

Order Diptera, family Drosophilidae

Vasily S. Sidorenko and Olga V. Nakonechnaya

INTRODUCTION

The Drosophilidae is a large cosmopolitan family of acalyptrate flies. Most of the species are saprophagous and feed on microorganisms in spoiled fruits, slime fluxes, fungi or other decaying organic matter. Some occur in flowing tree sap or in flowers. Many species of the genus *Scaptomyza* are leaf miners. Some species have bizarre feeding habits (Ashburner, 1981), being predators of Aleurodidae, Aphidoidea, certain other Homoptera orinquilines of solitary bees nests. The family includes the model organism *Drosophila melanogaster* Meigen, 1830, which has been studied intensively by geneticists, molecular and developmental biologists, and others.

The Palaearctic fauna currently comprises 482 species of 27 genera (Brake & Bächli, 2008). The drosophilid fauna of the Middle East, excluding Turkey, Israel and Lebanon (Máca, 1987, 1999; Bächli et al., 2002; Bächli, 2009), is poorly known. Hackman (1970) recorded some species from Afghanistan. The fauna of the Arabian Peninsula, apart from the few records listed from Saudi Arabia, Yemen and Oman (Bächli, 2009), is completely unknown. The family has hitherto not been reported from the UAE. This study enumerates 13 species in 7 genera, one of them new to science.

Nomenclature and systematic arrangement follow the World Catalogue of Drosophilidae (Brake & Bächli, 2008) and the TaxoDros database, version of October 2009 (Bächli, 2009).

MATERIALS AND METHODS

Most of the specimens dealt with in this chapter were collected by Mr. A. van Harten, using Malaise, water and light traps, and preserved in alcohol. Unless otherwise stated, the specimens were collected by him. More than 600 specimens were examined. The holotype and some paratypes of the new species are deposited in the National Museum of Wales, Cardiff, UK (NMWC). The remaining material is divided between the United Arab Emirates Invertebrate Collection, the collection of Environment Abu Dhabi, UAE, and the private collection of V. Sidorenko (Russia).

We followed Zhang & Toda (1992) and Bächli et al. (2004) for the definitions of measurements and indices: ac = third costal section between R2+3 and R4+5/distance between distal ends of R4+5 and M1; C = second costal section between subcostal break and R2+3/third costal section between R2+3 and R4+5; dcl = anterior dorsocentral/posterior dorsocentral in length; dcp = length distance between ipsilateral dorsocentrals/cross distance between anterior dorsocentrals; hb = length of heavy setation in third costal section between R2+3 and R4+5/ third costal section between R2+3 and R4+5; M = CuA1 between dm-cu and wing margin/M1 between r-m and dm-cu; orbito = distance between proclinate and posterior reclinate orbitals/distance between inner vertical and posterior reclinate orbital; presctl = prescutellar/posterior dorsocentral in length; prorb = proclinate orbital/posterior reclinate orbital in length; rcorb = anterior reclinate orbital/posterior reclinate orbital in length; sctl = basal scutellar/apical scutellar in length; sctlp = distance between ipsilateral scutellars/cross distance between apical scutellars; sterno = anterior katapisternal/posterior katapisternal in length; 4C = third costal section between R2+3 and R4+5/M1 between r-m and dm-cu; 4v = M1 between dm-cu and wing margin/M1 between r-m and dm-cu; 5x =

CuA1 between dm-cu and wing margin/dm-cu between M1 and CuA1. Other abbreviations used throughout the text: NARC = National Avian Research Centre; LT = light trap; MT = Malaise trap; WT = water trap.

SYSTEMATIC ACCOUNT

Subfamily **Steganinae** Hendel, 1917

Cacoxenus (Gitonides) vanharteni Sidorenko **nov. spec.**

Plates 1–4, Figures 1–2

Specimens examined: Holotype: ♂, United Arab Emirates, Sharjah Desert Park, 25°17'N 55°42'E, 20.x–24.xi.2007, in light trap, leg. A. van Harten. Paratypes: 15♂, 3♀, same data as holotype. 1♂, Fujairah, 1–8.iv.2006, LT; 1♂, 15–22.iv.2006, LT. 1♂, Hatta, 4–11.iv.2006, LT; 2♂, 1♀, 8–26.iv.2006, LT.

Description: Male. Body length 2.7 (2.0–3.3) mm. Head width 1.1 (0.8–1.2) mm. Frons yellowish-brown, dull, with numerous interfrontal setulae. Frontal index 1.0 (0.8–1.1); frontal tapering ratio 1.0 (0.9–1.1). Frontal triangle unclear; ocellar triangle prominent, dark-brown. Orbital plates narrow, yellowish-brown. Orbital setae dark-yellow, virtually in row; prorb 1.1 (1.0–1.3); rcorb 0.85 (0.7–1.1); orbito 1.3 (1.1–1.6); vibrissal index 0.3. Minute setae present between orbital setae. Vibrissa situated on dark-brown band. Face yellowish-brown, dull. Carina flat, slightly prominent. Cheeks with dark-brown oval spot near lower margin of eye. Cheek index 4.9 (3.8–7.0). Eye red, bare; index 1.45 (1.3–1.6). Antennae yellowish-brown. Pedicel yellowish-brown. Flagellomere I length to width ratio 1.9 (1.6–2.1). Arista bare. Proboscis yellow. Palpus yellow, broad, swollen, with sparse short setae ventrally, apical seta slightly longer and stronger than others.

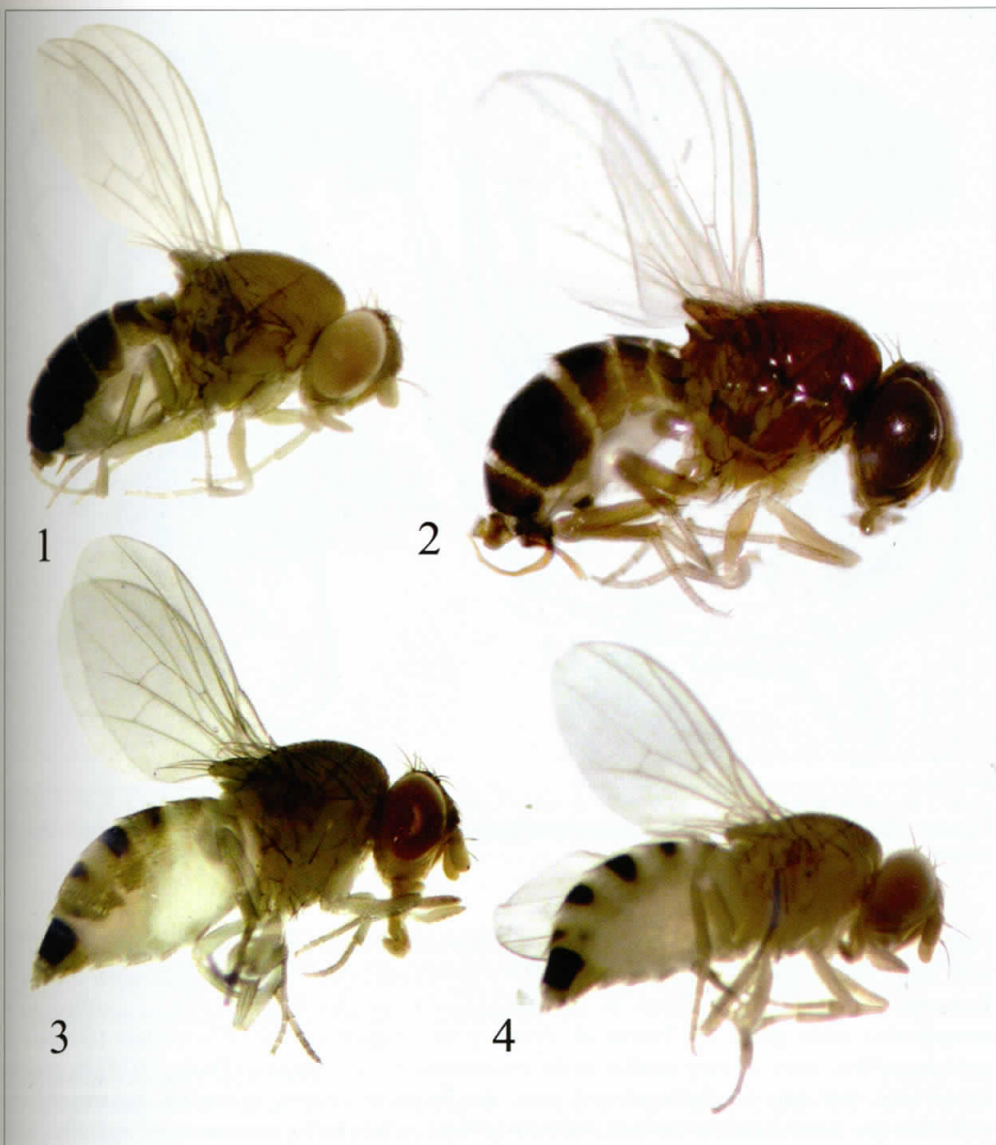
Thorax length 1.2 (0.8–1.5) mm. Scutum yellowish-brown, without spots at bases of setae. About 20 irregular rows of acrostichal setae. Only 1 postpronotal seta. Del 0.35 (0.3–0.5); dcp 0.2 (0.17–0.25); presctl 0.5 (0.45–0.55). Scutellum yellowish-brown, with 1–2 short setae in front of basal and apical scutellar setae respectively. Apical scutellar setae crossed, basal scutellar divergent; setl 1.05 (0.9–1.3); setlp 0.6 (0.44–0.9). Pleura yellowish-brown; sterno index 0.85 (0.75–0.9). Haltere yellowish-brown. Legs yellow. Preapical and apical setae on all tibiae but mid apical seta spur-like.

Wing transparent. Wing length 2.0 (1.4–2.6) mm; wing width 1.0 (0.8–1.4) mm. Indices: C 1.9 (1.8–2.25); ac 1.9 (1.7–2.2); hb 0.6 (0.5–0.8); 4C 1.2 (1.15–1.7); 4v 2.6 (2.15–2.9); 5x 1.9 (1.5–2.2); M 1.0. (0.8–1.4).

Abdomen brownish-black. Tergites I and II yellowish-brown medially, others dark-brown posterod. Sternites dark-brown: IV rounded, with 4 long setae caudally; V with 8 setae, excavated anteriorly; VI deeply notched, almost separated into two parts; VII narrow, semicircular, sclerotized, with short strongly chitinated spurs.

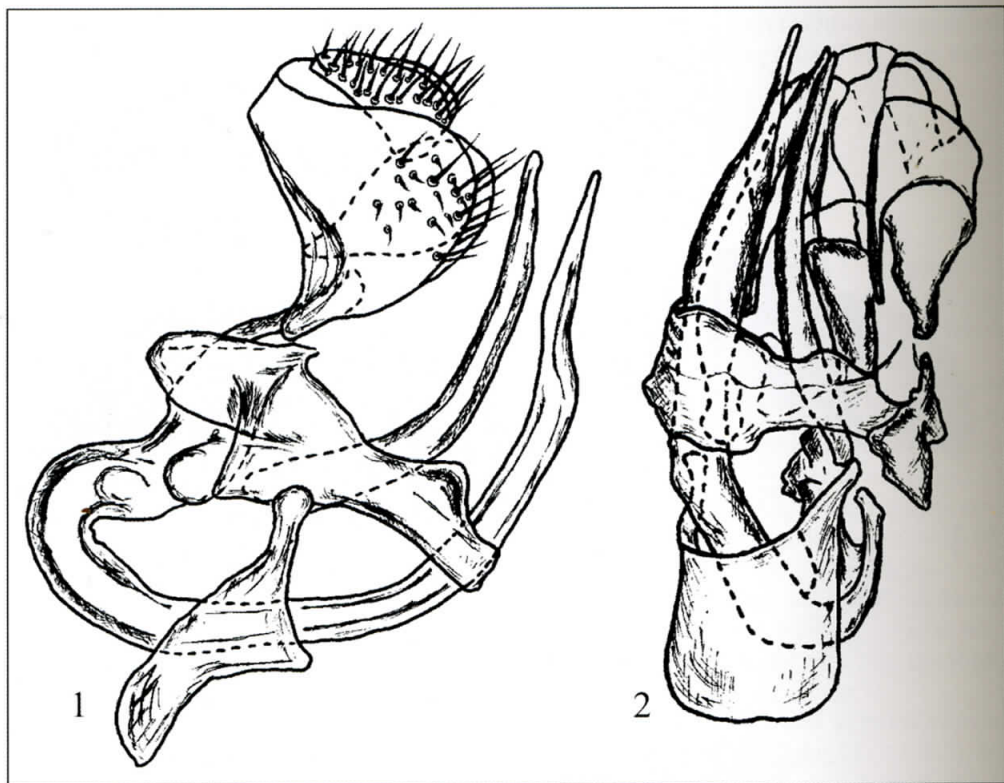
Epandrium with about 25 setae near posterocaudal and along ventral margins; anterior ventral corner strongly protruding. Surstylus separated from and covered by epandrium, rounded apically, with short setulae, without chitinated teeth. Cerci separated from epandrium, setigerous (Fig. 1). Hypandrium reduced, plate-like, lacking pubescence and paramedian setae. Parameres sclerotized, sabre-like, basally articulated with aedeagal apodeme, without sensilla. Gonopods anteriorly not fused to aedeagus, plate-like, vertical lobe slightly sclerotized. Aedeagal apodeme lobe-like, horizontally flattened, with pair of arms fused to base of parameres. Aedeagus sclerotized, strongly curved, narrowed apically in lateral view (Fig. 2).

Female. Body length 3.0 (2.9–3.3) mm. Head width 1.15 (0.95–1.3) mm. Frontal index 1.05 (0.9–1.15); frontal tapering ratio 1.0 (0.95–1.1). Prorb 1.15 (1.0–1.5); rcorb 0.8 (0.6–0.9); orbito 1.4 (1.2–1.6); vibrissal index 0.33 (0.3–0.38). Cheek index 4.9 (4.3–6.4); eye index 1.55.



Plates 1–4. *Cacozenus (Gitonides) vanharteni* Sidorenko nov. spec., 1–2: Habitus of male, lateral view; 3–4: Habitus of female, lateral view.

(1.35–1.65). Flagellomere I length to width ratio 2.0 (2.0–2.1). Palpus with prominent apical and 3–4 ventral setae. Thorax length 1.4 (1.2–1.6) mm. Dcl 0.4 (0.38–0.45); dcp 0.2 (0.19–0.25); sctl 0.9 (0.9–1.1); presctl 0.6 (0.55–0.6); scltp 0.65 (0.5–0.8); sterno 0.95. (0.8–1.1). Wing length 2.3 (1.8–2.8) mm; wing width 1.1 (0.9–1.35) mm. Indices: C 2.7 (2.0–3.45); ac 1.5 (1.3–1.6); hb 0.4 (0.3–0.6); 4C 1.25 (1.1–1.4); 4v 2.7 (2.4–3.3); 5x 1.8 (1.6–2.1); M 1.1 (0.85–1.25).



Figures 1–2. *Cacoxenus (Gitonides) vanharteni* Sidorenko nov. spec., male genitalia. 1: Lateral view; 2: Ventral view.

Tergites I–II yellow; tergites III–V with broad brownish-black bands interrupted medially; VI with small caudal spots separated medially; VII brownish-black. Sternites yellowish-brown.

Remarks: New species belongs to the subgenus *Gitonides* Knab, 1914, according to a comparative table given by Tsacas & Desmier de Chenon (1976). *Cacoxenus (Gitonides) vanharteni* nov. spec. is very similar to the Palearctic *C. (G.) vlasovi* (Duda, 1935) in general appearance, but can be distinguished from the latter in palpus, surstylus, parameres and aedeagus (in *vlasovi* palpus normal, with prominent setae; surstylus narrowed apically, with 2–4 strongly chitinized teeth; parameres broadened basally, with about 10 sensella arranged longitudinally; aedeagus not so strongly curved, truncated apically in lateral view).

Distribution: UAE.

***Cacoxenus (Gitonides) odontophorus* Tsacas & Chassagnard, 1999**

Plate 5

Specimens examined: Fujairah, 1♂, 20–27.v.2005, LT.

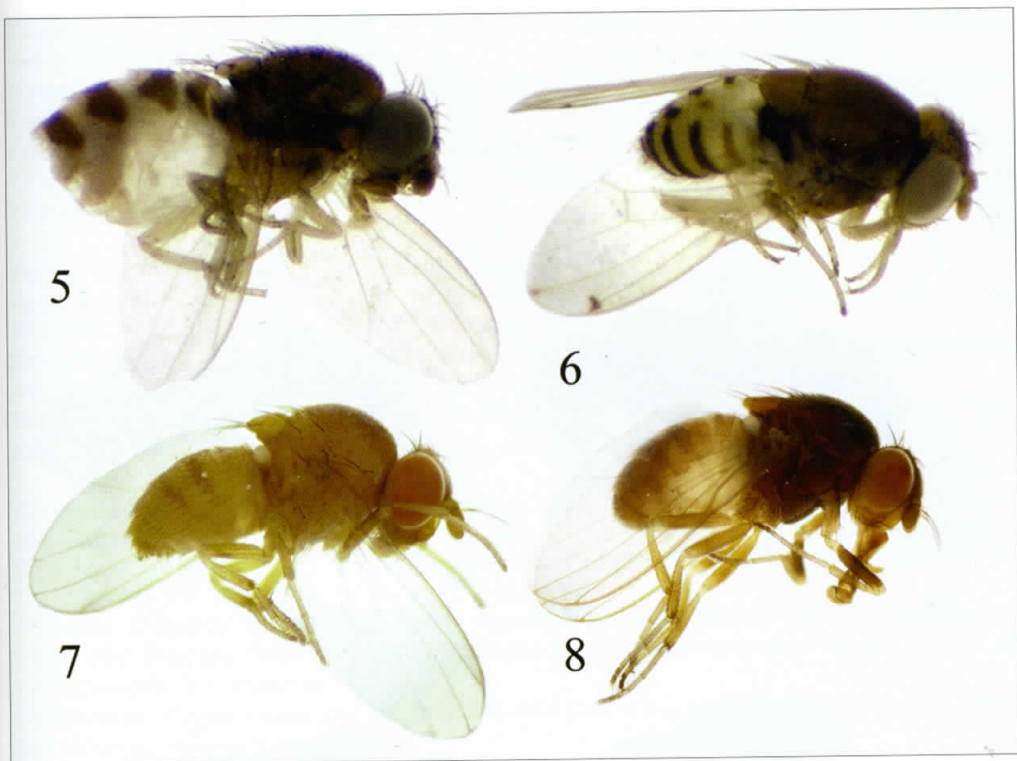
Remarks: Biology is unknown.

Distribution: Yemen and Nigeria. New to the UAE.

***Gitona beckeri* Duda, 1924**

Plate 6

Specimens examined: Al-Ajban, 1♀, 7–28.xii.2007, LT & MT. Sharjah Desert Park, 1♀, 21.xi–22.xii.2007, LT.



Plates 5–8. 5: *Cacoxenus (Gitonides) odontophorus* Tsacas & Chassagnard, habitus of male; 6: *Gitona beckeri* Duda, habitus of female; 7–8: *Gitona canariensis* (Duda). 7: Habitus of female; 8: Habitus of male.

Remarks: Among the 15 species of the genus *Gitona* Meigen, 1830, only *G. beckeri* and *G. incohata* Bock, 1982, have a short rudimentary vein near the apex of R2+3. Examined specimens also have this rudimentary vein (Plate 6) and key out to *G. beckeri* in Măca (1988). Biology is unknown.

Distribution: Uzbekistan, China, and Cyprus. New to the UAE.

Gitona canariensis Duda, 1934

Plates 7–8

Specimens examined: Fujairah, 1♀, 1–8.iv.2006, WT. Hatta, 4♂, 1♀, 4–11.iv.2006, LT; 4♂, 7♀, 8–26.iv.2006, LT. Wadi Bih dam, 2♀, 24.iv–1.v.2007, LT. Wadi Safad, 1♂, 15–22.iv.2006, 1♀, LT.

Remarks: This species was only known from Gran Canaria. The specimens examined possess spotless wings and three indistinct stripes on the male thorax (female thorax without such stripes). Male genitalia are indistinguishable from those figured by Tsacas (1995).

Distribution: Canary Islands. New to the UAE.

Subfamily *Drosophilinae* Rondani, 1856

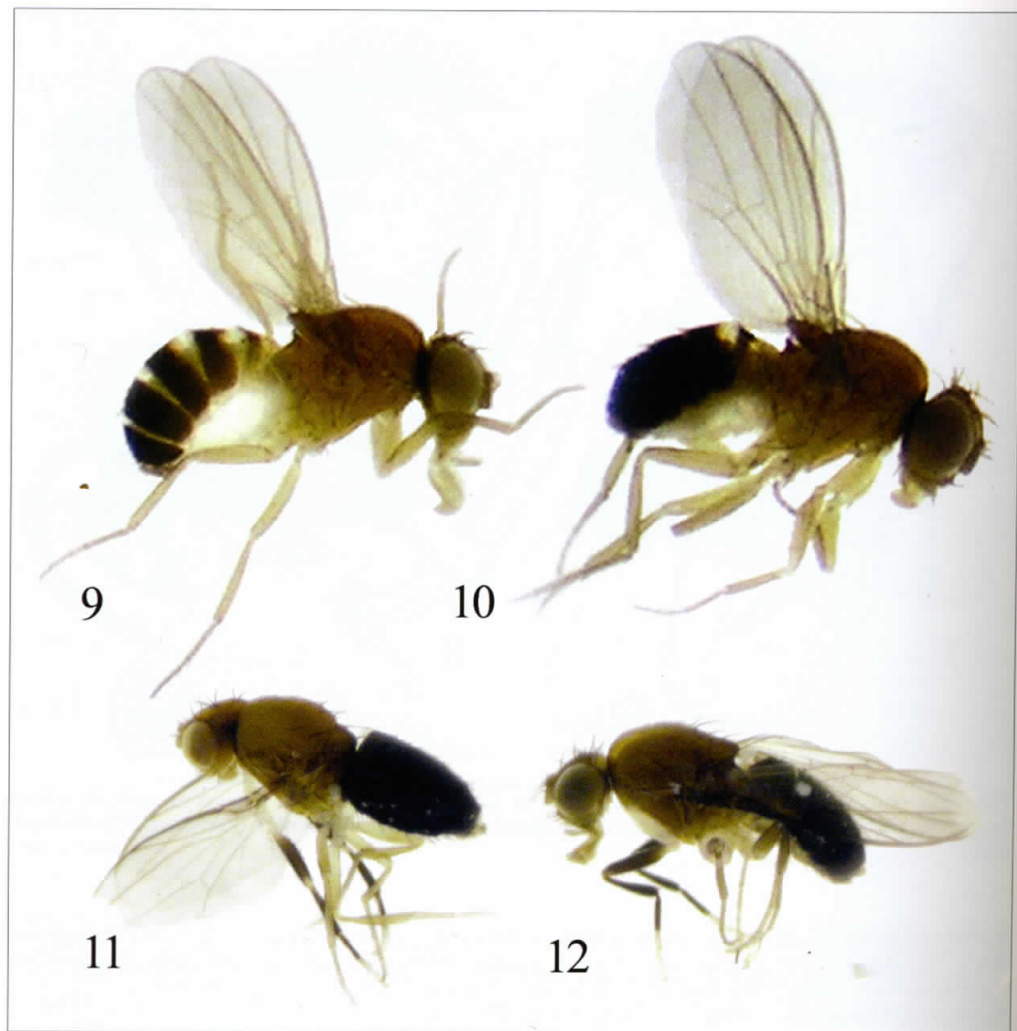
Scaptodrosophila lebanonensis (Wheeler, 1949)

Plates 9–10

Specimens examined: Bithnah, 22♂, 9♀, 16.xi–26.xii.2006, MT. Hatta, 1♂, 1♀, 8–26.iv.2006, LT.

Remarks: The flies are attracted by fruit and fermented drinks.

Distribution: Mediterranean area, Canary Islands, Hungary, Romania, Ukraine, Caucasus, Tajikistan, Iran, S China, USA (Arizona), Bahamas, and Brazil.



Plates 9–12. 9–10: *Scaptodrosophila lebanonensis*, habitus of male; 11–12: *Chymomyza pararufithorax* Vaidya & Godbole, habitus of female.

***Chymomyza pararufithorax* Vaidya & Godbole, 1973**

Plates 11–12

Specimens examined: Al-Ajban, 1♂, 6–22.v.2006, LT; 3♂, 2♀, 7–28.xii.2007, LT & MT. 1♀, 7–28.xii.2007, LT & MT.

Remarks: Examined specimens keyed out to *Ch. pararufithorax* in Okada (1976). Biology is unknown.

Distribution: Japan (Ryukyu Islands), S China, Hainan Island, Malaysia, Myanmar, India, and Sri Lanka. New to the UAE.

***Drosophila (Sophophora) kikkawai* Burla, 1954**

Plates 13–14

Specimens examined: Al-Ajban, 1♂, 6–22.v.2006, LT; 3♂, 2♀, 7–28.xii.2007, LT & MT. Bithnah, 1♂, 1♀, 16.xi–26.xii.2006, MT. Fujairah, 20–27.v.2005, 1♀, LT. Hatta, 1♂, 1♀, 8–26.iv.2006, LT. Khor al-Khwair, 3♂, 15–22.iii.2007, LT. Ruwais, Housing Complex, 1♂, 18.iv.2006, LT, leg. A. Saji. Sharjah

Desert Park, 3♂, 6♀, 20.x–24.xi.2007, LT; 3♂, 5♀, 21.xi–22.xii.2007, LT. Wadi Hayl, 1♂, 28.iii.2007, sweep net, leg. F. Menzel & A. Stark.

Remarks: The flies are rather common indoors, attracted by fruit and fermented drinks. Larvae are predominantly fruit breeders.

Distribution: Circumtropical, sometimes subtropical species occurring in SE Asia, New Guinea, Australia, New Caledonia, Fiji, Samoa, Hawaii, Africa?, Mauritius, and the Neotropics. New to the UAE.

***Drosophila (Sophophora) melanogaster* Meigen, 1830**

Plate 15

Specimens examined: Al-Ajban, 1♂, 2♀, 27.xii.2006–18.ii.2007, MT. Bithnah, 1♂, 26.xii.2006–20.ii.2007, MT. Wadi Bih, 1♂, 22.iii.2007, sweep net, leg. F. Menzel & A. Stark.

Remarks: Domestic species recorded almost everywhere. The flies are common indoors, attracted by fruit and fermented drinks. Larvae are predominantly fruit breeders.

Distribution: Cosmopolitan species. In the Middle East it has been recorded from Iraq, Syria, Lebanon, the north of the Arabian Peninsula, and Yemen. New to the UAE.

***Drosophila (Sophophora) simulans* Sturtevant, 1919**

Plate 16

Specimens examined: Hatta, 21♂, 8♀, 4–11.iv.2006, LT; 12♂, 9♀, 8–26.iv.2006, LT. Sharjah Desert Park, 1♂, 3♀, 21.xii–22.xii.2007, LT. Wadi Bih dam, 1♀, 24.iv–1.v.2007, LT. Wadi Safad, 8♂, 5♀, 15–22.iv.2006, LT.

Remarks: Domestic species, less widely distributed than *D. melanogaster*; absent in cold areas. The flies are common indoors, attracted by fruit and fermented drinks. Larvae are predominantly fruit breeders.

Distribution: Cosmopolitan species. In the Middle East it has been recorded from Iraq, Syria, and Lebanon. New to the UAE.

***Scaptomyza (Scaptomyza) flava* (Fallén, 1823)**

Plates 17–18

Specimens examined: Hatta, 1♂, 1♀, 4–11.iv.2006, LT; 1♀, 8–26.iv.2006, LT.

Remarks: Leaf-mining larvae of this species have been found in various plants, particularly Brassicaceae.

Distribution: Holarctic species widespread in Europe (Norway to Austria). Recorded in the Canary Islands, Madeira, Azores, Turkey, Turkmenistan, Uzbekistan, Kazakhstan, Afghanistan, north-west China, Russia (European, West and East Siberia, Far East), Mongolia, and Japan. In the Middle East it has been recorded from Lebanon and Israel. New to the UAE.

***Scaptomyza (Parascaptomyza) adusta* (Loew, 1862)**

Plate 21

Specimens examined: Hatta, 2♂, 1♀, 4–11.iv.2006, LT; 3♀, 8–26.iv.2006, LT. Wadi Shawkah, 26.iii.2007, 1♂, sweep net, leg. F. Menzel & A. Stark.

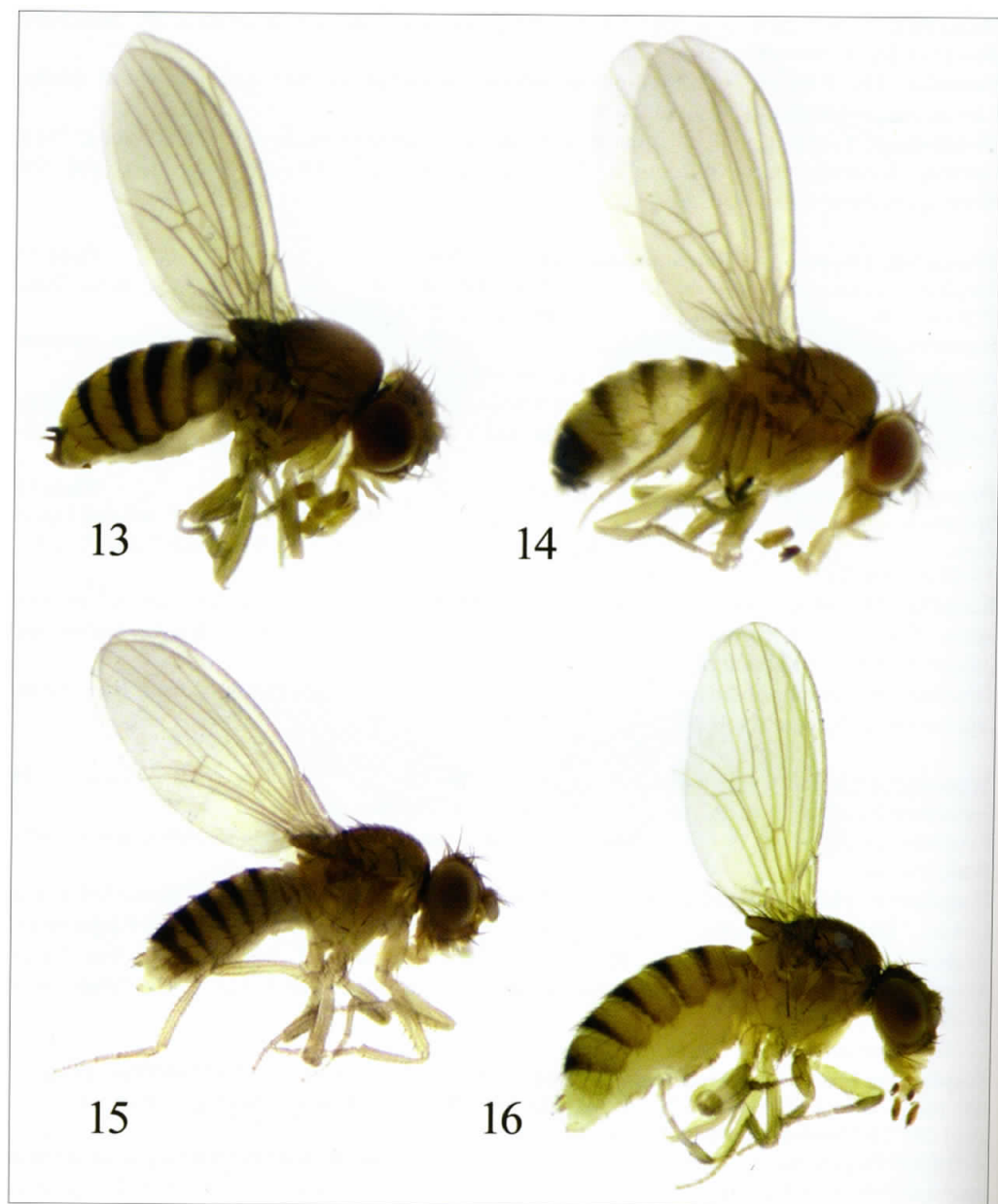
Remarks: Saprophagous species feeding and breeding on decaying plant parts of *Costus arabicus*, *Morus spec.*, *Spinacea oleracea*, and other plants (Malloch, 1915; Nicoli Aldini & Baviera, 2004; Bächli et al., 2004; Chandler et al., 2008).

Distribution: USA, Mexico to Argentina, Great Britain, Canary Islands, Azores, Italy, Malta, Greece, Turkey, Israel. New to the UAE.

***Scaptomyza (Parascaptomyza) pallida* (Zetterstedt, 1847)**

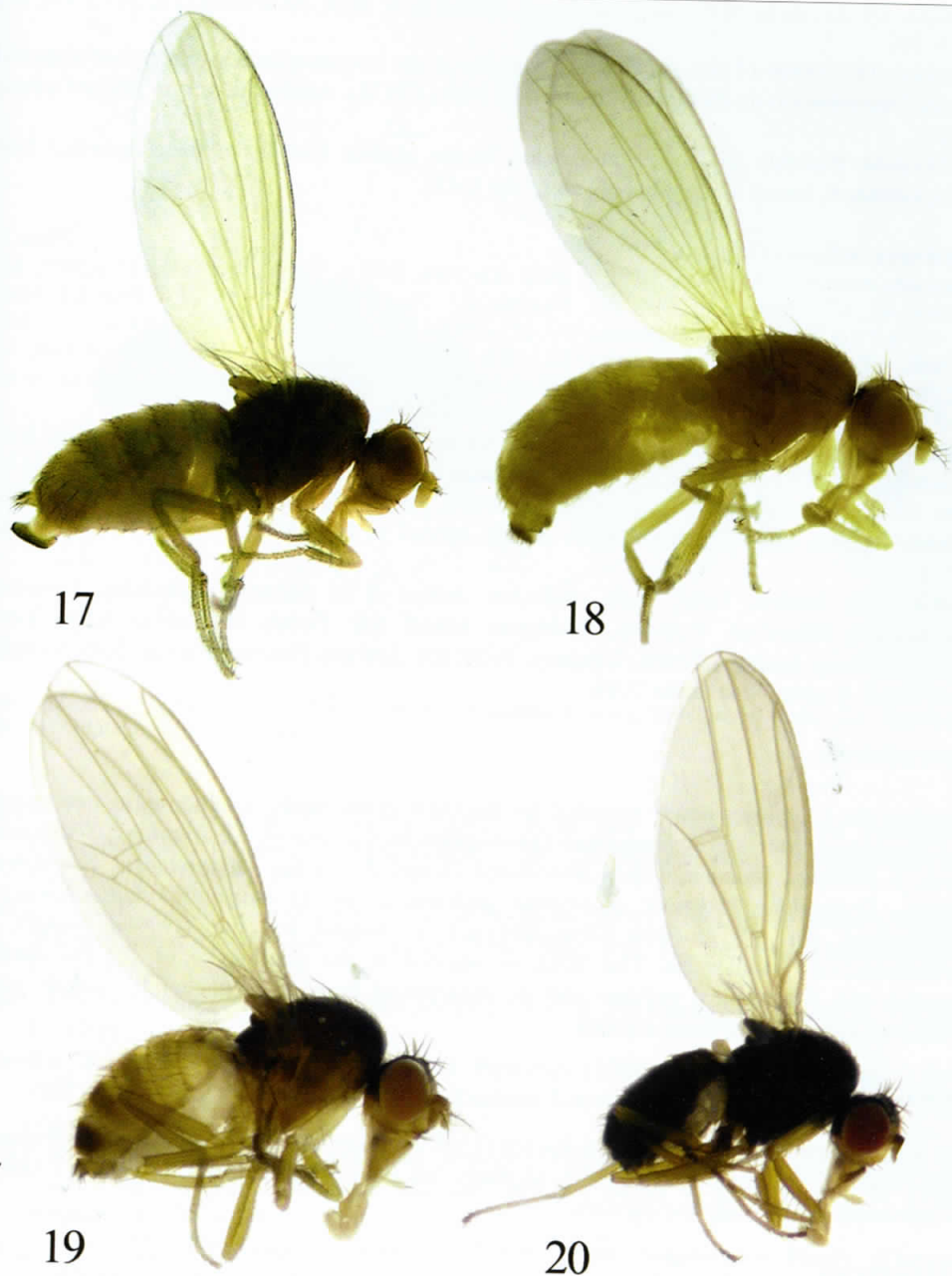
Plates 19–20

Specimens examined: Al-Ajban, 1♂, 2♀, 26.iii–4.iv.2006, MT; 7♂, 8♀, 6–22.v.2006, LT; 6♂, 8♀, 7–28.vii.2007, LT & MT. Bithnah, 3♂, 3♀, 26.xii.2006–20.ii.2007, MT. Fujairah, 1♀, 20–27.v.2005, LT; 3♀, 1–8.iv.2006, LT, 2♀, 15–22.iv.2006, LT. Hatta, 26♂, 40♀, 4–11.iv.2006, LT; 26♂, 32♀, 8–26.iv.2006, LT. Khor al-Khwair, 2♂, 2♀, 24.iv–1.v.2005, LT; 5♀, 24.iv–1.v.2007, LT. Sharjah Desert



Plates 13–16. 13–14. *Drosophila (Sophophora) kikkawai* Burla. 13: Habitus of female; 14: Habitus of male; 15: *D. (S.) melanogaster* Meigen, habitus of female; 16: *D. (S.) simulans* Sturtevant, habitus of female.

Park, 2♂, 3♀, 23–30.iv.2007, LT; 9♂, 10♀, 20.x–24.xi.2007, LT; 9♂, 13♀, 21.ix–22.xii.2007, LT. NARC, near Sweihan, 1♀, 26.ii–2.iv.2004, LT. Wadi Bih dam, 1♀, 22.iii.2007, sweep net, leg. F. Menzel & A. Stark; 33♂, 40♀, 24.iv–1.v.2007, LT. Wadi Safad, 5♂, 7♀, 15–22.iv.2006, LT. Wadi



Plates 17–20. 17–18. *Scaptomyza* (*Scaptomyza*) *flava* (Fallén). 17: Habitus of female; 18: Habitus of male. 19–20: *Scaptomyza* (*Parascaptomyza*) *pallida* (Zetterstedt). 19: Habitus of female; 20: Habitus of male.

Shawkah, 3♂, 2♀, 26.iii.2007, sweep net, leg. F. Menzel & A. Stark. Al-Wathba, 1♀, 28.x.2004, WT, leg. A. Saji.

Remarks: The larvae of this species of *Scaptomyza* are common in decaying plant material. Detailed information on its biology is given by Máca (1972). Adults are very abundant among grasses.

Distribution: Possibly cosmopolitan species. In the Middle East it has been recorded from Syria, Lebanon, Israel, and Yemen. New to the UAE.

Zaprionus indianus Gupta, 1970

Plate 22

Specimens examined: Al-Ajban, 1♂, 2♀, 26.iii–4.iv.2006, MT; 2♂, 4♀, 27.xii.2006–18.ii.2007, MT. Bithnah, 4♂, 8♀, 16.xi–26.xii.2006, MT. Fujairah, 2♂, 20–27.v.2005; 1♂, 15–22.iv.2006, LT. Hatta, 1♂, 1♀, 4–11.iv.2006, LT. Jebel Dhanna, 1♀, 22.xii.2004, LT leg. A. Saji. Khor al-Khwair, 1♀, 24.iv–1.v.2005, LT. Ruwais, housing complex, 1♀, 18.iv.2006, LT, leg. A. Saji. Sharjah Desert Park, 1♂, 13♀, 20.x–24.xi.2007, LT; 9♂, 34♀, 21.xi–22.xii.2007, LT. Wadi Hayl, 1♂, 1♀, 28.iii.2007, sweep net, leg. F. Menzel & A. Stark. Wadi Safad, 4♂, 2♀, 15–22.iv.2006, LT.

Remarks: A highly polyphagous species known to infest at least 73 different kinds of fruits (Vilela, 1999). *Z. indianus* is the one of the most common species of the genus in the UAE. This African species previously colonized India, some tropical islands of the Indian and Atlantic oceans, Saudi Arabia, and is widely spread in Brazil, and Uruguay (Nava et al., 2007).

Distribution: Austria, Italy, India, Pakistan, Africa S of Sahara, Seychelles, Comoros, Madagascar, Mauritius, Reunion, Rodriguez Island, São Tomé, St. Helena, Cape Verde Islands, Canary Islands., Brazil, Uruguay. From the Arabian Peninsula it has been recorded from Saudi Arabia. New to the UAE.

CONCLUSIONS

Amongst the 12 species newly recorded for the UAE in this study (excluding the new species of *Cacoxenus*), four are cosmopolitan (*Drosophila melanogaster*, *D. simulans*, *Scaptomyza flava*, *S. pallida*), four are widely distributed (*Scaptodrosophila lebanonensis*, *Scaptomyza adusta*, *Drosophila kikkawai*, *Zaprionus indianus*), one (*Cacoxenus odontophorus*) is Afrotropical, one (*Chymomyza pararufithorax*) is Oriental and two (*Gitona beckeri*, *G. canariensis*) are Palaearctic. The UAE is situated at the confluence of the Palaearctic, Oriental and Afrotropical regions and its drosophilid fauna is expected to include some additional species from those regions.

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Plates 21–22. 21: *Scaptomyza* (*Parascaptomyza*) *adusta* (Loew), habitus of male; 22: *Zaprionus indianus* Gupta, habitus of female.

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Authors' addresses:

V.S. Sidorenko & O.V. Nakonechnaya, Institute of Biology and Soil Sciences, Far Eastern Division of the Russian Academy of Sciences, Vladivostok, 690022, Russia; e-mails: stegana@mail.ru, markelova@biosoil.ru