

## Fruit flies (Diptera, Tephritidae) from Saudi Arabia, with descriptions of a new genus and six new species

Bernhard MERZ<sup>1</sup> & Hassan A. DAWAH<sup>2</sup>

<sup>1</sup>Muséum d'histoire naturelle, C. P. 6434, CH-1211 Genève 6, Switzerland.

E-mail: bernhard.merz@mhn.ville-ge.ch

<sup>2</sup>King Khalid University, College of Science, Department of Biology,

P. O. Box 9004, Abha, Saudi Arabia.

E-mail: dawahhassan@hotmail.com

### **Fruit flies (Diptera, Tephritidae) from Saudi Arabia, with descriptions of a new genus and six new species.**

- During a survey of the insect fauna of the Abha area (Aseer province, southwestern part of Saudi Arabia) with Malaise traps 51 species of Tephritidae were recorded, 40 of them being new records for this country. Nine species are not named. The first comprehensive checklist for Saudi Arabia is presented, including 62 species of which 10 species are considered to be pests. *Arabodesis* gen. n., with its type *A. reductiseta* sp. n., is described from Saudi Arabia and Yemen. Further new species are *Neoceratitis flavoscutellata* sp. n. (Saudi Arabia), *Dicheniotes multipunctatus* sp. n. (Kenya, Saudi Arabia, Tanzania, Yemen), *Sphenella setosa* sp. n. (Saudi Arabia), *Tanaica maculata* sp. n. (Ethiopia, Kenya, Saudi Arabia), and *Tanaica pollinosa* sp. n. (Saudi Arabia, South Africa). The status of *Tephritomyia despoliata* Hering and *Trupanea aucta* var. *repleta* Bezzi is discussed. *Sphenella marginata austrina* Munro is synonymized with *S. marginata* s. str. (syn. n.). Keys for the genera of the *Campiglossa* genus group and for the species of *Tanaica* Munro are provided.

**Keywords:** Diptera - Tephritidae - Saudi Arabia - new genus - new species - new synonymy.

## INTRODUCTION

Saudi Arabia is a large country of about 2.15 Million km<sup>2</sup>. Its biogeographical position is quite peculiar as a crossroad of various realms, included in the Palearctic Region which lies primarily in the North (at the border with Jordan), adjacent to the Afrotropical Region in the South West (separated from Eritrea by the narrow Red Sea), and to a lesser extent to the Oriental Region in the South East. It may be expected therefore that its fauna is reflecting this special biogeographical position, and elements of the various realms may be found.

Very little information is available on the Tephritidae fauna of this country although species of this family are usually attractive with patterned wings and bright eyes, easy to collect, often abundant on their host plants, and economically and ecologically important.

gically important. About 100 species of Tephritidae out of about 4500 described species worldwide are known as pests (White & Elson-Harris, 1992). The only comprehensive list of Saudi Arabian Tephritidae containing 12 species was given by Al-Ahmadi & Salem (1999), most of them species which cause damage in fruit plantations. Freidberg & Kugler (1989) added 6 species. Four further species are mentioned in isolated publications. Thus, 22 species are known up to date from Saudi Arabia (Tab. 1). Compared with the diversity of other countries (Tab. 2) it may be anticipated that any research which is not intended to study exclusively pest species will add new species to this list.

In the course of a survey of the insect fauna of the Aseer (= 'Asir') area (south-western part of Saudi Arabia) an important number of Tephritidae was collected by the second author using Malaise traps. After identification of the specimens by the first author it became clear that this collection improves considerably the knowledge on Tephritidae of Saudi Arabia. This paper brings together our present knowledge on its fruit fly diversity. In addition to the results of the identifications all available literature about Tephritidae of Saudi Arabia is summarized.

## MATERIAL AND METHODS

Some 440 specimens of Tephritidae were collected using Malaise traps at 4 sites in South-Western Saudi Arabia by the second author. All sites belong to Aseer (= 'Asir') and are situated between 260 and 2200 m within a radius of about 100 km around the town of Abha. The names of the localities and further information are given in Tab. 3. Abha has the highest rainfall of Saudi Arabia and it is the only region where open forests may grow. Consequently, the region is comparatively heavily populated and most of its surface is cultivated.

In order to resolve some taxonomic questions, about 80 specimens from other countries are included in this study.

The depository of the specimens is as follows:

CHD	collection H. Dawah
FMNH	Finnish Museum of Natural History, Helsinki, Finland
KMMA	Koninklijk Museum voor Midden Afrika, Tervuren, Belgium
MCSNM	Museo Civico di Storia Naturale, Milano, Italy
NHML	Natural History Museum London (= British Museum of Natural History), England
MHNG	Muséum d'histoire naturelle, Genève, Switzerland
NMWC	National Museum of Wales, Cardiff, United Kingdom
SAMCT	South African Museum, Cape Town, South Africa
SMNS	Staatliches Museum für Naturkunde, Stuttgart, Germany
TAU	Tel Aviv University, Israel
ZMUA	Zoological Museum, University of Amsterdam, Netherlands

Most specimens collected during this study are deposited in the MHNG. Duplicates are basically stored in the NMWC, TAU and the CHD except where otherwise mentioned.

TAB. 1

Checklist of Tephritidae of Saudi Arabia. Classification according to Norrbom *et al.* (1999a, b), but species are listed in alphabetical order within the tribe Tephritini. Abbreviations. *Column «Source»*: 1 = Al-Ahmadi & Salem (1999); 2 = Freidberg & Kugler (1989); 3 = Norrbom *et al.* (1999b); 4 = Shalaby (1961); 5 = White & Elson-Harris (1992); 6 = Anonymous (2002); 7 = De Meyer & Freidberg (2005). \* = Identification doubtful as species often misidentified (see also text). *Column «PS»*: Pest status according to White & Elson-Harris (1992). B = Potential species for Biological Control of weed; M = Minor pest species or potential pest species, attacking commercially grown plants; P = Pest species; B, M = Either polyphagous species whose host range include commercially grown species (and therefore considered potential or minor pest) as well as weeds (potential useful species), or a species which is attacking a plant species which is cultivated in some parts of the world and considered to be a pest in others.

no	Name	Source	PS
	Subfamily Trypetinae		
	Tribe Carpomyini		
	Subtribe Carpomyina		
1	<i>Carpomya incompleta</i> (Becker, 1903)	1, present study	P
2	<i>Myiopardalis pardalina</i> (Bigot, 1891)	1	P
	Tribe Dacini		
	Subtribe Ceratitidina		
3	<i>Capparimya aenigma</i> De Meyer & Freidberg, 2005	7, present study	
4	<i>Ceratitis capitata</i> (Wiedemann, 1824)	1, 4, 5	P
5	<i>Neoceratitis eflatouni</i> (Hendel, 1931)	present study	
6	<i>Neoceratitis flavoscutellata</i> <b>sp. n.</b>	present study	
	Subtribe Dacina		
7	<i>Bactrocera (Zeugodacus) cucurbitae</i> (Coquillett, 1899)	1	P
8	<i>Bactrocera (Daculus) oleae</i> (Gmelin, 1790)	1	P
9	<i>Bactrocera</i> (s. str.) <i>zonata</i> (Saunders, 1842)	6, present study	P
10	<i>Dacus (Leptoxyda) annulatus</i> Becker, 1903	3	M
11	<i>Dacus (Didacus) sp. nr. arcuatus</i> Munro, 1939	present study	
12	<i>Dacus (Didacus) ciliatus</i> Loew, 1862	1, 4	P
13	<i>Dacus (Didacus) frontalis</i> Becker, 1922	1, 5, present study	P
14	<i>Dacus (Leptoxyda) longistylus</i> Wiedemann, 1830	1, present study	B,M
15	<i>Dacus (Leptoxyda) semisphaereus</i> Becker, 1903	present study	
16	<i>Dacus (Didacus) vertebratus</i> Bezzi, 1908	5, present study	P
17	<i>Dacus (Leptoxyda) obesus</i> Munro, 1948	present study	M
18	<i>Dacus</i> sp. 1	present study	
	Subfamily Tephritinae		
	Tribe Noetini		
19	<i>Ensina sonchi</i> (Linnaeus, 1767)	present study	B,M
	Tribe Schistopterini		
20	<i>Bactropota</i> sp. 1	present study	
21	<i>Rhochmopterum arcoides</i> Munro, 1935	present study	
22	<i>Schistopterum moebiusi</i> Becker, 1903	present study	
	Tribe Tephrellini		
	Subtribe Platensina		
23	<i>Psednometopum</i> cf. <i>aldabrense</i> (Lamb, 1914)	present study	
24	<i>Stephanotrypeta brevicosta</i> Hendel, 1931	present study	
25	<i>Stephanotrypeta vittata</i> Freidberg, 1979	3, present study	
	Subtribe Tephrellina		
26	<i>Dicheniotes angulicornis</i> (Hendel, 1931)	present study	
27	<i>Dicheniotes multipunctatus</i> <b>sp. n.</b>	present study	

no	Name	Source	PS
28	<i>Gymnaciura austeni</i> (Munro, 1935)	present study	
29	<i>Metasphenisca hazelae</i> (Munro, 1947)	present study	
30	<i>Metasphenisca negeviana</i> (Freidberg, 1974)	2, present study	
31	<i>Oxyaciura tibialis</i> (Robineau-Desvoidy, 1830)	present study	
32	<i>Paraspheniscoides binarius</i> (Loew, 1861)	present study	
33	<i>Paraspheniscus debskii</i> (Efllatoun, 1924)	present study	
Tribe Tephritini			
34	<i>Acanthiophilus helianthi</i> (Rossi, 1794)	1	P
35	<i>Arabodesis reductisetata</i> <b>sp. n.</b>	present study	
36	<i>Campiglossa ignobilis</i> (Loew, 1861)	present study	B
37	<i>Capitites augur</i> (Frauenfeld, 1857)	1*, 3*, present study	
38	<i>Dectodesis auguralis</i> (Bezzi, 1908)	present study	
39	<i>Dectodesis</i> sp. 1	present study	
40	<i>Desmella</i> sp. nr <i>myiopotoides</i> (Bezzi, 1908)	present study	
41	<i>Dioxyna sororcula</i> (Wiedemann, 1830)	present study	B, M
42	<i>Euarestella iphionae</i> (Efllatoun, 1924)	2 (from «Arabia»)	
43	<i>Freidbergia mirabilis</i> Merz, 1999	present study	
44	<i>Goniurellia persignata</i> Freidberg, 1980	present study	
45	<i>Goniurellia spinifera</i> Freidberg, 1980	2, present study	
46	<i>Goniurellia tridens</i> (Hendel, 1910)	2	
47	<i>Hyalotephritis complanata</i> (Munro, 1929)	present study	
48	<i>Hyalotephritis planiscutellata</i> (Becker, 1903)	present study	
49	<i>Spathulina acroleuca</i> (Schiner, 1868)	present study	M
50	<i>Sphenella marginata</i> (Fallén, 1814)	present study	B
51	<i>Sphenella setosa</i> <b>sp. n.</b>	present study	
52	<i>Tanaica maculata</i> <b>sp. n.</b>	present study	
53	<i>Tanaica pollinosa</i> <b>sp. n.</b>	present study	
54	<i>Telaletes ochraceus</i> (Loew, 1861)	present study	
55	<i>Tephritomyia despoliata</i> (Hering, 1956)	present study	
56	<i>Trupanea amoena</i> (Frauenfeld, 1857)	1, present study	M
57	<i>Trupanea pseudoamoena</i> Freidberg, 1974	2, present study	
58	<i>Trupanea pulcherrima</i> (Efllatoun, 1924)	2	
59	<i>Trupanea replata</i> Bezzi, 1918	present study	
60	<i>Trupanea stellata</i> (Fuesslin, 1775)	1	M
61	<i>Trupanea</i> sp. 1	present study	
62	<i>Trupanodesis</i> sp. 1	present study	

The species are arranged according to Norrbom *et al.* (1999a); the nomenclature follows Norrbom *et al.* (1999b), except for the *Tephritis* genus group, where the systematic arrangement of Merz (1999) is adopted.

Morphological terminology is according to White *et al.* (1999), except for the term postpedicel, which is used instead of 1st flagellomere (Stuckenberg, 1999).

Each species is treated in the same way. First, the material studied is recorded. The localities are abbreviated as numbers following the details given in Tab. 3. In the «Distribution» section the general distribution is given. This information is taken basically from Norrbom *et al.* (1999b) and occasionally from other sources. The host plants are listed from the literature given in brackets. It should be noted that other plants may be hosts in Saudi Arabia. The indications about the pest status of each species are mainly taken from White & Elson-Harris (1992). Finally, comments about taxonomy, nomenclature and biology are given in the «Remarks» section.

TABLE 2  
Tephritidae diversity in various countries of the Near and Middle East.

Country	Nr species	Source
Afghanistan	46	Hering (1961)
Egypt	60	Norrbom <i>et al.</i> (1999b)
Iran	23	Hering (1956)
Iraq	31	Korneyev & Dirlbek (2000)
Israel	85	Freidberg (1988)
Jordan	19	Korneyev & Dirlbek (2000)
Lebanon	18	Knio <i>et al.</i> (2002)
Saudi Arabia	62	present study
Syria	34	Korneyev & Dirlbek (2000)
Yemen	51	Merz <i>et al.</i> (in press)

TABLE 3  
Collecting sites in Saudi Arabia, Province of Aseer (= 'Asir).

Nr	Locality	Coordinates	Altitude	coll. Dates	Remarks
1	Abha, Farm Centre (close to locality 2)	18.13N/42.30E	2200	III.-VI.2001	25 km E of Abha
2	Madenate Al-Ameer Sultan	18.13N/42.30E	2200	25.II.-25.V.2002	25 km E of Abha
3	Wadi Hali	18.36N/41.18E	810	9.I.2003	80 km NW Abha
4	Maraba	17.54N/42.23E	260	1.-30.V.2004	60 km S Abha

## RESULTS

Subfamily TRYPETINAE

Tribe CARPOMYINI

Subtribe CARPOMYINA

*Carpomya incompleta* (Becker, 1903)

*Material.* 2: 11 ♂♂, 5 ♀♀.

*Distribution.* Italy, East Africa, Near and Middle East. First recorded from Saudi Arabia by Al-Ahmadi & Salem (1999).

*Host plants.* *Zizyphus* spp. (Rhamnaceae) (Freidberg & Kugler, 1989).

*Pest status.* Pest species in some parts of the world (White & Elson-Harris, 1992).

Tribe DACINI

Subtribe CERATITIDINA

*Capparimyia aenigma* De Meyer & Freidberg, 2005

*Material.* 2: 2 ♀♀ (identification by M. De Meyer).

*Distribution.* Tropical Africa and Arabian Peninsula. First recorded from Saudi Arabia by De Meyer & Freidberg (2005).

*Host plants.* *Maerua* spp. and *Boscia* spp. (Capparidaceae) (De Meyer & Freidberg, 2005).

*Pest status.* Not a pest species.

*Remarks.* This species was recently described from specimens from Kenya and Tanzania (De Meyer & Freidberg, 2005). The two specimens from Saudi Arabia were also studied but not included into the type series because they differ slightly in thoracic markings from the East African population. The identification is therefore tentative (De Meyer & Freidberg, 2005).

*Neoceratitis efflatouni* (Hendel, 1931)

*Material.* 2: 1 ♂.

*Distribution.* Originally described from Sudan, subsequently found in Egypt and Israel. New for Saudi Arabia.

*Host plant.* *Lycium schweinfurthii* (Solanaceae) (Freidberg & Kugler, 1989).

*Pest status.* Not a pest species.

*Neoceratitis flavoscutellata* sp. n.

Figs 1-10

*Material.* Holotype ♂: SAUDI ARABIA: Abha, Madenate Ameer Sultan, 22.II.-25.V.2002, H. A. Dawah (MHNG). Paratypes: 16 ♂♂, 20 ♀♀, same data as holotype (CHD, KMMA, MHNG, NMWC, TAU). The holotype is double-mounted on a minutien pin on a polyporus block and is in good condition with only the left midleg missing.

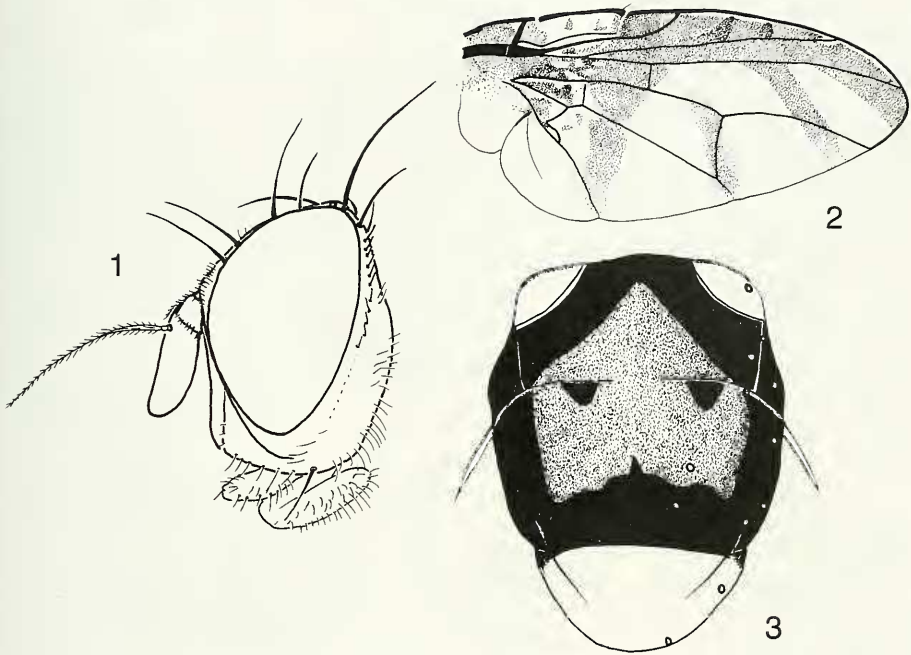
*Etymology.* The species is named after the entirely yellow scutellum, which is a unique characteristic within the genus.

*Diagnosis.* This is the only species of *Neoceratitis* with an entirely yellow scutellum dorsally (Fig. 3); wing with discal, anterior and posterior apical band fused in r1 and r2+3, subapical band isolated (Fig. 2).

*Description.* WING LENGTH. Male: 3.3-4.1 mm; female: 3.65-4.35 mm.

**HEAD** (Fig. 1). Anterior half of frons, ventral three quarters of face, and most of gena whitish-yellow; posterior half of frons and dorsum of occiput brownish-yellow; ocellar triangle, dorsal quarter of face and irregular pattern on occiput dorsal to occipital foramen blackish; gena with indistinct brown to black spot at eye margin; antenna and mouthparts yellow, but postpedicel with faint black tinge. Head in profile almost 1.5 times as high as long; gena about 1/6 to 1/5 as high as compound eye, the latter elongate oval; frons slightly longer than wide, in dorsal view slightly more than half as wide as entire head width; frons black setulose in middle; face not projecting at vibrissal corner, with indistinct antennal grooves separated by a broad, evenly convex carina; palpus slightly flattened, with black, stiff setulae; proboscis rather fleshy, capitate; antenna little shorter than face, postpedicel about twice as long as wide, apico-dorsally indistinctly pointed; arista setulose with longest rays about as long as basal diameter of arista. Chaetotaxy as in other *Neoceratitis*, all setae black: 2 frontal, 2 orbital (posterior about 0.75 times as long as anterior), 1 strong ocellar, 1 postocellar, 1 medial vertical, 1 lateral vertical, 1 genal, 1 row of postocular setae.

**THORAX.** Mesonotum dorsally with a pattern as in Fig. 3; postpronotum entirely whitish-yellow; a narrow yellow stripe from wing base along transverse suture; dorsal surface medially grey microtrichose, laterally with a shining, black, broad border; grey pattern anteromedially pointed and posteriorly with 1-3 black teeth penetrating into grey area; a pair of shiny black spots just posterior of transverse suture; scutellum swollen, whitish-yellow with a narrow brown to black spot laterally at base, white



FIGS 1-3

*Neoceratitis flavoscutellata* sp. n. (paratype from Abha): 1, head, lateral view; 2, wing; 3, thorax, dorsal view.

setulose on dorsal surface; most of anepisternum, anatergite and katatergite whitish-yellow, remaining parts of pleuron brown to black, subshining; setulae on grey and whitish-yellow surfaces white, other setulae pale brown; prosternum with pale brown setulae. Chaetotaxy as in other *Neoceratitis*, all setae black: 2 scapular, 1 postpronotal, 2 notopleural, 1 presutural supra-alar, 1 postsutural supra-alar, 1 intra-alar, 1 postalar, 1 dorsocentral posterior to line of postsutural supra-alar, 1 acrostichal, 1 anepisternal, 1 anepimeral, 1 katepisternal, 2 (pairs of) scutellar setae.

LEGS. All femora (except for knees) brown, distal parts contrastingly yellow; mid- and hindfemur anteroventrally with 4-7, midfemur dorsoventrally with 4-5 short, black setulae at apex; midtibia with a black apicoventral seta.

WING (Fig. 2). R1 dorsally entirely setulose, ventrally with 4-6 setulae in distal half of pterostigma; node of R2+3 and R4+5 ventrally with 2-3 setulae; R4+5 dorsally setulose over level of DM-Cu, the latter oblique; distance between R-M and DM-Cu on M about 1.2 times the length of DM-Cu; cell bcu with conspicuous posterodistal lobe; anal lobe large, undulating; wing with brown to black pattern, without light yellow areas; arrangement of spots and bands as in Fig. 2: Base of wing largely brown, in particular bc and surface ventral to stem vein; numerous brown streaks and spots from c to bcu; distally with 4 crossbands, the discal, anterior and posterior apical bands fused in r1 and r2+3; the subapical band well isolated from remaining pattern, obliquely transversing DM-Cu; r1 with 2-3 darker teeth-like spots; wing along C very

narrowly hyaline. Halter and calypteres whitish-yellow; both calypteres convex, subequal.

**ABDOMEN MALE.** Bicoloured, with posterior margin of tergite 1, lateral spots on tergite 2, entire tergite 3 and anterior third of tergite 4 dark brown, other parts of tergites 1-4 whitish-yellow; tergite 5 yellow medially, becoming gradually darker brown laterally; tergites black setulose, except for whitish-yellow parts on tergites 1-4, which are white setulose. Terminalia (Figs 4-6): epandrium ovoid, fused with lateral surstyli, the latter bifurcated and black distally, with a slightly pointed, apically directed, sparsely setulose branch and a broad ventral plate; medial surstylus narrow, with two black, subequal prenisetae; cercus large, setulose; hypandrium and associated structures symmetrical, glans as in Fig. 6 (drawn from compressed glans), of complicated 3-dimensional structure; vesica spoon-shaped, very large, bordered by a broad fringe of minute tubercles; its articulation with remaining glans flexible; sub-apical lobe well developed, with a sclerotized tip and a bar-like sclerotization basally; acrophallus composed of two ducts, the more straight one weakly sclerotized, sub-apically surrounded by a strongly sclerotized sheath.

**ABDOMEN FEMALE.** As in male, but entire anterior third of tergite 2 brown; tergite 6 almost invisible in dorsal view, at most 1/6 as wide as tergite 5; oviscape (Fig. 7) swollen, shining orange brown, but tip dark brown, black setulose; as long as 2-3 preceding tergites combined; aculeus (Figs 8-9) evenly pointed; sternite 8 width / aculeus length ratio = 0.8; aculeus length: 1.2 mm; 2 spermathecae present (Fig. 10): composed of a spherical apical part with a reticulate surface and a cylindrical base with some rather sharp projections.

*Distribution.* Saudi Arabia.

*Host plants.* Unknown. All specimens were collected in a Malaise trap.

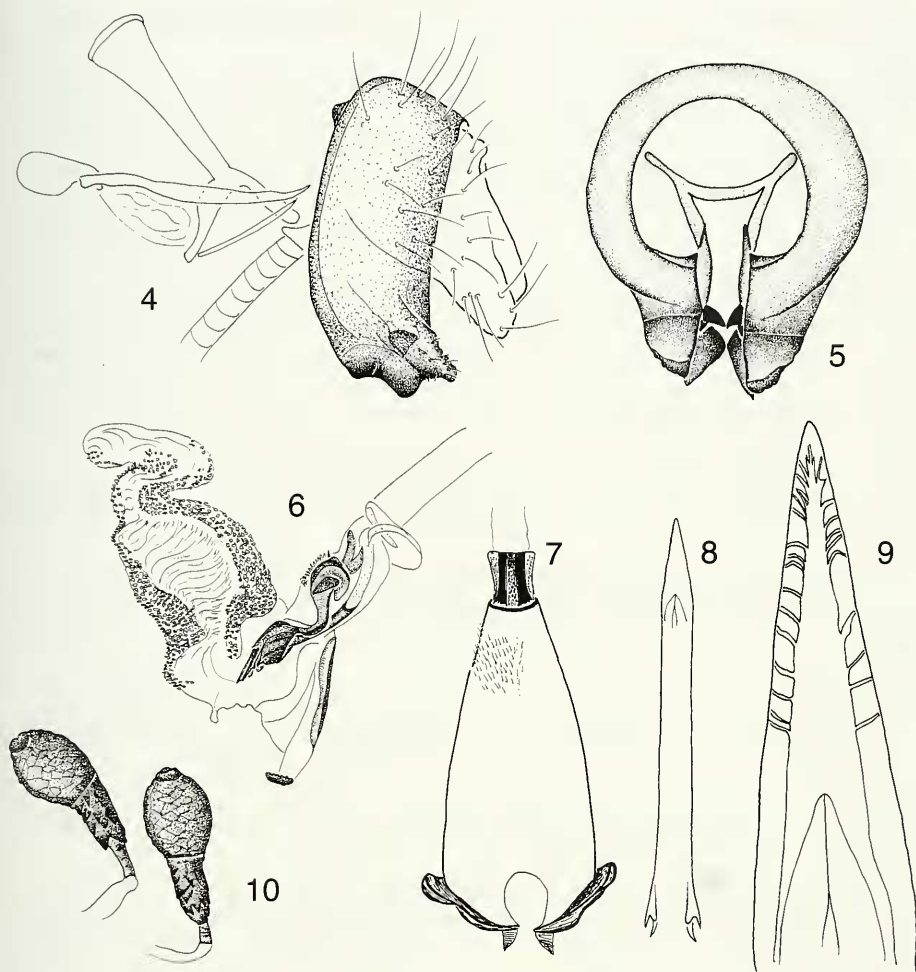
*Pest status.* Not a pest species.

*Remarks.* The genus was diagnosed under the name *Trirhithromyia* Hendel, 1931, by Hardy (1967) and Freidberg & Kugler (1989). Korneyev (1994) synonymized *Trirhithromyia* with *Neoceratitis* Hendel, 1927, and redescribed the genus. The new species fits well the characteristics given in these papers. The colour of the scutellum, however, which has black spots on the dorsal surface in other species of the genus, was considered to be of generic value by Hardy (1967) and Korneyev (1994), but *N. flavoscutellata* has only a narrow brown spot ventrobasally. Shape of head, wing pattern and genitalic characters show, however, that this species is congeneric with other *Neoceratitis*.

Within *Neoceratitis*, the new species appears to be related to *N. cyanescens* (Bezzi, 1923) which is known from Madagascar, Mauritius and La Réunion, sharing the same wing pattern and the entirely yellow postpronotal lobes. The grey-microtrichose pattern on the mesonotum and the colour of the abdomen are very different in the two species, in addition to the coloration of the scutellum (3 couples from La Réunion, St. Pierre (MHNG) studied, see Fig. 6 in Hancock, 1984).

Male terminalia of the new species differ clearly from those of *N. efflatouni* in length of vesica and sclerotization of glans (see Freidberg & Kugler, 1989, Fig. 216). On the other hand, they are similar to *Ceratitis capitata* (Wiedemann, 1824), as illustrated by Freidberg & Kugler (1989, Fig. 193). Unfortunately, male terminalia are unknown for most species of the Ceratitidina, thus, their value for phylogeny or species recognition is limited.





FIGS 4-10

*Neoceratitis flavoscutellata* sp. n. (4-6, male; 7-10, female, paratypes from Abha): 4, epandrium, lateral view; 5, same, caudal view; 6, glans; 7, oviscapae; 8, aculeus; 9, tip of aculeus; 10, spermathecae.

#### Subtribe DACINA

#### *Bactrocera* (s. str.) *zonata* (Saunders, 1842)

*Material.* 4: 1♂ (identification by I. M. White); 1♀, same, but IX.-X.2004 (identification by J. C. Deeming) (NMWC).

*Distribution.* Originally an Oriental species which was introduced to various countries of the Near East (Egypt, Israel, United Arab Emirates, Oman, Iran, Yemen) and some islands in the Indian Ocean (Réunion, Mauritius). Recorded from Saudi Arabia anonymously (Anonymus, 2002).

*Host plants.* Reared from numerous plants belonging to different families (White & Elson-Harris, 1992).

*Pest status.* Pest species in some parts of the world (White & Elson-Harris, 1992).

***Dacus (Didacus) sp. nr. arcuatus* Munro, 1939**

*Material.* 2: 2♂♂ (identifications by I. M. White).

*Distribution.* Published records of *D. arcuatus* from Kenya and South Africa. New for the Arabian Peninsula.

*Host plant.* *D. arcuatus* was reared from *Pergularia* sp. (Asclepiadaceae) (Munro, 1984).

*Remarks.* According to White (pers. comm.) the two males fit rather well *D. arcuatus*, but differ in morphological details. At the present moment only these two males are available from the Arabian Peninsula, and a safe identification is not possible.

***Dacus (Didacus) frontalis* Becker, 1922**

*Material.* 2: 3♂♂, 1♀; 4: 1♀ (identifications by I. M. White).

*Distribution.* Entire Afrotropical Region including the Arabian Peninsula. Recorded from Saudi Arabia by White & Elson-Harris (1992) and Al-Ahmadi & Salem (1999).

*Host plants.* Various Cucurbitaceae (White & Elson-Harris, 1992).

*Pest status.* Pest species in some parts of the world (White & Elson-Harris, 1992).

***Dacus (Didacus) vertebratus* Bezzi, 1908**

*Material.* 2: 1♂; 4: 3♂♂, 2♀♀ (identifications by I. M. White) (MHNG, NMWC).

*Distribution.* Entire Afrotropical Region including Madagascar, and the Arabian Peninsula. Recorded from Saudi Arabia by Munro (1984) and White & Elson-Harris (1992).

*Host plants.* Various Cucurbitaceae (White & Elson-Harris, 1992).

*Pest status.* Pest species in some parts of the world (White & Elson-Harris, 1992).

***Dacus (Leptoxyda) longistylus* Wiedemann, 1830**

*Material.* 4: 1♀ (identification by I. M. White).

*Distribution.* Afrotropical Region, Arabian Peninsula (Munro, 1984). Reported from Saudi Arabia by Al-Ahmadi & Salem (1999) and Carroll *et al.* (2002).

*Host plant.* Reared from Sodom apple (*Calotropis procera*, Asclepiadaceae) (Munro, 1984).

*Pest status.* A potential pest species in areas where the host is cultivated. On the other hand, Sodom apple is poisonous to livestock, and *D. longistylus* may therefore be useful for Biological Control in other parts of its distribution range (White & Elson-Harris, 1992).

***Dacus (Leptoxyda) obesus* Munro, 1948**

*Material.* 4: 1♂ (identification by I. M. White).

*Distribution.* So far only known from Kenya. New for Saudi Arabia.

*Host plant.* Reared from Sodom apple (*Calotropis procera*, Asclepiadaceae) (Munro, 1984).

*Pest status.* A potential pest species in areas where the host is cultivated (White & Elson-Harris, 1992).

*Remarks.* This is one of the most remarkable species of *Dacus*, characterized by a number of unusual features. Males lack a pecten on tergite 3; other characters of this small species are the blue-grey, silvery microtrichose scutum, the compact body, the broad continuous black band along anterior wing margin which is covering both costal cells, the absence of an anal streak, the presence of 2 black spots on the face, the absence of both supra-alar and prescutellar setae, the entirely yellow scutellum, the absence of stripe-like medial and lateral postsutural vittae (but with a yellow transversal marking in posterior half of scutum), the presence of two postalar vittae across katatergite and anatergite, and the entirely yellow legs. A comprehensive description and useful illustrations were provided by Munro (1984, p. 151). Because of the unusual set of characters Munro (1984) erected the new tribe *Pionodacini* and the new genus *Pionodacus* Munro, 1984, for this species. This proposal, however, was not accepted by subsequent workers (Norrbom *et al.*, 1999a).

***Dacus (Leptoxyda) semisphaereus* Becker, 1903**

*Material.* 4: 1 ♀ (identification by I. M. White) (NMWC).

*Distribution.* Eastern Africa from Egypt to Sudan and Ethiopia. New for Saudi Arabia.

*Host plant.* Unknown.

*Pest status.* Not a pest species.

*Remarks.* The data concerning this species were communicated by J. C. Deeming (in litt., 8.I.2005).

***Dacus (Leptoxyda)* sp. 1**

*Material.* 4: 1 ♂, 1 ♀ (identifications by I. M. White).

*Remarks.* This species is externally similar to *D. obesus*, differing chiefly in the colour of the scutum, which is black posterior of the suture (with a transversal yellow marking on posterior half of scutum in *D. obesus*). Currently, a revision of the genus is in preparation by I. M. White and the species will be formally described in this work.

Subfamily TEPHRITINAE

Tribe NOEETINI

***Ensina sonchi* (Linnaeus, 1767)**

*Material.* 2: 1 ♂, 2 ♀ ♀.

*Distribution.* Large distribution in Palaearctic, Afrotropical, Australasian (Hawaii) and Oriental Regions. New for Saudi Arabia.

*Host plants.* Wide range of Asteraceae of the subfamily Cichorioideae (*Chondrilla*, *Crepis*, *Helminthia*, *Lactuca*, *Picris*, *Scorzonera*, *Sonchus* and others) (Freidberg & Kugler, 1989; Hendel, 1927; Merz, 1994).

*Pest status.* A potential or minor pest on some cultivated plants (*Scorzonera* in Ukraine). On the other hand *E. sonchi* may be important in the natural regulation of *Sonchus oleraceus*, which is a weed in some parts of the world (White & Elson-Harris, 1992).

## Tribe SCHISTOPTERINI

*Bactropota* sp. 1

*Material.* 3: 45 specimens.

*Remarks.* This species differs readily from *B. woodi* Bezzi, the only described species of the genus (Freidberg, 2002), in wing pattern. In contrast to *B. woodi* the anterior margin has ill-defined, small yellow-brown areas, thus the entire wing appears much darker without two hyaline incisions which are present in *B. woodi* (see Fig. 2A in Freidberg, 2002). A revision of the genus is currently prepared by Freidberg *et al.* and the species will be formally described in that study.

*Rhochmopterum arcoides* Munro, 1935

*Material.* 2: 1 ♂.

*Distribution.* East Africa. New for Saudi Arabia.

*Host plant.* Reared in South Africa from flower heads of *Vernonia kraussii* (Asteraceae) (Munro, 1935).

*Pest status.* Not a pest species.

*Remarks.* This genus is in bad need of revision. At least 10 undescribed species are known in addition to the 6 described species from the Afrotropical Region (Freidberg, 2002). The specimen at hand fits very well the description and illustration of Munro (1935) as well as one couple from Kenya (Magadi road, 3.III.1993, leg. B. Merz, MHNG). The only difference concerns the colour of the tibiae, which are yellow with two black rings in basal and distal third in the specimens studied from Saudi Arabia and Kenya, whereas Munro (1935) did not give any indication of their colour.

*Schistopterum moebiusi* Becker, 1903

*Material.* 2: 1 ♂, 4 ♀ ♀; 3: 1 ♂, 1 ♀.

*Distribution.* Eastern Africa north to Lebanon (Deeming, in litt.), Yemen (Merz *et al.*, in press). New for Saudi Arabia.

*Host plant.* *Pluchea dioscoridis* (Asteraceae) (Freidberg & Kugler, 1989).

*Pest status.* Not a pest species.

## Tribe TEPHRELLINI

## Subtribe PLATENSININA

*Psednometopum* cf. *aldabrense* (Lamb, 1914)

*Material.* 2: 2 ♂ ♂.

*Distribution.* This species is only known from the island of Aldabra (Seychelles). The record from Kenya (Merz *et al.*, in press) is based on a misidentification of *P. nigratum* Munro, 1937. New for Saudi Arabia.

*Host plants.* Unknown.

*Pest status.* Not a pest species.

*Remarks.* *P. aldabrense* was recently recorded from Yemen based on one male (Merz *et al.*, in press). and this specimen belongs to the same species as the two males from Saudi Arabia. D. L. Hancock studied recently the types and additional specimens of *Tephritis aldabrensis* Lamb from Aldabra (in NHML) and found that the specimens

from the Arabian Peninsula differ from those of Aldabra by the entirely black pterostigma (with hyaline spot in specimens from Aldabra), and he concluded that they may belong to an undescribed species (Hancock, in litt.). However, as a very limited number of specimens is available and the two populations differ only slightly, the intraspecific variability of the species in the genus is poorly known. We prefer therefore not to describe a new species.

***Stephanotrypeta brevicosta* Hendel, 1931**

*Material.* 2: 2♂♂.

*Distribution.* Kenya, Sudan. New for Saudi Arabia.

*Host plants.* Unknown.

*Pest status.* Not a pest species.

***Stephanotrypeta vittata* Freidberg, 1979**

*Material.* 2: 1♂, 3♀♀.

*Distribution.* East Africa, Madagascar, Arabian Peninsula. Recorded from Saudi Arabia by Freidberg (1979).

*Host plant.* Unknown.

*Pest status.* Not a pest species.

*Remarks.* We follow here Freidberg (1979) for the generic placement of the species and do not accept the proposition of Hancock (2003), who transferred this species to *Terpnodesma* Munro.

Subtribe TEPHRELLINA

***Dicheniotes angulicornis* (Hendel, 1931)**

*Material.* 2: 1♂.

*Distribution.* Described from Sudan, later found in Yemen (Merz *et al.*, in press). New for Saudi Arabia.

*Host plants.* Unknown.

*Pest status.* Not a pest species.

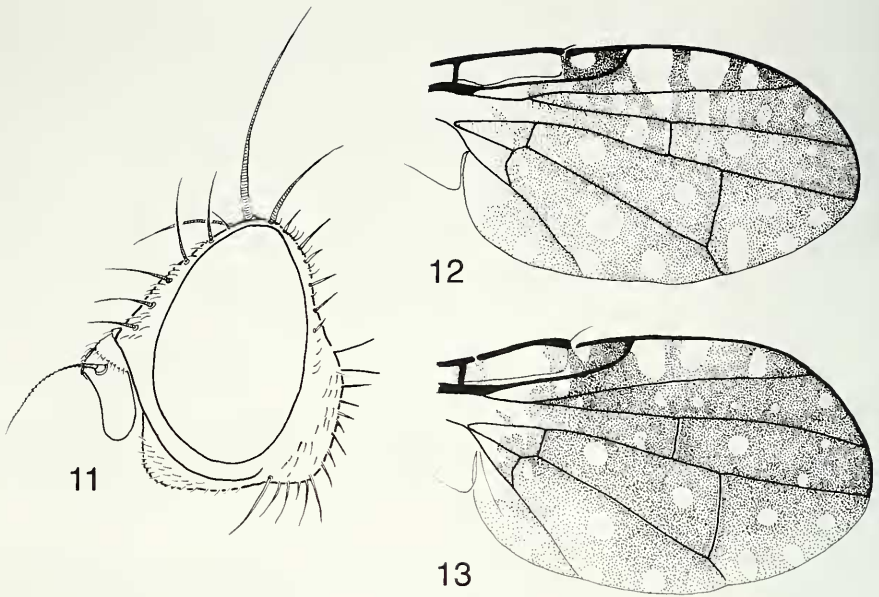
***Dicheniotes multipunctatus* sp. n.**

Figs 11-13

*Dicheniotes* sp. - Merz *et al.* (in press).

*Material.* Holotype ♂: KENYA: Rt. B4 nr. Lake Baringo, 28.XI.1986, A. Freidberg (TAU). Paratypes: KENYA: 1♂, Voi, Rt. A109, 4.6.V.1991, A. Freidberg & F. Kaplan (MHNG); 1♀, (N. W.) Kainuk, on Morun River, 25.XI.1989, A. Freidberg & F. Kaplan (TAU). SAUDI ARABIA: 1♀, Abha, Madenat Ameer Sultan, 22.II.-25.V.2002, H. A. Dawah (MHNG). TANZANIA: 1♀, Same, Rt. B1, 8-16.IX.1992, A. Freidberg (TAU); 1♂, 1♀, Dar es Salam, 20 km N, Rt. B1212, 4.IX.1996, A. Freidberg (TAU). YEMEN: 1♀, ar-Rujum, 16.X.2000-15.I.2001, Malaise trap, A. van Harten & A.M. Hager (MHNG); 1♀, Lahj, VIII.2000, Malaise trap, A. van Harten & A. Sallam (ZMUA); 1♀, 12 km NW of Manakhah, 27.III-5.V.2002, Mal. trap, A. van Harten; 1♀, same, but 5.V-17.VI.2002 (MHNG). The holotype is double-mounted on a minutien pin on a polyporus block and is in excellent condition.

*Etymology.* The species is named after the wing pattern with numerous hyaline and subhyaline spots.



FIGS 11-13

*Dicheniotes multipunctatus* sp. n.: 11, head, lateral view (holotype); 12, wing of male (holotype); 13, wing of female (paratype from Yemen, slightly modified after Merz *et al.*, in press).

*Diagnosis.* This species belongs to the group of species of *Dicheniotes* with a hyaline spot in cell r2+3 at the tip of R2+3 (Figs 12-13) and normal head shape without oblique oral opening or large labella (Fig. 11). It differs from all other species of the genus by the presence of 3 hyaline spots in cell r1, which are either small, or elongated and extending into cell r2+3; remainder of wing with numerous hyaline or subhyaline spots; sexual dimorphism of wing pattern present, but weak. Scutum thickly grey microtrichose, with distinct, coarse white setulae. Abdomen reddish-brown, subshining.

*Description.* WING LENGTH. Male: 3.15-3.35 mm; female: 2.70-3.35 mm.

**HEAD** (Fig. 11). Predominantly yellow, but ocellar triangle and a paired spot on occiput dorsal to occipital foramen greyish black; posterior half of frons, frontal and orbital plates silvery; face indistinctly whitish yellow; palpus and antenna entirely yellow, only apical two third of arista brown; head in profile about 1.2 times as high as long; gena narrow, about one tenth as wide as compound eye; at anterior margin with 2-3 rows of brown, rather short subvibrissal setulae of equal length; frons slightly wider than long (measured from posterior margin of posterior ocelli to base of antenna), tapering anteriorly; covered with numerous white setulae anteriorly; face shallow concave, without carina, vibrissal corner produced anteriorly to about same level as frontofacial corner; scape and pedicel black setulose; postpedicel 1.5 times as long as wide, dorsally slightly concave, rounded dorsoapically; arista almost bare, rays at most as long as basal diameter of arista; palpus short, not projecting beyond vibrissal

corner. The following paired pale brown setae are present: 1 genal, 3 frontal, 2 orbital, 1 ocellar, 1 medial vertical seta; 2 lateral vertical setae pale brown to white depending on illumination; postocellar and paraverticilar setae white; postocular setae mixed with long, white and short, black setulae.

**THORAX.** Scutum, dorsal surface of scutellum and pleura posterior to anterior spiracle black, very densely grey microtrichose, mat, black ground colour entirely invisible; postpronotum, posterior two third of notopleuron, pleura anterior to anterior spiracle and on ventral side of scutellum mat yellow to pale brown. Mesonotum covered with numerous short, white, coarse setulae; prosternum white setulose. The following pale brown, paired setae are present: 1 dorsocentral inserted closer to level of anterior supra-alar seta than to suture, 1 prescutellar acrostichal, 1 presutural supra-alar, 1 postsutural supra-alar, 1 intra-alar, 1 postalar, 1 postpronotal, 2 notopleural and 2 (pairs of) subequal scutellar setae; 2 anepisternal, 1 katepisternal and 1 anepimeral seta.

**LEGS.** Entirely yellow; hindtibia anterodorsally with a row of 4-7 outstanding setulae.

**WING MALE** (Fig. 12). Very wide, about 1.8 times as long as wide, apically broadly rounded, posteriorly with large anal lobe; R1 dorsally setulose except for a gap opposite subcostal break; R4+5 ventrally with 1-6 setulae proximally R-M, dorsally with 3-5 black setulae to level of R-M. Pattern orange brown, covering most of surface distal to subcostal break and interrupted by about 20 hyaline and 10 slightly yellowish spots; cell c hyaline with narrow brown stripes at base and tip; pterostigma with hyaline spot; r1 with 3 hyaline spots with the basal two spots larger, extending into cell r2+3; r2+3 with 6-8 small hyaline or pale yellowish spots; br with 1-2 hyaline spots; r4+5 with 4-5 spots, apex largely black; dm with 2-3 hyaline spots; m with 4 spots which are separated from each other by distance greater than their diameter; cu2 and anal lobe with about 4 spots. Halter and calypteres yellow. Lower, ventral calypter smaller than upper, dorsal.

**WING FEMALE** (Fig. 13). Shape and chaetotaxy as male; pattern darker brown, with hyaline spots clearly separated from dark area and only few yellowish spots present; only basal hyaline spot of r1 occasionally penetrating into r2+3, second hyaline spot of r1 always isolated from hyaline spot in r2+3. The female from Kainuk (Kenya), the smallest specimen (wing length: 2.70 mm; all other specimens > 3.0 mm) has only 2 hyaline spots in r2+3, remaining pattern as in other specimens.

**ABDOMEN MALE.** Strongly reddish-brown, subshining; basal two tergites mainly white setulose, other tergites covered with short black setulae. Epandrium reddish; structure not studied.

**ABDOMEN FEMALE.** Preabdomen as male; oviscape black, shining, pale brown setulose, about as long as length of 2.5 preceding tergites combined; eversible membrane with numerous denticles; aculeus evenly narrowed, apically sharply pointed.

*Distribution.* Eastern Afrotropical Region (Kenya, Tanzania) and Arabian Peninsula (Saudi Arabia, Yemen).

*Host plants.* Unknown. The specimens from the Arabian Peninsula were collected in Malaise traps.

*Pest status.* Not a pest species.

*Remarks.* The generic position of this species may be subject to discussions. In the key of Munro (1947) it runs with some problems to *Platensina* Enderlein because of the rather thick, ash-grey microtrichose mesonotum and the chaetotaxy (couplet 21 in Munro, 1947). However, some species of *Dicheniotes* Munro, such as *D. polypspila* (Bezzi), have also an ash-grey microtrichose mesonotum and a very similar type of wing pattern and head shape (some 30 specimens of both sexes from Kenya, along road from Nairobi to Mombasa between Hunters Lodge and Mtito Andei studied, MHNG). Its inclusion in *Dicheniotes* (3 frontal setae, 2 orbital setae, 2 pairs of scutellar setae, postocular setae mixed white and black, wing of *Tephrella* type of Munro, 1947) seems therefore justified.

Within *Dicheniotes* the new species differs from all congeners in wing pattern with 3 hyaline spots in cell r1, of which the apical spot is smaller than the two basal spots, but still clearly present, and the more numerous hyaline spots on the remaining wing surface. Because of the presence of a hyaline spot in r2+3 below tip of R2+3 *D. multipunctatus* runs to couplet 9 in Munro (1947, p. 178) next to *D. polypspila* which is morphologically similar with the same reddish abdomen and the thick, ash-grey microtrichose mesonotum and thus differing from the much more subshining mesonotum and shining black abdomen of other species, such as *D. angulicornis*, *D. erosa* (Bezzi) or *D. katonae* (Bezzi). The new species differs from *D. polypspila* by the following set of characters in addition to those given above: wing with less conspicuous dimorphism (very prominent in *D. polypspila*: male with basal half of r1 and r2+3, and cell br entirely hyaline, and r2+3 at tip with two broadly confluent hyaline spots; female with more isolated spots), hyaline spots often not sharply separated from black area (usually very sharply separated in *D. polypspila*), and oviscapae much shorter than preabdomen (in *D. polypspila* about as long as preabdomen).

***Gymnaciura austeni* (Munro, 1935)**

*Material.* 2: 1 ♀.

*Distribution.* Entire Afrotropical Region, Yemen (Merz *et al.*, in press). New for Saudi Arabia.

*Host plants.* Unknown.

*Pest status.* Not a pest species.

***Metasphenisca hazelae* (Munro, 1947)**

*Material.* 2: 1 ♂, 3 ♀♀.

*Distribution.* Eastern Africa. New for Saudi Arabia.

*Host plant.* *Barleria rehmanni* (Acanthaceae) (Munro, 1947).

*Pest status.* Not a pest species.

*Remarks.* Hancock (in litt.) found another specimen from Saudi Arabia in the unsorted material of the NHML: 1 ♂, Dhamar, 3.IX.62 (or 42), G. Popov (NHML).

***Metasphenisca negeviana* (Freidberg, 1974)**

*Material.* 2: 1 ♂.

*Distribution.* Near East. Recorded from Saudi Arabia by Freidberg & Kugler (1989).



*Host plant.* *Blepharis attenuata* (Acanthaceae) (Freidberg & Kugler, 1989).

*Pest status.* Not a pest species.

***Oxyaciura tibialis*** (Robineau-Desvoidy, 1830)

*Material.* 2: 2 ♀ ♀.

*Distribution.* Western Palaearctic Region to Afghanistan, Ethiopia. New for Saudi Arabia.

*Host plants.* *Lavandula* spp., *Nepeta septemcrenata* (Lamiaceae) (Freidberg & Kugler, 1989; Hendel, 1927; Merz, 1992).

*Pest status.* Not a pest species.

***Paraspheniscoides binarius*** (Loew, 1861)

*Material.* 2: 1 ♀.

*Distribution.* Afrotropical Region and islands of the Indian Ocean, Yemen (Merz *et al.*, in press). New for Saudi Arabia.

*Host plants.* *Lippia* spp. and *Lantana* spp. (Verbenaceae) (Munro, 1947).

*Pest status.* Not a pest species.

***Paraspheniscus debksii*** (Eflatoun, 1924)

*Material.* 2: 1 ♀.

*Distribution.* Described from Egypt. New for Saudi Arabia.

*Host plant.* *Stachys aegyptiaca* (Lamiaceae) (Eflatoun, 1924; Freidberg & Kugler, 1989; Hendel, 1927).

*Pest status.* Not a pest species.

Tribe TEPHRITINI

*Campiglossa* genus group

***Campiglossa ignobilis*** (Loew, 1861)

*Material.* 2: 34 ♂ ♂, 41 ♀ ♀, 1 without abdomen.

*Distribution.* Eastern Afrotropical Region, Yemen. New for Saudi Arabia.

*Host plant.* *Sonchus oleraceus* (Asteraceae) (Munro, 1957a).

*Pest status.* Because its host is a weed in some parts of the world, this species may be useful in the natural regulation of *S. oleraceus*.

***Desmella* sp. nr *myiopotoides*** (Bezzi, 1908)

*Material.* 2: 2 ♀ ♀.

*Distribution.* *D. myiopotoides* is known from the Eastern Afrotropical Region. Recently, a specimen of the *D. myiopotoides*-group was also found in Oman (Jebel Shams, 2500m, 7.V.1989, leg. M. J. Ebejer, MHNG, new record). New for Saudi Arabia.

*Host plant.* *D. myiopotoides* was reared in South Africa from flowers of *Chrysocoma tenuifolia* (Asteraceae) (Munro, 1925).

*Pest status.* Not a pest species.

*Remarks.* As Munro (1957a) pointed out this genus is in bad need of a revision. No further progress has been carried out since then. The two females at hand key out as *D. myiopotoides* (Bezzi), but this may be a complex of different species (Munro,

1957a). One female has a wing pattern similar to Fig. 137, and the other is similar to Fig. 139 in Munro (1957a). No males are available which may have good characters (Munro, 1957a). For these reasons the specimens from Saudi Arabia cannot be identified unambiguously. The genus is newly recorded for Saudi Arabia.

***Dioxya sororcula*** (Wiedemann, 1830)

*Material.* 2: 5 ♀ ♀.

*Distribution.* Tropics and Subtropics of the Old World, Australia, introduced to Hawaii. New for Saudi Arabia.

*Host plants.* *Bidens* spp., *Guizotia* sp., *Lactuca sativa* (Asteraceae) (Freidberg & Kugler, 1989; Merz, 1992; White & Elson-Harris, 1992).

*Pest status.* A potential or minor pest on some cultivated plants (*Lactuca* in the Philippines). On the other hand it may be important in the natural regulation of *Bidens* spp. which are weeds in some parts of the world (White & Elson-Harris, 1992).

***Tanaica*** Munro, 1957

Type species: *Ensina hyalipennis* Bezzi, 1924

*Diagnosis.* Within the *Campiglossa* group of genera *Tanaica* (Munro, 1957a) may be recognized by the flattened head (Fig. 24) which is longer than high in profile and the narrow gena; by the long labella which are longer than height of head and which are projecting distinctly beyond anterior vibrissal corner; by the wing, which is either entirely hyaline or which has a faint reticulate pattern (Figs 15, 25); by the legs, with the femora black except for the apical quarter; and by the male terminalia: preglans with two setulose areas and glans with two sclerotized plates of uneven length emerging from acrophallus, with the longer plate strongly concave (Figs 29-30).

*Redescription.* HEAD (Figs 14, 24). In profile flattened, longer than high; gena narrow, less than 0.8 times as wide as width of postpedicel; height of gena less than 0.15 times the height of compound eye; frons bare; frontal stripe (as defined by Munro, 1957a) indistinct, almost invisible; face concave; vibrissal corner distinctly projecting beyond frontofacial corner; mouthparts strongly geniculate with labella longer than height of head and projecting beyond vibrissal corner; palpus thin, parallel-sided, as long as labella; scape and pedicel black setulose; postpedicel about 1.5 times as long as wide, dorsoapically rounded; arista almost bare. Chaetotaxy: 2 black frontal setae; 2 orbital setae, anterior black, posterior short, white; ocellar seta black; medial vertical seta black; lateral vertical seta and postocellar seta white; paraverticilar seta absent or short and white; medial postocellar seta absent; postocular setae mixed white and black.

THORAX. Scutum white setulose, more or less uniformly grey microtrichose, without distinct brown longitudinal stripes; scutellum apically with small yellow patch. Chaetotaxy (all setae black): 1 postpronotal seta; 2 notopleural setae, the posterior shorter; 1 presutural supra-alar seta; 1 postsutural supra-alar seta; 1 intra-alar seta; 1 postalar seta; 1 dorsocentral seta distinctly anterior to level of postsutural supra-alar seta; 1 acrostichal seta; 2 (pairs of) scutellar setae, the apical less than half as long as the basal; 1 anepisternal seta and 1 katepisternal seta, both black; 1 white, lanceolate anepimeral seta.

LEGS. Mat yellow, but basal 0.7-0.8 of all femora black; coxae and trochanters black or mixed black and yellow; midtibia with 1 apicoventral black seta.

WING (Figs 15, 25). Hyaline or with faint reticulate pattern; pterostigma hyaline or brown with round hyaline spot medially; posterodistal extension of cell *bcu* short, but distinct; R-M in distal third of cell *dm*; distance between crossveins equal to length of DM-Cu; veins bare, only R1 with usual dorsal row of setulae, which is interrupted opposite level of tip of Sc, and ventrally with 0-5 setulae in distal half of pterostigma. Calypteres yellow, lower, ventral calypter strip-like, much smaller than upper, dorsal; halter yellow.

ABDOMEN MALE. Shining black or grey microtrichose and then with indistinct black paired spots on tergites; sternite 5 (Figs 16, 26) smoothly concave apically; epandrium (Fig. 18) ovoid, with distinct epandrial process; medial surstylus with 2 prenisetae of very unequal length, medial preniseta much larger (Fig. 19); preglans area with two areas of fine setulae (Fig. 20); glans with strongly sclerotized, tube-like acrophallus; vesica twice as long, with two sclerotized plates, the longer twice as long as the shorter, concave; shorter plate distally truncate.

ABDOMEN FEMALE. Preabdomen as male; oviscapae black, fine black setulose; at most as long as preceding 3 tergites combined; aculeus (Figs 21-22) evenly pointed apically; two spherical, pyriform spermathecae with small papillae (Fig. 23).

*Remarks.* *Tanaica* was described by Munro (1957a) in the *Ensina* series of genera for a species with entirely hyaline wings and a shining black abdomen. As it was already admitted by Munro (1957a), the genera placed in this group do not belong to a homogenous group, but are merely an assemblage of taxa which cannot be placed elsewhere. In fact, *Ensina* Robineau-Desvoidy is now placed in the tribe Noetini, whereas the other genera in the tribe Tephritini (Norrbon *et al.*, 1999a). *Prosanthus* Munro, *Sphenella* Robineau-Desvoidy and *Telaletes* Munro belong to the *Sphenella* genus group (Freidberg, 1987; Norrbom *et al.*, 1999a), whereas the relationships of the two monotypic genera *Deroparia* Munro and *Namwambina* Munro are still not satisfactorily known. *Tanaica*, the last of these genera, was correctly associated with the *Campiglossa* genus group (Norrbon *et al.*, 1999a) because of the presence of setulose preglans area (absent only in *Antoxya* Munro and *Dioxyna* Frey), the flattened head and the mostly black setae on head and thorax.

The only species included in *Tanaica* by Munro (1957a) exhibits two unusual characters for the *Campiglossa* genus group and may have influenced the placement of the genus in the *Ensina* series: the entirely hyaline wing and the shining black abdomen. However, with the inclusion of the two species described below the concept of the genus is modified, including also species with faint reticulate wing pattern and with grey microtrichose abdomen. Superficially they resemble species of *Desmella* Munro and *Dioxyna*. Whereas the latter genus is somewhat isolated by the lack of setulae on the preglans area, it is possible to separate safely *Desmella* from *Tanaica* only by the structure of the glans. More careful comparative studies of all included species are, however, needed to establish whether both genera may be maintained or eventually be synonymized.

In order to place *Tanaica* in the *Campiglossa* genus group, a key to the Afrotropical and Near Eastern genera is provided. Excluded are *Homoetricha* Hering

(6 species in Central and Eastern Palaearctic, to the west to Kazakhstan and Kyrgyzzia) and *Oxyparna* Korneyev (2 species in mountains between Kyrgyzzia and China).

- 1 One pair of frontal setae present (rarely on one side 2-3 frontal setae present, in these cases lunule very high and scape white setulose) . . . . . 2
- 1\* At least 2 pairs of subequal frontal setae present; scape always black setulose . . . . . 3
- 2 Scape black setulose; frons setulose anteriorly; lunule normal; posterior notopleural seta black; postpedicel about twice as long as wide . . . . . *Antoxya* Munro  
[1 Afrotropical species; *A. oxynoides* (Bezzi)]
- 2\* Scape white setulose; frons bare; lunule very high, a semicircle; posterior notopleural seta usually white; postpedicel barely longer than wide . . . . . *Oxya* Robineau-Desvoidy  
[23 species in Nearctic and Palaearctic Regions]
- 3 Apical scutellar setae at least 0.75 times as long as basal scutellar setae . . . . . 4
- 3\* Apical scutellar setae at most 0.6 times as long as basal scutellar setae, or entirely absent . . . . . 5
- 4 Labella long geniculate, longer than height of head (as in Fig. 24) . . . . . *Mesoclanis* Munro  
[8 Afrotropical and 1 Oriental species; 1 species introduced to Australia]
- 4\* Labella short geniculate, much shorter than height of head . . . . . *Scedella* Munro  
[15 Afrotropical and 2 Oriental/Australasian species]
- 5 Apical scutellar setae entirely absent . . . . . 6
- 5\* Apical scutellar setae present, though sometimes only little longer than surrounding setulae . . . . . 7
- 6 Head in profile higher than long; labella about 0.8 times as long as height of head; gena 0.2 times as high as eye and about as high as width of postpedicel; abdominal tergites dull, with indistinct paired spots on tergites 3-5; male: preglans area setulose . . . . . *Lethyna* Munro  
[7 Afrotropical species, 1 unidentified species in Yemen (Merz *et al.*, in press)]
- 6\* Head in profile wider than long; labella longer than height of head; gena at most 0.15 times as high as eye; about 0.7 times as high as width of postpedicel; paired spots on abdominal tergites distinct; male: preglans area bare . . . . . *Dioxya* Frey, part  
[10 species, worldwide distribution]
- 7 Posterior notopleural seta white . . . . . *Campiglossa* Rondani, part  
[almost 200 species worldwide, most diverse in Afrotropical, Nearctic and Palaearctic Regions]
- 7\* Posterior notopleural seta black . . . . . 8
- 8 Dorsocentral seta distinctly posterior to level of postsutural supra-alar seta; head flattened . . . . . *Campiglossa* Rondani, part  
[here only *C. martii* (Becker) from the Canary Islands and Southern Spain]
- 8\* Dorsocentral seta closer to suture than to postsutural supra-alar seta; shape of head variable . . . . . 9

- 9 Head in profile higher than long; labella usually shorter than height of head; wing pattern usually reticulate, rarely banded; male: preglans area setulose . . . . . *Campiglossa* Rondani, part [see couplet 7]
- 9\* Head in profile flattened, longer than high; labella longer than height of head, usually projecting beyond vibrissal corner; other characters variable . . . 10
- 10 Wing pattern strong, usually of banded appearance, with clear contrast between brown and hyaline areas; pterostigma uniformly brown without central hyaline spot; femora at least in basal half black; male: preglans area setulose . . . . . *Desmella* Munro [3 Afrotropical and 2 Palaearctic species]
- 10\* Wing pattern weak, reticulate, or wing entirely hyaline; border between brown and hyaline areas indistinct; pterostigma uniformly hyaline or brown with central hyaline spot; femora yellow or partly black; male: preglans area setulose or bare . . . . . 11
- 11 At least midfemur mostly yellow. Male: preglans area bare . *Dioxyna* Frey, part [here only the Palaearctic species *D. bidentis* (Robineau-Desvoidy) with short apical scutellar setae]
- 11\* All femora at least in basal 0.7 black. Male: preglans area setulose (Figs 20, 29) . . . . . *Tanaica* Munro [3 Afrotropical species, see below]

Key to species of *Tanaica* Munro, 1957

- 1 Wing with faint, but distinct reticulate pattern (Fig. 15); abdomen grey microtrichose, not shining . . . . . *T. maculata* sp. n.
- 1\* Wing entirely hyaline, at most pterostigma yellowish (Fig. 25); abdomen variable . . . . . 2
- 2 Abdomen strongly microtrichose, mat . . . . . *T. pollinosa* sp. n.
- 2\* Abdomen shining black, only very thinly microtrichose . . . . . *T. hyalipennis* (Bezzi, 1924)

*Tanaica hyalipennis* (Bezzi, 1924)

*Ensina hyalipennis* Bezzi, 1924: 549. Holotype ♀: SOUTH AFRICA: Cape, Cedarbergen, Clanwilliam, 4000-5000 ft, IX. 1923, leg. K. H. Barnard (SAMCT) (not examined).

*Material.* 1 ♂, 2 ♀ ♀, NAMIBIA: Keetmanshoop, 12.IX.2003, leg. A. Freidberg (TAU).

*Remarks.* The species was extensively described by Bezzi (1924), and redescribed by Munro (1929, 1957a) by adding new characters. Munro (1929) stated that the abdomen is shining black in the holotype, whereas it was described as «black, grey dusted» by Bezzi (1924). Because it was not possible to study the holotype we assume here that Munro correctly interpreted the colour of the abdomen. On the other hand, the illustration of the glans by Munro (1957a) is misleading because the distal two sclerotizations were not illustrated nor mentioned in the description. It is possible that he studied a teneral specimen with the sclerotization not yet fully developed. The above

mentioned male was dissected and it was found that the terminalia are the same as in *T. pollinosa* (Figs 27-30). According to available information (Munro, 1957a; Norrbom *et al.*, 1999b) *T. hyalipennis* has a rather narrow distribution in the Western part of South Africa and Namibia. This species was reared from *Chrysanthemoides monilifera* (Asteraceae) (Munro, 1957a).

***Tanaica maculata* sp. n.**

Figs 14-23

*Material.* Holotype ♂: SAUDI ARABIA: Abha, Madenate Ameer Sultan, 22.II.-25.V.2002, H. A. Dawah (MHNG). Paratypes: SAUDI ARABIA: 2♂♂, 3♀♀, same data as holotype (CHD, MHNG, NMWC). ETHIOPIA: 15♂♂, 9♀♀, Mojo, 75 km SE Addis Abeba, 20.XII.1989, A. Freidberg & F. Kaplan (MHNG, TAU). KENYA: 1♂, W-Nariobi (ILRAD), 1900 m, 1.III.1993, leg. B. Merz; 9♂♂, 5♀♀, same data, but 2.III.1993; 1♀, same data, but 3.III.1993; 1♀, same data, but 5.III.1993; 1♂, 2♀♀, same data, but 8.III.1993; 1♂, 2♀♀, same data, but 16.III.1993; 2♂♂, 40 km SE Nairobi, [on road] A 109, 1650 m, 17.III.1993, leg. B. Merz; 3♂♂, 75 km SE Nairobi (A 109), 1700 m, 17.III.1993; 1♀, 135 km SE Nairobi (A 109), 1200 m, 17.III.1993, leg. B. Merz (MHNG); 1♂, Rt. 104, 15 km SE Nairobi, 29.IV.-15.V.1991, A. Freidberg & F. Kaplan (TAU). The holotype is double-mounted on a minutien pin on a polyporus block and is in good condition with the right postocular seta and the right dorsocentral seta broken off and scutum slightly sunken medially.

*Etymology.* The name refers to the patterned wing, which is unique among known species of the genus.

*Diagnosis.* Within *Tanaica* this species is easily recognizable by the presence of a reticulate, weak wing pattern (Fig. 15). Cell r1 with 3 hyaline spots. The other two species of the genus have an entirely hyaline wing. The abdomen is microtrichose as in *T. pollinosa*.

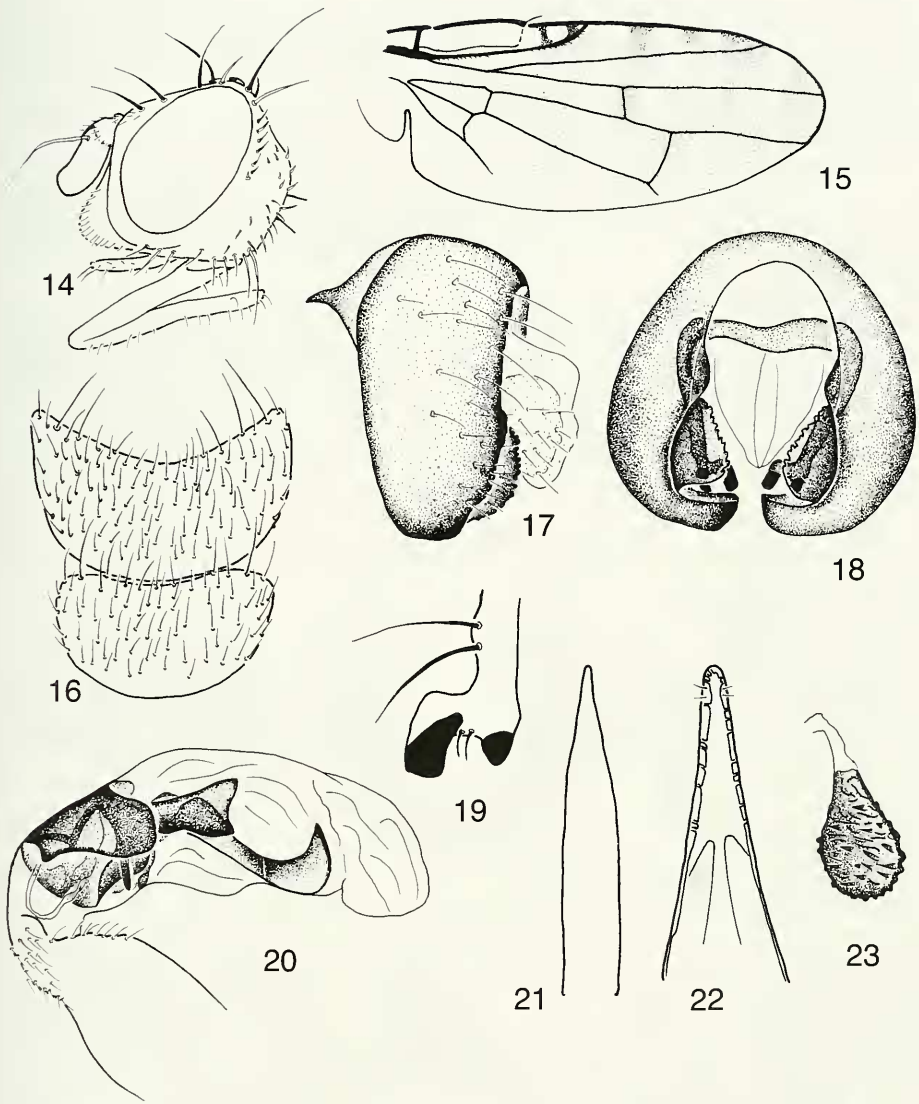
*Description.* WING LENGTH. Male: 2.1-3.4 mm; female: 2.0-3.5 mm.

HEAD (Fig. 14). Ground colour mat yellow; face, gena and parafacial whitish yellow; frons and antennae orange-yellow. In profile slightly wider than high, with swollen occiput; gena about 1/8 as high as eye, the latter about 1.3 times as high as wide; vibrissal corner strongly projecting beyond anterior base of antennae; frons bare, sides slightly converging towards lunule; interfrontal stripe indistinct, only visible as whitish line under certain angle; paraverticlar seta white, short, not longer than setulae on ventral half of occiput.

THORAX. Mesonotum black, densely ash-grey to silvery grey microtrichose, with traces of 3 brown longitudinal stripes over lines of dorsocentral setae and in middle; postpronotum and tip of scutellum yellowish; scutum covered with very dense, white setulae; setulae on pleura less numerous; prosternum white setulose. Chaetotaxy as described for the genus.

LEGS. As described for the genus.

WING (Fig. 15). With a weak reticulate pattern; cell c often with a pale brown mark in middle; pterostigma brown with a hyaline spot in middle or uniformly yellow; r1 with 3 hyaline spots; preapically on level of tip of R2+3 with 4 large spots in one line; apex of wing with small hyaline spot; remaining pattern faint, especially in anal lobe.



FIGS 14-23

*Tanaica maculata* sp. n. (16-20, male; 21-23, female, paratypes from Abha): 14, head, lateral view; 15, wing; 16, abdominal sternites 4 and 5; 17, epandrium, lateral view; 18, same, caudal view; 19, medial surstylus with prenisetae enlarged; 20, aculeus; 22, tip of aculeus; 23, spermatheca (only one illustrated).

ABDOMEN MALE. Preabdomen as in *T. pollinosa*. Terminalia (Figs 16-20). Epandrium (Fig. 18) ovoid, black, but epandrial process brown; the latter with serrate border, visible in lateral view (Fig. 17); medial surstylus with two unequal prenisetae present on prominent plate, the lateral preniseta much larger than the medial (Fig. 19); preglans area with 2 rows of short setulae; glans (Fig. 20) with well sclerotized basal

acrophallus and with 2 sclerites in vesica, of which one is long, apically pointed and medially curved and the other sclerite is short, widening apically with concave distal margin.

**ABDOMEN FEMALE.** In all characters, including terminalia (Figs 21-23) as in *T. pollinosa* (see below).

*Distribution.* Ethiopia, Kenya, Saudi Arabia.

*Host plants.* Unknown. The specimens from Kenya were swept from various herbs in grassland areas, whereas the specimens from Saudi Arabia were collected in a Malaise trap.

*Pest status.* Not a pest species.

*Remarks.* This species is easy to recognize within *Tanaica* by the reticulate wing pattern. The species is somewhat variable in wing pattern. Specimens from Ethiopia and Kenya tend to have a weaker pattern, with notably cell c entirely hyaline (without central darker spot) and with pterostigma uniformly yellow (in Saudi Arabian specimens usually brown with central hyaline spot). However, male and female terminalia are the same for populations from Kenya and Saudi Arabia, and few specimens from Kenya have the same wing pattern as those from Saudi Arabia. At the present moment it is not possible to decide whether these populations represent different species. Further studies, in particular the knowledge of host plants, would give further evidence about their status.

*T. maculata* has the same type of wing pattern as do some *Dioxyna* Frey. However, all *Dioxyna* lack the two rows of setulae on the preglans area (present in *Tanaica*). Moreover, they lack, except for *D. bidentis*, the apical scutellar setae. The latter species differs from *T. maculata* by the almost entirely yellow legs (femora blackish in *T. maculata*).

***Tanaica pollinosa* sp. n.**

Figs 24-33

*Material.* Holotype ♂: SAUDI ARABIA: Abha, Madenat Ameer Sultan, 22.II.-25.V.2002, H. A. Dawah (MHNG). Paratypes: SAUDI ARABIA: 1♂, 2♀, same data as holotype (CHD, MHNG). SOUTH AFRICA: 3♂♂, 2♀♀, N Transvaal, Sautpansberg, 1500 m. 15km NW Louis Trichardt, 25.XII.1994, A. Freidberg. The 2♀♀ with additional label: ex ? seeds *Tripteris auriculata*, 1.I.1995 (TAU, MHNG). The holotype is double-mounted on a minuten pin on a polyporus block and is in good condition with few setae on head and thorax broken off.

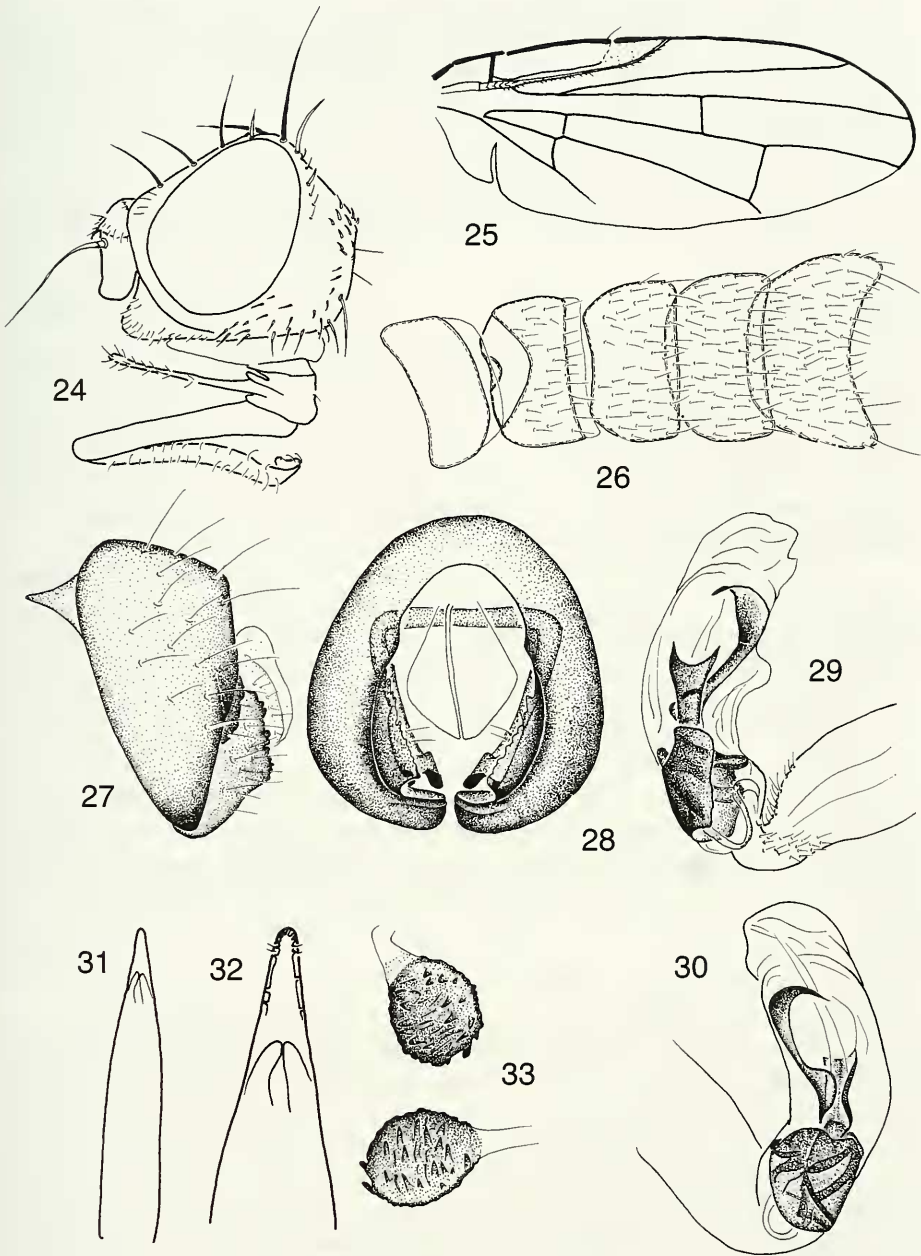
*Etymology.* The name refers to the grey microtrichose abdomen.

*Diagnosis.* This species differs from the other species from Saudi Arabia by its entirely hyaline wing without traces of a pattern (Fig. 25). The abdomen is densely grey microtrichose; tergites 2-5 each with a pair of indistinct brown spots.

*Description.* WING LENGTH (both sexes). 2.4-2.6 mm.

**HEAD** (Fig. 24). Ground colour mat yellow, but occiput and ocellar triangle black; face and gena whitish yellow; frons and antenna orange-yellow. Head in profile wider than high, with prominent occiput; gena narrow, less than one sixth as high as compound eye; the latter ovoid, about 1.25 times as high as wide; vibrissal corner projecting beyond level of antennal base; frons bare; interfrontal stripe indistinct, narrow, almost white; paravertical seta white, shorter than posterior orbital seta.





FIGS 24-33

*Tanaica pollinosa* sp. n. (24-30, male; 31-33, female, paratypes from Abha): 24, head, lateral view; 25, wing; 26, abdominal sternites; 27, epandrium, lateral view; 28, same, caudal view; 29, glans, lateral view; 30, glans, frontal view; 31, aculeus; 32, tip of aculeus; 33, spermathecae.

**THORAX.** Mesonotum black, densely silvery grey microtrichose; postpronotal lobe and posterior half of scutellum yellow; scutum densely covered with white, lanceolate setulae; pleura slightly darker grey, setulae on anepisternum, katepisternum and anepimeron less numerous and more acuminate; prosternum grey, white setulose. Chaetotaxy as described for the genus.

**LEGS.** As described for the genus.

**WING** (Fig. 25). Entirely hyaline, only stigma faintly yellowish.

**ABDOMEN MALE.** Tergites darker grey than mesonotum, but still distinctly golden-grey microtrichose; each tergite with a pair of almost parallel-sided spots which are forming a more or less uniform band from base to tip of abdomen; setulae short, dense, lanceolate; sternites (Fig. 26) darker grey, sparsely setulose; sternite 5 shallowly concave with smooth apicolateral corners; epandrium (Figs 27-28) black, but epandrial process brown; the latter prominent and distinctly projecting, with serrate border; inner terminalia as usual in tribe; aedeagus (Figs. 29-30) with 2 rows of setulae on preglans area; glans with strong basal sclerotization and 2 curved, unevenly long plates forming an open tube; the longer apically pointed and strongly curved medially; the shorter plate distinctly widening distally, forming an open rim; vesica as broad as acrophallus, distally truncate, rather small.

**ABDOMEN FEMALE** (Figs 31-33). Coloration and chaetotaxy of pregenital segments as male; oviscape black, fine setulose, without white setae, as long as preceding 3 tergites combined; aculeus apically evenly pointed, without step; 2 almost spherical spermathecae, covered with short papillae; aculeus length: 0.77 mm ( $n = 1$ ).

*Distribution.* Saudi Arabia, South Africa.

*Host plant.* *Tripteris auriculata* (Asteraceae).

*Pest status.* Not a pest species.

*Remarks.* This species differs from *T. hyalipennis* (Bezzi), the other species with entirely hyaline wings, only in the colouration of the abdomen. It is shining black in the latter, but grey microtrichose in *T. pollinosa*. All other external characters and the terminalia of both sexes are the same in both species.

### *Spathulina* genus group

#### *Spathulina acroleuca* (Schiner, 1868)

*Material. 2:* 2 ♀♀.

*Distribution.* Widespread in the Afrotropical, Southern Palaearctic, Oriental and Australasian Regions. Recorded from Yemen by Merz *et al.* (in press). New for Saudi Arabia.

*Host plants.* Various Asteraceae, such as *Bidens*, *Ceruana*, *Matricaria* and *Spilanthes* (Munro, 1938).

*Pest status.* The species was recorded as minor pest on Mexican sunflower (*Tithonia diversifolia*) in the Philippines (White & Elson-Harris, 1992).

### *Sphenella* genus group

#### *Sphenella marginata* (Fallén, 1814)

*Material. 2:* 1 ♂, 1 ♀.

*Distribution.* Palaearctic and Afrotropical Regions. New for Saudi Arabia.

*Host plants.* *Senecio* spp. (Asteraceae) (Freidberg & Kugler, 1989; Merz, 1994).

*Pest status.* May be important in the natural regulation of those *Senecio* spp. which are weeds in some parts of the world (White & Elson-Harris, 1992).

*Remarks.* After the study of large series from the Palaearctic and Afrotropical Regions we conclude that the differences given to separate *S. marginata* s.str. (Palaearctic subspecies) from *S. marginata austrina* Munro, 1957 (Afrotropical subspecies) (Munro, 1957b) are unreliable with many intermediate specimens known. The two taxa are considered here to belong to the same species and they are herewith synonymized (**syn. n.**).

*Sphenella setosa* sp. n.

Figs 34-41

*Material.* Holotype ♂: «SAUDI ARABIA: Aseer, Abha, Farm Centre, 14.IV.2001, H. A. Dawah»; «Tephritis sp. ♂, lower angle anal cell more prominent than any sp. photo in Die Fliegen» [J. C. Deeming's handwriting] (MHNG). Paratype: 1♂, SAUDI ARABIA: Aseer, Abha, Farm Centre, 14.IV.2001, H. A. Dawah (MHNG). The holotype is glued laterally on a card point, and is in good condition with left arista and few setae missing (left ocellar seta, few postocular setulae, left postpronotal seta, both left notopleural setae, left presutural supra-alar seta; left postsutural supra-alar seta; both right scutellar setae).

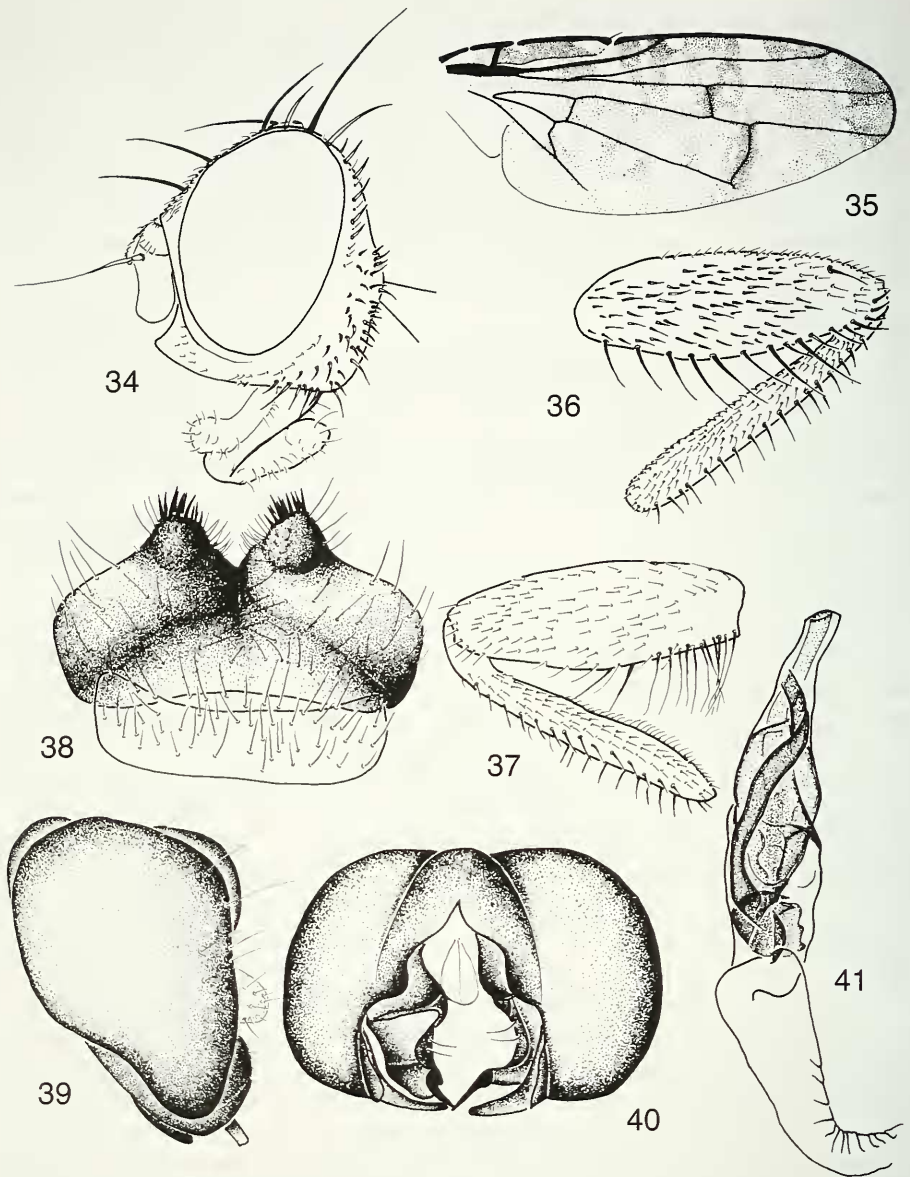
*Eymology.* The name refers to the strongly setulose legs.

*Diagnosis.* This species differs from all described *Sphenella* by the strongly setulose hindfemur and hindtibia (Figs 36-37), the wing (Fig. 35) with the ill-defined pattern of paler and darker areas on the entire surface, the strongly modified sternite 5 with 2 medial tubercles (Fig. 38), and the very large, black, globose epandrium (Fig. 40). The wing pattern resembles superficially species of *Paratephritis* Shiraki, *Telaletes* Munro and *Orotava* Frey, but the combination of bare R4+5, flat scutellum, presence of anteroventral setae on hindfemur and presence of only one long, pointed preniseta on the medial surstylus are typical for *Sphenella*. Other diagnostic characters of this species are the mixed white and black postocular setulae, the yellow legs with only hindfemur black in basal half, the yellow postpedicel, and the sclerotization of the glans.

*Description* (male only). WING LENGTH. 3.50-3.75 mm.

**HEAD** (Fig. 34). Mat yellow, but ocellar triangle and occiput grey microtrichose. In profile 1.25 times as high as long, gena 0.15 times as high as compound eye; fronto-facial angle about 110°; frons white setulose anteriorly; frontal plate rather densely white setulose; face distinctly concave, without carina; vibrissal corner white setulose; gena dorsally black and ventrally white setulose. Antenna yellow, scape with white setulae, pedicel with black setulae; postpedicel apicodorsally slightly pointed; arista virtually bare. Mouthparts short geniculate, labella fleshy, not extending beyond vibrissal corner. Chaetotaxy: 2 black frontal setae; 1 black anterior and 1 white, shorter posterior orbital seta; 1 black ocellar seta; 1 black medial vertical seta; 1 white lateral vertical seta; 1 white postocellar seta; 1 white paraverticilar seta; postocular setulae mixed white and black.

**THORAX.** Scutum densely golden grey microtrichose, in dorsal and posterior view with 3 faint brown longitudinal stripes on lines of dorsocentral setae and in



FIGS 34-41

*Sphenella setosa* sp. n. (male paratype): 34, head, lateral view; 35, wing; 36, hind leg, anterior view; 37, hind leg, posterior view; 38, abdominal sternites 4 and 5; 39, epiandrium, lateral view; 40, same, caudal view; 41, glans.

middle; entire surface covered densely with white setulae; scutellum flat, mat yellow, white setulose laterally; pleura slightly more ash-grey than scutum; anepisternum and anepimeron white setulose; prosternum densely white setulose. The following setae are black: 1 postpronotal seta; 2 notopleural setae (posterior notopleural seta about half as

long as anterior notopleural seta); 1 dorsocentral seta, which is inserted well posterior of suture, about at level of anterior wing base; 1 presutural supra-alar seta; 1 post-sutural supra-alar seta; 1 intra-alar seta; 1 postalar seta; 2 (pairs of) scutellar setae which are of same length; 1 katepisternal seta. Anepisternal seta and anepimeral seta white.

**LEGS** (Figs 36-37). Ground colour yellow, forecoxa whitish yellow, other parts brownish yellow; midfemur posteriorly at base with black stripe; hindfemur in anterior half black. All femora rather stout, conspicuously setulose; hindfemur with a row of long, black setae anteroventrally (Fig. 36), one strong, black anterodorsal seta, and with numerous soft, whitish, very long setulae (about as long as diameter of femur) posteroventrally in basal third (Fig. 37). Hindtibia anterodorsally and posterodorsally each with a row of conspicuous, outstanding, black setulae.

**WING** (Fig. 35). R4+5 bare on both sides; R1 setulose dorsally, with gap on level of subcostal break; ventrally with few setulae in distal half of pterostigma. Pattern brown to yellow brown, indistinctly striped, with darker areas along C, at wing tip, and around crossveins; other parts with a pattern of ill-defined subhyaline spots on pale brown surface.

**ABDOMEN**. Mat ash-grey microtrichose with yellow hind margins of tergites 2-5; tergite 5 about twice as long as tergite 4; all tergites white setulose, only tergite 5 posteriorly with a row of black setulae.

**MALE TERMINALIA**. Sternite 5 (Fig. 38) greatly modified, much larger than preceding sternites; apically with two medial bulbous projections, which are separated by a cleft and which bear apically about 12 stout, black setulae; other setulae rather soft, pale. Epandrium (Figs 39-40) very large, globose, black; epandrial process small, only little projecting; lateral surstylus separated from epandrium by a fold, strongly bent medially and pointed apically; medial surstylus with one very long, spine-like black preniseta, which is directed posteriorly; hypandrium as in other species of the genus; glans (Fig. 41) rather narrow, tapered apically and truncated, with a strongly sclerotized ductus.

*Distribution*. Saudi Arabia.

*Host plants*. Unknown.

*Pest status*. Not a pest species.

*Remarks*. This species keys out readily in Munro (1957b) in couplet 4 as *Sphenella* with the setulose hindfemur anteroventrally, the bare vein R4+5, and the flat scutellum. In addition, only one long, pointed preniseta is developed. Sternite 5 carries apicomediaally two tubercles as in other species of *Sphenella* but they are much more developed and they are covered with more conspicuous black setae posteriorly. Wing pattern, however, is very different, as other species of *Sphenella* have large hyaline areas, and the black areas are usually clearly delimited. In this respect *S. setosa* resembles some species of *Paratephritis* Shiraki, *Telaletes* Munro, and *Orotava* Frey, which have the same indistinct reticulation with the ill-defined hyaline spots and the brown stripe over DM-Cu. Within *Sphenella* the new species exhibits, in addition to the wing pattern and the structure of sternite 5, a number of unique characters: hindfemur with row of black setulae anteroventrally on entire length (in other species of *Sphenella* only near apex with few setulae) with white setulae in basal third postero-

ventrally (not present in other *Sphenella*); epandrium shining black and globose (much more elongated and less conspicuous in other *Sphenella*).

***Telaletes ochraceus* (Loew, 1861)**

*Material.* 1: 2♂♂; 2: 1♂, 1♀.

*Distribution.* East Africa. New to Saudi Arabia.

*Host plants.* Unknown.

*Pest status.* Not a pest species.

***Tephritis* genus group**

***Arabodesis* gen. n.**

Gen. nr. *Trupanodesis* Merz - Merz *et al.* (in press).

*Type species.* *Arabodesis reductisetata* sp. n.

*Etymology.* The name refers to the distribution in Arabia and its resemblance to *Trupanodesis* Merz and *Tephrodesis* Merz. Gender is feminine.

*Diagnosis.* The new genus belongs to the *Tephritis* group as defined by Merz (1999). The absence of medial postocellar setae (Fig. 43), the presence of only white postocular setae (Fig. 42), two (pairs of) subequal scutellar setae (Fig. 45) and the rather simple structure of the glans with short vesica (Fig. 50) place *Arabodesis* close to *Tephrodesis* and *Trupanodesis*. It differs from these genera by the black posterior notopleural seta, the dorsocentral seta situated well behind the transverse suture at level of postsutural supra-alar seta (Fig. 45), the convex lower calypter, the rather conspicuous posterodistal extension of cell *bcu* (Fig. 46), and the aculeus with an apical step (Fig. 53).

*Description.* HEAD (Figs. 42-44). In profile at least 1.5 times as high as long, gena and parafacial narrow; vibrissal corner projecting anteriorly; frons parallel-sided, narrow, longer than wide, with few tiny, fine, white setulae on interfrontal stripe; ocellar triangle with few white setulae between ocelli; scape white setulose and pedicel black setulose; postpedicel (Fig. 44) about twice as long as wide; arista almost bare; proboscis capitate; palpus not projecting beyond anterior margin of vibrissal corner. Chaetotaxy: 1-2 frontal seta, 1 orbital seta, 1 ocellar seta and 1 long medial vertical seta black, acuminate; postocellar seta, lateral vertical seta and row of postocular setae white, lanceolate; medial postocellar seta absent.

THORAX (Fig. 45). Shape as in other genera of the *Tephritis*-group; scutum covered with white setulae. Chaetotaxy: scapular setae absent; setae on thorax black, including posterior notopleural seta, only anepimeral seta white; 1 postpronotal seta; 2 notopleural setae, the posterior shorter; 1 presutural supra-alar seta; 1 postsutural supra-alar seta; 1 intra-alar seta; 1 postalar seta; 1 acrostichal seta; 1 dorsocentral seta well behind transverse suture, about at level of postsutural supra-alar seta; 2 (pairs of) subequal, strong scutellar setae; 1 anepisternal seta; 1 katepisternal seta; 1 anepimeral seta; prosternum white setulose.

LEGS. Hindfemur anteroventrally with 1-2 outstanding, longer setulae at tip; midtibia apicoventrally with one black seta.

WING (Fig. 46). Stigma about twice as long as wide; R-M crossvein situated in distal third of cell *dm*; distance between crossveins about 0.8 times as long as DM-Cu;

posterodistal extension of bcu distinct; veins bare, but R1 dorsally setulose except for gap on level of tip of Sc, ventrally with 0-2 setulae at tip of pterostigma. Both calypters with convex distal border, of subequal width.

**ABDOMEN MALE.** Densely white setulose, without longer setae; sternite 5 (Fig. 47) over 1.3 times as wide as sternite 4, distally smoothly concave; epandrium (Figs 48-49) ventrally very wide, bulging, fused with lateral surstyli, the latter unmodified; epandrial process present but not very prominent; medial surstylus with 2 subequal prenisetae and 2-3 setulae on plate; hypandrium and associated structures as usual for the *Tephritis* group, with unpaired hypandrial arms; distiphallus long, coiled, preglans area bare; glans (Fig. 50) with rather simple sclerotization; sclerotized ductus apically with few small spines; vesica short.

**ABDOMEN FEMALE.** Preabdomen as male; tergites 5 and 6 subequal; oviscape (Fig. 51) white setulose, at distal margin with numerous soft setulae; aculeus (Figs 52-53) with apical step; 2 spermathecae, covered with small papillae (Fig. 54).

*Remarks.* *Arabodesis* is a puzzling genus which exhibits an unusual combination of characters rendering its placement within the family difficult. Lack of scapular setae, the presence of only white postocular setae, and the gap of setulae on R1 opposite tip of Sc show that it belongs to the Tephritini. Based on the revisions of some genus groups within the tribe by Freidberg (1987, *Sphenella* group), Korneyev (1990, *Campiglossa* group) and Merz (1999, *Tephritis* group) it can be concluded that the new genus shares the synapomorphies of the *Tephritis* group as defined by Merz (1999): glans rather simple, weakly sclerotized and the presence of capitate mouthparts. Within the *Tephritis* group, *Arabodesis* exhibits a number of plesiomorphic character states, such as (1) the absence of medial postocellar setae (apomorphic state (= A): medial postocellar setae present), (2) the black posterior notopleural seta (A: white), (3) the position of the dorsocentral seta well behind the suture (A: almost on level of suture), (4) the rather large lower calypter with convex margin (A: small, stripe-like lower calypter with straight margin), and (5) the apical step of the aculeus (A: aculeus evenly pointed), although the polarity of the latter character is unresolved. A black posterior notopleural seta is known in the *Tephritis* group only from few *Tephritis* (*arnicae* (Linnaeus), *conura* (Loew)). The position of the dorsocentral seta is comparable only with *Euarestella* Hendel, which belongs to the *Goniurellia* clade (medial postocellar setae present; in addition, this genus has 2+1 frontal and 2 orbital setae). The large lower calypter is only known from *Tephritis* Latreille (but this genus has 2 frontal and 2 orbital setae; head shape is different, and the dorsocentral seta is almost on level of suture). The apical step on the aculeus is developed in the *Tephritis* group only in some *Tephritis* (*pulchra* group) but an apical step is widespread in many genera of Tephritini.

*Arabodesis* shares with *Tephrodesis* Merz a similar type of glans of aedeagus, which is evidence for a sister-group relationship and this character may be a good synapomorphy for these two genera. However, the position of *Tephrodesis* within the *Tephritis* group is not well understood, as its sister-group relationships are unknown (Merz, 1999). *Tephrodesis* differs from *Arabodesis* by the development of the apomorphic character states of characters (2) to (5) mentioned above, but also by the patterned wing, the 2+1 frontal and 2 orbital setae, and a black oviscape. Further, it

lacks the small spinules on the inner side of the ductus of the glans which are characteristic for *Arabodesis*.

Autapomorphies of *Arabodesis* are probably the presence of (a) only 1 orbital seta (in Tephritini very rare, only known from *Actinoptera* Rondani, but this genus differs in addition to the apomorphic character states (2) – (5) listed above by the very small pterostigma and a patterned wing), (b) the very high head (otherwise only in *Hyalotephritis* Freidberg, but this genus has the apomorphic character states (1) – (5), and different male terminalia) and (c) the large posterodistal extension of cell *bcu* (less conspicuous in other species of the *Tephritis* group).

In the key of Merz (1999) the new genus runs to couplet 11 which needs to be modified as follows:

- 11 One black orbital seta present; posterior notopleural seta black; dorso-central seta almost at level of postsutural supra-alar seta; wing entirely hyaline . . . . . *Arabodesis* gen. n.  
 11\* Two orbital setae present; posterior notopleural seta white; dorsocentral seta closer to suture than to postsutural supra-alar seta; wing usually with pattern, though sometimes weak . . . . . 11a  
 11a Two concolourous frontal setae present . . . . . 12  
 11a\* Three frontal setae, the anteriormost seta sometimes white . . . . . 13

This genus was first mentioned, but not formally described from Yemen based on three badly preserved specimens belonging to two species differing chiefly in the chaetotaxy of the head (Merz *et al.*, in press).

*Arabodesis reductiseta* sp. n.

Figs 42-54

Gen. nr. *Trupanodesis*, sp. 1 - Merz *et al.* (in press).

*Material.* Holotype ♀: SAUDI ARABIA: Abha, Madenate Ameer Sultan, 22.II.-25.V.2002, H. A. Dawah (MHNG). Paratypes: SAUDI ARABIA: 5 ♂♂, 15 ♀♀, same data as holotype (CHD, MHNG, NMWC, TAU). YEMEN: 1 ♂, 1 ♀, San'a, light trap, 3.IV.1999, leg. A. von Harten (MHNG, ZMUA); 1 ♀, San'a, ca. 7900 ft., 10.-15.X.1937, D. Carl Rathjens, B.M. 1939-396, from Lucerne (NHML). The holotype is glued laterally on a cardpoint, and is in good condition but both wings folded over each other.

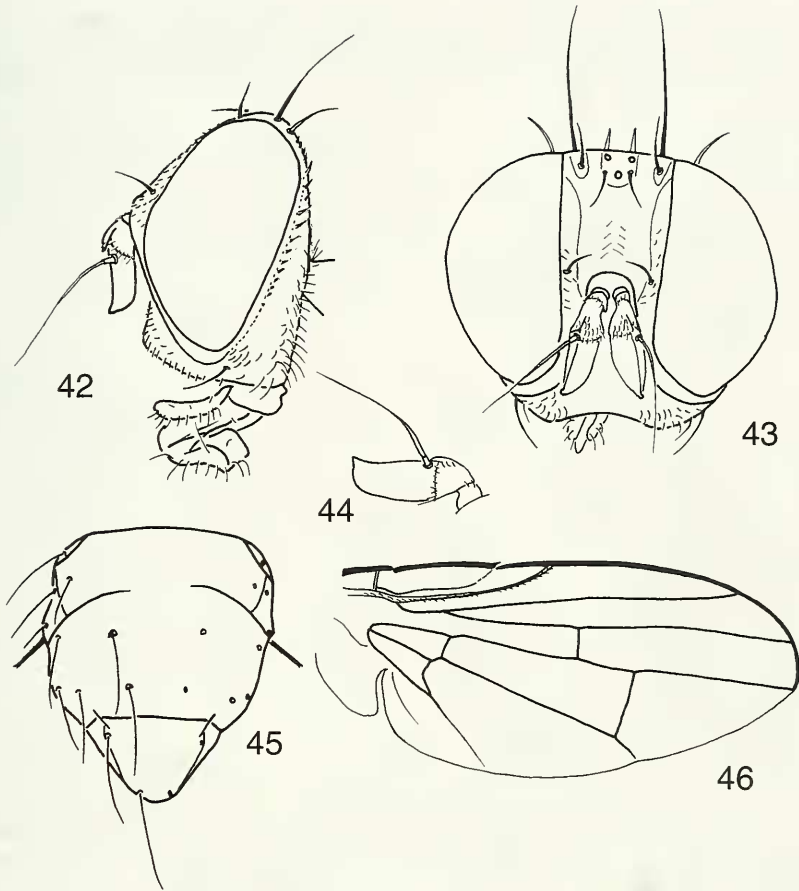
*Etymology.* The species is named for the small number of setae on the head.

*Diagnosis.* Easy to recognize by the presence of only 1 frontal and 1 orbital seta, both short, fine and black (Fig. 42); ocellar seta short; postpedicel with distinct dorso-apical point (Fig. 44); wing entirely hyaline (Fig. 45); male: epandrium medially strongly convex (Fig. 49), epandrial process in lateral view hardly visible (Fig. 48); glans with few small papillae near tip of ductus (Fig. 50); female: aculeus with apical step (Fig. 53).

*Description.* WING LENGTH. Male: 2.05-2.30 mm; female: 2.20-2.60 mm.

HEAD (Figs 42-43). Mat yellow, but ocellar triangle and occiput dorsal to occipital foramen ash grey microtrichose; head in profile 1.5-1.6 times as high as long; compound eye about 1.75 times as high as wide; gena about 1/6 as high as compound eye; only one weak frontal seta almost at level of antennal bases; 1 weak, reclinate





FIGS 42-46

*Arabodesis reductiseta* sp. n. (paratype from Abha): 42, head, lateral view; 43, head, frontal view; 44, antenna; 45, thorax, dorsal view; 46, wing.

orbital seta very high on head near vertex; all other setae also weak except for long medial vertical seta; postocular setae all white, short, in one row; pedicel without strong dorsal seta; postpedicel about twice as long as wide, with conspicuous dorso-apical point (Fig. 44).

**THORAX** (Fig. 45). Scutum, pleura and subscutellum mostly ash grey microtrichose; only postpronotal lobe, dorsal part of anepisternum, posterior half of notopleuron, most of prosternum and entire scutellum mat yellow; scutum covered with short, weak, white setulae; scutellum bare, but white setulose along margin; chaetotaxy as described for genus; halter yellow; both calypters yellow.

**LEGS.** Yellow, but hindfemur ventrally in middle with grey patch.

**WING** (Fig. 46). Entirely hyaline, only pterostigma slightly yellowish.

**ABDOMEN MALE** (Figs. 47-50). Mat ash grey microtrichose; posterior margin of tergites with yellow transversal stripes, broader on syntergite 1+2 than on posterior

tergites; sternites yellow, each with a pair of grey spots (Fig. 47); sclerotization of glans compact (Fig. 50); acrophallus with two internal ducts, which are crossing in distal half; near tip with few small papillae on inner side; vesica small, apically broadly rounded.

**ABDOMEN FEMALE** (Figs 51-54). Oviscape about as long as preceding 1-1.5 tergites combined, about 0.5 mm long; orange on surface, black at both sides and along a medial longitudinal stripe; aculeus with slightly concave margin in basal half and abruptly narrowing in apical third, tip with apical step; length about 0.45 mm.

*Distribution.* Saudi Arabia, Yemen.

*Host plants.* Unknown. All specimens were collected in Malaise traps.

*Pest status.* Not a pest species.

*Remarks.* At first glance *A. reductiseta* resembles species of *Hyalotephritis*, which is the only genus of the *Tephritis* group with species having entirely hyaline wings and a similar head shape. Chaetotaxy (especially absence of medial postocellar setae), position of the dorsocentral seta, colour of posterior notopleural seta, and presence of 1-2 anteroventral setulae on hindfemur near tip indicate immediately that the new species does not belong to the *Goniurellia* clade in the *Tephritis*-group (see also above). A second species of *Arabodesis* is known from Yemen (Merz *et al.*, in press). It differs from *A. reductiseta* by the stronger setae on the head, the presence of 2 frontal setae, and the postpedicel being dorso-apically rounded. As only one female is available, which is slightly shrivelled, this species is not formally described here.

***Capitites augur*** (Frauenfeld, 1857)

*Material. 2:* 2♂♂.

*Distribution.* Egypt, Israel. Sudan. Recorded from Saudi Arabia by Al-Ahmadi & Salem (1999, as *Trupanea augur*) and by Norrbom *et al.* (1999b, as *Paradesis augur*). It should be noted that this species was misidentified in the past, and its status was resolved by Freidberg & Kugler (1977). Therefore, it may be possible that old records refer to other species (*Goniurellia* spp.).

*Host plant.* *Pulicaria crispata* (Asteraceae) (Freidberg & Kugler, 1989, as *Dectodesis augur*).

*Pest status.* Not a pest species.

***Dectodesis auguralis*** (Bezzi, 1908)

*Material. 2:* 2♂♂, 1♀.

*Distribution.* Eastern Afrotropical Region from Eritrea to Zimbabwe, Yemen (Merz *et al.*, in press). New for Saudi Arabia.

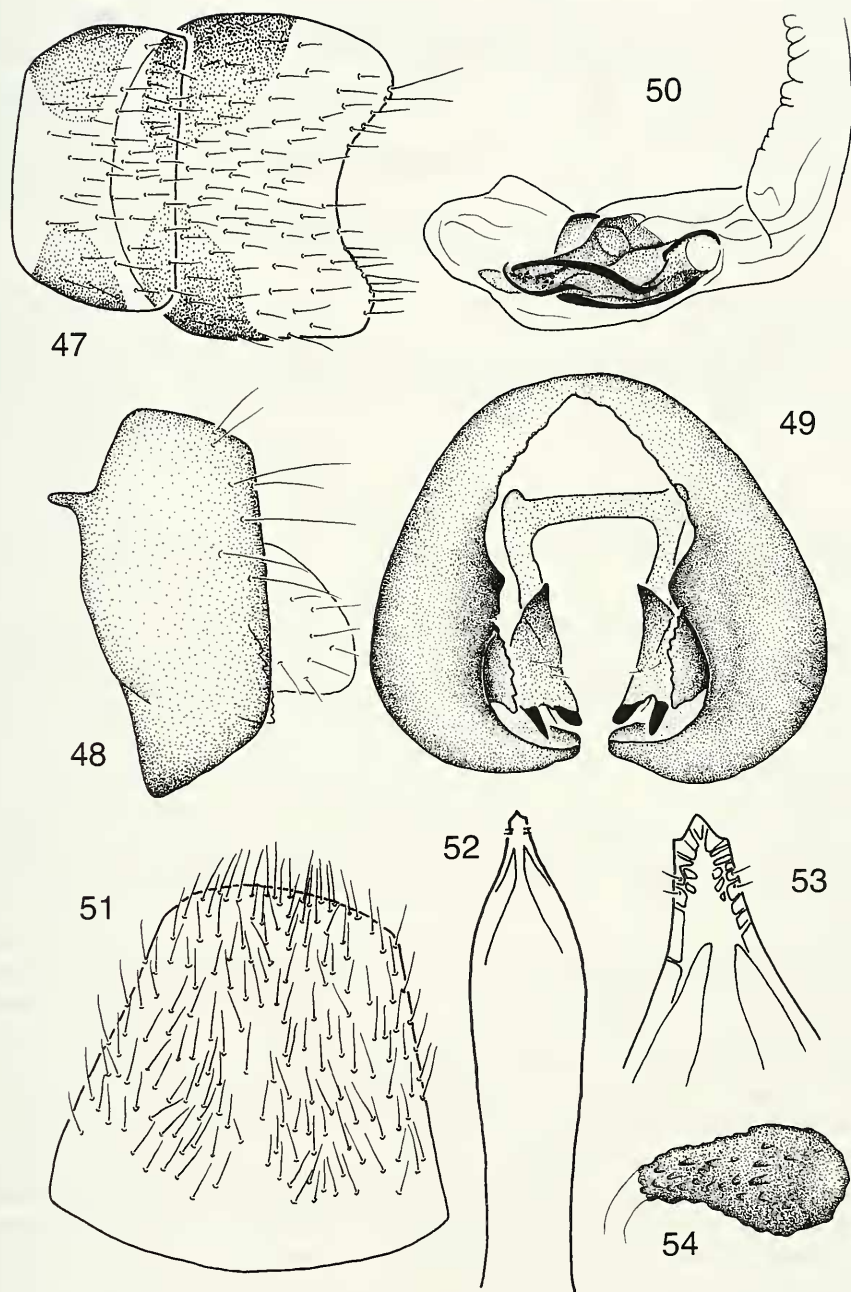
*Host plants.* Unknown, but other species of the genus live in flowerheads of *Erigeron*, *Helichrysum* and *Gnaphalium* (Asteraceae).

*Pest status.* Not a pest species.

***Dectodesis* sp. 1**

*Material. 2:* 1♂.

*Remarks.* This male lacks the head and is also otherwise in bad condition. It is very similar to the previous species, but the apical scutellar setae are absent. Judging from wing pattern and colour of mesonotum this species may belong to *D. confluens*



FIGS 47-54

*Arabodesis reductiseta* sp. n. (47-50, male; 51-54, female, paratypes from Abha): 47, abdominal sternites 4 and 5; 48, eandrium, lateral view; 49, same, caudal view; 50, glans; 51, oviscape; 52, aculeus; 53, tip of aculeus; 54, spermatheca (only one illustrated).

(Wiedemann, 1830), a very widespread and abundant species in Eastern and Southern Africa. Because of the poor condition of the specimen we are not naming it here.

***Freidbergia mirabilis* Merz, 1999**

*Material.* 2: 1 ♂.

*Distribution.* Described from Kenya and Ethiopia (Merz, 1999). New for Saudi Arabia.

*Host plants.* *Pluchea* spp. (Asteraceae) (Merz, 1999).

*Pest status.* Not a pest species.

***Goniurellia persignata* Freidberg, 1980**

*Material.* 1: 1 ♂; 2: 1 ♂, 2 ♀.

*Distribution.* From Sri Lanka and China in the East through Middle Asia and the Southern Mediterranean Region to Morocco. Also known from Ethiopia. New for Saudi Arabia.

*Host plant.* *Pulicaria arabica* (Asteraceae) (Freidberg, 1980).

*Pest status.* Not a pest species.

***Goniurellia spinifera* Freidberg, 1980**

*Material.* 2: 1 ♂, 1 ♀.

*Distribution.* Near East and North Eastern Afrotropical Region. Recorded from Saudi Arabia by Freidberg (1980).

*Host plant.* *Pulicaria desertorum* (Asteraceae) (Freidberg, 1980).

*Pest status.* Not a pest species.

***Hyalotephritis* Freidberg, 1979**

This genus was proposed by Freidberg (1979) for two species which are morphologically very similar: *H. complanata* (Munro) and *H. planiscutellata* (Becker). He provided a key and illustrated the main differences between the two species (head shape, structure of glans, aculeus tip). Larvae of both species live in flowerheads of *Conyza dioscoridis* (Asteraceae). The comparison of the 35 specimens from Saudi Arabia with numerous specimens of *H. planiscutellata* from Israel, Kenya and Oman, and two pairs of *H. complanata* from South Africa showed that both species are present in Saudi Arabia. It was observed that the structure of the glans is the only reliable character separating the two species, whereas head and aculeus shape are more variable. The glans of the Saudi Arabian specimens of *H. planiscutellata* fits the illustration of Freidberg (1979), but a notable difference could be found in the sclerotization of the glans in all specimens of *H. complanata* (Fig. 55), including one male from South Africa, compared with the illustration of Freidberg (1979, Fig. 13): The distal part of the sclerotized tube is longer and stronger, undulating, ending in a small apical sclerite which is darker than the previous part.

***Hyalotephritis complanata* (Munro, 1929)**

*Material.* 2: 2 ♂♂, 3 ♀♀; 3: 7 ♂♂, 6 ♀♀.

*Distribution.* South and East Africa. New for Saudi Arabia.

*Host plant.* *Pluchea dioscoridis* (Asteraceae) (Freidberg, 1979).

Fig. 55

*Pest status.* Not a pest species.

*Remarks.* For the structure of the glans of the aedeagus see above (Fig. 55).

***Hyalotephritis planiscutellata*** (Becker, 1903)

*Material.* 3: 11♂♂, 6♀♀.

*Distribution.* Near East south to Ethiopia, Yemen (Merz *et al.*, in press). New for Saudi Arabia.

*Host plant.* *Pluchea dioscoridis* (Asteraceae) (Freidberg & Kugler, 1989).

*Pest status.* Not a pest species.

***Tephritomyia despoliata*** (Hering, 1956)

Figs 56-58

*Acanthiophilus* (*Tephritomyia*) *despoliatus* Hering, 1956: 88. Holotype ♂: «IRAN (Chorassan), Birdjant, 23.VII.-2.VIII.1954, Richter & Schäuffele», «*Acanthiophilus despoliatus* m. Type, det. M. Hering 1955» (SMNS). Paratype ♂, same data as holotype (SMNS) (examined).

*Material.* 2: 7♂♂, 10♀♀.

*Distribution.* So far only known from Iran. New for Saudi Arabia.

*Host plants.* Unknown. All other species of the genus with known host plants live in flowerheads of *Echinops* spp. (Cardueae, Asteraceae) without causing galls.

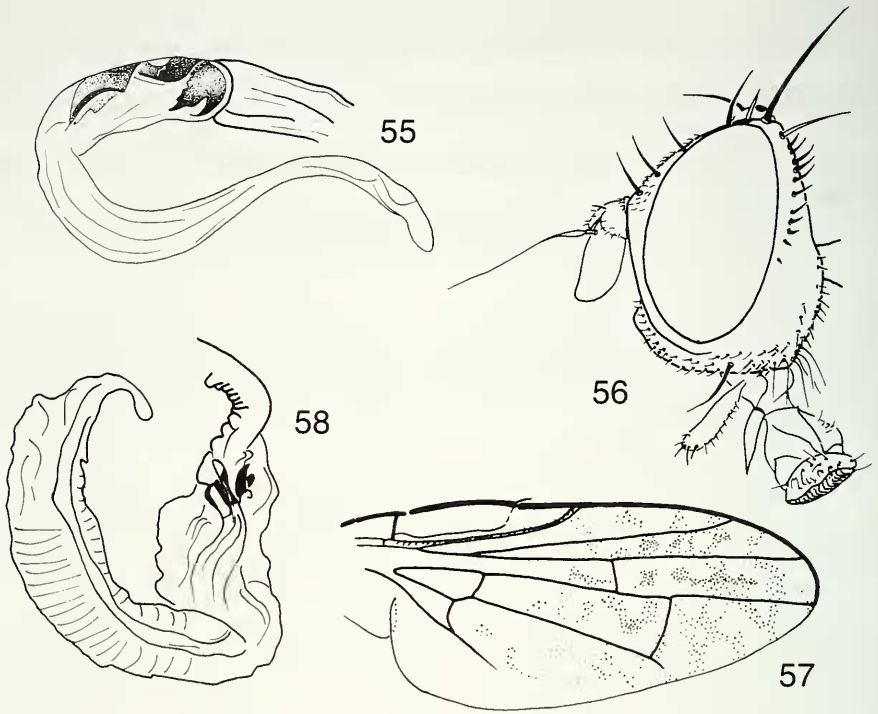
*Pest status.* Not a pest species.

*Remarks.* *Tephritomyia* is a difficult Palaearctic and Afrotropical genus of morphologically similar species and is in need of revision. Based on the original description the specimens from Saudi Arabia resemble *Acanthiophilus despoliatus* Hering, which was described from 3 specimens from Iran (Hering, 1956). The comparison of the holotype and a paratype of the latter and the specimens from Saudi Arabia shows a general resemblance. The differences are:

1. Wing length: The two specimens from Iran have longer wings (4.60-4.81 mm, compared to 3.6-4.2 mm in Saudi Arabian specimens), but the specimens from Saudi Arabia were collected in alcohol and dry mounted, and have the wings usually slightly folded. The real length may be longer.

2. Leg colour: The types from Iran have entirely yellow legs, whereas the colour of the Saudi Arabian population is more variable, with specimens having entirely yellow legs to others with black marks or a black ring in basal third of one to all femora.

*T. despoliatus* is morphologically quite similar to the widely distributed Palaearctic species *Tephritomyia lauta* (Loew) (compare head shape, Fig. 56 with Fig. 133 in Freidberg & Kugler, 1989, and male terminalia, compare Fig. 58 with Fig. 24.12.C in Merz, 1999, for *T. lauta*). The two species differ by the much paler wing pattern without clearly delimited hyaline spots in *T. despoliatus* (Fig. 57). In *T. lauta*, the pattern is stronger with the hyaline spots more regular and entirely surrounded by the dark pattern (see Fig. 24.8.A in Merz, 1999). In general, *T. despoliatus* is much paler, with the scutellum either entirely yellow or only grey at base (usually entirely grey in *T. lauta*). The abdominal tergites have a more extensive yellow pattern (usually almost entirely grey in *T. lauta*), but intermediate specimens occur in both species. The length of the ov scape is more variable in *T. lauta* (as long as preceding 2.5-4 tergites combined, but at most as long as preceding 3 tergites combined in *T. despoliatus*).



FIGS 55-58

*Hyalotephritis complanata* (Munro, 1929, specimen from Abha) (55) and *Tephritomyia despoliata* (Hering, 1956, specimen from Abha) (56-58): 55, 58, male, glans; 56, head; 57, wing.

Hering (1956) considered the shape of the postpedicel as the best discriminating character between *T. despoliatus* and *T. lauta*. The study of numerous specimens of *T. lauta* from Israel, Cyprus and Crete shows, however, that there is no clearcut gap between the two species for this character. It seems that the shape of the postpedicel in the different specimens is the result of the drying process.

At the present state of knowledge we prefer to consider the two populations from Iran and Saudi Arabia as conspecific. Their status should be revised, however, as soon as more specimens become available, and/or biological data about the host plants are known.

***Trupanea amoena*** (Frauenfeld, 1857)

*Material*. 2: 38♂♂, 31♀♀.

*Distribution*. Southern Palaearctic Region, East Africa, Oriental Region, Australia. Recorded from Saudi Arabia by Al-Ahmadi & Salem (1999).

*Host plants*. This is one of the most polyphagous Tephritinae, attacking capitula of species of various Asteraceae (*Achillea*, *Carthamus*, *Ethulia*, *Lactuca*, *Launaea*, *Leontodon*, *Picris*, *Sonchus* and others) (Freidberg & Kugler, 1989; Merz, 1994; Munro, 1964).

*Pest status.* Recorded as minor pest on *Calendula officinalis* (Asteraceae) in India (White & Elson-Harris, 1992).

***Trupanea pseudoamoena* Freidberg, 1974**

*Material.* 2: 2 ♀ ♀.

*Distribution.* Near East. Recorded from Saudi Arabia by Freidberg & Kugler (1989).

*Host plant.* *Pulicaria crispa* (Asteraceae) (Freidberg & Kugler, 1989).

*Pest status.* Not a pest species.

***Trupanea repleta* Bezzi, 1918**

Figs 59-69

*Trypanea aucta* var. *repleta* Bezzi, 1918: 45. Holotype ♂: [ERITREA] «Ghinda, Mochi, VI.16» (handwritten, white paper), «repleta» (in Bezzi's handwriting, white paper), «Holotypus ♂, *Trupanea aucta* var. *repleta* Bezzi 1918, desig. B. Merz 2004» (handwritten, red label) (MCSNM) (examined).

*Material.* 2: 10 ♂ ♂, 20 ♀ ♀. Further specimens studied. CAPE VERDE ISLANDS: 3 ♂ ♂, S. Tiago, Lagoa, 15.II.1954, Lindberg; 4 ♂ ♂, 1 ♀, Sol, Terra Boa, 21.I.1954, Lindberg; 1 ♂, Maio, Pedro Vaz, 3.II.1954, Lindberg; 1 ♂, Maio, Morrinho, 3.II.1954, Lindberg; 1 ♂, S. Vicente, Rib. Julião, 9.-11.III.1954, Lindberg; 1 ♂, Nicolau, Rib. Brava, 6.-19.XII.1953, Lindberg (all FMNH). YEMEN: see Merz *et al.* (in press).

*Diagnosis.* Within *Trupanea* this is a typical species of the former *Urelliosoma*, with crescent hyaline apical wing pattern (Figs 60-63) and with a pale brown abdomen in both sexes. No sexual dimorphism in wing pattern; wing with narrow basal crossband with an obtuse angle on level of M; this band often broken around M; small hyaline spots in r2+3 and r4+5 sometimes present; head with slightly produced vibrissal corner (Fig. 59); glans with typical sclerotized hook (Fig. 67).

*Redescription.* WING LENGTH. Male: 2.5-3.05 mm; female: 2.5-2.85 mm.

HEAD (Fig. 59). Mat yellow, upper frons, ocellar triangle and occiput partly thin grey microtrichose; compound eye 1.3-1.5 times as high as long, gena 1/10 as high as eye; frons about as long as wide, anteriorly with few pale setulae; lunule rather high, conspicuous; face slightly concave; vibrissal corner projecting in profile slightly beyond base of antennae; antennae yellow, scape white setulose, pedicel with black setulae; postpedicel dorsally concave, dorso-apically slightly pointed; mouthparts yellow, capitate; palpus not projecting beyond vibrissal corner. Chaetotaxy: frontal setae, anterior orbital seta, ocellar seta and medial vertical seta pale brown, other setae yellow to white; 3 frontal setae, 2 orbital setae, 1 ocellar seta, 1 medial and 1 lateral vertical seta, 1 postocellar seta; row of postocular setae white; no medial postocellar seta.

THORAX. Scutum, scutellum and pleura ash-grey microtrichose; ground colour of notopleura, postpronotum and pleura partly yellow; scutum covered with short, white setulae; all setae pale brown, only posterior notopleural seta white; dorsocentral seta almost at level of suture; chaetotaxy as usual in the genus.

LEGS. Yellow; foretarsus without modifications or modified setulae in both sexes.

WING (Figs 60-63). R4+5 bare on both sides; posterodistal extension of cell bcu indistinct; pattern brown, but basal crossband often paler, almost yellow; no bulla;

basal crossband narrow, stripe-like, sometimes interrupted on one or both sides of obtuse angle on level of M; both crossveins bordered by brown ray; hyaline spot at tip of R2+3 present or absent; small hyaline spots in dark patch of r2+3 and r4+5 sometimes present (Fig. 61); hyaline spot in r4+5 just anterior to DM-Cu always present; at tip of R4+5 sometimes with small dark, isolated spot; brown ray in dm just distal to of R-M reaching CuA1 (Figs 62-63) or reduced (Fig. 61), rarely absent. No sexual dimorphism in wing pattern. Halter and calypter yellow.

**ABDOMEN MALE.** Mat orange-brown, in middle rarely grey microtrichose. Sternite 5 (Fig. 64) concave distally, with 1 lateroapical seta; epandrium yellow, ovoid (Figs 65-66); prenisetae subequal, claw-shaped; glans (Fig. 67) with sclerotized hook dorsally and small sclerotization basally; vesica small.

**ABDOMEN FEMALE.** Oviscape as long as last two tergites of preabdomen combined, black, at base with white setulae; aculeus as in Figs 68-69, apically rounded, without step.

*Distribution.* Cape Verde Islands, Eritrea, Yemen. New for Saudi Arabia.

*Host plants.* They are unknown for *T. repleta*. Taking into account the very limited host plant range of species of the group of species formerly placed in the genus *Urelliosoma* which is restricted to *Launaea* (Asteraceae, Cichorioideae) it is assumed that *T. repleta* attacks the same plant genus. According to Kilian (in litt., 17.V.2004) a possible host is *Launaea intybacea*, whose distribution matches the distribution of the fly. This plant forms a monophyletic species group with *Launaea nudicaulis*, which is the only known host plant of *T. pulcherrima*, probably the sister species of *T. repleta* (see below).

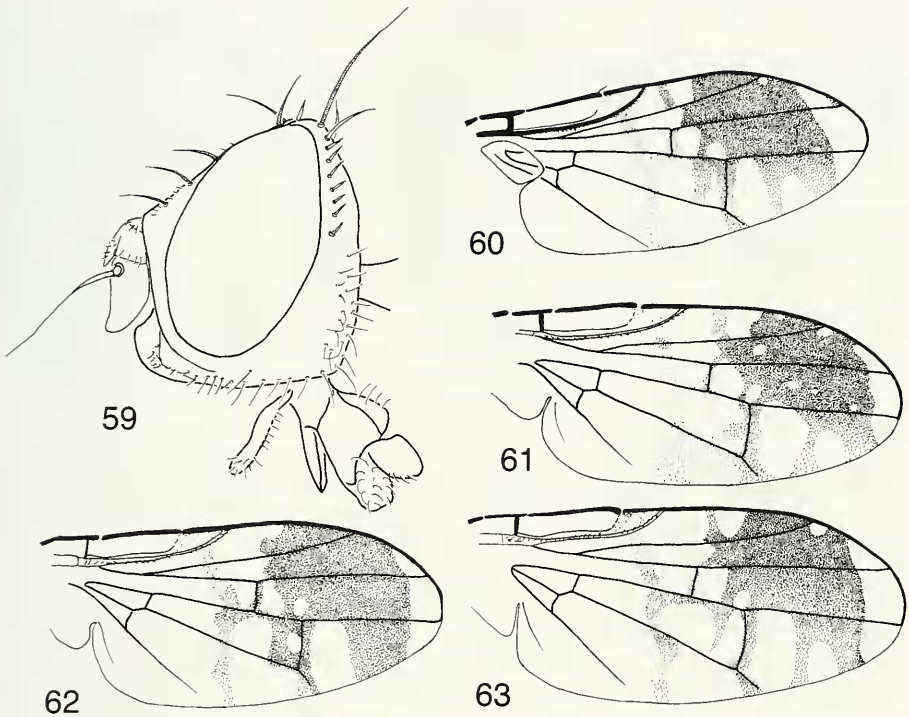
*Pest status.* Not a pest species.

*Remarks.* The specimens from Saudi Arabia are superficially very similar to specimens of *Trupanea pulcherrima* (Efllatoun, 1924) from Israel, but they key out as *T. repleta* in Munro (1964). The latter is a very poorly known species. The original description and illustration of Bezzi (1918) are insufficient and misleading because they are based on one male only and compared with an Indian species which belongs to another species group. Frey (1958) reports on the variability of the wing pattern in specimens from the Cape Verde Islands, and Munro (1964) who did not see the holotype, did not add further characters. Judging from the illustration of the wing in Bezzi (1918) it seems reasonable to assume that *T. repleta* belongs to the group of species formerly placed in *Urelliosoma* Hendel, 1927, a genus which was synonymized with *Trupanea* by Merz (1999) and which includes also *T. pulcherrima*. In order to clarify the status of the two taxa, the holotype of *T. aucta* var *repleta* Bezzi and the specimens mentioned by Frey (1958) were studied, as well as numerous specimens of *T. pulcherrima* (see below). It is concluded here that both taxa represent distinct species which differ in morphology, distribution, and probably also in their biology.

### *Trupanea pulcherrima* (Efllatoun, 1924)

*Tephritis pulcherrima* Efllatoun, 1924: 100. Syntypes: 7♂♂, 2♀♀, EGYPT: Wadi Hoff; 7th Tour, Suez Road; Ezbet-el-Naghl (Plant Protection Department, Ministry of Agriculture, Dokki, Cairo, Egypt; Entomological Society of Egypt, Cairo; for details see Norrbom *et al.*, 1999a) (not examined).





FIGS 59-63

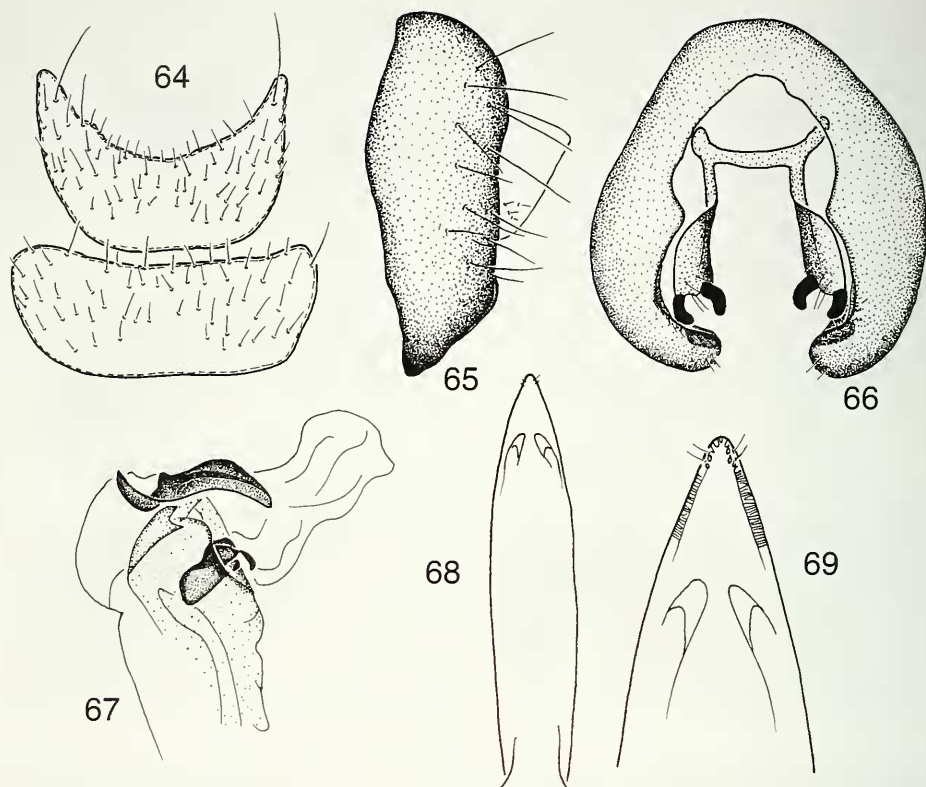
*Trupanea repleta* Bezzi, 1918: 59, head, lateral view; 60, wing male (holotype); 61 wing male (Abha); 62, wing female (Abha); 63, wing male (Abha).

**Material.** ISRAEL: 2♂♂, 1♀, Hameshar, 16.VI.1986, A. Freidberg; 1♀, Mishor Paran, 70 km N Elat, 17.III.1995, Merz; 4♂♂, 2♀♀, Nahal Hiyyon, 13.IV.1992, Merz & Freidberg; 1♂, Nahal Zofar, 11.IV.1992, Merz & Freidberg; 1♂, 1♀, Dead Sea, Qalya (= Kallia), 7.VI.1996, Merz & Freidberg (all MHNG). TUNISIA: 1♀, 24 km S Gabès, 33.42N/10.00E, 8.VI.2000, Schmid-Egger; 1♀, 5 km W Douz, 33.29N/8.59E, 21.III.2001, Schmid-Egger (both MHNG).

**Distribution.** Iran, Tunisia, Egypt, and Israel. Recorded from Saudi Arabia by Freidberg & Kugler (1989). This last record should be revised because of its confusion with *T. repleta*.

**Host plants.** *Launaea nudicaulis* (Asteraceae) (Freidberg & Kugler, 1989). The distribution of the plant corresponds perfectly with the known distribution of *T. pulcherrima*.

**Remarks.** The descriptions of Efflatoun (1924), Hendl (1927) and Freidberg & Kugler (1989) are very comprehensive and the species is therefore not redescribed here. Colouration and structure of head, thorax, abdomen and terminalia of both sexes are the same for *T. pulcherrima* and *T. repleta*. Differences between the two species concern the wing pattern. In *T. repleta* the basal dark crossband (from the tip of Sc to the tip of A1+CuA2) is narrow, often paler than the remaining pattern, and in some



FIGS 64-69

*Trupanea repleta* Bezzi, 1918 (64-67, male; 68-69, female, specimens from Abha): 64, abdominal sternites 4 and 5; 65, eandrium, lateral view; 66, same, caudal view; 67, glans; 68, aculeus; 69, tip of aculeus.

specimens broken in the middle. Usually this band is oblique and directed towards R-M until M, forming a very obtuse angle and parallel to DM-Cu until wing margin. In *T. pulcherrima* this basal crossband is much wider and its basal border is almost straight from C to the hind margin of the wing without distinct angle at level of M. Moreover the entire pattern is uniformly brown, or only slightly paler in the stigma.

### *Trupanea* sp. 1

*Material.* 2: 3 ♂♂, 2 ♀♀.

*Remarks.* *Trupanea* is one of the largest genera of Tephritidae and is known from all major biogeographical regions, with 40 species known from the Afrotropical Region (Munro, 1964) and about 12 species from the Palearctic Region (Norrbon *et al.*, 1999b). The 5 specimens belong probably to a species close to the *T. stellata* subgroup as defined by Munro (1964). However, they do not fit the description of any species in this monograph nor any other description available to us. Taking into account the large size of the genus, the small differences between species and the unknown variability in many species we are not describing this species here.

*Trupanodesis* sp. 1

*Material*. 2: 1 ♂.

*Remarks*. The genus was proposed by Merz (1999) for *Trupanea aurea* Bezzi, 1924 (type species) and an undescribed species from Kenya based on a cladistic analysis. The specimen from Saudi Arabia may be the same species as the undescribed species from Kenya. However, as only one specimen is available, this identification is tentative.

*Distribution and host plants*. This is an Afrotropical genus with both species assigned to it living in flowerheads of *Vernonia* (Asteraceae, Vernonieae) (Merz, 1999).

## DISCUSSION

In the course of a survey of the insect fauna of the Aseer (= 'Asir') area in southwestern Saudi Arabia 51 species of Tephritidae were found, of which 42 species could be named (Tab. 1). Six of them are new to science, and 9 species could not be identified safely to species level. Previously, 22 species were recorded from this country, and the presence of half of them could be confirmed in this study. For 11 species we could not find specimens in the Malaise traps during this survey. In total, 62 species of Tephritidae are currently known to occur in Saudi Arabia. This diversity matches well with other countries of the Near and Middle East except for Israel which is much better known through the collecting efforts of A. Freidberg in the last 35 years in all parts of the country (Freidberg & Kugler, 1989). No comparative effort has been conducted for other countries in the region, and it is thus likely that their real species number is much higher. For instance, 17 species recorded from the southernmost part of Israel and the Sinai mountains in Egypt have not yet been found in Saudi Arabia, but most of them should also occur in the mountains next to the Gulf of Aqaba in the northwestern part of Saudi Arabia. Examples are *Capparimyia savastani* (Martell), *Euarestella kugleri* Freidberg and *E. pinniae* Freidberg, *Goniurellia lacerata* (Becker) and *G. longicauda* Freidberg, *Notomma mutilum* (Bezzi) and *Trupanea desertorum* (Eflatoun).

The present study is interesting from a biogeographical point of view: Over two thirds of the species of the Aseer area are of Afrotropical origin. This means that these species have a predominantly Afrotropical distribution, or most species of the genus are Afrotropical. Four species are typical for desert areas in the Near and Middle East (e. g., *Metasphenisca negeviana*, *Trupanea pseudoamoena*), and only one species, *Ensina sonchi*, is a typical Palaearctic species. Four species are widespread in the Old World (e. g., *Dioxya sororcula*, *Spathulina acroleuca*), and one species, *Bactrocera zonata*, is a recent introduction from the Oriental Region. On the other hand, typical Oriental species are not present in the Aseer area nor elsewhere in Saudi Arabia. Interestingly enough, some genera and tribes which are widespread in the Palaearctic Region are not yet known in Saudi Arabia, such as Terelliini, Myopitini, or the large genus *Tephritis*. They are all known from desert localities in Israel, Jordan and Syria (Freidberg & Kugler, 1989; Korneyev & Dirlbek 2000), and their occurrence in the North of Saudi Arabia may be expected. In contrast, Israel has a higher proportion of Palaearctic species, with only about 20% of Afrotropical elements (Freidberg, 1988).

Although a remarkable diversity of Tephritidae was collected by a Malaise trap it is generally known that traps are not the best collecting method for Tephritidae.

Sweeping over potential host plants and rearing Tephritids from infested plants yield usually a much higher number of species. Consequently, it may be assumed that the real number of species in Saudi Arabia may be doubled by using better collecting techniques and by collecting in the northern, palaeartic part of the country.

It can be seen from Tab. 1 that 10 species recorded from Saudi Arabia are pest species according to White & Elson-Harris (1992) and require special attention in fruit plantations. Only 4 of these species were found in the present survey: *Carpomyia incompleta*, *Bactrocera zonata*, *Dacus frontalis*, and *D. vertebratus*, and all of them only in small number of specimens. No new pest species was discovered. But other pest species attacking Cucurbitaceae, such as *Bactrocera cucurbitae* or *Dacus ciliatus*, should also occur in the Aseer area. Probably this is again a question of the collecting method. Monitoring those species needs specific collecting methods (e. g., traps with cue lure or methyl eugenol for Dacini; see Munro, 1984).

#### ACKNOWLEDGEMENTS

Our sincerest thanks go to John Deeming (Cardiff, Wales) who initiated this study, established the contact between the authors, arranged the loans of specimens to BM, gave important information, and reviewed the manuscript. The generous help of Amnon Freidberg (Tel-Aviv, Israel) is thankfully acknowledged. He was loaning and donating numerous specimens, helped us with fruitful discussions and was reviewing an earlier version of the paper. For help with identifications and useful comments we are indebted to Marc De Meyer (Tervuren, Belgium), David Hancock (Cairns, Australia), and Ian White (London, United Kingdom). For loan of specimens we express our sincerest thanks to Fabrizio Rigato (Milano, Italy), Gunilla Stahls-Mäkälä (Helsinki, Finland) and Hans-Peter Tschorsnig (Stuttgart, Germany). A special thank is sent to Norbert Kilian (Botanical Garden and Botanical Museum, Free University, Berlin, Germany) for information about the plant genus *Launaea*. Finally, we would like to thank Florence Marteau (Geneva) for technical help.

#### REFERENCES

- AL-AHMADI, A. Z. & SALEM, M. M. 1999. Entomofauna of Saudi Arabia (Part 1). *King Saud University, Academic Publishing & Press*, 240 pp.
- ANONYMOUS 2002. Report of the EPPO Workshop on *Bactrocera zonata*. *European and Mediterranean Plant Protection Organization, UNESCO*, 8 pp. ([http://www.eppo.org/MEETINGS/2002\\_meetings/bzonata.htm](http://www.eppo.org/MEETINGS/2002_meetings/bzonata.htm))
- BEZZI, M. 1918. Notes on the Ethiopian Fruit-Flies of the Family Trypanidae, other than *Dacus* (s. l.) (Dipt.) - II. *Bulletin of Entomological Research* 9 (1): 13-46.
- BEZZI, M. 1924. 9. South African Trypanid Diptera in the Collection of the South African Museum. *Annals of the South African Museum* 19: 449-577 & plates XII-XV.
- CARROLL, L. E., WHITE, I. M., FREIDBERG, A., NORRBOM, A. L., DALLWITZ, M. J. & THOMPSON, F. C. 2002. Pest Fruit Flies of the World: Descriptions, Illustrations, Identification, and Information Retrieval. Version: 8th August 2002. (<http://www.sel.barc.usda.gov/Diptera/tephritid/pests/adults/>)
- DE MEYER, M. & FREIDBERG, A. 2005. Revision of the fruit fly genus *Capparimyia* (Diptera, Tephritidae). *Zoologica Scripta* 34: 279-303.
- EFFLATOUN H. C. 1924. A Monograph of Egyptian Diptera. Pars II, Fam. Trypanidae. *Mémoires de la Société Royale Entomologique d'Égypte* 2 (2): 1-132 & 5 plates.

- FREIDBERG, A. 1979. The Afrotropical species assigned to *Terellia* R. D. (Diptera: Tephritidae). *Journal of the Washington Academy of Science* 69: 164-174.
- FREIDBERG, A. 1980. A revision of the genus *Goniurellia* Hendel (Diptera: Tephritidae). *Journal of the Entomological Society of Southern Africa* 43: 257-274.
- FREIDBERG, A. 1987. *Orthocanthoides aristae*, a remarkable new genus and species of Tephritidae (Diptera) from Mount Kenya. *Annals of the Natal Museum* 28 (2): 551-559.
- FREIDBERG, A. 1988. 10. Zoogeography of the Diptera of Israel (pp. 277-308). In: YOM-TOV, Y. & TCHERNOV, E. (eds). The zoogeography of Israel. *Dr. W. Junk Publishers, Dordrecht*, 600 pp.
- FREIDBERG, A. 2002. Systematics of Schistopterini (Diptera: Tephritidae: Tephritinae), with descriptions of new genera and species. *Systematic Entomology* 27: 1-29.
- FREIDBERG, A. & KUGLER, J. 1977. The type-species of *Goniurellia* Hendel, 1927 (Insecta: Diptera: Tephritidae). *Z. N. (S.)* 2157. *Bulletin of Zoological Nomenclature* 33 (3-4): 208-211.
- FREIDBERG, A. & KUGLER, J. 1989. Diptera: Tephritidae. *Fauna Palaestina - Insecta* 4: 212 pp. & 9 plates.
- FREY, R. 1958. Zur Kenntnis der Diptera brachycera p. p. der Kapverdischen Inseln. *Commentationes biologicae* 18 (4): 1-61.
- HANCOCK, D. L. 1984. Ceratitinae (Diptera: Tephritidae) from the Malagasy subregion. *Journal of the Entomological Society of Southern Africa* 47 (2): 277-301.
- HANCOCK, D. L. 2003. The status and relationships of *Terpnodesma* Munro and establishment of the new tribe Axiothaumini (Diptera: Tephritidae: Tephritinae). *African Entomology* 11 (1): 143-145.
- HARDY, D. E. 1967. Studies of fruitflies associated with mistletoe in Australia and Pakistan with notes and descriptions on genera related to *Perilampus* Bezzi. *Beiträge zur Entomologie* 17 (1-2): 127-149.
- HENDEL, F. 1927. 49. Trypetidae. In: LINDNER, E. (ed.). Die Fliegen der Palaearktischen Region. Volume 5: 1-221 & 17 plates.
- HERING, E. M. 1956. Bohrfliegen von Iran 1954 (Dipt., Trypetidae). *Jahreshefte des Vereins für Vaterländische Naturkunde in Württemberg* 111: 82-89.
- HERING, E. M. 1961. Ergebnisse der Deutschen Afghanistan-Expedition 1956 der Landes-sammlungen für Naturkunde Karlsruhe. *Beiträge zur naturkundlichen Forschung in Südwestdeutschland* 19 (3): 319-331.
- KNIO, K. M., KALASH, S. H. & WHITE, I. M. 2002. Flowerhead-infesting fruit flies (Diptera: Tephritidae) on thistles (Asteraceae), in Lebanon. *Journal of Natural History* 36: 617-629.
- KORNEYEV, V. A. 1990. A review of the *Sphenella* and *Paroxyna* series of genera (Diptera, Tephritidae, Tephritinae) of eastern Palearctic. *Nasekomye Mongolii* 11: 395-470 (in Russian).
- KORNEYEV, V. A. 1994. *Neoceratitis* Hendel, a new senior synonym of *Trirhithromyia* Hendel (Diptera, Tephritidae). *Journal of the Ukrainian Entomological Society* 1 (2) (1993): 59-62.
- KORNEYEV, V. A. & DIRLBEK, J. 2000. The fruit flies (Diptera: Tephritidae) of Syria, Jordan and Iraq. *Studia Dipterologica* 7 (2): 463-482.
- MERZ, B. 1992. The Fruit flies of the Canary Islands (Diptera: Tephritidae). *Entomologica Scandinavica* 23: 215-231.
- MERZ, B. 1994. Diptera Tephritidae. *Insecta Helvetica, Fauna* 10: 1-198.
- MERZ, B. 1999. 24. Phylogeny of the Palearctic and Afrotropical Genera of the *Tephritis* Group (Tephritinae: Tephritini) (pp. 629-669). In: ALUJA, M. & NORRBOM, A. L. (eds). Fruit Flies (Tephritidae): Phylogeny and Evolution of Behaviour. *CRC Press, Boca Raton, London, New York, Washington D. C.*, 944 pp.
- MERZ, B., VAN AARTSEN, B., WHITE, I. M. & VAN HARTEN, A. in press. Contribution to the knowledge of the Fruit flies (Diptera, Tephritidae) of Yemen. *Fauna of Arabia* 21.

- MUNRO, H. K. 1925. Biological Notes on South African Trypanidae (Fruit-flies). I. *Entomology Memoirs, Union of South Africa, Department of Agriculture, Memoir* 3: 39-67.
- MUNRO, H. K. 1929. 1. Additional Trypetid Material in the Collection of the South African Museum (Trypetidae, Diptera). *Annals of the South African Museum* 29: 1-39 & plate 1.
- MUNRO, H. K. 1935. Biological and systematic notes and records of South African Trypetidae (Fruit-Flies, Diptera) with descriptions of new species. *Entomology Memoirs, Union of South Africa, Department of Agriculture, Memoir* 9: 18-59.
- MUNRO, H. K. 1938. A revision of the African species of the genus *Spathulina* Rond. (Diptera, Trypetidae). *Transactions of the Royal Entomological Society of London* 87: 417-429.
- MUNRO, H. K. 1947. African Trypetidae (Diptera). *Memoirs of the Entomological Society of Southern Africa* 1: 1-284 & 16 plates.
- MUNRO, H. K. 1957a. Trypetidae. Ruwenzori Expedition 1934-1935. Volume 2 (9): 853-1054.
- MUNRO, H. K. 1957b. *Sphenella* and some allied genera (Trypetidae, Diptera). *Journal of the Entomological Society of Southern Africa* 20 (1): 14-57.
- MUNRO, H. K. 1964. The genus *Trupanea* in Africa. An analytical study in Bio-Taxonomy. *Department of Agricultural Technical Services, Republic of South Africa, Entomology Memoirs* 8: 1-101.
- MUNRO, H. K. 1984. A taxonomic treatise on the Dacidae (Tephritoidea, Diptera) of Africa. *Department of Agriculture and Water Supply, Republic of South Africa, Entomology Memoir* 61: 1-313.
- NORRBOM, A. L., CARROLL, L. E. & FREIDBERG, A. 1999a. Status of Knowledge (pp. 9-47). In: THOMPSON, F. C. (ed.). Fruit Fly Expert Identification System and Systematic Information Database. *Myia* 9: 1-524.
- NORRBOM, A. L., CARROLL, L. E., THOMPSON, F. C., WHITE, I. M. & FREIDBERG, A. 1999b. Systematic Database of Names (pp. 65-299). In: THOMPSON, F. C. (ed.). Fruit Fly Expert Identification System and Systematic Information Database. *Myia* 9: 1-524.
- SHALABY, F. 1961. A preliminary survey of the insect fauna of Saudi Arabia. *Bulletin de la Société Entomologique d'Égypte* 14: 211-228.
- STUCKENBERG, B. R. 1999. Antennal evolution in the Brachycera (Diptera), with a reassessment of terminology relating to the flagellum. *Studia Dipterologica* 6 (1): 33-48.
- WHITE, I. M. & ELSON-HARRIS, M. M. 1992. Fruit Flies of Economic Significance: Their Identification and Bionomics. *CAB International and ACIAR, London, XII* & 601 pp.
- WHITE, I. M., HEADRICK, D. H., NORRBOM, A. L. & CARROLL, L. E. 1999. 33. Glossary (pp. 881-924). In: ALUJA, M. & NORRBOM, A. L. (eds). Fruit Flies (Tephritidae): Phylogeny and Evolution of Behaviour. *CRC Press, Boca Raton, London, New York, Washington D. C.*, 944 pp.