. Costal vein ratio 0.46; M vein ratio 0.49. Abdomen: Lateral margins of tergites 1–3 frequently pale, yellowish to faintly pinkish, otherwise tergites grey. Male terminalia (Figs 128'129): Surstylus bilobed, with deep ventromedial cleft, lateral lobe rounded, medial lobe becoming narrower and truncate apically, apex bearing 2 large apical setulae.

Remarks: Cresson (1929: 176) originally considered Becker's placement of this species in *Elephantinosoma* to be incorrect and transferred the species to *Allotrichoma*. The change was based on specimens Cresson studied from the collection in Wien that bore Becker's determination label "Eleh. chnumi Beck. det Becker." Almost two decades later, however, Cresson (1946b: 250) examined specimens of what he considered to be the "true *perspiciendum*" and renamed his former *perspiciendum* as *Allotrichoma aegyptium*. Cresson's later correction was either unnoticed or unaccepted, and Collin (1949: 203–205) and Cogan (1984: 465) followed his earlier precedent and kept this species in *Allotrichoma*. Regardless of the misidentification and its generic placement on that basis, this species is assigned to *Allotrichoma*. This species is distinguished from subcongeners by the narrow silvery-grey fronto-orbits, which contrast with dorsal golden-tan facial colouration, light tan mesonotum, and bilobed surstylus of the male.

Distribution: Afrotropical Region: Sudan; Palaearctic Region: Algeria, Egypt, Israel, Saudi Arabia, and now UAE.

### Genus *Hecamede* Haliday, 1937

*Hecamede* Haliday, in Curtis, 1837: 281 [published in synonymy; first made available by use of Haliday, 1839: 221, 224; type species: *Notiphila albicans* Meigen, 1830, by monotypy]. Cogan, 1984: 130–131 [Palaearctic catalogue]. Mathis, 1993: 1–46 [revision]. Mathis & Zatwarnicki, 1995: 157–160 [world catalogue].

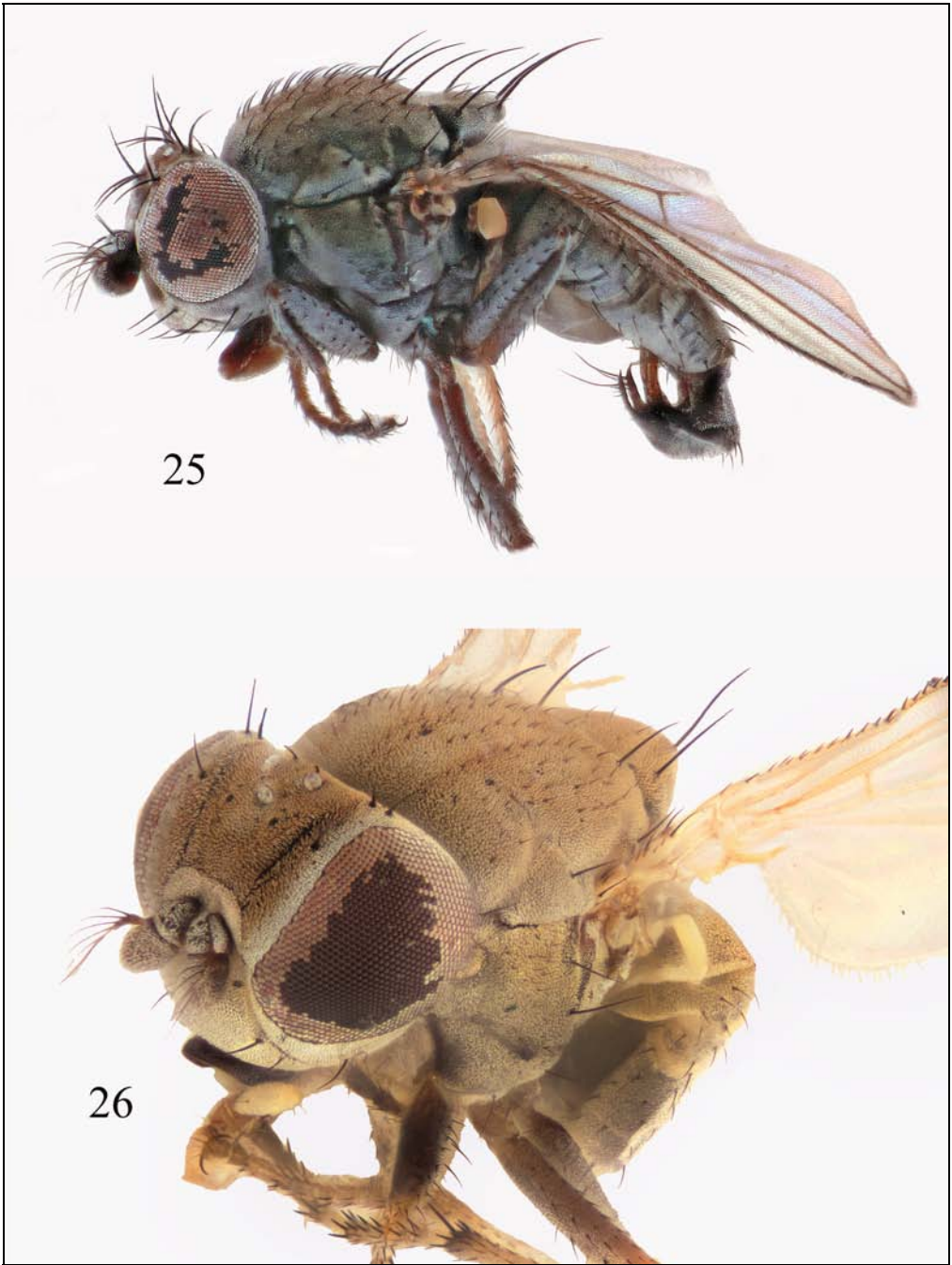
### Key to the species of *Hecamede* from the UAE

- 1 Proclinate fronto-orbital setae 2; gena with 1 black seta near middle .. *H. africana* Mathis
- Proclinate fronto-orbital seta 1; gena either with a few to several black setae, scattered, or bare of setae ..... *H. maritima* Mathis

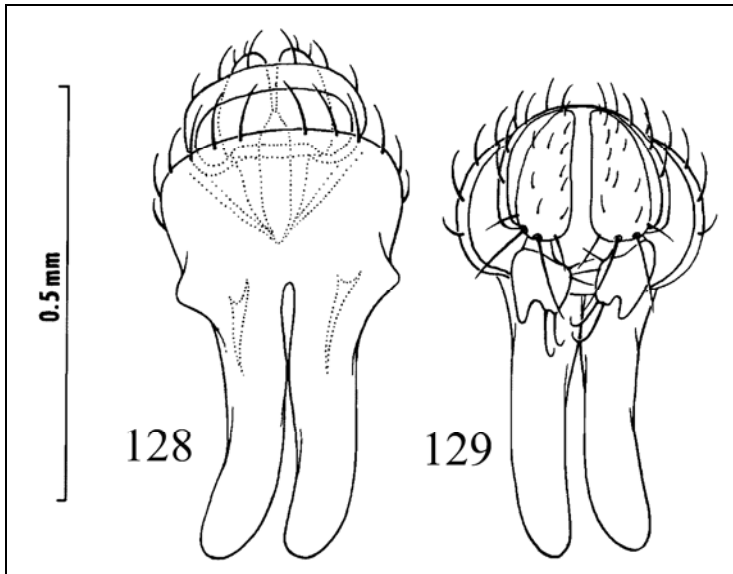
### *Hecamede (Hecamede) africana* Mathis, 1993

Figures 130–131

*Hecamede (Hecamede) africana* Mathis, 1993: 7 [Kenya. Mombasa (100 km N); HT ♂, USNM]. Mathis & Zatwarnicki, 1995: 157 [world catalogue].



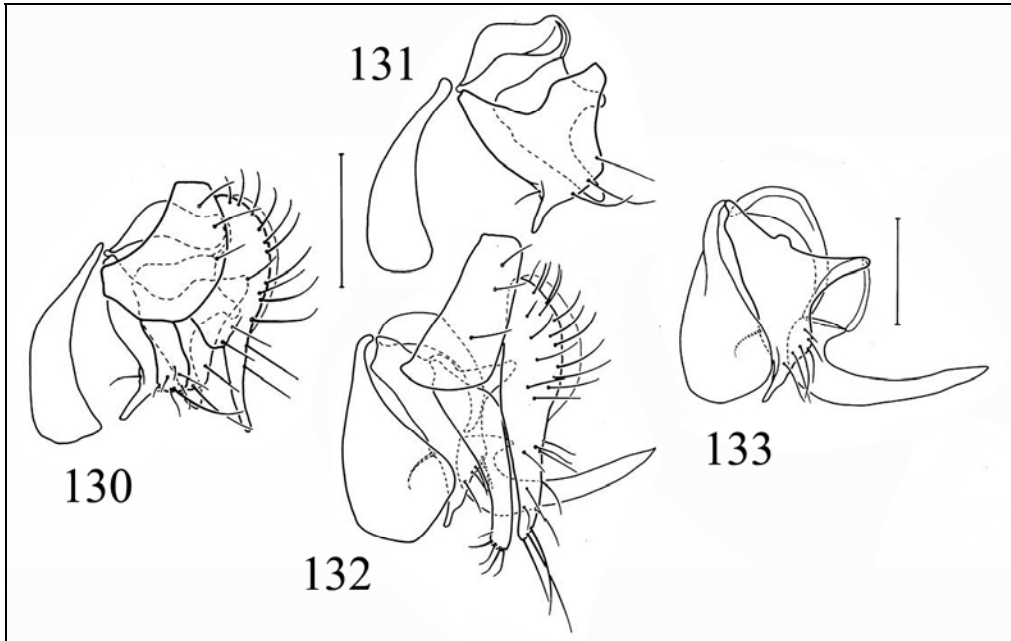
Plates 25–26. Habitus, anterolateral view. 25: *Allotrichoma (Allotrichoma) choanum* Mathis & Zatwarnicki sp. nov.; 26: *Eremotrichoma perspicendum* (Becker). Photographs: T. Zatwarnicki.



Figures 128–129. Male terminalia of *Eremotrichoma perspicendum* (Becker). 128: Dorsal view; 129: Ventral view. Scale bar = 0.5 mm.

Specimens examined from the UAE: N of Ajman, 25°25.9'N 55°29.4'E, 3♂, 3♀, 11–25.xi.2006, water trap, AvH. Fujairah, coastal salt marsh, 25°12.8'N 56°21.5'E, 1♀, 22.ii.2006, light trap, JCD. Ar-Rafah, mangrove, 25°43.7'N 55°52.5'E, 1♂, 9.iii.2010, TZ. Wadi Safad, 25°13.1'N 56°17.6'E, 1♀, 31.i–21.ii.2006, light trap, AvH.

Diagnosis: This species is distinguished from congeners, especially those of the *albicans* group by the following combination of characters: Small to moderately small shore-flies, length 1.65–2.40 mm. Head: Fronto-orbits, most of face, and gena silvery grey, densely microtomentose, microtomentum slightly less lustrous than that of pleura; ocellar triangle large, greyish tan to slightly golden, usually slightly darker laterally at vertex; mesofrons more thinly invested with microtomentum than fronto-orbits, light brown to greyish-brown towards vertex, becoming mostly orange to reddish-orange toward anterior margin; 1 reclinate and 2 proclinate fronto-orbital setae; reclinate seta aligned with and inserted mesad to posterior proclinate seta; anterior proclinate seta inserted slightly anterior to alignment of anterior setae of ocellar triangle. Antenna mostly yellowish-orange to orange; basal flagellomere with some brown colouration toward base, near insertion of arista; arista bearing 3 dorsal branches. Face with 3 lateral setae, each arising from subshiny, bare, shallow tubercle; facial prominence bare at apex. Gena with pale, indistinct setulae except for one black seta inserted near middle slightly above midheight; eye-to-cheek ratio averaging 0.48. Clypeus yellow to greyish-yellow, very thinly invested with microtomentum. Thorax: Scutum and disc of scutellum mostly greyish tan; lateral margins of scutum, beginning slightly above level of notopleuron, becoming grey; prescutellar setae well developed, distinct; pleural sclerites grey and microtomentum with faint shiny luster; anepisternum bearing numerous setulae on dorsal half toward posterodorsal angle. Coxae mostly greyish, with some yellow colouration ventrally; trochanters mostly yellow; apices of femora mostly yellow; forefemur mostly black anteriorly, grey posteriorly; mid- and hindfemora greyish anteriorly, posterior surface blackish; tibiae yellow with very thin investment of white microtomentum;



Figures 130–133. Male terminalia of *Hecamede*. 130: Male terminalia of *Hecamede (Hecamede) africana* Mathis, lateral view; 131: Internal structures of the male genitalia, lateral view; 132: Male terminalia of *Hecamede (Hecamede) maritima* Mathis, lateral view; 133: Internal structures of the male genitalia, lateral view. Scale bar = 0.1 mm.

tarsomeres mostly yellow except for apical two, which are dark brown. Wing with costal vein ratio averaging 0.46; M vein ratio averaging 0.54; last section of vein M shallowly sinuous. Abdomen: Male terminalia (Figs 130–131): Tergite 5 largely membranous, anterior margin with lateral, spherical apodemes; epandrium a dorsal band, becoming broader ventrally; surstylus in lateral view moderately long, digitiform, parallel-sided, bluntly rounded apically, apex bearing 4–6 setulae; cercus moderately long, length of main portion subequal to height of epandrium in lateral view, bearing a very long, narrow process medially that extends ventrally; gonite more or less triangular in shape in lateral view, with an anteroventral, narrow process, bearing 3–4 setulae ventrally and a subapical seta anteriorly; aedeagal apodeme sinuous, broader in lateral view toward middle; aedeagus angulate, curved at a right angle, broad basally, narrowed and tapered apically; hypandrium relatively narrow, shallowly rounded anteriorly.

Distribution: Afrotropical Region: Kenya; recorded now for the first time from the Palaearctic Region from the UAE.

***Hecamede (Hecamede) maritima* Mathis, 1993**

Plate 28, Figures 132–133

*Hecamede (Hecamede) maritima* Mathis, 1993: 26 [Egypt. Sinai: Nabk; HT ♂, USNM]. Mathis & Zatwarnicki, 1995: 159 [world catalogue].

Specimens examined from the UAE: N of Ajman, coast, 25°27'N 55°28.4'E, 15♂, 11♀, 11.iii.2008, JHS; water trap, 3♀, 11–25.xi.2006, AvH. Fujairah, coastal salt marsh, 25°12.8'N 56°21.5'E, 1♀, 22.ii.2006, light trap, JCD. Kalba, beach, 25°06'N 56°21.5'E, 1♂, 3.iii.2010, WNM. Khor Fakkan, beach, 25°22.1'N 56°20.9'E, 5♂, 1♀, 11.iii.2010, WNM, TZ. Khor Kalba, mangrove, 25°00.9'N

56°21.6'E, 1♂, 4.iii.2010, WNM. Ar-Rafah, mangrove, 25°43.7'N, 55°52.5'E, 10♂, 1♀, 9–13.iii.2010, WNM, TZ. S of Ra's al-Khaimah, coast, 25°43.7'N 55°52.4'E, 1♂, 3♀, 11.iii.2008, JHS. Qurayya, beach, 25°13.57'N 56°21.49'E, 1♂, 13.iii.2008, JHS. Sharm, beach, 25°28.9'N 56°21.7'E, 1♀, 17.iii.2010, WNM. Um al-Quwain, park at beach, 25°35.4'N 55°34'E, 6♂, 18.iii.2008, JHS; Um al-Quwain, beach, 25°31.5'N 55°31.5'E, 5♂, 12♀, 18.iii.2008, JHS; beach, 19♂, 2♀, 28.ii–15.iii.2010, WNM, TZ.

Diagnosis: This species is distinguished by congeners by the following combination of characters: Proclinate, fronto-orbital seta 1, inserted anterolaterad of reclinate seta; gena with 1 larger and several smaller black setae; forefemur lacking a row of setae along anteroventral surface; forebasitarsus lacking black setae at base of posteroventral surface; tergite 5 of male appearing bare or at most with sparse, inconspicuous cuticular microtrichia, and the shape of the structures of the male terminalia, especially the surstylus and gonite. Small to moderately small shore-flies, body length 1.50–2.90 mm. Head: Fronto-orbits and ocellar triangle densely microtomentose, grey; mesofrons, except for ocellar triangle, sparsely microtomentose, anterior portion mostly yellowish to reddish-orange; 1 proclinate fronto-orbital seta inserted anterolaterad of reclinate seta. Antenna mostly yellowish-orange to orange; basal flagellomere mostly yellowish but with some brownish colouration toward base on dorsal surface, near insertion of arista; arista bearing 3–4 dorsal branches. Face densely microtomentose, whitish grey to silvery grey, bearing 3 lateral setae, each arising from subshiny, bare, shallow tubercle, sometimes with a smaller 4th seta ventrad to other setae; facial prominence bare at apex, bare area relatively small, usually less in diameter than width of pedicel. Gena high, gena-to-eye ratio averaging 0.40; densely microtomentose, concolorous with face, bearing 1 larger and a few to several smaller black setae. Clypeus black with moderate to dense investment of grey microtomentum. Thorax: Scutum and disc of scutellum mostly greyish tan with some faint golden luster; lateral margins of mesonotum slightly greyer, becoming progressively more so ventrad through notopleural area or farther onto the dorsum of the anepisternum; pleural sclerites grey and microtomentum with faint shiny luster; anepisternal setulae mostly on dorsal 1/3, occupying an area that is more or less triangular, with a line of setulae to ventral portion of pleuron where several more setulae are inserted. Legs with coxae, trochanters, and femora mostly grey; forefemur lacking row of setae on anteroventral surface, mostly blackish on anterior surface, mostly grey posteriorly; mid- and hindfemora greyish anteriorly, posterior surface blackish; tibiae yellow with very thin investment of whitish microtomentum; forebasitarsomere lacking black setae to base of posteroventral surface; tarsomeres yellowish except for apical 1–2, these dark brown. Wing with costal vein ratio averaging 0.35; M vein ratio averaging 0.50; last section of vein M very shallowly sinuous. Abdomen: Male terminalia (Figs 132–133): Tergite 5 with anterior 3/4 to 7/8 more lightly sclerotized and bearing numerous, evenly scattered spicules, from dorsal view with anterior margin broadly bifid, posterior 1/4–1/8 as a sclerotized band bearing 8–11 setae along posterolateral margin, with 2 globular apodemes anterobasally; epandrium as a dorsal band, gradually enlarged posteriorly; surstylus in lateral view long and narrow, tapered toward ventral apex, posterior and anterior margins slightly curved, apex bearing 4–5 setulae; cercus long and narrow, length almost twice that of epandrium, bearing a conspicuously longer seta at posteroventral margin; gonite roughly triangular in shape, with a narrow connection above aedeagus, ventral angle as a narrowed, short, parallel-sided, blunt process; aedeagal apodeme L-shaped, with arms curved, better developed toward angle; aedeagus long and narrow, tapered gradually to apex, shaped like a pipe, with right angled curve at basal 1/4–1/3; hypandrium slightly emarginate anteriorly.

Distribution: Palaearctic Region: Egypt (Sinai), Israel, Oman, and now UAE.



Plates 27–29. Habitus, anterolateral view. 27: *Trimerogastra cincta* Hendel; 28: *Hecamede (Hecamede) maritima* Mathis; 29: *Elephantinosoma chnumi* Becker. Photographs: T. Zatwarnicki.

Tribe **Lipochaetini** Becker, 1896**Key to the genera of Lipochaetini from the UAE**

- 1 Eye pyriform, distinctly narrowed ventrally; gena short, less than 1/4 eye height; katepisternal seta present along the posterior margin, moderately well developed ..... *Glenanthe* Haliday
- Eye oval or round, not distinctly narrowed ventrally; gena high, 1/3 or more of eye height; katepisternal seta greatly reduced or lacking ..... *Homalometopus* Becker

Genus *Glenanthe* Haliday, 1839

*Hydrellia* (*Glenanthe*) Haliday, 1839: 404. Type species: *Hydrellia* (*Glenanthe*) *ripicola* Haliday, 1939, by monotypy.]. Walker, 1853: 258–259 [review].

*Glenanthe*. Loew, 1860: 16 [accorded generic status]. Cogan, 1984: 133 [Palaeartic catalogue]. Mathis & Zatwarnicki, 1995: 160–162 [world catalogue]. Zatwarnicki & Mathis, 2012: 418–443 [revision of Old World species].

*Glenanthe ripicola* (Haliday, 1939)

Plate 30, Figures 134–137

*Hydrellia* (*Glenanthe*) *ripicola* Haliday, 1839: 404 [Great Britain. Northern Ireland. Down: Holywood (muddy sea coast); ST (sex ?), NMI]. Walker, 1853: 259 [review].

*Glenanthe ripicola*. Haliday, 1855: 64 [generic combination]. Cogan, 1984: 133 [Palaeartic catalogue, in part]. Mathis & Zatwarnicki, 1995: 161 [world catalogue, in part]. Zatwarnicki & Mathis, 2012: 436–440 [revision].

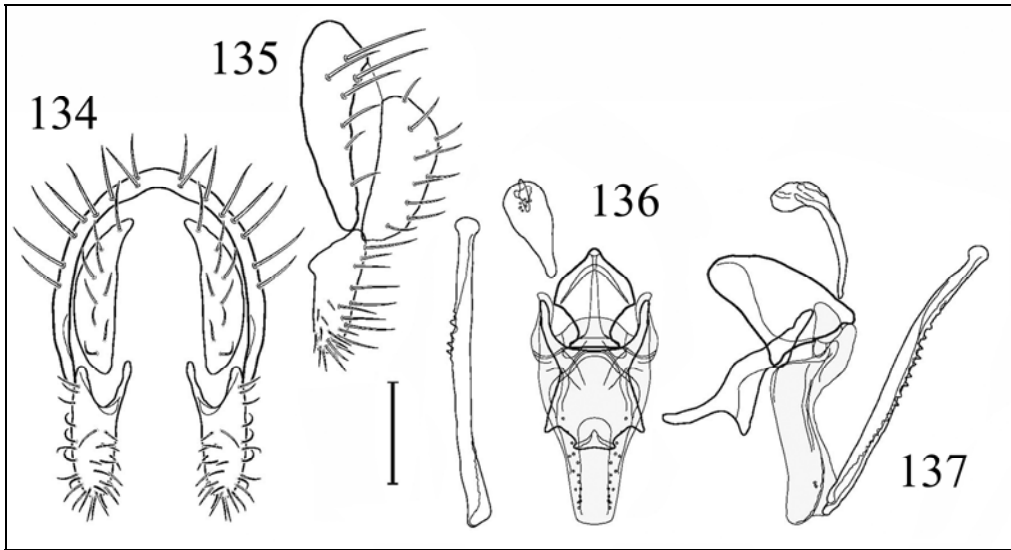
*Glenanthe fasciventris* Becker, 1903: 170. Papp, 1979: 99 [synonymy].

*Glenanthe iranica* Canzoneri & Rampini, 1992: 231. Mathis & Zatwarnicki, 1995: 160–161 [world catalogue]. Zatwarnicki & Mathis, 2012: 436 [revision; synonymy].

Specimens examined from the UAE and Oman: N of Ajman, dunes with mangrove, *Avicennia marina*, 25°25.7'N 55°30.1'E, 2♀, 11.iii.2008, JHS; mangrove, 19♂, 15♀, 28.ii–13.iii.2010, WNM, TZ; salt marsh, 5♂, 6♀, 16.ix–22.x.2006, water trap, AvH; 1 ex (without abdomen), 1–20.ix.2007, AvH; 11♂, 2♀, 16.ix–12.x.2006, AvH; 4♂, 2♀, 21.ix–25.x.2007, AvH; 1♂, 11–16.xi.2006, AvH; 1♀, 16–22.xi.2006, AvH. Khor Kalba, mangrove, 25°00.9'N 56°21.6'E, 2♂, 2♀, 4.iii.2010, WNM. NARC, near Sweihan, 24°24'N 55°26'E, 1♂, 14–28.iii.2005, light trap, AvH. OMAN: Shinas, mangrove creek, 24°44.3'N 56°27.6'E, at light, 2♀, 9.vi.1994, leg. M. D. Gallagher.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small shore-flies, body length 1.30–1.82 mm; generally dull-coloured, light brown to grey, microtomentose. Head: Frons largely tan to greyish tan with not evident medial vitta, frons becoming more greyish on fronto-orbits; pseudopostocellar setulae relatively large, about ½ length of ocellar setae, slightly divergent; ocellar setulae short, about 1/4 length of ocellar seta; ocellar seta, almost as long as lateroreclinate fronto-orbital seta, with 4–6 interfrontal setulae in irregular rows from anterior ocellus to anterior margin of frons; 1 large lateroreclinate and 2 shorter proclinate fronto-orbital setae, proclinate setae laterad of larger seta. Antenna generally yellow; basal flagellomere at most faintly darkened along dorsal margin; arista tan to brown, length subequal to combined length of pedicel and basal flagellomere. Face, including dorsal carina, mostly silvery white to cream white with some faint yellow dorsally; 2 dorsomost medial facial setae larger than ventral and ventrolateral setulae. Parafacial largely concolorous with face, some specimens lighter, more whitish. Gena-to-eye ratio 0.20–0.21. Clypeus microtomentose, dull, grey. Maxillary palpus elongate, narrow, yellow. Thorax: Mesonotum largely greyish tan, slightly contrasted with tan frons, with faint indication of anterior dorsocentral vittae in some specimens, becoming more greyish laterally through postpronotum and pleural areas. Acrostichal setulae in 2 rows, prescutellar pair well developed, length subequal to postermost dorsocentral seta. Wing





Figures 134–137. Male terminalia of *Glenanthe ripicola*. (Haliday). 134: Epandrium, cerci, and surstyli, ventral view; 135: Same, lateral view; 136: Internal structures (aedeagus, phallapodeme, hypandrium, ejaculatory apodeme), ventral view; 137: Same, lateral view. Scale bar = 0.1 mm.

largely hyaline, without darkened area or pale spots; wing ratio 0.46–0.47; costal vein ratio 0.20–0.23; M vein ratio 0.41–0.42. Legs uniformly yellow, only apical tarsomeres becoming brownish. Abdomen: Generally greyish tan to tannish grey, darker toward anterior margin of tergites, lacking conspicuous spots laterally. Male terminalia (Figs 134–137): Generally thinly developed, height almost twice width in posterior view; epandrium in posterior view as an inverted U, as wide as high, generally uniformly thinly developed, setulae longer toward dorsum, in lateral view wider dorsally, gradually tapered ventrally to rounded, ventral margin; cerci in posterior view lenticular, slightly thinner and medially curved dorsally, otherwise evenly developed, in lateral view with height about twice width, uniformly setulose; surstylus in posterior view digitiform, basal margin deeply incised, forming a narrow dorsomedial process, ventral margin rounded, in lateral view also digitiform, slightly wider basally, rounded ventral or apical margin; aedeagus in ventral view robustly V-shaped, base moderately incised, in lateral view wide basally, thereafter abruptly narrowed to parallel-sided apical 2/3, flap-like distiphallus more evident in lateral view, longer than basiphallus, narrowly elongate, bearing numerous saw-like teeth over much of length, apex knob-like; ejaculatory apodeme in lateral view club-like, narrow, shallowly curved ‘handle’ toward base of aedeagus, in ventral view drop-like to ovate; hypandrium in ventral view widely and moderately deeply incised basally, forming lateral, posteriorly directed, thin arms, lateral margins shallowly hourglass-like, anterior margin more prominent, truncate medially, in lateral view with anterior margin shallowly sinuous, posterior margin with pointed process just beyond midlength.

Remarks: This is the common, more southern species of *Glenanthe* in the Palearctic Region, occurring as far north as the German states of Thüringen and Sachsen-Anhalt and Northern Ireland. In Northern Germany (Island Borkum, Sülldorf) and Bulgaria (Shablensko and Varnensko Lake) we identified specimens of both species and *G. fuscineris* Becker, 1896,

apparently occurring together microsympatrically. How these species are partitioning the environment when occurring together is an interesting and inviting ecological question. Structures of the male terminalia of this species are characterized by being relatively short, especially the digitiform surstyli. An exception to this tendency, however, is the exceptional long aedeagal flap, which is greater in length and the aedeagus, unlike any congener.

Distribution: Oriental Region: India; Palaearctic region: Algeria, Belgium, Bulgaria, Croatia, Cyprus, Denmark, Egypt, France, Germany, Great Britain, Greece, Hungary, Iran, Ireland, Israel, Italy, Mallorca, Montenegro, Morocco, Oman, Portugal, Romania, Slovenia, Spain, Tunisia, Turkey, and now UAE.

Genus *Homalometopus* Becker, 1903

*Homalometopus* Becker, 1903: 175. Type species: *Homalometopus albiditinctus* Becker, by monotypy]. Mathis, 1984b: 251–262 [revision]. Cogan, 1984: 133 [Palaearctic catalogue]. Munari, 1988: 5–16 [revision]. Mathis & Zatwarnicki, 1995: 162 [world catalogue].

*Homalometopus albiditinctus* Becker, 1903

Plate 31, Figures 138–142

*Homalometopus albiditinctus* Becker, 1903: 175 [Egypt. “Port-Said”; LT ♀ (designated by Mathis 1984b: 255), ZMHU]. Mathis, 1984b: 254–255 [revision]. Cogan, 1984: 133 [Palaearctic catalogue]. Mathis & Zatwarnicki, 1995: 162 [world catalogue].

*Homalometopus* [sic] *albiditinctus*. Collin, 1949: 215 [discussion, Libya: Khamissa, Siwa].

Specimens examined from the UAE: Al-Ajban, 245 m, 24°35.8'N 55°00.2'E, 4♂, 15.iii.2010, WNM. Ajman, industrial area, 25°21.8'N 55°28.4'E, 4♂, 2♀, 10–17.iii.2010, WNM. N of Ajman, 25°25.7'N 55°30.1'E, 6♂, 8♀, 1.ix–22.xi 2006, 2007, water trap, AvH; dunes with *Avicennia marina*, 6♂, 7♀, 11.iii.2008, JHS; mangrove, 17♂, 4♀, 28.ii–13.iii.2010, WNM, TZ. Khor Kalba, mangrove, 25°00.9'N 56°21.6'E, 5♂, 1♀, 4 .iii.2010, WNM (USNM. Ar-Rafah, 25°43.7'N 55°52.5'E, 5♂, 17.iii.2009, water trap, leg. C. Schmid-Egger. Um al-Quwain, salt marsh, 25°32'N 55°32.2'E, 6♂, 2♀, 18.iii.2008, JHS.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small to moderately small shore-flies, body length 1.65–2.20 mm. Head: Frons mostly grey to very slightly brownish-grey. Thorax: Mesonotum mostly grey, some specimens with some brownish colouration. Prescutellar acrostichal setae lacking. Scutellum short, posterior margin bluntly rounded; scutellar ratio 0.75. Abdomen: Male terminalia: Epandrium with arms of inverted U more or less parallel; surstylus long and slender, over 5 times longer than wide, margins nearly parallel-sided in posterior and lateral views, only base enlarged, apex evenly rounded.

Remarks: This species is the most easily recognizable of the genus. Both sexes are distinguished from congeners most readily by the lack of a distinct pair of prescutellar acrostichal setae. The shape of the various structures of the male terminalia is also diagnostic. Distribution: Palaearctic Region: Algeria, Egypt, Israel, Libya, Spain, Tunisia, and now UAE.

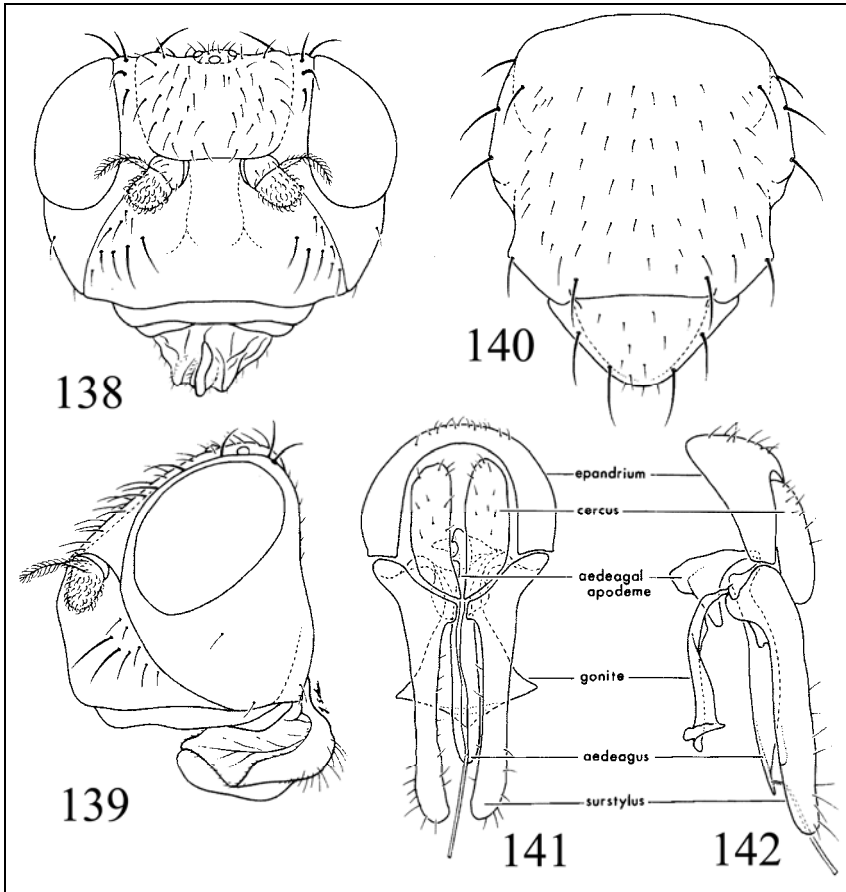
Tribe *Ochtherini* Dahl, 1959

Genus *Ochthera* Latreille, 1802

*Ochthera* Latreille, 1802: 462. Type species: *Musca manicata* Fabricius, 1794, by subsequent designation (Latreille, 1810: 444)]. Clausen, 1977: 451–529 [revision of Nearctic, Neotropical, and Palaearctic species]. Cogan, 1984: 161–162 [Palaearctic catalogue]. Mathis & Zatwarnicki, 1995: 143–149 [world catalogue].

Key to the species of *Ochthera* from the UAE

- 1 Sensory structure of male forebasitarsomere as a raised keel bearing 2 setae with spatulate bases on each side of keel ..... *O. pilimana* Becker



Figures 138–142. *Homalometopus albiditinctus* Becker. 138: Head, anterior view; 139: Head, lateral view; 140: Thorax, ventral view; 141: Male genitalia, ventral view; 142: Male genitalia, lateral view.

- Sensory structure of male forebasitarsomere bearing 3 setae, these slightly flattened but not with spatulate bases, arising from a pit ..... *O. schembrii* Rondani

***Ochthera pilimana* Becker, 1903**

Plate 33

*Ochthera pilimana* Becker, 1903: 181 [Egypt. “Alexandrien” (= El Iskandariya); LT ♂ (designated by Clausen, 1977: 521), ZMHU]. Clausen, 1977: 520–522 [revision]. Cogan, 1984: 162 [Palaeartic catalogue]. Mathis & Zatwarnicki, 1995: 147 [world catalogue].

*Ochthera canescens* Cresson, 1931: 168 [Taiwan. Polisha; HT ♂, ANSP (6485)]. Hennig, 1941: 162 [synonymy]

Specimens examined from the UAE: Al-Ajban, 245 m, 24°35.8'N 55°00.2'E, 1♀, 15.iii.2010, WNM. Ajman, industrial area, 25°21.8'N 55°28.4'E, 1♂, 17.iii.2010, WNM. Hatta dam, 365 m, 24°47.7'N 56°06.3'E, 1♀, 1.iii.2010, TZ. Wadi Maidaq, 390 m, 25°20.8'N 56°05.5'E, 1♂, 3.iii.2010, TZ. Wadi Shawkah, reservoir, 25°06.3'N 56°02.8'E, 2♂, 10.iii.2008, JHS; reservoir, 300 m, 16♂, 5♀, 27.ii.2010, WNM, TZ. Al Wathba Wetland Reserve, 24°15'41"N 54°36'04"E, Malaise trap, iv.2015, 1♂, leg. A. Saji & AvH, NMWC.

Diagnosis: This species is similar to *O. schembrii* and other congeners but is distinguished by

the following combination of characters: Moderately large to large shore-flies, body length 4.10–5.75 mm. Thorax: Male with sensory structure on lateral apex of forebasitarsomere, sensory structure as a raised keel bearing 2 setae with spatulate bases on each side of keel. Abdomen: Sternite 5 of female distinctly narrower than sternite 6; sternite 6 of female subequal in width to sternite 2 or only slightly wider, 1.2 times or less.

Distribution: Afrotropical Region: Sierra Leone, Socotra; Australasian/Oceanian Region: Australia (New South Wales), Guam, Micronesia, New Caledonia; Oriental Region: China (Hainan), India, Indonesia (Java), Philippines, Taiwan; Palaeartic Region: Egypt, Israel, Japan (Kyushu), and now UAE.

***Ochthera schembrii* Rondani, 1847**

*Ochthera schembrii* Rondani, 1847: xxx [“insula Melita” (= Malta); LT ♀ (designated by Clausen, 1979: 141), MZUF (2107)]. Clausen, 1977: 516–518 [revision]. Cogan, 1984: 162 [Palaeartic catalogue]. Mathis & Zatwarnicki, 1995: 148–149 [world catalogue].

*Ochthera mantispa* Loew, 1847: 372 [Greece. Rhodes; LT ♂ (designated by Clausen, 1977: 516), ZMHU]. Clausen, 1977: 516–518 [revision]; 1979: 142 [synonymy].

*Ochthera angustitarsis* Becker, 1903: 181 [Egypt. “Damiette”; HT ♂, ZMHU]. Clausen, 1979: 142 [synonymy].

*Ochthera setigera* Czerny, 1909: 271 [Spain. Elche; LT ♂ (designated by Clausen, 1977: 516), NMW]. Clausen, 1979: 142 [synonymy].

Specimens examined from the UAE: Hatta dam, 365 m, 24°47.7'N 56°06.3'E, 10♂, 1.iii.2010, WNM. Qurayya, beach, 25°12.6'N 56°21.6'E, 1♂, 1♀, 4.iii.2010, WNM. Wadi Shawkah, reservoir, 25°06.3'N 56°01.6'E, 2♂, 10–14.iii.2008, JHS; road, 265 m, 10♂, 1♀, 27.ii.2010, WNM.

Diagnosis: This species is similar to *O. pilimana* and other congeners but is distinguished by the following combination of characters: Medium-sized to large shore-flies, body length 3.80–5.20 mm. Thorax: Male with sensory structure on lateral apex of forebasitarsomere, sensory structure bearing 3 setae, these slightly flattened but without spatulate bases, arising from a pit. Abdomen: Sternite 5 of female subtriangular, much wider posteriorly; sternite 6 of female distinctly wider than sternite 2, 1.4–4.0 times.

Distribution: Palaeartic Region: Algeria, Azores, Bulgaria, Canary Islands, Egypt, Great Britain, Greece, Iran, Israel, Italy, Malta, Morocco, Spain, Turkey, Turkmenistan, UAE.

Subfamily **Ilytheinae** Cresson

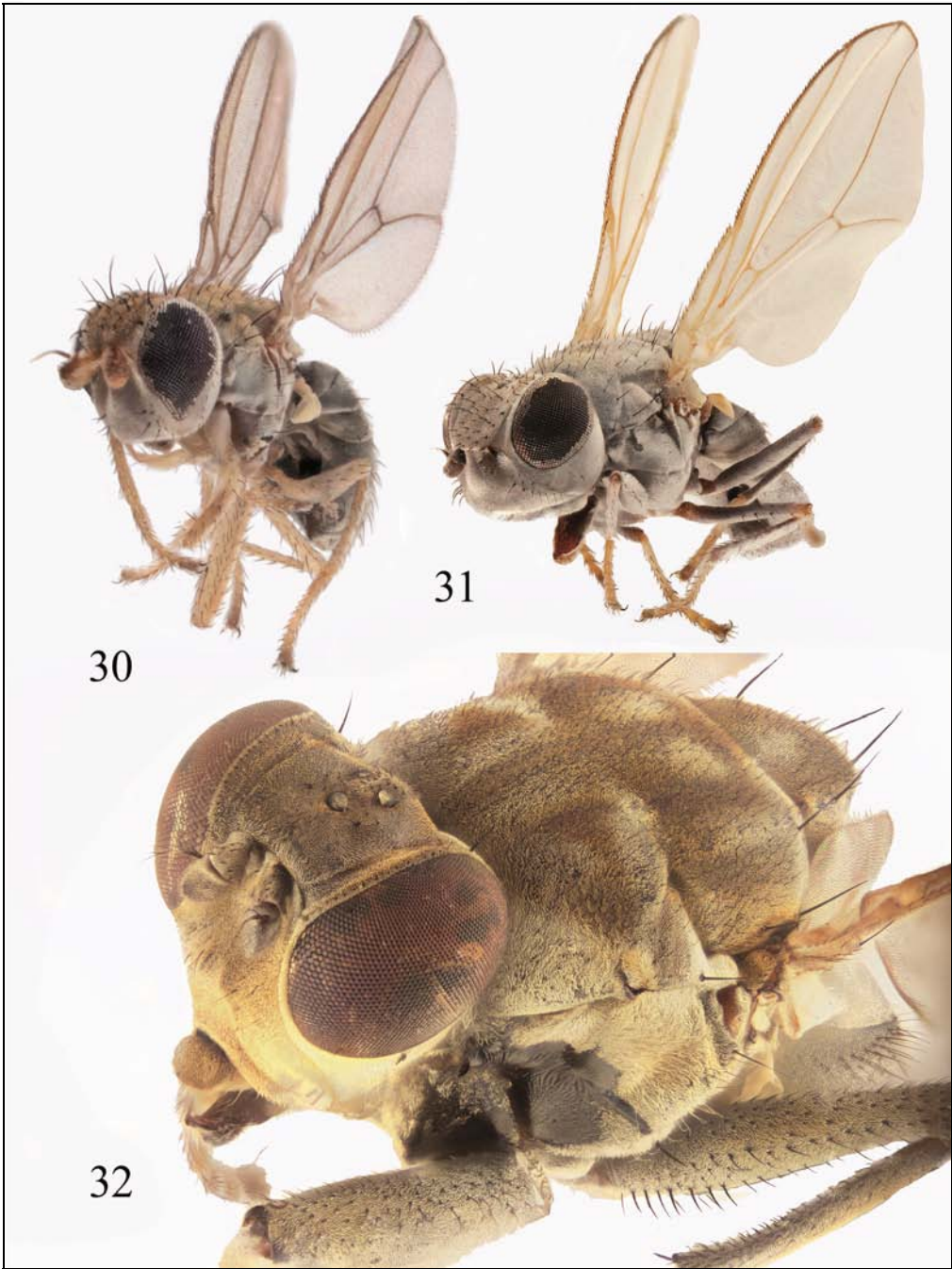
**Key to the tribes of Ilytheinae from the UAE**

- 1 Posterior notopleural seta inserted near ventral margin and at same level as anterior seta...  
..... **Hyadinini** Phillips et al.
- Posterior notopleural seta inserted at much higher level than anterior seta..... **2**
- 2 Fronto-orbital setae either laterocline and inconspicuous or lacking; prescutellar acrostichal setae lacking..... **Hyadinini** Phillips et al.
- Fronto-orbital setae conspicuous, well developed, mostly reclinate or procline or both; prescutellar acrostichal setae present, well developed ..... **Ilytheini** Cresson

Tribe **Hyadinini** Phillips et al., 1949

**Key to the genera of Hyadinini from the UAE**

- 1 Posterior notopleural seta inserted near ventral margin of notopleuron and at about same level as anterior seta ..... **Hyadina** Haliday



Plates 30–32. Habitus, anterolateral view. 30: *Glenanthe ripicola* (Haliday); 31: *Homalometopus albiditinctus* Becker; 32: *Ochthera pilimana* Becker. Photographs: T. Zatwarnicki.

- Posterior notopleural seta inserted at conspicuously higher level than anterior seta..... 2
- 2 Arista bare or minutely haired. Presutural or sutural dorsocentral seta present .....  
..... *Philygria* Stenhammar
- Arista bearing short to long dorsal rays. Presutural or sutural dorsocentral seta lacking .....  
..... *Nostima* Coquillett

Genus *Hyadina* Haliday, 1837

*Hyadina* Haliday in Curtis, 1837: 282 [published in synonymy, first used for a taxon by Haliday, 1839: 404]. Type species: *Notiphila guttata* Fallén, 1813, subsequent designation of Westwood, 1840: 153. Cogan, 1984: 158–159 [Palearctic catalogue]. Mathis & Zatwarnicki, 1995: 202–207 [world catalogue]; 2004c: 35–57 [review, Israel].

*Hyadina fenestrata* Becker, 1903

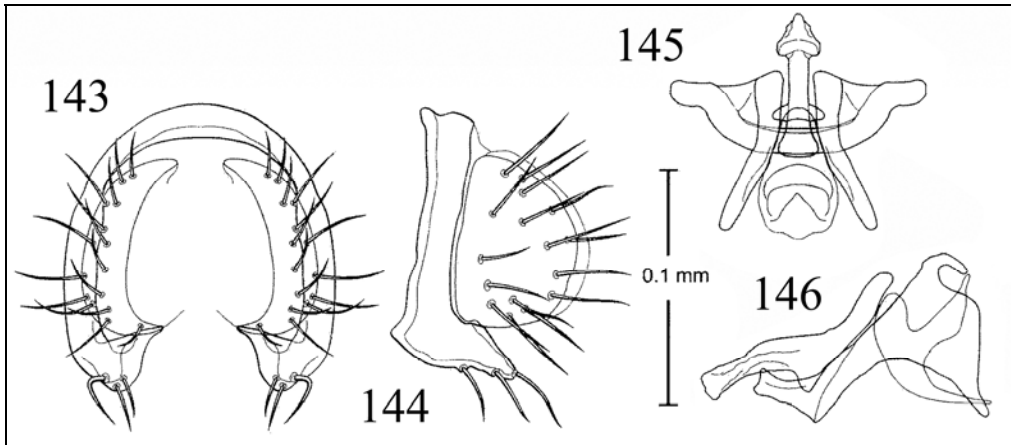
Plate 36, Figures 143–146

*Hyadina fenestrata* Becker, 1903: 173 [Egypt. Aswân, Suez, Fayûm; LT ♂ (designated by Mathis & Zatwarnicki, 2004c: 41), ZMHU]; 1905: 204 [Palearctic catalogue]; 1926: 59 [review, Palearctic fauna]. Steyskal, 1968: 31 [list, Egypt]. Cogan, 1984: 158 [Palearctic catalogue]. Mathis & Zatwarnicki, 1995: 203 [world catalogue]; 2003: 633–634 [review, Seychelles]; 2004c: 39–42 [review, Israel, lectotype designation].

*Hydrina fenestrata*. Frey, 1931: 114 [list, Canary Islands].

Specimens examined from the UAE and Oman: Al-Ain, Mubazzarah, hot spring, 24°06.4'N 55°44.8'E, 3♂, 16.iii.2010, WNM. Hatta Dam, 365 m, 24°47.7'N 56°06.3'E, 8♂, 2♀, 1.iii.2010, WNM, TZ. Ra's al-Khaimah, 25°46'N, 55°53.6'E, 1♂, 13.iii.2010, WNM. Wadi Hayl, 245 m, 25°04.9'N 56°13.5'E, 2♂, 6.iii.2010, WNM. Wadi Madaq. 390 m. 25°20.8'N 56°05.5'E, 1♂, 8.iii.2010, WNM. Wadi Safad, 25°13.1'N 56°17.6'E, 1♀, 22.ii.2006, JCD. Wadi Shawkah, 25°06.3'N 56°02.8'E, 3♂, 2♀, 31.x–28.xi 2006, 2007, water trap, AvH; reservoir, 300 m, 1♀, 27.ii.2010, TZ; road, 265 m, 2♂, 2♀, 27.ii–10.iii.2010, WNM. OMAN: Dhofar, Wadi Darbat, grasses beside lake, 17°04.6'N 54°29.5'E, 1♂, 8♀, 13.x.1990, JCD. Dhofar, Ain Hamran, 17°06.5'N 54°17.8'E, 2♂, 22.ix.1988, leg. M.J. Ebejer.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small shore-flies, body length: Male 1.79–1.82 mm, female 1.77 mm. Head: One vertical seta (outer or lateral seta lacking). Thorax: Scutum and scutellum shiny brown; scutellum with velvety black stripes laterally; anepisternum and katepisternum densely grey microtomentose; dorsal half of anepisternum lacking velvety black spot around anterior spiracle. Wing pale, faintly brownish; veins pale brown; vein R<sub>2+3</sub> at merger with costa forming acute angle; costa extended to apex of vein M; crossvein r-m positioned distinctly behind 2nd costal break; crossvein dm-cu slightly brown, flanked by distinct hyaline spots (spot basad of crossvein vein dm-cu in cell dm; spot distal of crossvein dm-cu in cell M). Legs brown, coxae grey microtomentose, last 3 tarsomeres not darkened. Abdomen: Brown grey microtomentose. Last tergite shiny. Male terminalia (Figs 143–146): Epandrium in posterior view broadly U-shaped, dorsal arch narrow, parallel-sided, becoming wider only on ventral 1/5 in lateral view, ventral margin bearing a few setae; cerci in posterior view shallowly and narrowly lunate, both dorsal and ventral apices pointed, oriented medially, in lateral view broadly and deeply D-shaped; aedeagus in lateral view bilobed, both lobes pointed and subequal in length, dorsal lobe wider on basal 2/3, in ventral view wider in profile apically; phallapodeme in lateral view long, and with keel shallowly angulate, keel long, subrectangular, length almost equal to basal width; gonite fused with hypandrium, gonite in lateral view with basodorsal recurved, short, narrow process, very basally, abruptly narrowed, especially ventrally, to moderately wide middle portion, thereafter narrowed dorsally to pointed apex; hypandrium in ventral view very widely and shallowly U-shaped, posterior arms extended laterally.



Figures 143–146. Male terminalia of *Hyadina fenestrata* Becker. 143: Epandrium and cerci, ventral view; 144: Same, lateral view; 145: Internal stuctures (aedeagus, phallapodeme, gonites), ventral view; 146: Same, lateral view. Scale bar = 0.1 mm.

Remarks: This species is distinguished from congeners occurring in the Middle East by the following combination of characters: One vertical seta (medial, lateral lacking); lack of velvety black areas at the lateral scutellar base and around the anterior spiracle on the anepisternum; and a hyaline spot in cell M, distal of crossvein dm-cu.

Distribution: Afrotropical Region: Seychelles (La Digue, Mahé); Palaearctic Region: Canary Islands, Egypt, Israel, and now Oman and UAE.

#### Genus *Nostima* Coquillett, 1900

*Nostima* Coquillett, 1900a: 35. Type species: *Nostima slossonae* Coquillett, 1900, by original designation [as a genus]. Foote, 1995: 425 [biology]. Mathis & Zatwarnicki, 1995: 190–194 [world catalogue]. Hollmann-Schirmacher, 1998: 44 [synonymy of *Nostima* with *Philygria*]. Edmiston & Mathis, 2005: 1–107 [revision of New World species].

#### Key to the species of *Nostima* from the UAE

- 1 Face with medial portion shiny black, bare. Dorsal 3/4 of anepisternum and notopleuron concolorous with scutellum, velvety black ..... *N. carinata* Canzoneri & Raffone  
 – Face uniformly yellowish-grey. Anepisternum and notopleuron greyish-brown to greyish-black, distinctly not concolorous with scutellum ..... *N. picta* (Fallén)

#### *Nostima carinata* Canzoneri & Raffone, 1987

Plate 34

*Nostima carinata* Canzoneri & Raffone, 1987: 59 [Kenya. “Ukunda dint., fiume”; HT ♂, CANZ (right antenna, scutellum, all legs except the right hindleg, and abdomen missing, wings stuck together)]. Mathis & Zatwarnicki, 1995: 191 [world catalogue].

Specimens examined from the UAE: Wadi Asimah, 435 m, 25°24.1'N 56°08.2'E, 2♂, 8.iii.2010, WNM. Wadi Hayl, 245 m, 25°04.9'N 56°13.5'E, 5♂, 3♀, 6.iii.2010, WNM, TZ. Wadi Shawkah, road, 265 m, 25°06.3'N 56°01.6'E, 1♀, 10.iii.2010, WNM.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Head: Face white except for vertical, polished black, medial stripe that is narrowly tear drop in shape, gradually becomes wider ventrally. Thorax: Mesonotum distinctly

bicoloured, scutellum velvety black, contrasted distinctly with greyish-brown scutum; anepisternum with dorsal 3/4 concolorous with scutellum; ventral 1/4 of anepisternum and katepisternum silvery white. Crossveins r-m and dm-cu within white, halo-like spots (seen from an oblique angle).

Remarks: Specimens of this species were sometimes misidentified as the Afrotropical species, *P. flavitarsis* Canzoneri & Meneghini, 1969 (Zatwarnicki, 1991; Mathis & Zatwarnicki, 1995).

Distribution: Afrotropical Region: Kenya, Seychelles (La Digue, Mahé, Praslin), Sierra Leone; Australasian/Oceanian Region: Papua New Guinea; Oriental Region: China (Hong Kong), Vietnam; Palaearctic Region: Oman, and now UAE.

***Nostima picta*** (Fallén, 1813)

Figures 147–150

*Notiphila picta* Fallén, 1813: 254 [Sweden; ST ♂♀, NRS]. Stenhammar, 1844: 156 [review]. Cresson, 1930: 101 [designation as type for genus]. Sturtevant & Wheeler, 1954: 241 [revision, key].

*Philygria picta*. Loew, 1860: 25 [generic combination].

*Nostima picta*. Cresson, 1930: 101 [generic combination]; 1944: 176 [review]. Cogan, 1984: 151 [Palaearctic catalogue]. Mathis & Zatwarnicki, 1995: 192–193 [world catalogue]. Edmiston & Mathis, 2005: 55–60 [revision]. Dawah & Abdullah, 2006: 389 [fauna, Saudi Arabia].

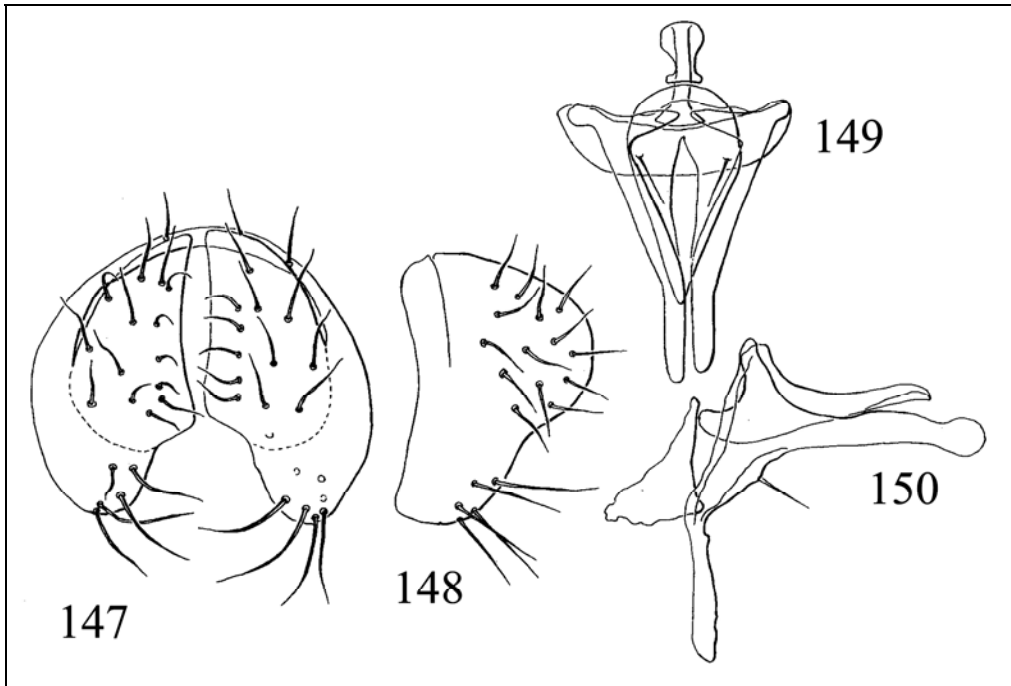
*Notiphila pullula* Fallén, 1823: 11 [Sweden; ST (sex ?), ZIL]. Zetterstedt, 1846: 1913 [synonymy].

*Philygria pullula*. Becker, 1905: 203 [generic combination].

Specimens examined from the UAE: Al-Ajban, 24°35.8'N 55°00.2'E, 2♂, 1♀; 17.iv–19.vi.2006, Malaise trap, AvH. Desert farm, 25°07.9'N 55°45.1'E, 1♀, 12.iii.2008, JHS. Sharjah Desert Park, 25°16.9'N 55°41.4'E, 2♀, 25.ii–25.iii.2006, JCD, AvH. Hatta, 28°49'N 56°07'E, 6♂, 10♀, 8–26.iv.2006, light trap, AvH; Ra's al-Khaimah, farm, 25°47.9'N 56°04.3'E, 2♂, 1♀, 16.iii.2008, JHS. Wadi Hayl, 245 m, 25°04.9'N 56°13.5'E, 2♂, 3♀, 6.iii.2010, WNM, TZ. Wadi Safad 25°13.1'N 56°17.6'E, 1♂, 13.iii.2008, JHS; 1♂, 31.i–21.ii.2006, light trap, AvH. Wadi Shawkah, reservoir, 25°06.3'N 56°01.6'E, 1♀, 10.iii.2008, JHS; road, 265 m, 2♂, 10.iii.2010, WNM. Wadi Mirba, mountain oasis, 25°16.22'N 56°16.68'E, 1♂, 13.iii.2008, JHS.

Diagnosis: *Nostima picta* specimens are distinguished from congeners by the following combination of external characters: Small shore-flies, body length 1.15–1.30 mm; pale to dark brown with silver, silvery grey, velvety black, yellowish-silver and golden microtomentum. Head: Frons with velvety black ventrolateral triangles, anterior semicircle dark brown with golden microtomentum. Occiput dorsally with silvery grey microtomentum, ventrally shiny dark brown. Lateral vertical seta 1/2 length of medial vertical seta; paravertic setae absent. Scape and pedicel brown; basal flagellomere with dorsal 1/3 brown and ventral 2/3 dark yellowish-brown; arista dorsally branched. Facial background pale to dark brown with silvery grey microtomentum; band of silvery grey microtomentum along eye margin from below medial vertical seta, along parafacial, extended to gena. Gena covered with silvery grey microtomentum, but not as dense as parafacial; postgena ventrally with silvery grey microtomentum as on gena, dorsally shiny, pale to dark brown. Maxillary palpus yellow; prementum yellowish-brown. Thorax: Scutal length 0.30–0.43 mm; scutellar length 0.17–0.19 mm; mesonotum medially brown with yellowish-silver microtomentum; posterior margin with dense velvety black microtomentum; silvery grey microtomentose vitta lateral to dorsocentral line, anteriorly vitta covers postpronotum, posteriorly vitta narrows; scutellum dorsally covered with dense velvety black microtomentum contiguous with black microtomentum on posterior mesonotal margin, laterally with dense, silvery grey microtomentum contiguous with silvery grey lateral vitta on mesonotum; anepisternum dorsal 1/3 pale to dark brown with yellowish-silver microtomentum, medial 1/3 shiny dark brown with sparse microtomentum, ventral 1/3 with dense, silvery grey microtomentum; katepisternum pale to dark brown, dorsal 1/2 with dense, silvery grey microtomentum, ventral





Figures 147–150. Male terminalia of *Nostima picta* (Fallén). 147: Cerci and epandrium, ventral view, 148: Same, lateral view, 149: Internal structures, ventral view, 150: Same, lateral view.

1/2 with less dense, yellowish-silver microtomentum; subscutellum shiny dark brown with sparse, yellowish-silver microtomentum; anatergite shiny dark brown with sparse, yellowish-silver microtomentum, ventral 1/8 bare. Chaetotaxy: Anterior dorsocentral seta 1/2 length of posterior seta; anterior notopleural seta 1/3 length of posterior seta; lateral scutellar seta 1/3 length of apical seta. Wing: Length 1.12–1.21 mm; width 0.49–0.55 mm; costal vein ratio 0.74–0.98; M vein ratio 0.18–0.26; uniformly amber-coloured with dark brown veins; crossveins r-m and dm-cu yellowish-white. Halter whitish-yellow. Legs yellowish-brown to dark brown; tibia banded on paler coloured specimens; tarsomere 5 brown. Abdomen: Background brown, shiny; tergites 1, 2, and 3 covered dorsally with pale yellowish-silver microtomentum, dorsolaterally area with slightly less dense microtomentum; tergite 4 often with lateromedial circular spot of dense, silvery grey microtomentum. Male genitalia (Figs 147–150): Epandrium-cerci-surstyli complex fused; epandrium narrow dorsal band; cercus crescent-shape with many long setulae, separated dorsally from epandrium by narrow V-shaped space; surstylus reduced, dorsally fused with epandrium, bearing long ventral setulae; aedeagal apodeme triangular in lateral view, posterior projection spatulate, anterior projection somewhat irregularly club-shaped with minute projections, appearing rough, lateral projections arc-shaped; aedeagus elongate and rectangular with rounded ventral projection; subepandrial plate-gonite-hypandrium fused; subepandrial plate a narrow band; gonite broadly fused anteriorly with subepandrial plate, with rounded posterior projection, prominent ventromedial setula, and rounded elongate dorsal projection; hypandrium broadly fused posteriorly with subepandrial plate, anteriorly broadly rounded.

Distribution: Nearctic Region: Canada (Alberta, British Columbia, Manitoba, New Brunswick, Ontario, Quebec, Saskatchewan), United States (Alabama, Arizona, Arkansas, California, Colorado, District of Columbia, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Louisiana, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, South Dakota, Tennessee, Texas, Virginia, Washington, Wisconsin, West Virginia); Neotropical Region: Guatemala, México (Jalisco, Veracruz); Palearctic Region: Afghanistan, Austria, Azores, Belgium, Bulgaria, Canary Islands, Czech Republic, Egypt, Estonia, Finland, France, Germany, Great Britain, Hungary, Israel, Italy, Japan (Hokkaido, Honshu), Macedonia, Madeira Islands, Morocco, Netherlands, Poland, Romania, Russia (European Territory, Far East), Saudi Arabia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, and now UAE.

Genus *Philygria* Stenhammar, 1844

*Philygria* Stenhammar, 1844: 154 [type species: *Notiphila flavipes* Fallén, 1823, by subsequent designation, Coquillett, 1910: 588]. Cogan, 1984: 149–151 [Palearctic catalogue]. Mathis & Zatwarnicki, 1995: 194–200 [world catalogue]. Hollmann-Schirmmacher, 1998: 44–132 [revision].

*Philygria posticata* (Meigen, 1830)

Plate 33

*Ephydra posticata* Meigen, 1830: 124 [not given (? former Germany); ST (2 ♂), NMW].

*Philygria posticata*. Schiner, 1864: 58 [generic combination]. Cogan, 1984: 150 [Palearctic catalogue].

Mathis & Zatwarnicki, 1995: 187 [world catalogue]. Hollmann-Schirmmacher, 1998: 108–110 [revision].

*Hydrina posticata*. Becker, 1926: 57 [generic combination].

Specimen examined from the UAE: Wadi Hayl, 25°04.8'N 56°13.5'E, 1♂, 15.iii.2008, JHS.

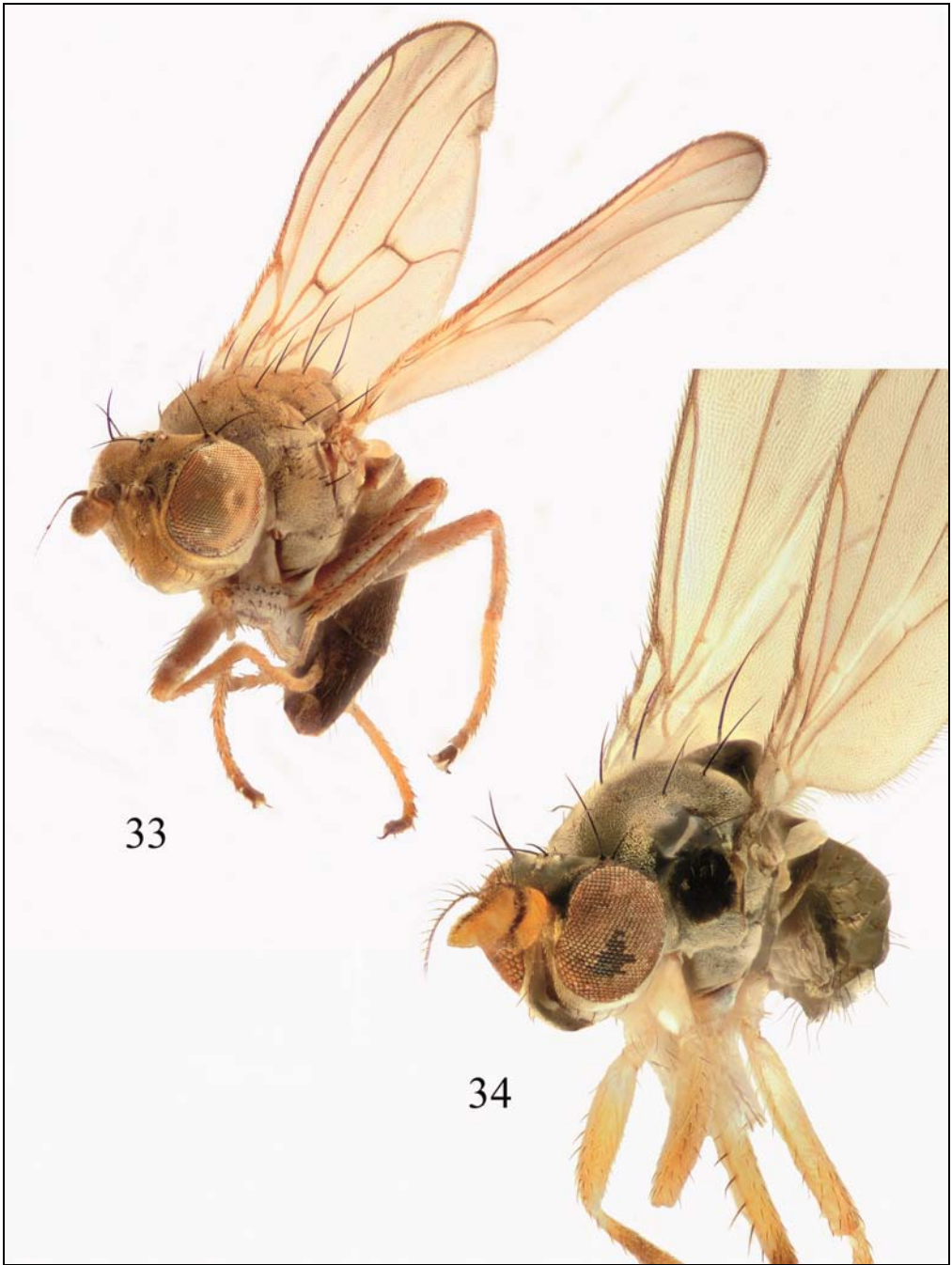
Diagnosis: This species is distinguished from congeners by the following combination of characters: Small shore-flies, body length 1.70–1.85 mm. Head: Frons brownish-grey, anterior margin slightly lighter in colour. Face and parafacial yellow to golden; gena silvery grey microtomentose; gena-to-eye ratio 0.28–0.32. Thorax: Generally brownish-grey with brown stripes along setal tracks. Wing of normal length, 2.15–2.30 mm, extended past abdomen; only crossveins r-m and dm-cu slightly to moderately darkened; if hyaline spots present on either side of crossvein dm-cu, these faint; costal vein ratio 0.54–0.56; vein M ratio 0.38–0.41. Legs usually yellow, femora and tibiae sometimes brown; basal tarsomeres yellow, apical 2 brown. Abdomen: Generally microtomentose except for shiny tergites 4–5. Male terminalia: Epandrium-cerci-surstyli fused; epandrium a broad, U-shaped band with small rounded anteroventral projections; cercus completely fused laterally with epandrium with small v-shaped space dorsally separating cercus from epandrium, and bearing many long setulae; surstyli fused dorsally with epandrium, rounded ventrally with field of a few long setae and many smaller setulae; aedeagus elongate in lateral view, 5 times longer than wide, crooked at base, apical half slightly tapered to rounded apex, bearing an appendage medially along dorsal surface; phallapodeme elongate, thinly and irregularly triangular in lateral view; gonite with 2 basal setae and a digitiform terminal extension; subepandrial plate-gonite-hypandrium fused; hypandrium very narrow, lacking ventroposterior appendage.

Distribution: Palearctic Region: Austria, Czech Republic, Germany, Great Britain, Hungary, Italy, Poland, Russia (European Territory), Slovakia, Switzerland, and now UAE.

Tribe *Ilytheini* Cresson, 1943

#### Key to the genera of *Ilytheini* from the UAE

- 1 Dorsocentral setae 3 (1+2) ..... *Donaceus* Cresson  
 – Dorsocentral setae 2 (1+1) ..... *Zeros* Cresson



Plates 33–34. Habitus, anterolateral view. 33: *Philygria posticata* (Meigen); 34: *Nostima carinata* Canzoneri & Raffone. Photographs: T. Zatwarnicki.

Genus *Donaceus* Cresson, 1943

*Donaceus* Cresson, 1943b: 5. Type species: *Donaceus nigronotatus* Cresson, 1943b, original designation. Zack & Sites, 1988: 101–105 [revision]. Mathis & Zatwarnicki, 1995: 186–187 [world catalogue].

*Donaceus nigronotatus* Cresson, 1943

Plate 35

*Donaceus nigronotatus* Cresson, 1943b: 5 [Taiwan. Takao; HT ♀, ANSP (6650)]. Zack & Sites, 1988: 102–103 [revision]. Mathis & Zatwarnicki, 1995: 186–187 [world catalogue].

Specimens examined from the UAE: Khor Kalba, mangrove, 25°00.9'N 56°21.6'E, 2♂, 4.iii.2010, TZ.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Generally rather pale, 2 apical spots on scutellum and abdomen only black. Head: Frons twice as wide as long; fronto-orbits not convergent until just ventrad of antenna. Face in anterior view very wide at oral margin, almost as wide as head. Thorax: Mesonotal vestiture variegated with brownish spots at bases of setae. Scutellum with 2 large, conspicuous subapical black spots between lateral and apical setae. Abdomen: Greyish-brown.

Distribution: Afrotropical Region: Madagascar; Australasian/Oceanian Region: Australia, Hawaiian Islands (Hawaii, Kauai, Maui, Oahu), Indonesia (Irian Jaya); Oriental Region: Hong Kong, Japan (Ryukyu Islands), Taiwan; from the Palaearctic Region only known from the UAE.

Genus *Zeros* Cresson, 1943

*Zeros* Cresson, 1943b: 10. Type species: *Ilythea obscura* Cresson, 1918, original designation. Mathis & Zatwarnicki, 1995: 188–190 [world catalogue]. Hollmann-Schirmmacher, 1998: 24 [review].

*Zeros invenatus* (Lamb, 1912)

*Ilythea invenata* Lamb, 1912: 322 [Seychelles. Mahé; LT ♂ (designated by Mathis & Zatwarnicki, 2003: 638), BMNH].

*Zeros invenatus*. Cresson, 1943b: 12 [generic combination]. Mathis & Zatwarnicki, 1995: 189–190 [world catalogue]. Dawah & Abdullah, 2006: 388 [fauna, Saudi Arabia].

Specimens examined from the UAE: Ajman, industrial area, 25°21.8'N 55°28.4'E, 1♀, 17.iii.2010, WNM.

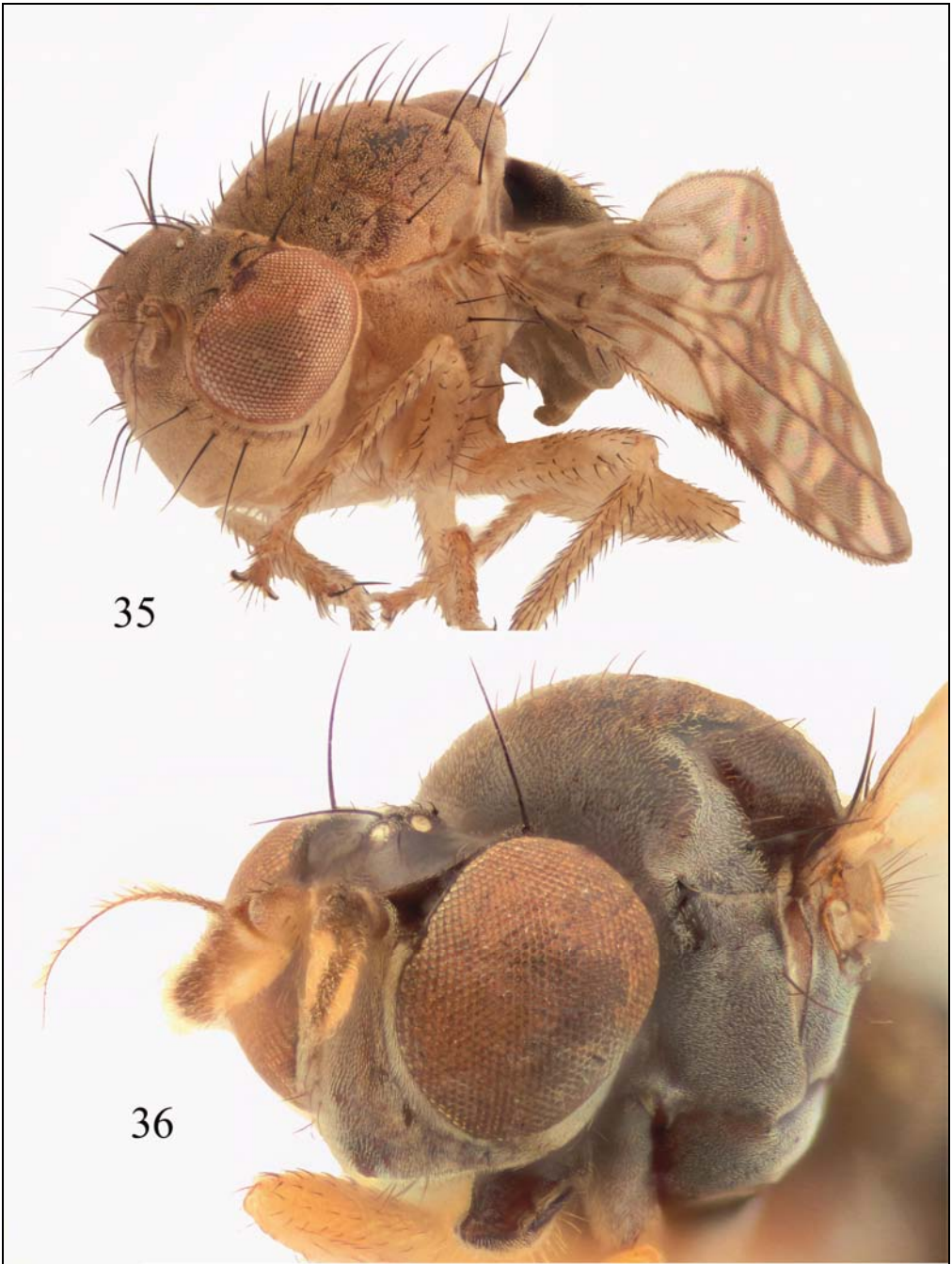
Diagnosis: This species is distinguished from congeners by the following combination of characters: Thorax: Wing maculate, consisting of round hyaline intervenous spots in a fuscous field, intervening fuscous areas rarely in the form of parallel-sided bars; crossveins r-m and dm-cu both lacking. Abdomen: Sparsely microtomentose.

Remarks: Discovery of this species in the UAE was unexpected.

Distribution: Afrotropical Region: Madagascar, Seychelles (La Digue, Mahé, Praslin), Sierra Leone Australasian/Oceanian Region: Australia (New South Wales), Papua New Guinea (New Guinea), French Polynesia (Society Islands), “Samoa”; Oriental Region: India (Assam), Malaysia, Thailand; Palaearctic Region: Israel, Mallorca, Saudi Arabia, and now UAE.

Subfamily **Ephydrinae** Zetterstedt**Key to the tribes of Ephydrinae from the UAE**

- 1 Medial facial area and lower facial margin without setae; facial setae inserted in more or less vertical series, parallel with parafacial. Subcranial cavity small to large ..... 2
- Medial facial area and lower facial margin setose, the latter often with long setae; insertions of facial series of setae convergent above. Subcranial cavity large and cavernous ..... 3



Plates 35–36. Habitus, anterolateral view. 35: *Donaceus nigronotatus* Cresson; 36: *Hyadina fenestrata* Becker. Photographs: T. Zatwarnicki.

- 2 Presutural or sutural dorsocentral seta inconspicuous or absent ..... **Dagini** Mathis  
 – Presutural or sutural dorsocentral seta present, conspicuous ..... **Parydrini** Wirth & Stone  
 3 Postsutural dorsocentral setae 3–4, anterior 3 pairs sometimes very short and weak. Disc of proepisternum with few to many fine setulae ..... **Ephydrini** Zetterstedt  
 – Postsutural dorsocentral setae 2, both equally strong. Disc of proepisternum usually bare, sometimes with a few fine setulae..... **Scatellini** Wirth & Stone

Tribe **Dagini** Mathis, 1982

Genus **Brachydeutera** Loew, 1862

*Brachydeutera* Loew, 1862: 162. Type species: *Brachydeutera dimidiata* Loew, 1862 (= *Notiphila argentata* Walker, 1853), monotypy. Wirth, 1964: 3–12 [revision]. Mathis & Zatwarnicki, 1995: 229–232 [world catalogue].

### Key to the species of *Brachydeutera* from the UAE

- 1 Brown colour of anepisternum gradually becoming paler ventrally, merging with pale grey ..... ***B. longipes*** Hendel  
 – Brown colour of anepisternum continued ventrally to about dorsal 1/6–1/3, thereafter sharply delimited from pale grey colouration on ventral pleural region ..... ***B. meridionalis*** Rondani

***Brachydeutera longipes*** Hendel, 1913

Figures 151–152

*Brachydeutera longipes* Hendel, 1913: 99 [Taiwan. Kankau; LT ♂ (designated by Mathis & Ghorpadé, 1985: 15), NMW]. Wirth, 1964: 7–8 [revision]. Mathis & Ghorpadé, 1985: 15–18 [revision]. Mathis & Steiner, 1986: 56–60 [revision]. Mathis & Zatwarnicki, 1995: 231 [world catalogue].

Specimens examined from the UAE: Al-Ajban, 24°35.8'N 55°00.2'E, 1♂, 2♀, 7–28.ii.2005, AvH; 245 m, 1♀, 15.iii.2010, WNM. Bithnah, 25°11'N 56°14'E, 1♀, 2.ii–31.xii.2005, light trap, AvH. Fujairah, 25°12.8'N 56°21.5'E, 1♂, 5.iii–6.iv.2005, light trap, AvH. Near Mahafiz, 25°12'N 55°44'E, 1♀, 21–28.viii.2006, light trap, AvH. NARC, near Sweihan, 24°24'N 55°26'E, 1♂, 2♀, 30.i–14.iii.2005, light trap, AvH. Ra's al-Khaimah, 25°46'N 55°53.6'E, 1♀, 18.iii.2010, TZ. Sharjah, 25°21'N 55°24'E, 1♂, i.2005, AvH. Sharjah Desert Park, 25°16.9'N 55°41.4'E, 1♂, 20.x–8.xi.2005, water trap, AvH; Wadi Bih, dam, 115 m, 25°48'N 56°04.4'E, 1♂, 9.iii.2010, WNM. Wadi Safad, 140 m, 25°13.3'N 56°18.3'E, 1♂, 11.iii.2010, WNM. Wadi Shawkah, road, 265 m, 25°06.3'N 56°01.6'E, 1♀, 10.iii.2010, WNM.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Generally paler in colour, especially the dorsum of mesonotum and abdomen. Head: Facial carina low, less prominent. Thorax: Anterior notopleural seta present; brown colour of anepisternum gradually becoming paler ventrally, merging with pale grey. Abdomen: Male terminalia (Figs 151–152): Apparent merger of fused surstyli with epandrium in lateral view with a shallow, broad swelling along anterior margin; gonite narrow, sinuous, slightly spatulate apically.

Remarks: In the Old World, *B. longipes* is quite similar and closely related to *B. pleuralis* Malloch, 1928, which also overlaps in much of its distribution (Mathis & Ghorpadé, 1985). Distinguishing between *B. longipes* and *B. pleuralis* will probably require examination of characters of the male terminalia.

Distribution: Nearctic Region: Canada (Ontario), United States (Georgia, Maryland, North Carolina); Neotropical Region: Bolivia (La Paz), Brazil (Paraná), Guyana, Honduras, Mexico (Veracruz-Llave), Venezuela (Guarico, Zulia), West Indies (Barbados, Cayman Islands, Dominican Republic, Grenada, Jamaica, Puerto Rico); Oriental Region: Cambodia, China,

India, Indonesia, Malaysia, Pakistan, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, Vietnam; Palearctic Region: Iraq, Japan, and now UAE.

***Brachydeutera meridionalis*** Rondani, 1856 Plate 39, Figures 153–158

*Pegophila meridionalis* Rondani, 1856: 129 [not given (? Italy); ST (sex ♀), MZUF (2139)].

*Notiphila meridionalis*. Cogan, 1984: 147 [generic combination].

*Brachydeutera meridionalis*. Stuke, 2012b: 194 [generic combination].

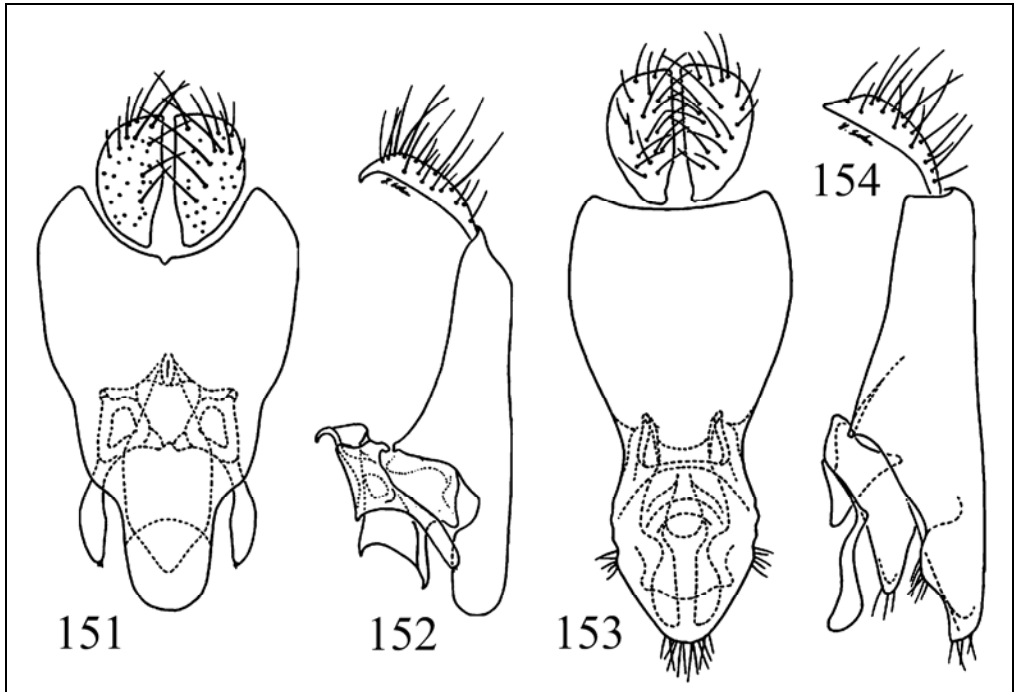
*Brachydeutera ibari* Ninomyia, 1929: 190 [Japan. Honshu: Ogahanto; NT ♂, (designated by Mathis & Ghorpadé, 1985: 13), HUS]. Mathis & Ghorpadé, 1985: 12–15 [revision]. Krivosheina, 1988: 50–51 [immature stages]. Stuke, 2012b: 194 [synonymy].

*Brachydeutera argentata* of authors, not Walker, 1853 [misidentification]. Cogan, 1984: 161 [Palearctic catalogue].

Specimens examined from the UAE: Wadi Bih, 115 m, 25°48'N 56°04.4'E, 1♀, 9.iii.2010, WNM. Wadi Hayl, 25°04.8'N 56°13.5'E, 1♂, 15.iii.2008, JHS. Wadi Shawkah, reservoir, 300 m, 25°06.3'N 56°02.8'E, 1♀, 27.ii.2010, TZ.

Diagnosis: Moderately small to medium-sized shore-flies, body length 2.35–3.35 mm. Head (Figs 155–158): Frons mostly uniformly brown except for olivaceous to greenish area posterolaterad of ocelli; prominent, laterocline fronto-orbital setae 3, anterior seta weaker, about 1/2–2/3 length of posterior 2. Antenna and ridge of facial carina brown, concolorous with frons. Arista branches 9–11. Facial carina rather sharp, acutely pointed ventrally, extended from ptilinal suture to oral emargination. Clypeus, face, except for ridge of carina and narrow margin along oral emargination silvery-white. Palpus pale, mostly yellowish. Thorax (Fig. 158): Mesonotal chaetotaxy moderately developed; setae barely evident, setae of main setal tracks small. Mesonotum mostly brown, but with considerable olivaceous colouration, especially as stripes on either side of acrostichal track, laterad of dorsocentral track, near dorsal margin of notopleuron and extended posteriorly through supra-alar area, and at merger of scutum and scutellum. Scutellar ratio 0.74; distance between apical scutellar setae slightly less than between basolateral scutellar seta and apical one. Anterior notopleural seta present, although weaker than posterior one; katepisternal seta present. Brownish colouration of mesonotum continued ventrally to dorsal 1/4–1/6 of anepisternum, thereafter abruptly delimited from greyish to silvery-white colouration of ventral portion of pleural areas; anepisternum with posterior margin silvery grey. Wing hyaline, clear; vein R<sub>2+3</sub> moderately arched; vein R<sub>4+5</sub> conspicuously arched; costal vein ratio 2.95; M vein ratio 0.62. Femora mostly yellowish, forefemur with sparsely microtomentose, grey area anterodorsally toward base; tibiae yellowish basally, becoming gradually darker apically, stramineous to brown; tarsomeres dark brown; male hindtibia lacking patch of ventral, long setae. Abdomen: Dorsum with posterolateral, greyish areas on tergites 3–6 of female and 3–5 of male, greyish area progressively larger, extended across entire posterior margin of tergite 6 of female, 5 of male. Male terminalia (Figs 153–154) as follows: Dorsal surface of epandrium in posterior view deeply concave, forming pocket between which cerci lie; epandrial width at dorsum much wider than lateral margins of cerci; dorsal 1/4 of lateral margin of epandrium slightly flared laterally, thereafter generally narrowed ventrally by two parallel-sided steps; epandrium + surstyli parallel-sided, apex bluntly rounded, in lateral view apex of epandrium + surstyli bluntly rounded and bare, thereafter parallel-sided on ventral half, then forming angulate concavity on anterodorsal surface; gonite with base subrectangular, posteroventral angle drawn into long, slender, more or less parallel-sided process, length subequal to length of basal portion.

Remarks: This species is very similar to *B. argentata* and could easily be confused with it. It is distinguished by the lighter brown colouration of the abdominal dorsum and by the



Figures 151–154. Male terminalia of *Brachydeutera*. 151: Cerci and epandrium of *Brachydeutera longipes* Hendel, ventral view; 152: Same, lateral view; 153: Cerci and epandrium of *Brachydeutera meridionalis* (Rondani), ventral view; 154: Same, lateral view.

conformation of structures of the male terminalia, especially the fused surstyli (merger of surstyli with the epandrium indicated by an angulate emargination, best seen in lateral view), which bear generally inconspicuous, microscopic setae anteroventrally. From the study area, this species is distinctive (see characters used in the key) and is not likely to be confused with any other.

Distribution: Australasian/Oceanian Region: Hawaiian Islands (Hawaii); Oriental Region: China, Bonin Islands, Taiwan; Palaearctic Region: Israel, Japan (Honshu), Madeira Islands, Russia (Far East), and now UAE.

Tribe **Ephydrini** Zetterstedt, 1837

Genus ***Ephydra*** Fallén, 1810

*Ephydra* Fallén, 1810: 22. Type species: *Ephydra riparia* Fallén, 1813, by subsequent designation (Curtis, 1832: plate 413)]. Wirth, 1975: 11–44 [review of Old World species]. Cogan, 1984: 165–166 [Palaearctic catalogue]. Mathis & Zatwarnicki, 1995: 240–247 [world catalogue].

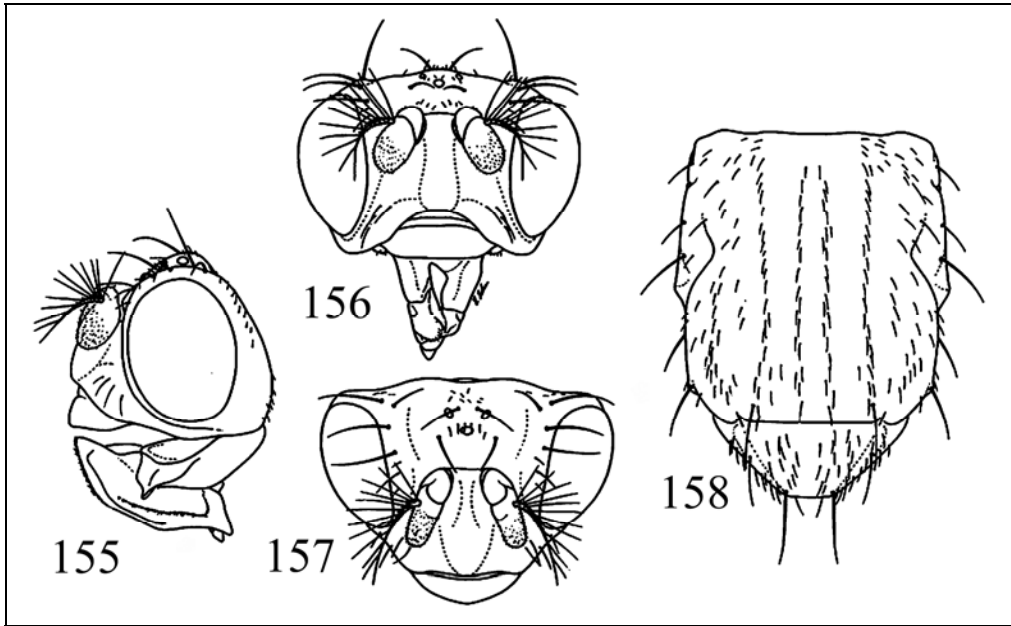
***Ephydra (Ephydra) flavipes*** (Macquart, 1844)

Plate 37

*Coenia flavipes* Macquart, 1844: 412 [Brazil and Chile (probably an error); LT ♂ (designated by Mathis 1978: 105), MNHN].

*Ephydra flavipes*. Mathis, 1978: 105 [generic combination]. Dawah & Abdullah, 2006: 389 [fauna, Saudi Arabia].





Figures 155–158. Head and thorax of *Brachydeutera meridionalis* (Rondani). 155: Head, lateral view; 156: Head, anterior view; 157: Head, dorsal view; 158: Thorax, dorsal view.

*Ephydra opaca* Loew, 1856: 55 [Egypt. Asyût; ST ♂♀, NMW]. Mathis & Zatwarnicki, 1995: 241 [synonymy; world catalogue].

*Ephydra helwanensis* Steyskal, 1968: 110 [Egypt. Helwan; HT ♂, MAED]. Wirth, 1975: 32–35 [revision]. Mathis, 1978: 105 [synonymy].

Specimens examined from the UAE: Al-Ajban, 24°35.8'N 55°00.2'E, 3♂, 1♀, 15.iii–2.v.2006, 2010, Malaise trap, AvH. Ajman, industrial area, 25°21.8'N 55°28.4'E, 2♂, 10–12.iii.2010, WNM. N of Ajman, salt marsh, 25°25.9'N 55°29.4'E, 1♂, 16.ix–12.x.2006, water trap, AvH; mangrove, 6♂, 28.ii–13.iii.2010, WNM. Desert farm, 25°07.9'N 55°45.1'E, 5♂, 12.iii.2008, JHS. Fujairah, 25°12.8'N 56°21.5'E, 2♂, 13.v–5.vi.2005, light trap, AvH. Hatta dam, 365 m, 24°47.7'N 56°06.3'E, 1♀, 1.iii.2010, TZ. Khor Kalba, mangrove, 25°00.9'N 56°21.6'E, 1♂, 1♀, 4.iii.2010, WNM. Qurayya, beach, 25°12.6'N 56°21.6'E, 3♂, 3–4.iii.2010, WNM; beach, 1♀, 13.iii.2008, JHS. Ra's al-Khaimah, 25°46'N 55°53.6'E, 1♂, 18.iii.2010, WNM. Sharjah Desert Park, 25°16.9'N 55°41.4'E, 4♂, 2♀, 12.iii.2008, JHS. Um al-Quwain, salt marsh, 25°32'N 55°32.2'E, 6♂, 3♀, 18.iii.2008, JHS; beach, 1♀, 13.iii.2008, JHS; beach, 14♂, 2♀, 28.ii–15.iii.2010, WNM, TZ. Wadi Asimah, 435 m, 25°24.1'N 56°08.2'E, 1♀, 8.iii.2010, TZ. Wadi Bih, dam, 115 m, 25°48'N 56°04.4'E, 1♂, 9.iii.2010, WNM. Wadi Hayl, 25°04.83'N 56°13.53'E, 1♂, 2♀, 15.iii.2008, JHS. Wadi Madaqa, 390 m, 25°20.8'N 56°05.5'E, 5♂, 3–8.iii.2010, WNM. Wadi Madaqa, 25°19.7'N 56°07.2'E, 1♂, 1♀, 15.iii.2008, JHS. Wadi Safad, 140 m, 25°13.3'N 56°18.3'E, 1♀, 11.iii.2010, WNM. Wadi Shawkah, reservoir, 300 m, 25°06.3'N 56°02.8'E, 1♀, 27.ii.2010, TZ; road, 265 m, 6♂, 5♀, 27.ii–10.iii.2010, WNM; reservoir, 8♂, 18♀, 10–14.iii.2008, JHS. Wadi al-Sidr, farm, 25°24.73'N 56°05.12'E, 4♂, 5♀, 17.iii.2008, JHS. Wadi Wurayah, 210 m, 25°23.9'N 56°16.2'E, 1♀, 17.iii.2010, WNM.

Diagnosis: Similar to *E. riparia* Fallén, 1813, but differing by the following characters: Body generally more microtomentose, especially dorsally, only slightly shiny, with more of a greyish tinge on sides. Head: Face usually brassy microtomentose, somewhat whitish, sometimes dark golden brown. Thorax: Prescutellar area of female with low hump bearing a group of longer acrostichal setae; female mesopleuron with an uneven row of bristly hairs;

legs generally yellow, occasionally femora slightly olive-green infuscated. Abdomen: Male fifth tergite with short, stout, anteroventral process. Male terminalia as follows: Surstylus stout basally, tapered with rounded apices distally, with distinct sclerotized carina on medial margin of anterior side; bearing fairly numerous scattered fine hairs except on dorsal side at apex. Aedeagus with apex slender and rounded in lateral view, anterior membranous lobe with strong ridges only proximally, the recurved basal process about half as long as straight portion. Gonite with apex rounded, bearing a longer, slender, pointed process and a short, blunter, subapical process. Genital plate strongly sclerotized and with very strong, transverse, ridge-like folds, the whole angularly bent ventrally in middle forming a strongly serrate, ventral process.

Distribution: Afrotropical Region: Aldabra Group (Aldabra), Chad, Sudan; Palaearctic Region: Albania, Algeria, Bulgaria, Canary Islands, Cyprus, Egypt, France, Greece, Iran, Iraq, Israel, Italy, Libya, Malta, Morocco, Pakistan, Saudi Arabia, Spain, Tunisia, Turkey, Turkmenistan, Uzbekistan, Yugoslavia, and now UAE.

Tribe **Scatellini** Wirth & Stone, 1956

### Key to the genera of Scatellini from the UAE

- 1 Laterocline fronto-orbital seta 1 ..... *Scatophila* Becker  
 – Laterocline fronto-orbital setae 2 ..... **2**  
 2 Genal seta either lacking or much reduced, not evident ..... *Lamproscatella* Hendel  
 – Genal seta normally developed, conspicuously evident ..... *Scatella* Robineau-Desvoidy

Genus *Lamproscatella* Hendel, 1917

*Lamproscatella* Hendel, 1917: 42. Type species: *Ephydra sibilans* Haliday, 1833, by original designation]. Cogan, 1984: 172 [Palaearctic catalogue]. Mathis & Zatzwornicki, 1995: 256–258 [world catalogue].

*Scatella* (*Lamproscatella*). Becker, 1926: 84–86 [review of Palaearctic species].

*Lamproscatella nigricans* Krivosheina, 2004

*Lamproscatella nigricans* Krivosheina, 2004: 326 [Tajikistan. Dzhilikulya (vicinity), “Tigrovaya balka” refuge; HT ♂, ZMUM].

Specimen examined from the UAE: Al-Ajban, 24°36'N 55°01'E, 1♂, 23–30.xi.2005, AvH.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small to moderately small shore-flies, body length 1.90–2.50 mm. Body, including antennae, palpi and tarsi, completely black with dense greyish to brownish microtomentum. Head: Vestiture of mesofrons thinly microtomentose with some faintly subshiny, metallic golden brown to bronzy luster; colouration of mesofrons contrasted distinctly with dull-coloured, charcoal grey parafrons; several small setae on mesofrons anterior of medial ocellus, setae generally scattered; fronto-orbital plate concolorous with mesofrons. Larger fronto-orbital setae 2, first and third setae much reduced, not generally discernable from surrounding, smaller setae. Postocular setae slightly larger toward dorsum, none well developed. Antenna dark, microtomentose, brownish-black; arista usually longer than combined length of pedicel and basal flagellomere, bare to micropubescent. Face dull greyish microtomentose, wider than high, not greatly protrudent, interfoveal facial carina lacking distinct crease; without distinct, large, dorsally curved seta toward posteroventral angle of face, with 6 lateral setae, arranged by 3 in 2 rows, several setae along oral margin and descending from facial carina to posteroventral angle of face, other facial setae subequal

to each other, smaller than marginal ones. Eye nearly round; gena short, gena-to-eye ratio 0.25, generally concolorous with facial colour anteriorly, lighter, more whitish-grey posteriorly. Thorax: Mesonotum yellowish-grey, generally with sparse, scattered, faint metallic speckles, especially anteriorly; development of setae relatively moderate. Colouration of pleural areas tannish-brown, generally lighter in colour than mesonotum, becoming lighter anteroventrally. Colouration of legs from olivaceous grey to black, becoming darker toward apices. Wing hyaline; costal margin normally setulose. Abdomen: Abdomen sparsely microtomentose, faintly shiny; dorsum generally concolorous with mesonotum, darker and subshiner posteriorly; ventral portion of anterior tergites lighter in colour, greyish, more microtomentose. Male terminalia: Epandrium in posterior view with ventral margin shallowly rounded and bearing several setulae, longest subequal in length to width of cercus, in lateral view narrowest dorsally, thereafter ventrally as an elongate, narrow teardrop, widest subapically, apical margin rounded; cercus only 0.25 times combined length of epandrium and surstylus; ventral arm of gonite in lateral view moderately narrow, parallel-sided, thumb-like, apex broadly rounded, in ventral view triangular, acutely pointed apically, basolateral angle projected, digitiform; aedeagus in lateral view subalar, curved, apical half tapered to acute point; phallopodeme in lateral view very narrow, elongate, arched.

Remarks: This species is very similar to *L. sibilans* (Haliday, 1833) and is best distinguished from the latter by characters of the male terminalia, especially the shape of the epandrium in lateral view, the length of the cercus, the anterior margin of the surstylus with long setulae, and the finger-like gonite in lateral view with a broadly rounded apex.

Distribution: Palaearctic Region: Only known from Tajikistan and now UAE.

#### Genus *Scatella* Robineau-Desvoidy, 1830

*Scatella* Robineau-Desvoidy, 1830: 801. Type species: *Scatella buccata* Robineau-Desvoidy, 1830 (= *Ephydra stagnalis* Fallén, 1813), designated by Coquillett, 1910: 603. Cogan, 1984: 173–176 [Palaearctic catalogue]. Mathis & Zatwarnicki, 1995: 262–281 [world catalogue].

#### Key to the species of *Scatella* from the UAE

- 1 Genal height nearly 1/2 eye height; body colouration except for dark dorsum silvery grey, especially face; mesofrons shiny, with metallic dark grey reflections ..... *S. paludum* (Meigen)
- Genal height at most 1/4–1/3 eye height; body colouration mostly brownish; mesofrons at most partially shiny, with metallic bronzy to brown reflections ..... **2**
- 2 Legs and basal flagellomere mostly pale, yellowish; length of arisal branching rays twice arisal width at base ..... *S. rufipes* Strobl
- Legs and basal flagellomere dark, mostly blackish; length of arisal branching rays about equal to arisal width at base ..... **3**
- 3 Frons mostly microtomentose and dull ..... *S. ciliata* Collin
- Frons thinly microtomentose, subshiny ..... **4**
- 4 White wing spots conspicuous, strongly contrasted with dark background; species generally appearing robust, setation stronger ..... *S. septemfenestrata* Lamb
- White wing spots faint, not strongly contrasted with darker background; generally smaller flies, setation generally weaker ..... *S. tenuicosta* Collin

#### *Scatella* (*Scatella*) *paludum* (Meigen, 1830)

*Ephydra paludum* Meigen, 1830: 118 [not given (? former Germany)]; LT ♀ (designated by Cresson, 1930: 123), NMW].

*Scatella paludum*. Becker, 1902: 310 [generic combination]. Cogan, 1984: 174 [Palaeartic catalogue]. Olafsson, 1991: 22–24 [revision]. Mathis & Zatwarnicki, 1995: 275 [world catalogue].

*Ephydra leucostoma* Meigen, 1830: 121 [not given (? former Germany); LT ♂ (designated by Cresson, 1930: 124), NMW]. Becker, 1902: 311 [synonymy].

*Scatella leucostoma*. Haliday in Walker, 1856: 346 [generic combination].

*Ephydra (Scatella) sorbillans* Haliday, 1839: 409 [not given (? Northern Ireland), “on the sea-coast”; ST (sex ?), NMI]. Becker, 1902: 311 [synonymy].

*Scatella sorbillans*. Haliday in Walker, 1856: 346 [generic combination].

*Ephydra (Ephydra) argyrostoma* Stenhammar, 1844: 176 [Sweden. Ostrogothia, Scania; ST ♂♀, ZIL and ZIU]. Haliday in Walker, 1856: 346 [synonymy with *Ephydra sorbillans* Haliday].

Specimens examined from the UAE: Ajman, industrial area, 25°21.8'N 55°28.4'E, 2♂, 17.iii.2010, WNM. Bithnah, 25°11'N 56°14'E, Malaise & light traps, 3♀, 6.iii–26.xii 2006, 2008, AvH. Hatta, 28°49'N 56°07'E, 1♂, 4–11.iv.2006, light trap, AvH. Kalba, beach, 25°06'N 56°21.5'E, 1♀, 3.iii.2010, WNM. Sharjah Desert Park, 25°16.9'N 55°41.4'E, 2♀, 28.ii–31.v 2005, 2006, JCD, AvH. Sharjah–Khor Kalba, near tunnel, 1♀, 7–22.iii.2006, light trap, AvH. NARC, near Sweihan, 24°24'N 55°26'E, 14–28.iii.2005, 3♂, light trap, AvH. Um al-Quwain, beach, 25°31.4'N 55°31.4'E, 2♂, 1♀, 28.ii.2010, WNM. Wadi Asimah, 435 m, 25°24.1'N 56°08.2'E, 2♀, 8.iii.2010, WNM. Wadi Hayl, 245 m, 25°04.9'N, 56°13.5'E, 1♂, 2♀, 6.iii.2010, WNM; 1♂, 2♀, 15.iii.2008, JHS. Wadi Madaq, 390 m, 25°20.8'N 56°05.5'E, 1♀, 8.iii.2010, WNM. Wadi Safad, 25°13.1'N 56°17.6'E, 1♀, 31.i–21.ii.2006, light trap, AvH. Wadi Shawkah, reservoir, 25°06.3'N 56°02.8'E, 1♂, 4♀, 10.iii.2008, JHS; 300 m; reservoir, 1♂, 2♀, 27.ii.2010, WNM; road, 265 m, 1♀, 10.iii.2010, WNM. Wadi Wurayah, 25°24'N 56°17'E, 3♂, 2♀, 22.i–14.iv 2005, 2006, water trap, T. Pape; 210 m, 2♂, 17.iii.2010, WNM.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Colouration generally brown dorsally but grey to whitish-grey on pleurae; males and females quite similar, not strongly sexually dimorphic. Head: Mesofrons of male distinctly narrowed anteriorly, trapezoidal, shiny; face, including antennal grooves and dorsum of facial prominence, more unicolorous, silvery white; gena high, nearly half eye height; genal seta weakly developed. Thorax: Mesonotum more uniformly coloured, greyish-brown to slightly less microtomentose posteriorly. Wing mostly hyaline, spots very obscure to nonexistent; costal thickness of male relatively thin, similar in sections I, II, and III, section I not conspicuously thickened.

Distribution: Afrotropical Region: South Africa (Transvaal), Zaire; Nearctic Region: Canada (British Columbia, Ontario), USA (Arizona, California, Iowa, Montana, Ohio, Oregon, Texas, Utah, Virginia, Washington, Wyoming); Neotropical Region: Mexico (Morelos, Sonora), West Indies (Guadalupe); Oriental Region: Japan (Ryukyu Islands); Palaeartic Region: Algeria, Austria, Azores, Belgium, Bulgaria, Canary Islands, Cyprus, Czech Republic, Denmark, Egypt, Faroe Islands, Finland, France, Germany, Great Britain, Hungary, Iceland, Ireland, Italy, Japan (Hokkaido, Honshu, Shikoku), Madeira Islands, Mallorca, Malta, Mongolia (Töv), Morocco, Netherlands, Norway, Poland, Romania, Russia (European Territory, Far East), Slovakia, Sweden, Switzerland, Ukraine, and now UAE.

***Scatella (Scatella) rufipes* Strobl, 1906**

Plate 38, Figures 159–160

*Scat[ella]. lutosa* variety *rufipes* Strobl, 1906: 371 [Spain. Elche; ST ♀, DCSA, NMW].

*Scatella rufipes*. Zatwarnicki, 1991: 328 [revised status]. Mathis & Zatwarnicki, 1995: 276 [world catalogue].

*Scatella rubida* Becker, 1907: 399 [Algeria. Biskra; LT ♂ (designated by Olafsson, 1991: 21), ZMHU]. Olafsson, 1991: 21 [revision]. Zatwarnicki, 1991: 328 [synonymy].

Specimens examined from the UAE: Al-Ajban, 245 m, 24°35.8'N 55°00.2'E, 2♀, 15.iii.2010, WNM. N of Ajman, salt marsh, 25°25.9'N 55°29.4'E, 1♀, 16.ix–22.x.2006, water trap, AvH; mangrove, 3♂, 1♀, 28.ii.2010, WNM, TZ. Ajman, industrial area, 25°21.8'N 55°28.4'E, 1♂, 12.iii.2010, WNM. Sharjah Desert Park, 25°16.9'N 55°41.4'E, 1♀, 30.iv–31.v.2005, AvH. Sharjah National Park, 25°18.9'N 55°32.2'E, 1♂, 12.iii.2008, JHS. Um al-Quwain, beach, 25°31.4'N 55°31.4'E, 1♂, 1♀, 28.ii.2010,

WNM. Wadi Asimah, 435 m, 25°24.1'N 56°08.2'E, 2♂, 8.iii.2010, TZ. Wadi Shawkah, road, 265 m, 25°06.3'N 56°01.6'E, 2♂, 4♀, 27.ii–10.iii.2010, WNM.

Diagnosis: This species is distinguished from congeners by the following combination of characters: Small to moderately small shore-flies, body length 1.40–2.10 mm; generally light coloured, tannish to yellowish-grey, densely microtomentose. Head: Frons mostly tan to greyish tan microtomentose, some species with faint yellowish colouration anterolaterally. Scape and pedicel greyish-brown to greyish-black; basal flagellomere darkened dorsoapically, yellowish ventrobasally. Face generally greyish tan; gena moderately high, gena-to-eye ratio 0.16. Thorax: Mesonotum greyish tan, pleural areas becoming greyer to whitish-grey ventrally. Wing very faintly infuscate, more so toward anterior margin, white spots faint; cell  $R_{2+3}$  with a large white spot at midlength; cell  $R_{4+5}$  with 2 white spots, separate, on either side of alignment of crossvein dm-cu; cell dm with subapical white spot, abutting vein  $CuA_1$ . Femora, tibiae, and tarsi mostly yellow, faintly brownish dorsally, tarsomeres becoming darker towards apex, apical 1–2 mostly brown. Abdomen: Tergites partially subshiny, more sparsely microtomentose, extensively greyer. Male terminalia as in Figures 159–160.

Distribution: Palaearctic Region: Algeria, Egypt, Iran, Iraq, Israel, Italy, Jordan, Mallorca, Morocco, Spain, Tunisia, and now UAE.

### *Scatella (Scatella) septemfenestrata* Lamb, 1912

*Scatella septemfenestrata* Lamb, 1912: 328 [Seychelles. Mahé (marsh behind beach at Port Glaud); LT ♀ (designated by Mathis & Zatwarnicki, 2003: 644), BMNH]. Mathis & Zatwarnicki, 1995: 276–277 [world catalogue].

Specimens examined from the UAE: Al-Ain, Mubazzarah, hot spring, 24°06.4'N 55°44.8'E, 2♀, 16.iii.2010, WNM, TZ. Kalba, beach, 25°06'N 56°21.5'E, 1♂, 3.iii.2010, TZ. Khor Fakkan, beach, 25°22.1'N 56°20.9'E, 1♀, 11.iii.2010, WNM; NARC, near Sweihan, 24°24'N 55°26'E, 1♂, 14–28.iii.2005, light trap, AvH. Wadi Asimah, 435 m, 25°24.1'N 56°08.2'E, 8♂, 11♀, 8.iii.2010, WNM, TZ. Wadi Hayl, 245 m, 25°04.9'N 56°13.5'E, 3♂, 2♀, 6.iii.2010, WNM. Wadi Madaq, 390 m, 25°20.8'N 56°05.5'E, 3♂, 2♀, 3.iii.2010, WNM, TZ. Wadi Shawkah, reservoir, 300 m, 25°06.3'N 56°02.8'E, 3♂, 16♀, 27.ii.2010, WNM, TZ; road, 265 m, 3♂, 27.ii.2010, WNM. Wadi Wurayah, 210 m, 25°23.9'N 56°16.2'E, 2♀, 17.iii.2010, WNM.

Diagnosis: This species is similar to *S. tenuicosta* Collin and *S. stagnalis* (Fallén, 1813) but is distinguished from either and other congeners by the following characters: Small shore-flies, body length 1.50–1.95 mm. Head: Frons mostly microtomentose, mostly dull, at most subshiny laterally. Arista rays short, not much longer than arista width at base. Face greyish-brown. Thorax: Mesonotum and dorsal portion of pleural area dark brown, ventral pleurites grey. Wing with six to seven hyaline spots within a dark coloured background (sometimes the apical spot in cell  $r_{2+3}$  is indistinct). Legs greyish to mostly brownish-black; tarsi mostly black. Abdomen: Brown black to black, sparsely microtomentose, subshiny to shiny.

Distribution: Afrotropical Region: Ascension Islands, Nigeria, St. Helena, Rodrigues Island, Seychelles (La Digue, Mahé, Praslin); now first time in the Palaearctic Region, from the UAE.

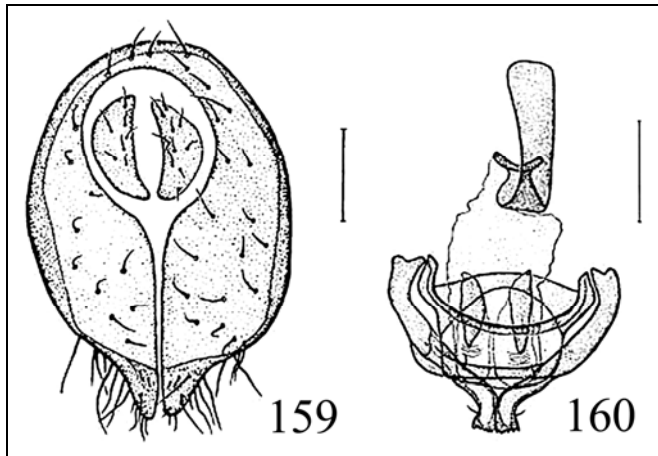
### *Scatella (Scatella) tenuicosta* Collin, 1930

*Scatella (Scatella) tenuicosta* Collin, 1930: 136 [Great Britain. Essex: Pitsea and Walton-on-Naze; Dorset: Arne; Glamorgan: Porthcawl; Norfolk: Palling-on-sea; Suffolk: Aldeburgh, Felixstowe, Butley, Newmarket; ST ♂♀, BMNH, UMO, ZIL]. Olafsson, 1991: 31 [revision]. Mathis & Zatwarnicki, 1995: 278 [world catalogue].

*Scatella (Scatella) stagnalis* of authors, nec Robineau-Desvoidy, 1830 [misidentification in part]. Kirk-Spriggs & McGregor, 2009 [biogeographic study, United Arab Emirates].



Plates 37–38. Habitus, anterolateral view. 37: *Ephydra flavipes* (Macquart); 38: *Scatella (Scatella) rufipes* Strobl. Photographs: T. Zatwarnicki.



Figures 159–160. Male terminalia of *Scatella (Scatella) rufipes* Strobl. 159: Epandrium, and cerci, ventral view; 160: Internal male genitalia, ventral view. Scale bars = 0.1 mm.

Specimens examined from the UAE: Al-Ajban, 245 m, 24°35.8'N 55°00.2'E, 2♂, 1♀, 15.iii.2010, WNM. N of Ajman, mangrove, 25°25.7'N 55°30.1'E, 2♂, 1♀, 28.ii.2010, WNM. Ajman, industrial area, 25°21.8'N 55°28.4'E, 5♂, 4♀, 10–12.iii.2010, WNM, TZ. Desert Farm, 25°07.9'N 55°45.1'E, 1♀, 12.iii.2008, JHS. Fujairah, 25°12.8'N 56°21.5'E, 1♀, 8–29.iv.2006, light trap, AvH; Hatta, 28°49'N 56°07'E, 1♀, 4–11.iv.2006, light trap, AvH. Hatta dam, 365 m, 24°47.7'N 56°06.3'E, 14♂, 12♀, 1.iii.2010, WNM, TZ. Kalba, beach, 25°06'N 56°21.5'E, 2♀, 3.iii.2010, WNM. Khor al-Khwair, 25°58'N 56°03'E, 1♀, 22.ii–1.iii.2007, light trap, AvH. Khor Fakkan, beach, 25°22.1'N 56°20.9'E, 5♂, 4♀, 11.iii.2010, WNM, TZ. Masafi, farm, 25°18.9'N 56°07.8'E, 1♀, 17.iii.2008, JHS. Ra's al-Khaimah, farm, 25°47.9'N 56°04.3'E, 1♂, 2♀, 16.iii.2008, JHS. Ra's al-Khaimah, 25°46'N 55°53.6'E, 2♂, 2♀, 13.iii.2010, WNM. Sharjah Desert Park, 25°16.9'N 55°41.4'E, 2♀, 29.iii–12.vi.2005, light trap, AvH. Sharjah National Park, 25°18.9'N 55°32.2'E, 2♂, 4♀, 12.iii.2008, JHS. NARC, near Sweihan, 24°24'N 55°26'E, 1♀, 14–28.iii.2005, light trap, AvH; 1♂, 21.ii.2006, JCD. Um al-Quwain, beach, 25°13.6'N 56°21.5'E, 2♂, 2♀, 13–18.iii.2008, JHS; beach, 1♂, 28.ii.2010, WNM. Wadi Asimah, 435 m, 25°24.1'N 56°08.2'E, 13♂, 12♀, 8.iii.2010, WNM, TZ. Wadi Bih, dam, 25°48'N 56°04.4'E, 1♂, 6–17.iii.2008, light trap, AvH; 115 m, 5♂, 3♀, 9.iii.2010, WNM. Wadi Hayl, 25°04.8'N 56°13.5'E, 2♂, 5♀, 15.iii.2008, JHS; 245 m, 1♂, 2♀, 6.iii.2010, WNM. Wadi Madaqa, 25°19.7'N 56°07.2'E, 2♂, 2♀, 15.iii.2008, JHS; 1♀, 1–8.v.2006, light trap, AvH; 390 m, 10♂, 4♀, 8.iii.2010, WNM, TZ. Wadi Safad, 25°13.1'N 56°17.6'E, 2♀, 13.iii.2008, JHS; 1♀, 22.ii.2006, AvH; 140 m, 3♂, 2♀, 11.iii.2010, WNM, TZ. Wadi Mirba, mountain oasis, 25°16.2'N 56°16.7'E, 2♂, 3♀, 13.iii.2008, JHS. Wadi Shawkah, reservoir, 25°06.3'N 56°02.8'E, 5♂, 6♀, 10–14.iii.2008, JHS; 1♀, 20.iii.2007, leg. F. Menzel; reservoir, 300 m, 13♂, 6♀, 27.ii.2010, WNM, TZ; 9♂, road, 265 m, 27.ii–10.iii.2010, WNM. Wadi al-Sidr, farm, 25°24.7'N 56°05.1'E, 2♀, 17.iii.2008, JHS. Wadi Wurayah, 210 m, 25°23.9'N 56°16.2'E, 4♂, 17.iii.2010, WNM.

Diagnosis: This species is distinguished from congeners by the following combination of characters: A smaller species of *Scatella*, body length 1.50–2.50 mm. Head: Mesofrons at most very thinly microtomentose, subshiny to shiny, some specimens with a medial vitta more densely microtomentose. Face, including facial hump, mostly densely greyish-brown microtomentose; gena moderately short, height about equal to height of basal flagellomere; genal seta well developed, conspicuous. Thorax: Mesonotum essentially concolorous with pleural areas, thinly to moderately microtomentose, dull, mesonotal stripes more evident anteriorly, some specimens more thinly microtomentose through portion of dorsocentral track

and medially, subshiny; bearing a well-developed pair of presutural acrostichal setae; well-developed dorsocentral setae all postsutural; basal scutellar setae much shorter than apical setae; pleural region more densely microtomentose than mesonotum, more greyish-brown to tan. Wing generally faintly to moderately infusate with conspicuous white spots; wing cell  $r_{2+3}$  with a conspicuous subrectangular to subquadrate spot near middle, lacking a hyaline area toward apex; cell  $r_{4+5}$  with a conspicuous subapical, transverse, subrectangular white area that is not constricted or divided medially; costal section I of male normally developed, not extensively and/or conspicuously thickened. Abdomen: Tergites thinly to moderately microtomentose, subshiny to shiny. Female with sternite 7 whole, undivided medially, rectangular, wider than long.

Remarks: This species is one of the most misidentified species in the region and is much more widespread than was previously appreciated (Olafsson, 1991: 31). Usually the species was misidentified as *S. stagnalis* Robineau-Desvoidy, 1830. This species is commonly found in greenhouses in the Holarctic Region and has been transported and perhaps introduced many times in potting soil.

Distribution: Afrotropical Region: Cape Verde Islands; Nearctic Region: Greenland, United States (Delaware, District of Columbia, Maryland, Oregon, Virginia, West Virginia); Palaearctic Region: Austria, Azores, Bulgaria, Canary Islands, Cyprus, Denmark, Egypt, Finland, France, Germany, Great Britain, Greece, Hungary, Iceland, Norway, Russia (European Territory), Spain, Sweden, Switzerland, Tunisia, Turkey, Yugoslavia, UAE.

#### Genus *Scatophila* Becker, 1896

*Scatophila* Becker, 1896: 237. Type species: *Ephydra caviceps* Stenhammar, 1844, original designation. Zatwarnicki & Mathis, 1994: 351–370 [classification, phylogeny]. Mathis & Zatwarnicki, 1995: 281–287 [world catalogue].

#### *Scatophila farinae* Becker, 1903

Plate 40

*Scatophila farinae* Becker, 1903: 177 [Egypt. Luxor; LT ♂ (designated by Zatwarnicki, 1987: 282), ZMHU]. Beschovski & Zatwarnicki, 2004: 46 [review; Bulgaria].

Specimens examined from the UAE: Khor Kalba, mangrove, 25°00.9'N 56°21.6'E, 1♀, 4.iii.2010, TZ. Sharjah Desert Park, 25°16.9'N 55°41.4'E, 4♀, 29.iii–22.iv 2005, 2007, light trap, AvH. Sharjah–Khor Kalba, near tunnel, 24°59'N 56°14'E, 1♀, 3–18.v.2006, light trap, AvH. NARC, near Sweihan, 24°24'N 55°26'E, 1♂, 1♀, 14–28.iii.2005, light trap, AvH. Wadi Asimah, 435 m, 25°24.1'N 56°08.2'E, 1♂, 8.iii.2010, TZ. Wadi Bih, dam, 115 m, 25°48'N 56°04.4'E, 2♂, 9.iii.2010, WNM, TZ. Wadi Safad, 140 m, 25°13.3'N 56°18.3'E, 2♂, 11.iii.2010, TZ.

Diagnosis: This species is distinguished from related congeners by the following combination of characters: Small shore-flies, body length 1.35–1.50 mm. Head: Frons with mesofrons whitish-grey with some faint bluish tinges, parafrons darker, more charcoal grey. Face whitish-grey; gena moderately high, gena-to-eye ratio 0.20. Thorax: Mesonotum densely whitish-grey microtomentose; acrostichal setulae all small; 2 postsutural dorsocentral setae. Wing generally very pale, white spots barely discernible; without white spots in cell  $R_1$ ; cell  $R_{2+3}$  with an elongate white spot basally, a large white spot at midlength, and a spot subapically; cell  $R_{4+5}$  with 4 white spots, 1 basally, 1 at level of crossvein dm-cu, 1 subapically, 1 apically; cell dm with an apical white spot; cell m with a large white spot, sometimes partially subdivided. Femora and tibiae mostly dark grey, apices yellowish; tarsi dark dorsally but mostly yellowish-orange, apical tarsomeres brown. Abdomen: Tergites 1–4 bluish-grey, moderately microtomentose, partially subshiny; tergite 5 mostly black with very sparse, fine microtomentum.

Distribution: Palaearctic Region: Algeria, Bulgaria, Canary Islands, Egypt, Italy, Morocco, and now UAE.





Plates 39-40. Habitus, anterolateral view. 39: *Brachydeutera meridionalis* Rondani; 40: *Scatophila farinae* Becker. Photographs: T. Zatwarnicki.

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## REFERENCES

- Becker, Th. (1896): Dipterologische Studien IV. Ephydriidae. *Berliner Entomologische Zeitschrift*, 41 (2): 91–276.
- Becker, Th. (1902): Die Meigen'schen Typen der sogen. Muscidae acalypterae (Muscaria holometopa) in Paris und Wien. *Zeitschrift für systematische Hymenopterologie und Dipterologie*, 2 (5): 209–256, 289–349.
- Becker, Th. (1903): Ägyptische Dipteren gesammelt und beschrieben. *Mitteilungen aus dem Zoologischen Museum in Berlin*, 2 (3): 67–195.
- Becker, Th. (1905): Ephydriidae. Pp. 185–215 in: Th. Becker, M. Bezzi, K. Kertész & P. Stein, eds., *Katalog der paläarktischen Dipteren*. Vol. 4, 328 pp., G. Wesselényi in Hódmezővásárhely, Budapest.
- Becker, Th. (1907): Die Ergebnisse meiner dipterologischen Frühjahrsreise nach Algier und Tunis, 1906. *Zeitschrift für systematische Hymenopterologie und Dipterologie*, 7 (5): 369–407.
- Becker, Th. (1910): Dipteren aus Südarabien und von der Insel Sokótra. 30 pp. Prepublication separate from *Denkschriften der Mathematisch-Naturwissenschaftlichen Klasse der Kaiserlichen Akademie der Wissenschaften*, 71 [1907]: 131–160, 5 figs. [Journal article published in 1931.]
- Becker, Th. (1922): Wissenschaftliche Ergebnisse der mit Unterstützung der Akademie der Wissenschaften in Wien aus der Erbschaft Treitl von F. Werner unternommenen zoologischen Expedition nach dem anglo-Ägyptischen Sudan (Kordofan) 1914. VI. Diptera. *Denkschriften der Akademie der Wissenschaften in Wien Mathematisch-Naturwissenschaftliche Klasse*, 98 [1923]: 57–82.
- Becker, Th. (1924): H. Sauter's Formosa-Ausbeute: Ephydriidae (Diptera). *Entomologische Mitteilungen*, 13: 89–93.
- Becker, Th. (1926): 56a Ephydriidae und 56b Canaceidae. In: E. Lindner, ed., *Die Fliegen der palaearktischen Region*, 6 (1): 1–115.
- Becker, Th. & P. Stein (1912): Persische Dipteren von den Expeditionen des Herrn N. Zarudny 1898 und 1901. *Annuaire du Musée Zoologique de l'Académie Impériale des Sciences de St.-Petersbourg*, 18: 503–654.
- Beschovski, V.L. & T. Zatwarnicki (2004): Faunistic review of the subfamily Ephydrinae in Bulgaria (Insecta: Diptera, Ephydriidae) with some data from other Palaeearctic countries. *Acta Zoologica Bulgarica*, 56 (1): 31–55.

- Bezzi, M. (1908): Ditteri Eritrei. Parte Seconda (1). Diptera Cyclorrhapha. *Bullettino della Società Entomologica Italiana*, 39: 3–199.
- Bezzi, M. 1914a. Studies in Philippine Diptera, I. *The Philippine Journal of Science* section D, 8 (4) [1913]: 305–332.
- Bezzi, M. (1914b): Contributo allo studio della Fauna Libica. Materiali raccolti nelle zone di Musurata e Homs (1912–13) dal Dott. Alfredo Andreini, Capitano Medico. Ditteri. *Annali del Museo civico di Storia naturale Genova*, Series 3, 6: 165–181.
- Canzoneri, S. (1981): Ricerche condotte dal prof. A. Giordani Soika nel Senegal ed in Gambia. Diptera: Ephydriidae e Canaceidae. *Bollettino del Museo civico di Storia naturale di Venezia*, 31: 201–221.
- Canzoneri, S. (1982): Ephydriidae e Canaceidae della Sierra Leone (Diptera). *Accademia Nazionale dei Lincei, Problemi Attuali di Scienza e di Cultura, Sezione: Missioni ed Esplorazioni – VIII*, Quaderno N. 255: 53–62.
- Canzoneri, S. (1987): Sugli Ephydriidae e Canacidae del Sudan (Diptera, Cyclorrhapha). *Bollettino del Museo civico di Storia naturale di Venezia*, 37 [1986]: 79–97.
- Canzoneri, S. (1988): Una nuova specie di *Allotrichoma* dell'Etiopia (Diptera, Ephydriidae). *Società Veneziana di Scienze Naturali – Lavori*, 13: 3–4.
- Canzoneri, S. & D. Meneghini (1969): Sugli Ephydriidae e Canaceidae della fauna etiopica. *Bollettino del Museo civico di Storia naturale di Venezia*, 19 [1966]: 101–185.
- Canzoneri, S. & D. Meneghini (1972): Una nuova *Psilopa* del Lido di Volano e revisione delle specie italiane (Dipt. Ephydriidae). *Bollettino del Museo civico di Storia naturale di Venezia*, 22–23: 143–153.
- Canzoneri, S. & D. Meneghini (1975a): Nota sui Discocerini (Diptera, Ephydriidae). *Bollettino del Museo civico di Storia naturale di Venezia*, 27: 39–45.
- Canzoneri, S. & D. Meneghini (1975b): Primi Dati Sulle *Hydrellia* dell'Iran (Diptera, Ephydriidae). *Atti della Società italiana de Scienze naturali del Museo civico di Storia naturale di Milano*, 116 (3–4): 218–222.
- Canzoneri, S. & D. Meneghini (1979): Una nuova *Notiphila* dell'Iran (Diptera, Ephydriidae). *Bollettino del Museo civico di Storia naturale di Venezia*, 30: 209–210.
- Canzoneri, S. & G. Raffone (1987): Ditteri raccolti dal Dr. Walter Rossi in Kenya (Ephydriidae, Canacidae). *Bollettino del Museo civico di Storia naturale di Venezia*, 37 [1986]: 57–76.
- Canzoneri, S. & L. Rampini (1992): Una nuova specie di *Glenanthe* dell'Iran (Diptera, Ephydriidae). *Bollettino del Museo civico di Storia naturale di Venezia*, 41 [1990]: 231–233.
- Canzoneri, S. & L. Rampini (1996): Ricerche condotte dall'Università di Lund in Sierra Leone: Diptera, Ephydriidae. *Società Veneziana di Scienze Naturali – Lavori*, 21: 7–14.
- Clausen, P.J. 1977. A revision of the Nearctic, Neotropical, and Palearctic species of the genus *Ochthera* including one Ethiopian species, and one new species from India. *Transactions of the American Entomological Society*, 103: 451–530.
- Clausen, P.J. (1979): Lectotype designation of *Ochthera schembrii* Rondani (Diptera: Ephydriidae) and resulting synonymies. *Entomological News*, 90 (3): 141–142.
- Clausen, P.J. (1980): Modifications to the genus *Ochthera* (Diptera: Ephydriidae) and additions to the Neotropical species. *Transactions of the American Entomological Society*, 106 (2): 205–222.
- Cogan, B.H. (1968): A revision of the Ethiopian species of the tribe Notiphilini (Diptera: Ephydriidae). *Bulletin of the British Museum (Natural History), Entomology*, 21 (6): 281–365.
- Cogan, B.H. (1980): 71. Family Ephydriidae. Pp. 655–669 in: R.W. Crosskey, ed., *Catalogue of the Diptera of the Afrotropical Region*. 1437 pp., British Museum (Natural History), London.

- Cogan, B.H. (1984): Family Ephydriidae. Pp. 126–176 in: Á. Soós & L. Papp, eds., *Catalogue of Palaearctic Diptera*. 10. 402 pp., Elsevier Science Publishers, Amsterdam, and Akadémiai Kiadó, Budapest.
- Cogan, B.H. & W.W. Wirth (1977): Family Ephydriidae. Pp. 321–339 in: M.D. Delfinado & D.E. Hardy, eds., *A catalogue of the Diptera of the Oriental Region. Volume III. Suborder Cyclorrhapha (excluding Division Aschiza)*. 451+vii pp., University Press of Hawaii, Honolulu.
- Collin, J.E. (1930): Some new species of the dipterous genus *Scatella* Dsv. and the differentiation of *Stictoscatella* gen. nov. (Ephydriidae). *The Entomologist's Monthly Magazine*, 66: 133–139.
- Collin, J.E. (1949): Results of the Armstrong College Expedition to Siwa Oasis (Libyan Desert), 1935, under the leadership of Prof. J. Omer-Cooper. Diptera Empididae, Dolichopodidae, Aschiza and Acalypterae. *Bulletin de la Société Foudad ler d'Entomologie*, 33: 175–25.
- Coquillett, D.W. (1900a): New genera and species of Ephydriidae. *The Canadian Entomologist*, 32 (2): 33–36.
- Coquillett, D.W. (1900b): Report on a collection of dipterous insects from Puerto Rico. *Proceedings of the United States National Museum*, 22: 249–270.
- Coquillett, D.W. (1910): The type-species of the North American genera of Diptera. *Proceedings of the United States National Museum*, 37: 499–647.
- Cresson, E.T., Jr. (1917): Descriptions of new genera and species of the dipterous family Ephydriidae. IV. *Entomological News*, 28 (8): 340–341.
- Cresson, E.T., Jr. (1922): Descriptions of new genera and species of the dipterous family Ephydriidae. V. *Entomological News*, 33 (5): 135–137.
- Cresson, E.T., Jr. (1924): Descriptions of new genera and species of the dipterous family Ephydriidae. VI. *Entomological News*, 35 (5): 159–164.
- Cresson, E.T., Jr. (1925): Studies in the dipterous family Ephydriidae, excluding the North and South American faunas. *Transactions of the American Entomological Society*, 51: 227–258.
- Cresson, E.T., Jr. (1929): Studies in the dipterous family Ephydriidae. Paper II. *Transactions of the American Entomological Society*, 55: 165–195.
- Cresson, E.T., Jr. (1930): Studies in the dipterous family Ephydriidae. Paper III. *Transactions of the American Entomological Society*, 56: 93–131.
- Cresson, E.T., Jr. (1931): Descriptions of new genera and species of the dipterous family Ephydriidae. Paper X. *Entomological News*, 42 (6): 168–170.
- Cresson, E.T., Jr. (1936): Descriptions and notes on genera and species of the dipterous family Ephydriidae. II. *Transactions of the American Entomological Society*, 62: 257–270.
- Cresson, E.T., Jr. (1939): Description of a new genus and ten new species of Ephydriidae, with a discussion of the species of the genus *Discomyza* (Diptera). *Notulae Naturae. The Academy of Natural Sciences of Philadelphia*, 21: 1–12.
- Cresson, E.T., Jr. (1942): Synopses of North American Ephydriidae (Diptera) I. The subfamily Psilopinae, with descriptions of new species. *Transactions of the American Entomological Society*, 68: 101–128.
- Cresson, E.T., Jr. (1943a): Descriptions of new genera and species of the dipterous family Ephydriidae, Paper XIII. *Notulae Naturae. The Academy of Natural Sciences of Philadelphia*, 121: 1–4.
- Cresson, E.T., Jr. (1943b): The species of the Tribe Ilytheini (Diptera: Ephydriidae: Notiphilinae). *Transactions of the American Entomological Society*, 69: 1–16, 2 plates.
- Cresson, E.T., Jr. (1944): Synopses of North American Ephydriidae (Diptera). Parts IA and II. *Transactions of the American Entomological Society*, 70: 159–180.

- Cresson, E.T., Jr. (1945): A systematic annotated arrangement of the genera and species of the Indo-Australian Ephydriidae (Diptera). I. The subfamily Psilopinae. *Transactions of the American Entomological Society*, 71: 47–75.
- Cresson, E.T., Jr. (1946a): A systematic annotated arrangement of the genera and species of the Neotropical Ephydriidae (Diptera) I. The subfamily Psilopinae. *Transactions of the American Entomological Society*, 71: 129–163.
- Cresson, E.T., Jr. (1946b): A systematic annotated arrangement of the genera and species of the Ethiopian Ephydriidae (Diptera) I. The subfamily Psilopinae. *Transactions of the American Entomological Society*, 72: 241–264.
- Cresson, E. T., Jr. (1948): A systematic annotated arrangement of the genera and species of the Indo-Australian Ephydriidae (Diptera). II. The subfamily Notiphilinae and supplement to Part I on the subfamily Psilopinae. *Transactions of the American Entomological Society*, 74: 1–28.
- Curtis, J. (1832): *British Entomology; Being illustrations and descriptions of the genera of insects found in Great Britain and Ireland: containing coloured Figures from nature of the most rare and beautiful species, and in many instances of the plants upon which they are found*. Vol. 9. E. Ellis and Company, Simpkin and Marshall, J. B. Bailliere, London.
- Curtis, J. (1837): *A guide to an arrangement of British Insects: being a catalogue of all the named species hitherto discovered in Great Britain and Ireland*. Ed. 2, 294 pp. Printed for the author, London.
- Czerny, L. (1909): Cyclorrhapha Schizophora Holometopa. In: L. Czerny & P.G. Strobl, Spanische Dipteren. III. *Verhandlungen der kaiserlich-königlichen zoologisch-botanischen Gesellschaft in Wien*, 59: 247–290.
- Dahl, R.G. (1973): Beiträge zur Kenntnis der Fauna Afghanistans. Ephydriidae, Diptera. *Acta Musei Moraviae*, 56–57: 347–360.
- Dawah, H.A. & M.A. Abdullah (2006): The Ephydriidae (Diptera: Brachydeutera: Muscomorpha) of south-western Saudi Arabia. *Fauna of Arabia*, 21: 383–394.
- Deeming, J.C. (2002): Some species of the genus *Hydrellia* Robineau-Desvoidy (Diptera, Ephydriidae) in Africa and Arabia, with special reference to species of economic importance. *Mitteilungen aus dem Museum für Naturkunde in Berlin, Deutsche Entomologische Zeitschrift*, 49 (2002): 47–59.
- Dikow, T. & W.N. Mathis (2002): A revision and phylogenetic study of *Actocetor* Becker (Diptera: Ephydriidae). *Proceedings of the Entomological Society of Washington*, 104 (2): 249–290.
- Ebrahim, A.M., M.S. El-Hawagry, F.H. Negm & A.A. El-Moursy (2007): Key to tribes, genera, and species of the subfamily Gymnomyzinae (Ephydriidae) from Egypt, with description of a new species. *Proceedings of the Second International Conference of Economic Entomology. Entomological Society of Egypt*, 1: 253–266.
- Edmiston, J.F. & W.N. Mathis (2005): A revision of the New World species of the shore-fly genus *Nostima* Coquillett (Diptera: Ephydriidae). *Smithsonian Contributions to Zoology*, number 623: vi + 1–108.
- Enderlein, G. (1934): Heringiinae, eine neue minierende Chloropiden Unterfamilie. *Zoologischer Anzeiger*, 105: 191–194.
- Fallén, C.F. (1810): *Specimen entomologicum novam Diptera disponendi methodum exhibens*. 26 pp., Berlingianis, Lundae [= Lund].
- Fallén, C.F. (1813): Beskrifning öfver några i Sverige funna Vattenflugor (Hydromyzides). *Kongliga Vetenskaps-Academiens Handlingar*, series 3, 1813: 240–257.
- Fallén, C.F. (1823): *Hydromyzides Sveciae*. 12 pp., Berlingianis, Lundae [= Lund].
- Foote, B.A. (1995): Biology of shore-flies. Pp. 417–442 in: T.E. Mittler et al., eds., *Annual Review of Entomology*, 40: 609 pp. Palo Alto, California.

- Frey, R. (1931): Die Dipterenfauna der Kanarischen Inseln und ihre Probleme. *Societas Scientiarum Fennica. Commentationes Biologicae*, 6 (1): 111–117.
- Frey, R. (1958a): Kanarische Diptera brachycera p.p., von Håkan Lindberg gesammelt. *Societas Scientiarum Fennica. Commentationes Biologicae*, 17 (4): 1–63.
- Frey, R. (1958b): Zur Kenntnis der Diptera brachycera p.p. der Kapverdischen Inseln. *Societas Scientiarum Fennica. Commentationes Biologicae*, 18 (4): 1–61.
- Freidberg, A. & W.N. Mathis (1985): On the feeding habits of *Rhynchopsilopa* [Dip.: Ephydriidae]. *Entomophaga*, 30 (1): 13–21.
- Gatt, P. & M.J. Ebejer (2003): The Ephydriidae Diptera: Brachycera, Muscomorpha of the Maltese Islands. *Studia Dipterologica* 101: 199–214.
- Giordani Soika, A.G. (1950): Vicarianze nella Fauna litoriparia del litorale veneto in rapporto alle caratteristiche del terreno. Studi sulle Olocenosi V. *Bollettino del Museo civico di Storia naturale di Venezia*, 5: 1–16.
- Giordani Soika, A.G. (1956a): Studi di ecologia e biogeografia XVII – Su *Coenia beckeri* muscidae endemico delle sorgenti solfuree di “Acque Albulè” presso Tivoli (Dipt. Ephydriidae). *Bollettino del Museo civico di Storia naturale di Venezia*, 9: 17–20.
- Giordani Soika, A.G. (1956b): Viaggi di A. Giordani Soika nel Sahara IX. Contributo allo studio del popolamento del Sahara Diptera Ephydriidae. *Bollettino del Museo civico di Storia naturale di Venezia*, 9: 95–114.
- Greathead, D.J. (1963): A review of the insect enemies of Acridoidea (Orthoptera). *Transactions of the Royal Entomological Society, London*, 114: 437–517.
- Haliday, A.H. (1833): Catalogue of Diptera occurring about Holywood in Downshire. *Entomological Magazine*, 1: 147–180.
- Haliday, A.H. (1837): In: J. Curtis, *A Guide to an Arrangement of British Insects; Being a Catalogue of all the Named species Hitherto Discovered in Great Britain and Ireland*. Second edition, 294 pp. + vi. Printed for the author, London.
- Haliday, A.H. (1839): Remarks on the generic distribution of the British Hydromyzidae (Diptera). *Annals of Natural History*, 3: 217–224, 401–411.
- Haliday, A.H. (1855): Recent works on the Diptera of northern Europe. *Natural History Review*, 2: 49–61.
- Hendel, F. (1913): Acalyptrate Musciden (Dipt.) II. In: H. Sauter's Formosa-Ausbeute. *Supplementa Entomologica*, 2: 77–112.
- Hendel, F. (1914): Acalyptrate Musciden (Dipt.) III. In: H. Sauter's Formosa-Ausbeute. *Supplementa Entomologica*, 3: 90–117.
- Hendel, F. (1917): Beiträge zur Kenntnis der acalyptraten Musciden. *Deutsche Entomologische Zeitschrift*, 1917 (6): 33–47.
- Hendel, F. (1931): Neue aegyptische Dipteren aus der Gruppe der acalyptraten Musciden, gesammelt von Prof. Efflatoun Bey. *Bulletin de la Société Royale Entomologique d'Égypte*, 15 (2): 59–73.
- Hendel, F. (1933): Neue Acalyptrate Musciden aus der paläarktischen Region. (Dipt.). *Deutsche Entomologische Zeitschrift*, 1933: 39–56.
- Hennig, W. (1937): 60a. Milichiidae et Carnidae. In: E. Lindner, ed., *Die Fliegen der palaearktischen Region*, 6 (1): 1–91.
- Hennig, W. (1941): Verzeichnis der Dipteren von Formosa. *Entomologische Beihefte aus Berlin-Dahlem*, 8: 1–239 + iv.
- Hollmann-Schirrmacher, V. (1998): Phylogeny of the subfamily Ilytheinae (Diptera, Ephydriidae) with special reference to the genus *Philygria*. *Studia Dipterologica*, Supplement 5: 1–144.
- Kertész, K. (1901): Zwei neue *Ephygrobia*-Arten von Singapore. *Természetráji Füzetek*, 24: 81.

- Kirk-Spriggs, A.H. (1987): A new species of *Scoliocephalus* Becker (Dipt., Ephyridae) from the Cape Verde Islands, with a key to the known species of the genus. *The Entomologist's Monthly Magazine*, 123 (1472–1475): 69–72.
- Kirk-Spriggs, A.H. & G. McGregor (2009): Disjunctions in the Diptera (Insecta) fauna of the Mediterranean Province and southern Africa and a discussion of biogeographical considerations. *Transactions of the Royal Society of South Africa*, 64 (1): 32–52.
- Krivosheina, M.G. (1988): Morfologija preimaginalnych stadij *Brachydeutera ibari* Ninomyia i *Cnestrum lepidopes* Becker (Diptera, Ephyridae) [Morphology of the Preimaginal Stages of *Brachydeutera ibari* Ninomyia and *Cnestrum lepidopes* Becker (Diptera, Ephyridae)]. *Bjulleten' Moskovskogo Obshchestva ispytatelej prirody Otdel biologicheskij* [Bulletin of the Moscow Society of Surveyors of Nature, biological section], 93 (3): 49–54, 18 figs.
- Krivosheina, M.G. (1998): A revision of the shore-fly genus *Notiphila* Fallén of Palaearctic (Diptera Ephyridae). *International Journal of Dipterology*, 9 (1): 31–63.
- Krivosheina, M.G. (2001): A revision of the shore-fly genus *Notiphila* Fallén, 1810 of Oriental Region (Diptera: Ephyridae). *Russian Entomological Journal*, 10 (1): 75–92.
- Krivosheina, M.G. (2004): A review of shore-flies of the genus *Lamproscatella* (Diptera, Ephyridae) from Russia and adjacent territories. *Zoological Journal*, 83 (3): 321–329. [in Russian]
- Krivosheina, M.G. & T. Zatwarnicki (1997): Some notes on the Old World *Allotrichoma* (Diptera: Ephyridae) with description of three new species. *Polskie Pismo Entomologiczne*, 66: 291–310.
- Lamb, C.G. (1912): The Percy Sladen Trust Expedition to the Indian Ocean in 1905, under the Leadership of Mr. J. Stanley Gardiner, M.A. Volume IV. Number XIX. Diptera: Lonchaeidae, Sapromyzidae, Ephyridae, Chloropidae, Agromyzidae. *The Transactions of the Linnean Society of London*, series 2, 15: 303–348.
- Latreille, P.A. (1802): Histoire naturelle, générale et particulière des Crustacés et des Insectes. Tome troisième, 468 pp. In: C.S. Sonnini, ed., *Histoire naturelle par Buffon*. F. Dufart, Paris.
- Latreille, P.A. (1804): Tableau méthodique des Insectes. *Nouveau Dictionnaire d'Histoire Naturelle*, 24: 129–200.
- Latreille, P.A. (1810): *Considérations générales sur l'ordre naturel des animaux composant les classes des crustacés, des arachnides, et des insectes; avec un tableau méthodique de leurs genres, disposés en familles*. 444 pp., F. Schoell, Paris.
- Loew, H. (1847): Dipterologisches. *Stettiner Entomologische Zeitung*, 8 (12): 368–376.
- Loew, H. (1856): Neue Beiträge zur Kenntniss der Dipteren. Vierter Beitrag. *Programm der Königlichen Realschule zu Meseritz*, 1856: 1–57.
- Loew, H. (1860): Neue Beiträge zur Kenntniss der Dipteren. Siebenter Beitrag. Die Europaischen Ephyridinidae und die bisher in Schlesien beobachteten Arten derselben. *Programm der Königlichen Realschule zu Meseritz*, 1860, 46 pp.
- Loew, H. (1862): Monographs of the Diptera of North America. Part 1. *Smithsonian Institution, Smithsonian Miscellaneous Collections*, 6 (141): 1–221.
- Loew, H. (1873): *Beschreibungen europäischer Dipteren*. 3. Systematische Beschreibung der bekannten europäischen zweiflügeligen Insecten, von Johann Wilhelm Meigen. Zehnter Theil oder vierter Supplementband, 320 + viii pp. Druck und Verlag von H.W. Schmidt, Halle.
- Macquart, M.J. [1844]: Diptères exotiques nouveaux ou peu connus. *Mémoires de la Société royale des Sciences, de l'Agriculture et des Arts de Lille*, 1840: 162–460.
- Macquart, M.J. [1851]: Diptères exotiques nouveaux ou peu connus. Suite du 4e supplément. *Mémoires de la Société royale des Sciences, de l'Agriculture et des Arts de Lille*, 1850: 134–294, plates 15–28.

- Mathis, W.N. (1978): New synonymy in Ephydriidae (Diptera). *Entomological News*, 89 (2–3): 105–106.
- Mathis, W.N. (1984a): A revision of the genus *Asmeringa* Becker (Diptera: Ephydriidae). *Israel Journal of Entomology*, 17 [1983]: 67–79.
- Mathis, W.N. (1984b): A revision of the shore-fly genus *Homalometopus* Becker (Diptera: Ephydriidae). *Proceedings of the Biological Society of Washington*, 9 (2): 251–262.
- Mathis, W.N. (1986a): A revision of the subgenus *Eremotrichoma* Soika of the shore-fly genus *Allotrichoma* Becker (Diptera, Ephydriidae). *Israel Journal of Entomology*, 19: 127–139.
- Mathis, W.N. (1986b): Studies of Psilopinae (Diptera: Ephydriidae), I: A revision of the shore-fly genus *Placopsidella* Kertész. *Smithsonian Contributions to Zoology*, 430: 30 + iv pp.
- Mathis, W.N. (1991): Classification of the shore-flies (Diptera: Ephydriidae). Past, present, and future. Pp. 209–227, 11 figs. in: L. Weismann et al., eds., *Proceedings of the Second International Congress of Dipterology*. VEDA, Bratislava, SPB Academic Publishing, 368 pp., The Hague.
- Mathis, W.N. (1993): Studies of Gymnomyzinae (Diptera: Ephydriidae), IV: A revision of the shore-fly genus *Hecamede* Haliday. *Smithsonian Contributions to Zoology*, 541: 46 + iii pp.
- Mathis, W.N. (1994): A revision of the genus *Clasiopella* Hendel (Diptera: Ephydriidae). *Proceedings of the Entomological Society of Washington*, 96 (3): 454–465.
- Mathis, W.N. (1997): Shore-flies of the Belizean Cays (Diptera: Ephydriidae). *Smithsonian Contributions to Zoology*, 592: vi + 1–77.
- Mathis, W.N. & J.C. Deeming (1987): A revision of the shore-fly genus *Elephantinosoma* Becker (Diptera: Ephydriidae). *Proceedings of the Entomological Society of Washington*, 89 (3): 562–570.
- Mathis, W.N. & K.D. Ghorpadé (1985): Studies of Parydrinae (Diptera: Ephydriidae), I: A review of the genus *Brachydeutera* Loew from the Oriental, Australian, and Oceanian Regions. *Smithsonian Contributions to Zoology*, 406: 25 + iv pp.
- Mathis, W.N. & W.E. Steiner, Jr. (1986): An adventive species of *Brachydeutera* Loew in North America (Diptera: Ephydriidae). *Journal of the New York Entomological Society*, 94 (1): 56–61.
- Mathis, W.N. & T. Zatwarnicki (1990a): A revision of the Western Palearctic species of *Athyroglossa* (Diptera: Ephydriidae). *Transactions of the American Entomological Society*, 116 (1): 103–133.
- Mathis, W.N. & T. Zatwarnicki (1990b): Taxonomic notes on Ephydriidae (Diptera). *Proceedings of the Biological Society of Washington*, 103 (4): 891–906.
- Mathis, W.N. & T. Zatwarnicki (1993): A revision of the shore-fly genus *Chlorichaeta* Becker (Diptera: Ephydriidae). *Tijdschrift voor Entomologie*, 136 (1): 55–76.
- Mathis, W.N. & T. Zatwarnicki (1995): *A world catalog of the shore-flies (Diptera: Ephydriidae)*. *Memoirs on Entomology, International*, 4: vi + 423 pp.
- Mathis, W.N. & T. Zatwarnicki (1998): A review of the West Indian species of *Mimapsilopa* Cresson (Diptera: Ephydriidae). *Proceedings of the Entomological Society of Washington*, 100: 7–24.
- Mathis, W.N. & T. Zatwarnicki (2002): A phylogenetic study of the tribe Dryxini Zatwarnicki (Diptera: Ephydriidae). *Smithsonian Contributions to Zoology*, 617: 101 + vi pp.
- Mathis, W.N. & T. Zatwarnicki (2003): Shore-flies of the Republic of Seychelles (Diptera: Ephydriidae). *Annales Zoologici*, 53 (4): 585–650.
- Mathis, W.N. & T. Zatwarnicki (2004): A revision of the shore-fly genus *Trimerogastra* Hendel (Diptera: Ephydriidae). Pp. 89–108 in: N.L. Evenhuis & K.Y. Kaneshiro, eds., D. Elmo Hardy



- Memorial Volume. Contributions to the Systematics and Evolution of Diptera. *Bishop Museum Bulletins in Entomology*, 12: viii + 222 pp.
- Mathis, W.N. & T. Zatwarnicki (2004c): A review of the species of *Hyadina* Haliday (Diptera: Ephydriidae) occurring in Israel. *Israel Journal of Entomology*, 34: 35–57.
- Mathis, W.N. & T. Zatwarnicki (2006): A revision of the New World species of the shore-fly genus *Leptopsilopa* Cresson (Diptera: Ephydriidae). *Annales Zoologici* (Warsaw), 56 (1): 85–138, 216 figures, 2 tbls.
- Mathis, W.N. & T. Zatwarnicki (2012): A review of the shore-fly genus *Oedenopiforma* Cogan (Diptera: Ephydriidae). *Canadian Entomologist*, 144: 81–92.
- McAlpine, J.F. (1981): Morphology and terminology – adults. Pp. 9–63 in: J.F. McAlpine et al., eds, *Manual of Nearctic Diptera*. Volume 1. Research Branch Agriculture Canada, Monograph no. 27, vi + 674 pp.
- Meigen, J.W. (1830): *Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten*. 6: 401 + xi pp., Schulz-Wundermann, Hamm.
- Meijere, J.C.H. de (1913): Praeda Itineris a L. F. de Beaufort in Archipelago indico facti annis 1909–1910. VI. Dipteren I. *Bijdragen tot de Dierkunde*, 19: 45–68.
- Meijere, J.C.H. de (1924): Studien über südostasiatische Dipteren XVI. *Tijdschrift voor Entomologie*, 67: 197–224.
- Munari, L. (1988): Il genere *Homalometopus* Becker: Considerazioni e ipotesi sulla sua biogeografia e filogenesi, con descrizione di una nuova specie della Sardegna (Diptera, Ephydriidae). *Società Veneziana di Scienze Naturali - Lavori*, 13: 5–16.
- Olafsson, E. (1991): Taxonomic Revision of Western Palaearctic species of the genera *Scatella* R.-D. and *Lamproscatella* Hendel, and Studies on Their Phylogenetic Positions within the Subfamily Ephydriinae (Diptera, Ephydriidae). *Entomologica Scandinavica*, Supplement 37: 1–100.
- Oldroyd, H. (1964): *The Natural History of Flies*. 324 pp., W. W. Norton and Company, Inc., New York.
- d'Orbigny, C.V.D. (1845): *Dictionnaire universel d'histoire naturelle résumant et complétant tous les faits présentés par les encyclopédies, les anciens dictionnaires scientifiques, les oeuvres complètes de Buffon, et les traités spéciaux sur les diverses branches des sciences naturelles;—donnant la description des êtres et des divers phénomènes de la nature l'étymologie et la définition des noms scientifiques, les principales applications des corps organiques et inorganiques à l'agriculture, à la médecine, aux arts industriels, etc.; dirigé par M. Charles d'Orbigny, et enrichi d'un magnifique atlas de 288 planches gravées sur acier*. Tome sixième [Livraison 65], C. Renard, Paris.
- Ozerov, A.L. (1984): New Species of the Genus *Risa* (Diptera, Risidae) from Middle Asia. *Zoologicheskii Zhurnal*, 6: 945–948 [in Russian with an English title and abstract].
- Ozerov, A.L. (1992): To the Knowledge of Risidae of the Fauna of the USSR. *Zoologicheskii Zhurnal*, 14: 151–153 [in Russian with an English title and abstract].
- Papp, L. (1977): Notes on Some Becker's Types (Diptera, Carnidae and Risidae fam. n.). *Annales Historico-Naturales Musei Nationalis Hungarici*, 69: 185–189.
- Papp, L. (1979): A contribution to the revision of the Palaearctic Ephydriidae (Diptera). *Folia Entomologica Hungarica*, series nova, 32 (1): 97–104.
- Papp, L. (1980): New taxa of the Acalyprate flies (Diptera: Tunisiimyidae Fam. n., Risidae, Ephydriidae: Nannodastiinae Subfam. n.). *Acta Zoologica Academiae Scientiarum Hungaricae*, 26 (4): 415–431.
- Papp, L. (1983): New taxa of Ephydriidae (Diptera) from the Hortobágy National Park (Hungary). *Acta Zoologica Academiae Scientiarum Hungaricae*, 29 (1–3): 209–217.

- Papp, L. (1984): Family Risidae. Pp. 177–178 in: Á. Soós & L. Papp, eds., *Catalogue of Palaearctic Diptera*, Vol. 10. Akadémiai Kiadó, Budapest.
- Perris, E. (1847): Lettre de M. Édouard Perris A M. M sur une excursion dans les Grandes Landes. *Mémoires de l'Académie Royale des Sciences, Belles-Lettres et Arts de Lyon*. Section des Sciences, 2: 433–506.
- Robineau-Desvoidy, J.B. (1830): Essai sur les Myodaires. *Mémoires Présentés par divers Savans a l'Académie Royale des Sciences de l'Institut de France, et Imprimés par son Ordre Sciences Mathématiques et Physiques*, 2 (2): 1–813.
- Rondani, C. (1847): Communications: Nota septima ad inserviendum dipterologiae italicae. Nova species generis *Ochtherae* Latr., descripta a Camillo Rondani. *Annales de la Société Entomologique de France*, second series, 5 (Bulletin): xxix–xxxii.
- Rondani, C. (1856): *Dipterologiae italicae prodromus. genera Italica ordinis dipterorum ordinatim disposita et distincta et in familias et stirpes aggregata*. Volume 1, 228 pp., A. Stoschi, Parmae [= Parma].
- Schiner, I.R. (1864): *Catalogueus Systematicus Dipterorum Europae*. 115 pp., Wien.
- Séguy, E. (1951a): Description d'un nouveau genre d'Ephydrine (Dipt. Ephydriidae). *Bollettino della Società Entomologica Italiana*, 81 (1): 4–7.
- Stenhammar, C. (1844): Försök till Gruppering och Revision af de Svenska Ephydrinae. *Kongliga Vetenskaps-Akademiens Handlingar*, series 3, 1843: 75–272.
- Steyskal, G.C. (1968): Notes and descriptions of Egyptian Acalyprate Diptera (Ephydriidae, Milichiidae, Otitidae). *Bulletin. Société Entomologique d'Egypte*, 50: 109–125.
- Stower, W.J., G.B. Popov & D.J. Greathead (1958): Oviposition behaviour and egg mortality of the desert locust (*Schistocera gregaria* Forskål) on the coast of Eritrea. *Anti-Locust Bulletin*, 30: 1–33.
- Strobl, P.G. (1906): Spanische Dipteren. II. Beitrag. *Memorias de la Real Sociedad Española de Historia Natural*, 3 (Memorial 5) [1905]: 271–422.
- Stuckenberg, B.R. (1999): Antennal evolution in the Brachycera (Diptera), with a reassessment of terminology relating to the flagellum. *Studia Dipterologica*, 6: 33–48.
- Stuke, J.-H. (2012a): Neue Uferfliegen-Funde (Diptera: Ephydriidae) vom Madeira-Archipel, mit der Beschreibung einer neuen Art. *Studia Dipterologica*, 17 [2010] (1/2): 211–221.
- Stuke, J.-H. (2012b): Taxonomic remarks on *Notiphila meridionalis* Rondani (Diptera: Ephydriidae). *Studia Dipterologica*, 18 [2011] (1/2): 194–196.
- Sturtevant, A.H. & M.R. Wheeler (1954): Synopses of Nearctic Ephydriidae (Diptera). *Transactions of the American Entomological Society*, 79: 151–257.
- Tenorio, J.A. (1980): Family Ephydriidae. Pp. 251–351 in: D.E. Hardy & M.D. Delfinado, eds., *Insects of Hawaii. Volume 13. Diptera: Cyclorrhapha III, Series Schizophora section Acalypterae, exclusive of family Drosophilidae*. 451 + vii pp., University Press of Hawaii, Honolulu.
- Walker, F. (1853): Diptera. In W.W. Saunders, ed., *Insecta Saundersiana: or Characters of Undescribed Insects in the Collection of William Wilson Saunders, Esq., F. R. S., F. L. S., &c.* 1 (4): 253–414. Van Voorst, London.
- Walker, F. (1856): Catalogue of the dipterous insects collected at Sarawak, Borneo, by Mr. A. R. Wallace, with descriptions of new species. *Proceedings of the Linnean Society of London Zoology*, 1: 105–136.
- Westwood, J.O. (1840): Order XIII. Diptera Aristotle (Antilata Fabricius. Halteriptera Clairv.). Pp. 125–154. In, *An Introduction to the Modern Classification of Insects; Founded on the Natural Habits and Corresponding Organisation of the Different Families. Synopsis of the genera of British Insects*. 158 pp. Longman, Orme, Brown, Green and Longmans, London.

- Wiedemann, C.R.W. (1824): *Munus Rectoris in Academia Christiana Albertina aditurus Analecta entomologica ex Museo Regio Havniensi maxime congesta profert iconibusque illustrat.* 60 pp. Kiliae [= Kiel].
- Wiedemann, C.R.W. (1830): *Aussereuropäische zweiflügelige Insecten.* Vol. 2, 648 + xii pp., Schulz, Hamm.
- Wirth, W.W. (1964): A revision of the shore-flies of the genus *Brachydeutera* Loew (Diptera: Ephydriidae). *Annals of the Entomological Society of America*, 57 (1): 3–12.
- Wirth, W.W. (1968): The genus *Rhynchopsilopa* Hendel (Diptera: Ephydriidae). *Annals of the Natal Museum*, 20 (1): 37–46.
- Wirth, W.W. (1975): A revision of the brine flies of the genus *Ephydra* of the Old World (Diptera: Ephydriidae). *Entomologica Scandinavica*, 6 (1): 11–44.
- Zack, R.S. & R.W. Sites (1988): A new species of *Donaceus* Cresson (Diptera: Ephydriidae) from Malaysia. *Proceedings of the Entomological Society of Washington*, 90 (1): 101–105.
- Zatwarnicki, T. (1987): New synonyms and records of Palearctic *Scatophila* (Diptera, Ephydriidae). *Polskie Pismo Entomologiczne*, 57 (2): 277–298.
- Zatwarnicki, T. (1988): Materials to the knowledge of the genus *Hydrellia* Robineau-Desvoidy (Ephydriidae, Diptera). *Polskie Pismo Entomologiczne*, 58 (3): 587–634.
- Zatwarnicki, T. (1991): Changes in nomenclature and synonymies of some genera and species of Ephydriidae (Diptera). *Deutsche Entomologische Zeitschrift*, 38 (4–5): 295–333.
- Zatwarnicki, T. (1992): A new classification of Ephydriidae based on phylogenetic reconstruction (Diptera: Cyclorrhapha). *Genus*, 3 (2): 65–119.
- Zatwarnicki, T. (1996): A new reconstruction of the origin of eremoneuran hypopygium and its classification implications (Insecta: Diptera). *Genus*, 7 (1): 103–175.
- Zatwarnicki, T. (2002): A revision of the genus *Orasiopa* Zatwarnicki et Mathis (Diptera: Ephydriidae). *Annales Zoologici* (Warsaw), 52 (2): 297–317.
- Zatwarnicki, T. & W.N. Mathis (1994): Phylogeny and classification of the genus *Scatophila* Becker (Diptera: Ephydriidae). *Annales de la Société Entomologique de France*, 29 [1993], (4): 351–370.
- Zatwarnicki, T. & W.N. Mathis (2001): A generic classification of the tribe Discocerini (Diptera: Ephydriidae). *Annales Zoologici*, 51 (1): 5–51.
- Zatwarnicki, T. & W.N. Mathis (2012): Heterogeneity in shore-flies – the case of *Glenanthe* Haliday (Diptera: Ephydriidae) in the Old World. *Annales de la Société Entomologique de France* (n.s.), 47 (3–4): 418–443.
- Zetterstedt, J.W. (1846). *Diptera scandinaviae disposita et descripta.* Tomus quintus, iv + 1739–2162. Officina Lundbergiana, Lundae [= Lund].

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Annex 1: Checklist of the shore-flies from the United Arab Emirates  
(5 subfamilies, 16 tribes, 44 genera, 71 species)

Subfamily **Discomyzinae** Acloque

Tribe Discomyzini Acloque, 1897

Genus *Actocetor* Becker, 1903

1. *Actocetor indicus* (Wiedemann, 1824)

Genus *Clasiopella* Hendel, 1914

2. *Clasiopella uncinata* (Hendel, 1914)

Tribe Psi lopini Cresson, 1942

Genus *Achaetorisa* Papp, 1980

3. *Achaetorisa salsolae* Mathis & Zatwarnicki **sp. nov.**

Genus *Ceropsilopa* Cresson, 1917

4. *Ceropsilopa violacea* (Canzoneri & Meneghini, 1969)

5. *Ceropsilopa vanharteni* Mathis & Zatwarnicki **sp. nov.**

Genus *Clanoneurum* Becker, 1903

6. *Clanoneurum cimiciforme* (Haliday, 1855)

Genus *Leptopsilopa* Cresson, 1922

7. *Leptopsilopa pollinosa* (Kertész, 1901)

Genus *Psilopa* Fallén, 1823

8. *Psilopa aenigma* Mathis & Zatwarnicki **sp. nov.**

9. *Psilopa aequalipes* (Becker, 1907)

10. *Psilopa biskrae* (Becker, 1907)

11. *Psilopa fratella* (Becker, 1903)

12. *Psilopa maritima* (Perris, 1847)

13. *Psilopa nervimaculata* (Becker, 1910)

14. *Psilopa nilotica* (Becker, 1903)

15. *Psilopa rufithorax* (Becker, 1903)

16. *Psilopa rutilans* Canzoneri & Meneghini, 1972

Genus *Rhynchopsilopa* Hendel, 1913

17. *Rhynchopsilopa nitidissima* Hendel, 1931

Genus *Risa* Becker, 1907

18. *Risa longirostris* Becker, 1907

Genus *Scoliocephalus* Becker, 1903

19. *Scoliocephalus pallidisetis* Becker, 1903

Subfamily **Hydrelliinae** Robineau-Desvoidy

Tribe Atissini Cresson, 1942

Genus *Asmeringa* Becker, 1903

20. *Asmeringa aspinalli* Mathis & Zatwarnicki **sp. nov.**

21. *Asmeringa inermis* Becker, 1903

22. *Asmeringa nana* Mathis & Zatwarnicki **sp. nov.**

Genus *Atissa* Haliday, 1837

23. *Atissa pygmaea* (Haliday, 1833)

24. *Atissa vanharteni* Mathis & Zatwarnicki **sp. nov.**

Genus *Cerobothrium* Frey, 1958

25. *Cerobothrium khorkalba* Mathis & Zatwarnicki **sp. nov.**

- Genus *Ptilomyia* Coquillett, 1900  
 26. *Ptilomyia shoka* Mathis & Zatwarnicki **sp. nov.**
- Genus *Schema* Becker, 1907  
 27. *Schema acrosticalis* (Becker, 1903)
- Genus *Subpelignus* Papp, 1983  
 28. *Subpelignus maculipennis* Mathis & Zatwarnicki **sp. nov.**
- Tribe Dryxini Zatwarnicki, 1992  
 Genus *Oedenopiforma* Cogan, 1968  
 29. *Oedenopiforma vockerothi* Mathis & Zatwarnicki, 2012
- Genus *Paralimna* Loew  
 30. *Paralimna (Paralimna) hirticornis* de Meijere, 1913  
 31. *Paralimna (Phaiosterna) bicolor* (Macquart, 1851)
- Tribe Hydrelliini Robineau-Desvoidy  
 Genus *Hydrellia* Robineau-Desvoidy, 1830  
 32. *Hydrellia elegans* Dahl, 1973  
 33. *Hydrellia latipalpis* Cresson, 1943
- Tribe Notiphilini Bigot, 1853  
 Genus *Notiphila* Fallén, 1810  
 34. *Notiphila (Notiphila) flava* Dahl, 1973
- Subfamily **Gymnomyzinae** Latreille
- Tribe Discocerinini Cresson, 1925  
 Genus *Diclasioipa* Hendel, 1917  
 35. *Diclasioipa niveipennis* (Becker, 1896)
- Genus *Hecamedoides* Hendel, 1917  
 36. *Hecamedoides costatus* (Loew, 1860)  
 37. *Hecamedoides infantinus* (Becker, 1924)
- Genus *Orasiopa* Zatwarnicki & Mathis, 2001  
 38. *Orasiopa mera* (Cresson, 1939)  
 39. *Orasiopa opa* Zatwarnicki, 2002
- Genus *Polytrichophora* Cresson, 1924  
 40. *Polytrichophora mira* Ebrahim et al., 2007
- Tribe Gymnomyzini Latreille, 1829  
 Genus *Athyroglossa* Loew, 1860  
 41. *Athyroglossa (Athyroglossa) argyrata* Hendel, 1931  
 42. *Athyroglossa (Athyroglossa) vorticis* (Becker, 1903)  
 43. *Athyroglossa (Parathyroglossa) hayliensis* M. & Z. **sp. nov.**
- Genus *Chlorichaeta* Becker, 1922  
 44. *Chlorichaeta tuberculosa* Becker, 1922
- Genus *Trimerogastra* Hendel, 1914  
 45. *Trimerogastra cincta* Hendel, 1914
- Tribe Hecamedini Mathis, 1991  
 Genus *Allotrichoma* Becker, 1896  
 46. *Allotrichoma (Allotrichoma) biroi* Cresson, 1929  
 47. *Allotrichoma (Allotrichoma) choanum* M. & Z. **sp. nov.**  
 48. *Allotrichoma (Allotrichoma) hatta* M. & Z. **sp. nov.**
- Genus *Elephantinosoma* Becker, 1903  
 49. *Elephantinosoma chumi* Becker, 1903

Genus *Eremotrichoma* Giordani Soika, 1956  
 50. *Eremotrichoma perspicendum* (Becker, 1903)

Genus *Hecamede* Haliday, 1937  
 51. *Hecamede (Hecamede) africana* Mathis, 1993  
 52. *Hecamede (Hecamede) maritima* Mathis, 1993

Tribe Lipochaetini Becker, 1896

Genus *Glenanthe* Haliday, 1839  
 53. *Glenanthe ripicola* (Haliday, 1839)

Genus *Homalometopus* Becker, 1903  
 54. *Homalometopus albiditinctus* Becker, 1903

Tribe Ochtherini Dahl, 1959

Genus *Ochthera* Latreille, 1802  
 55. *Ochthera pilimana* Becker, 1903  
 56. *Ochthera schembrii* Rondani, 1847

Subfamily **Ilytheinae** Cresson

Tribe Hyadinini Phillips et al., 1949

Genus *Hyadina* Haliday, 1837  
 57. *Hyadina fenestrata* Becker, 1903  
 Genus *Nostima* Coquillett, 1900  
 58. *Nostima carinata* Canzoneri & Raffone, 1987  
 59. *Nostima picta* (Fallén, 1813)

Genus *Philygria* Stenhammar, 1844  
 60. *Philygria posticata* (Meigen, 1830)

Tribe Ilytheini Cresson, 1943

Genus *Donaceus* Cresson, 1943  
 61. *Donaceus nigronotatus* Cresson, 1943  
 Genus *Zeros* Cresson, 1943  
 62. *Zeros invenatus* (Lamb, 1912)

Subfamily **Ephydrinae** Zetterstedt

Tribe Dagini Mathis, 1982

Genus *Brachydeutera* Loew, 1862  
 63. *Brachydeutera meridionalis* Rondani, 1856  
 64. *Brachydeutera longipes* Hendel, 1913

Tribe Ephydrini Zetterstedt, 1837

Genus *Ephydra* Fallén, 1810  
 65. *Ephydra flavipes* (Macquart, 1844)

Tribe Scatellini Wirth & Stone, 1956

Genus *Lamproscatella* Hendel, 1917  
 66. *Lamproscatella nigricans* Krivosheina, 2004  
 Genus *Scatella* Robineau-Desvoidy, 1830  
 67. *Scatella (Scatella) paludum* (Meigen, 1830)  
 68. *Scatella (Scatella) rufipes* Strobl, 1906  
 69. *Scatella (Scatella) septemfenestrata* Lamb, 1912  
 70. *Scatella (Scatella) tenuicosta* Collin, 1930

Genus *Scatophila* Becker, 1896  
 71. *Scatophila farinae* Becker, 1903