

Further new taxa and little-known species of non-biting moth flies (Diptera, Psychodidae) from Yemen

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Abstract. An account of the Psychodinae, tribe Psychodini, from Yemen is given, including the description of a new genus, *Psychana* gen. nov. with the following five species included: *Psychana rujumensis* sp. nov. (type species), *P. absidata* (Quate & Quate, 1967) comb. nov. and *P. pinguicula* (Quate & Quate, 1967) comb. nov. (both from New Guinea), *P. moleva* (Quate, 1965) comb. nov. (Philippines), and *P. pellucida* (Quate, 1965) comb. nov. (Malaysia), all of them from *Psychoda* Latreille, 1796. Three additional new species, *Copropsychoda bulbosa* sp. nov., *Falsologima verrucosa* sp. nov. (male), and *Psychoda obscuripennis* sp. nov. (male), are described and figured. *Psychodula harrisi* (Satchell, 1950) comb. nov. (from *Chodopsycha* Ježek, 1984) is redescribed to give female characters and recorded for the first time from Yemen and the Afrotropical region. Comments on the generic classification of all five genera are given. A preliminary key to the tribes of the subfamily Psychodinae and to the world genera of the tribe Psychodini is added.

Key words. Taxonomy, new genus and species, new combination, Psychodidae, Psychodini, world key to genera, Yemen

Introduction

The knowledge of the Yemenite non-phlebotomine moth flies is limited to a short paper by JEŽEK & VAN HARTEN (2002). They described one new species of the genus *Mormopericomiella* Ježek & van Harten, 2002 and one new species of the genus *Philosepedon* Eaton, 1904. They also registered the morphological variability of *Karakovounimerus sarai* (Salamanna, 1975), as new to the Afrotropical region. DUCKHOUSE & LEWIS (1980) listed 100 species of non-phlebotomine moth flies in the Catalogue of Afrotropical Diptera. Afterwards, 45 new species have been added to this list (JEŽEK 2004). Generally speaking, the non-biting moth flies of the Afrotropical region as a whole are still very poorly known.

Here we describe a new genus, *Psychana* gen. nov. (type species: *Psychana rujumensis* sp. nov.). We also transfer to it four species placed in *Psychoda* Latreille, 1796: *Psychana absidata* (Quate & Quate, 1967) comb. nov. and *P. pinguicula* (Quate et Quate, 1967) comb. nov., both from New Guinea, *P. moleva* (Quate, 1965) comb. nov. from the Philippines, and *P. pellucida* (Quate, 1965) comb. nov. from Malaysia. We further describe four new species from four different genera from Yemen: *Copropsychoda bulbosa* sp. nov., *Falsologima verrucosa* sp. nov. (only male), *Psychana rujumensis* sp. nov., and *Psychoda obscuripennis* sp. nov. (only male).

Although 153 species of non-phlebotomine moth flies are now recorded in the Afrotropical region (including the taxa described or redescribed here), it is undoubtedly only a fraction of the existing fauna. The paper is supplemented by an attempt of a preliminary key to the tribes of the subfamily Psychodinae and the known genera of the tribe Psychodini. The genera *Neopsychoda* Duckhouse, 1966 (type species: *N. pulchra* Duckhouse, 1966, by original designation), *Mystropsychoda* Duckhouse, 1975 (type species: *M. rhodesiensis* Duckhouse, 1975, by original designation), and *Rhipidopsychoda* Vaillant, 1991 (type species: *Psychoda nana* Tonnoir, 1922, by original designation) probably do not belong to the Psychodini and were thus omitted. Diagnostic characters of the above mentioned three genera were given by DUCKHOUSE (1966, 1975) and VAILLANT (1991).

Material and methods

The material was collected in a Malaise trap operated at Ar Rujum, Al Mahwit Governorate, Yemen (15°29'N 43°41'E), from October 16, 2000 to June 5, 2001. The trap was placed within a tree nursery of the Yemeni Ministry of Agriculture and Irrigation, in a plot with tall weedy plants in the shade of a *Cupressus* tree. Ar Rujum is situated at the margin of the Yemeni high plains at an altitude of about 1900 m a.s.l.; a steep valley leads from Ar Rujum to Tihama in SSE direction. The area has sparse growths of *Acacia* and *Ziziphus* trees and *Euphorbia* shrubs, as well as some cereals fields.

The captured moth flies were preserved in 75% ethanol in Yemen and mounted on slides in Prague. The slides (Canadian Balsam) are deposited in the Department of Entomology of the National Museum, Prague, Czech Republic (acronym: NMPC). Thousands of specimens were collected; only a small amount of the material was included in this study. Slides were numbered with two separate series of numbers: Inv. No. = Inventory Slide Number of the family Psychodidae and Cat. No. = Catalogue Number of Slide. The latter series is used for type material included in the NMPC Diptera collection.

Wing indices are based on distances between the following points: A = tip of R_5 , B = radial fork, C = medial fork, D = tip of Cu; the distances are indicated by both extreme points. Maximum wing length is (approximately) equal to the distance from a line connecting the bases of basal costal node to neala and the tip of R_5 . Fore, middle and hind leg ratios indicated by P_1 , P_2 and P_3 , respectively.

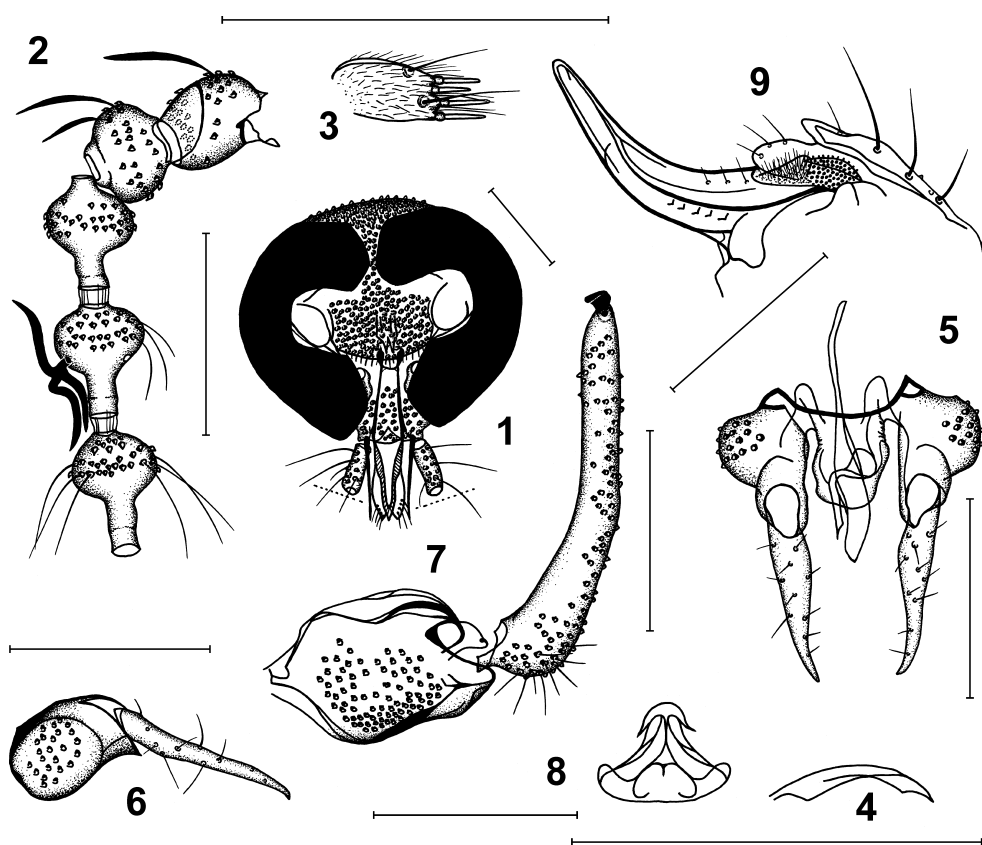
Taxonomy

Copropsychoda bulbosa sp. nov.

(Figs. 1-20)

Type material. HOLOTYPE: ♂, **YEMEN:** Ar Rujum, 15°29'N 43°41'E, 16.i.-9.iv.2001, Malaise trap, A. van Harten leg. Slide with dissected specimen, Cat. No. 34252, Inv. No. 14041 (NMPC). PARATYPES: 4 ♂♂ 4 ♀♀ (slides, NMPC), the same locality, collector and trap. ALLOTYPE: ♀, 16.x.2000-15.i.2001, Cat. No. 34253, Inv. No. 14042. OTHER PARATYPES: ♂♂, same date as holotype, Cat. No. 34254-34255, Inv. No. 14043-14044; ♂, 9.iv.-5.vi.2001, Cat. No. 34256, Inv. No. 14045; ♂, 16.x.2000-15.i.2001, Cat. No. 34257, Inv. No. 14046; ♀♀, same date as previous specimen, Cat. No. 34258-34260, Inv. No. 14047-14049. Figures based mainly on the holotype, partly on the paratypes.

Description. Male. Eyes separated, frontoclypeus with rectangular patch of insertions of hairs connected with dorso-ventral stripe irregularly arranged hair pits between upper apices of eyes (Fig. 1). Minimum distance between eyes 0.5 times as wide as diameter of facet (Fig. 10). Ratios of distance of both tangential points of eyes (dorsal and ventral) to minimum width of frons 9 : 1, to facet diameter 18 : 1. Antenna with 14 segments (Figs. 2, 11); scape almost ovoid, slightly longer than pedicel, the latter hardly globular; flagellomeres 1-9 pitcher-shaped, nodes bulbous, internodes (necks) shorter than nodes; antennomeres 12-14 progressively decreasing in size, almost globular, segment 12 quite separated, antennomeres 13 and 14 fused; sensory filament composed of two anterior and one posterior branch. Length ratios of maxillary palpomeres (Fig. 12) 1 : 1 : 1 : 1.5, palpomere 4 not annulate, tapering gently to apex. Terminal lobe of labium (Fig. 3) with four digitiform protuberances and two long setae. Ratio of maximum length of cibarium to length of epipharynx 1.3 : 1. Thoracic sclerites as in Fig. 13. Wing (Fig. 14) of characteristic psychodini-shape, clear, 1.3 mm (holotype) and 1.3-1.6 mm (paratypes) long, wing membrane bare, radial and medial forks complete; following veins or their parts strengthened: Sc (considerably), R_1 , R_2 , base of R_4 , R_5 , basal part of M_{1+2} , M_4 and beginning of Cu (conspicuously); basal costal nodes distinct; Sc uninterrupted, bent; M_3 , Cu and M_4 not connected basally; R_5 reaching to wing margin with round apex; medial wing angle 96° (BCD); wing indices: $AB : AC : AD = 3 : 3.5 : 2.6$ and $BC : CD : BD = 1 : 1.9 : 2.2$; maximum wing length equal to 2.3 times its maximum width. Maximum length of haltere equal to 3.3 times its maximum width. Ratios of lengths of femora, tibiae and first tarsomeres: $P_1 = 2.6 : 2.5 : 1$; $P_2 = 2.9 : 3.2 : 1.1$; $P_3 = 3.3 : 3.9 : 1.2$; fore claws generally bent, form depending on angle of view (Figs. 4, 15). Basal apodeme of male genitalia narrow, slightly bent proximally (in dorsal as well as in lateral aspect, Figs. 5, 16). Phallobasis bag-shaped, with three phallomeres around gonopore, dorsal phallomeres broad, completely fused, distorted in lateral view, ventral phallomere needle-shaped, bent, shorter than dorsal one. Gonocoxites short, thick, protruding laterally in dorsal view; gonostylus thin, 1.5 times as long as gonocoxite (Figs. 5, 6), pointed. Epandrium (Figs. 7, 17) with one large field of insertions of hairs on each side. Basal aperture as well as sclerotized remainders of tergite and sternite 10 inside of epandrium missing. Hypandrium narrow (Fig. 5). Epiproct hardly visible, hypoproct small, with tongue-shaped lobulus in middle, hairy. Surstylus long, distinctly

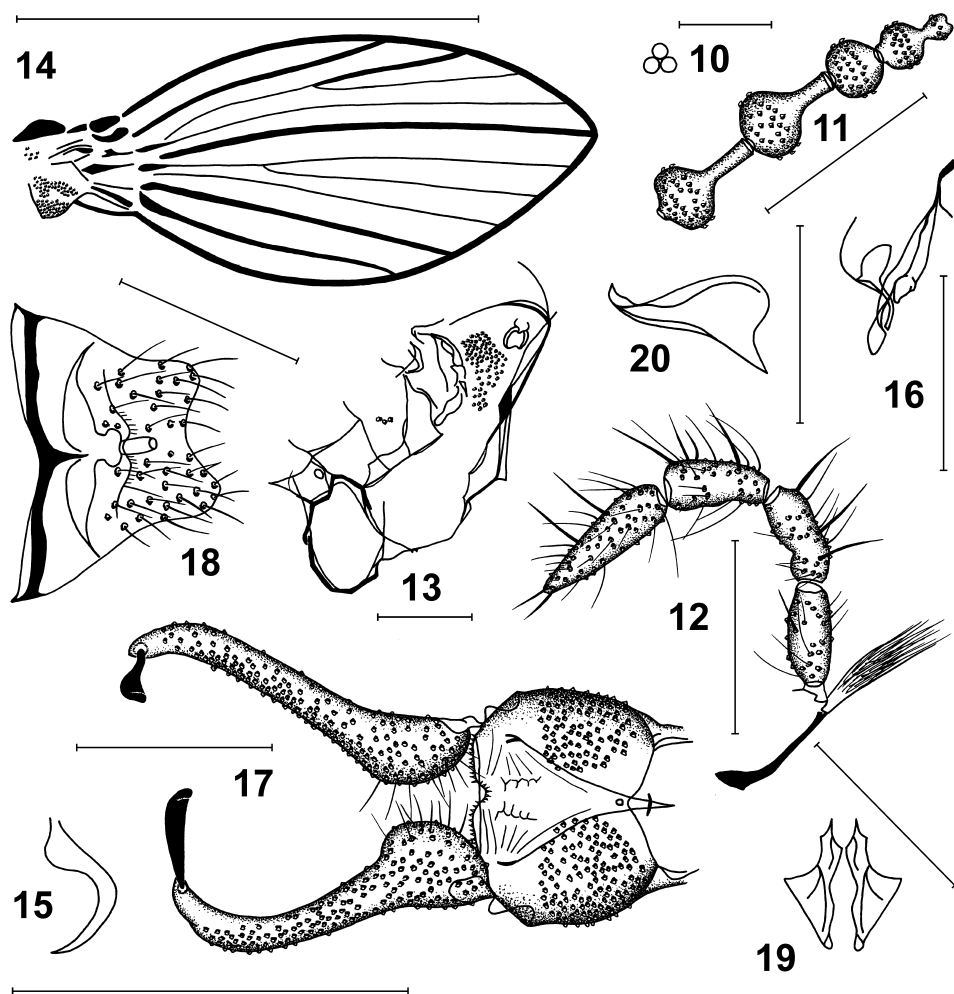


Figs. 1-9. *Copropsychoda bulbosa* sp. nov., ♂ (1-7) and ♀ (8-9). 1 – head; 2 – basal antennomeres; 3 – dorsal view of terminal lobe of labium; 4 – dorsal view of fore claw; 5 – dorsal view of aedeagal complex and gonopods; 6 – lateral view of gonocoxite and gonostyle; 7 – lateral view of epandrium and surstylus; 8 – anterior view of genital chamber; 9 – lateral view of subgenital plate and cercus. Scales = 0.1 mm (Figs. 1-3, 5-9); 0.05 mm (Fig. 4).

longer than epandrium, bulbose basally (Figs. 7, 17), S-shaped in dorsal view, C-shaped in lateral one, subapically with one rather large retinaculum.

Female. Similar to male. Wing 1.2-1.4 mm long. Genitalia as figured (Figs. 8, 9, 18, 19, 20), subgenital plate (Fig. 18) bilobed, with shallow apical concavity, hairy; sensory digital organ developed; plate with a pointed sclerotized rib in medial line basally; complicated sclerotized forms of genital chamber without mesh-like structures (Figs. 8, 19, 20). Cercus (Fig. 9) hardly twice as long as subgenital plate, bent.

Differential diagnosis. *Copropsychoda bulbosa* sp. nov. is characterized by having the radial and medial forks of wings complete (Fig. 14), the ventral male phallomere rectangularly bent at the base and without a conspicuous ring, the gonocoxites bulbous basally (Fig. 5), and the subgenital plate of female with convergent sides (Fig. 18). The most closely related spe-



Figs. 10-20. *Copropsychoda bulbosa* sp. nov., ♂ (10-17) and ♀ (18-20). 10 – facets; 11 – apical antennomeres; 12 – maxilla and maxillary palpus; 13 – lateral view of thoracic sclerites; 14 – wing; 15 – lateral view of fore claw; 16 – lateral view of aedeagal complex; 17 – dorsal view of epandrium and surstyli; 18 – subgenital plate; 19 – dorsal view of genital chamber; 20 – same, lateral view. Scales = 0.1 mm (Figs. 10-13, 16-20); 1 mm (Fig. 14); 0.05 mm (Fig. 15).

cies Palaearctic *C. brevicornis* (Tonnoir, 1940) has incomplete radial and medial forks, ventral phallomere with a fully developed basal ring which is only inconspicuously bent at the base, only slightly strengthened gonocoxites, and an almost parallel-sided female subgenital plate.

Etymology: Bulbosus (Latin, adjective) = bulbous – gonocoxites with conspicuous lateral protuberances.

Bionomy. Unknown. The adults were collected from October to June in a Malaise trap at Ar Rujum.

Distribution. Yemen.

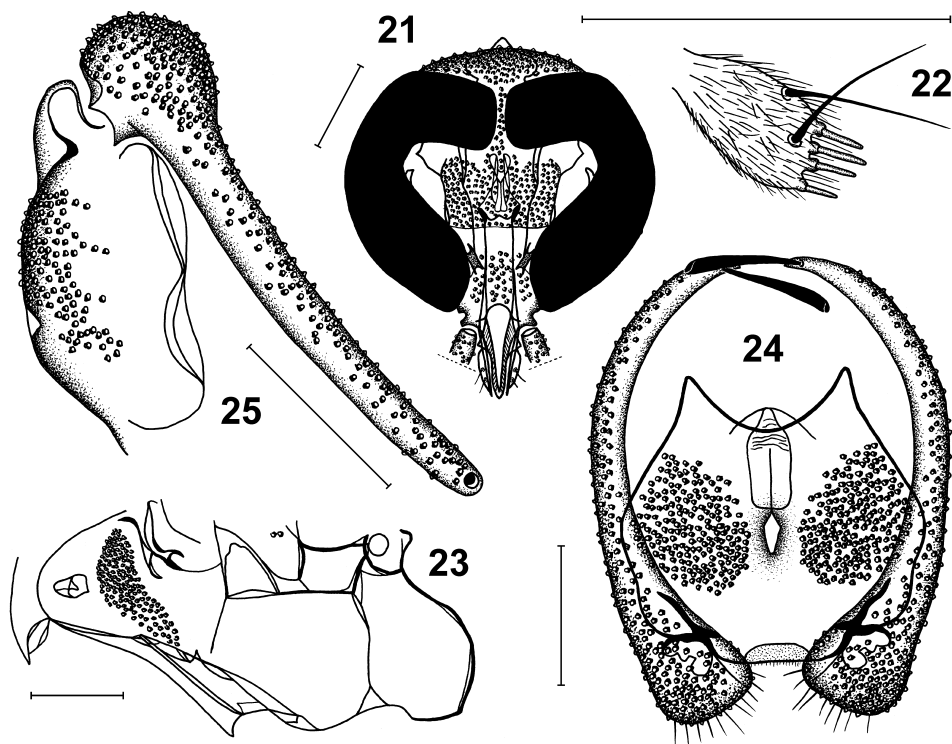
Comments on the generic classification and extent of the genus. VAILLANT (1971) described the genus *Copropsychoda*, separating it from *Psychoda* Latreille, 1796. He did not establish the type species but included only *C. brevicornis* (Tonnoir, 1940) in the new genus. It should therefore be recognized as the type species by monotypy. Four species of *Copropsychoda* are now known: *C. brevicornis* from Europe and West Siberia (JEŽEK 1992), *C. miyatakei* (Tokunaga, 1958) from Japan, *C. dewulfi* (Satchell, 1955) from the Belgian Congo (currently Democratic Republic of the Congo) and *C. bulbosa* sp. nov. from Yemen.

***Falsologima verrucosa* sp. nov.**

(Figs. 21-34)

Type material. HOLOTYPE: ♂, **YEMEN:** Ar Rujum, 15°29'N 43°41'E, 16.x.2000-15.i.2001, Malaise trap, A. van Harten leg. Slide, dissected specimen, Cat. No. 34261, Inv. No. 14050 (NMPC). PARATYPES: 2 ♂♂ (slides, NMPC), same date, Cat. No. 34262, Inv. No. 14051; 16.1.-9.4.2001, Cat. No. 34263, Inv. No. 14052. Figures based mainly on the holotype, partially on paratypes.

Description. Male. Eyes not touching; frontoclypeus with central patch of insertions of hairs trilobed (Fig. 21), medial lobe thin and long, lateral ones short and rounded; areas near tentorial pits with rectangular border. Minimum distance between eyes 0.5 times as wide as diameter of facets (Fig. 26). Ratios of distance of tangential points of ends of eyes to minimum width of frons 21 : 1, to facet diameter 10.5 : 1. Antennae with 14 segments (Figs. 27, 28); scape cylindrical, short; pedicel almost globular; flagellomeres amphora-shaped. Apical antennomere with bulbous basis, spined, neck as well with a lateral spine, terminal part obovate with one apical seta. Sensory filaments long, thin, with four branches, paired. Length ratios of maxillary palpomeres 1 : 1.1 : 1.3 : 1.6 (Fig. 29); palpomere 4 not annulate, connected basally with apical end of palpomere 3. Terminal lobe of labium as in Fig. 22, with four digitiform projections. Maximum length of cibarium equal to 1.3 times length of epipharynx. Thoracic sclerites as in Fig. 23, anepisternum with rounded inner apical part, pleurotergum with 2-3 hairs. Wing (Fig. 30) narrowly lancet-shaped, 2.0 mm (holotype) and 1.6-1.8 mm (paratypes) long, clear, clouded only between C and R₁; following veins or their parts strengthened: Sc, R₁, R₄ and M₁₊₂ basally, R₅, M₄ and Cu; basal costal nodes well visible; Sc uninterrupted; M₃, Cu and M₄ not connected basally; R₅ extending distally to reach wing margin in apex of wing; veins r-r, r-m and m-m not developed; medial wing angle 81° (BCD); wing indices: AB : AC : AD = 2.8 : 3.5 : 2.5; BC : CD : BD = 1 : 1.6 : 1.7; maximum wing length equal to 2.7 times its maximum width. Maximum length of haltere equal to 2.8 times its maximum width. Ratios of lengths of femora, tibiae and first tarsomeres: P₁ = 2.9 : 2.8 : 1; P₂ = 3.2 : 3.7 : 1.3; P₃ = 3.6 : 4.4 : 1.3; fore claws twice pointed and bent distad (see Fig. 31). Basal apodeme of male genitalia (Figs. 32, 33) narrowed and geniculate (dorsal view), widened from lateral aspect, rounded proximally; distal part of basal apodeme forked in two caudal arms; phallobasis with

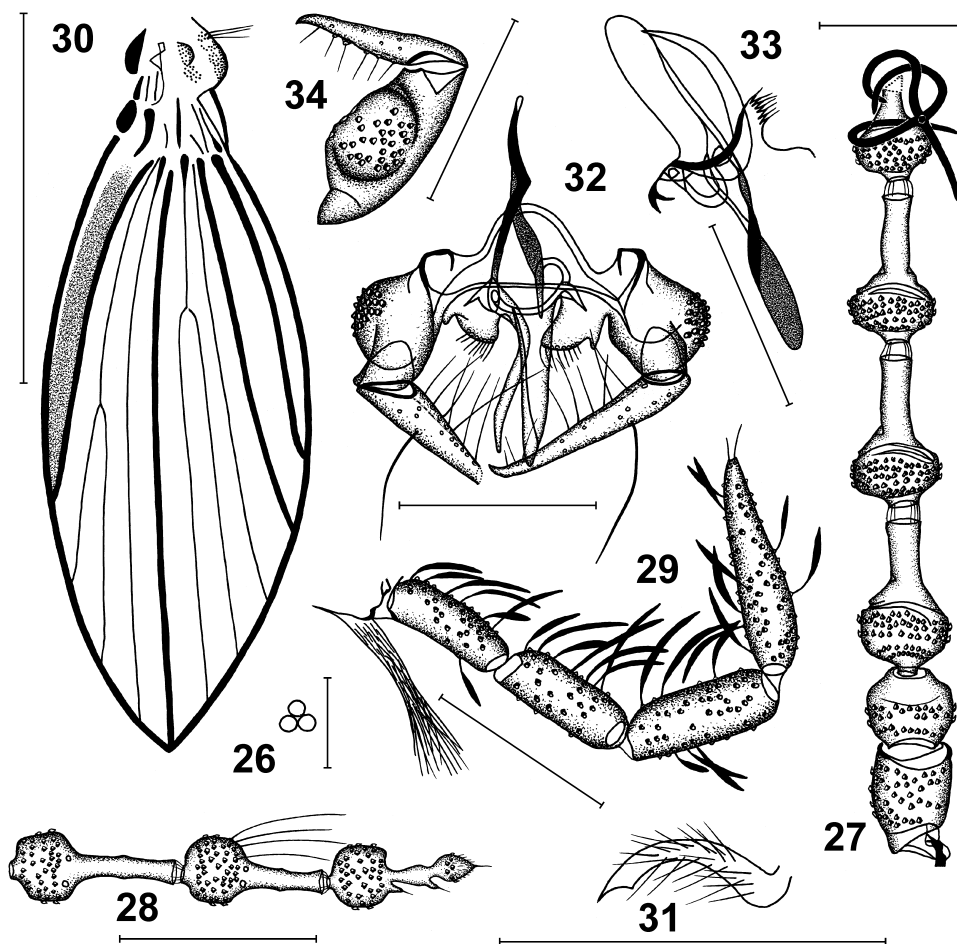


Figs. 21-25. *Falsologima verrucosa* sp. nov., ♂. 21 – head; 22 – dorsal view of terminal lobe of labium; 23 – lateral view of thoracic sclerites; 24 – dorsal view of epandrium and surstyli; 25 – same, lateral view. Scales = 0.1 mm.

three phallomeres around gonopore; dorsal phallomeres completely fused, rounded apically from lateral view, pointed from dorsal aspect; ventral phallomere needle-shaped and bent. Paired external additional protuberances short, bilobed; inner lobuli rounded, with tufts of hairs, outer lobuli smaller and pointed. Gonocoxites (Figs. 32, 34) cylindrical with hemispherical lateral protuberances; gonostylus long, with thin pointed and bent tip, inner side covered with long hairs, outer side with one long basal seta. Epandrium (Figs. 24, 25) widely setose (one area on each side), only central rhomboidal aperture developed. Hypandrium narrow. Epiproct and hypoproct inconspicuous, hairy. Surstylus very long, bent in dorsal view, almost straight in lateral view, with one long subapical retinaculum.

Female. Unknown.

Differential diagnosis. Male of *Falsologima verrucosa* sp. nov. is characterized by having the paired external additional protuberances near phallomeres short and bilobed, of which the inner lobule is rounded with a tuft of hairs and the outer one is smaller and pointed, large and almost equally long phallomeres, and the minimum distance between eyes equal to 0.5 times the diameter of facet. The species thus differs from *F. savaiensis* (Edwards, 1928) which



Figs. 26-34. *Falsologima verrucosa* sp. nov., ♂. 26 – facets; 27 – basal antennomeres; 28 – apical antennomeres; 29 – maxilla and maxillary palpus; 30 – wing; 31 – dorsal view of fore claw; 32 – dorsal view of aedeagal complex and gonopods; 33 – lateral view of aedeagal complex; 34 – lateral view of gonocoxite and gonostyle. Scales = 0.1 mm (Figs. 26-29, 32-34); 1 mm (Fig. 30); 0.05 mm (Fig. 31).

lacks the paired external additional protuberances of the male genitalia, has a very short rudimental ventral phallomere in contrast to fused dorsal phallomeres, and the minimum distance between eyes equal to one facet diameter.

Etymology. *Verrucosus* (Latin, adjective) = full of tubercles – in reference to the large hairy tubercles near phallomeres.

Bionomy. Unknown. The adults were trapped in a Malaise trap at Ar Rujum between October and April.

Distribution. Yemen.

Comments on the generic classification and extent of the genus. *Falsologima* Ježek & van Harten, 1996 was erected for *Psychoda* auct. (nec Latreille, 1796) partim with the tropicopolitan *Psychoda savaiiensis* Edwards, 1928 as the type species. The genus now further includes *F. guamensis* (Quate, 1965) from Guam, the Philippines, New Guinea, New Britain and New Ireland; *F. quadrilosa* (Quate & Quate, 1967) from New Guinea; *F. quadropsis* (Quate et Quate, 1967) from New Guinea; *F. serpentina* (Quate, 1965) from the Philippines and New Guinea; and *F. verrucosa* sp. nov. from Yemen.

Psychana gen. nov.

Type species. *Psychana rujumensis* sp. nov. by present designation.

Differential diagnosis. Antennomeres 13-14 fused, (apical) antennomere 15 separated, conical, meropleural suture conspicuously or at least slightly developed. This contrasts with the genera *Ypsydocha* Ježek, 1984 and *Tinearia* Schellenberg, 1803 in which antennomeres 13-15 are fused, antennomere 15 is not conical and the meropleural suture is missing. The mentioned characters seem to be unique for this genus, especially in the shape of the apical flagellomere.

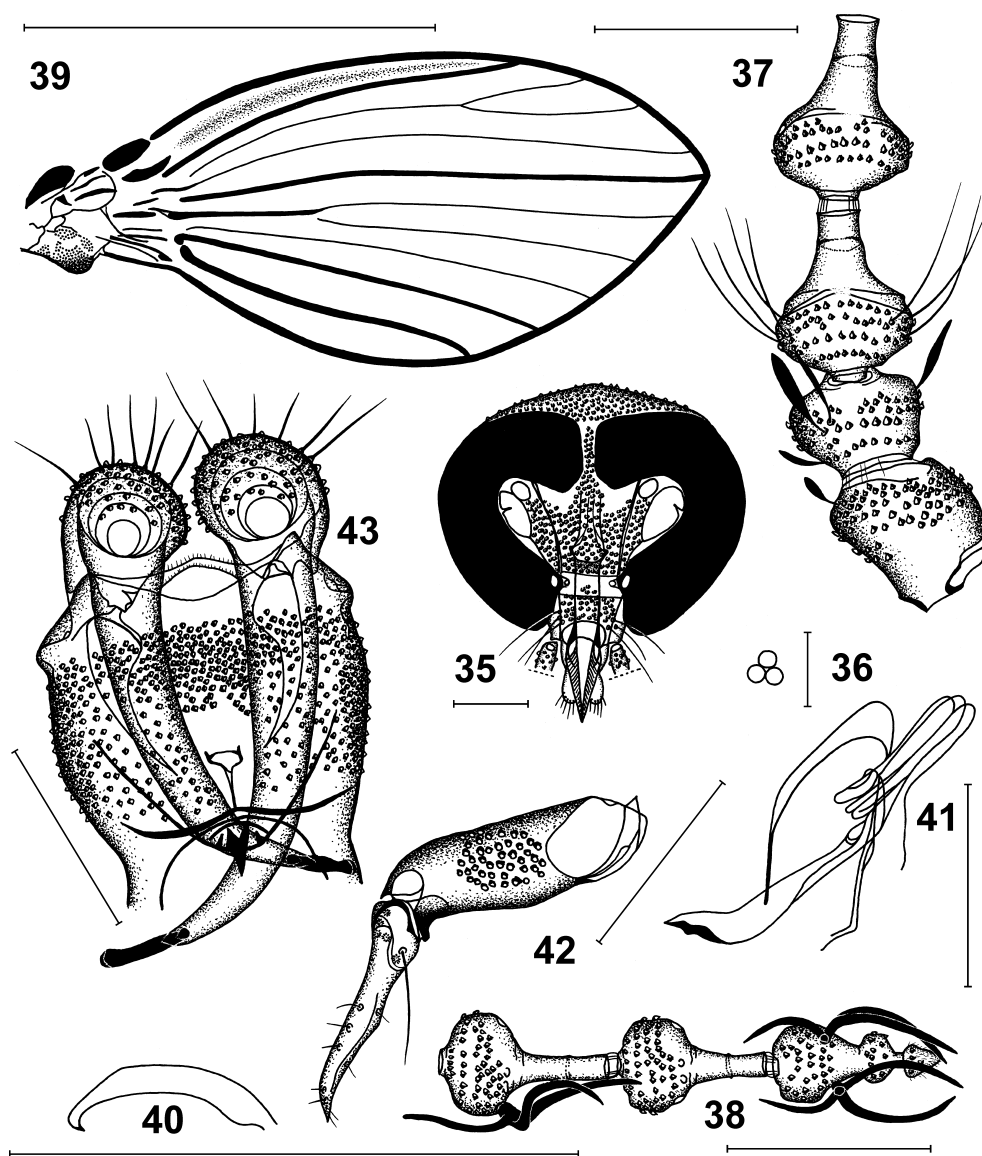
Etymology. A mutation of *Psychoda* (gender feminine).

Comments on the generic classification and extent of the genus. JEŽEK (1983, 1984) discussed in detail the position of six new genera excluded from the genus *Psychoda* auct. in the light of relationships among other genera. The complex taxonomical situation of the tribe Psychodini, comprising chiefly the clearly polyphyletic *Psychoda* s. lat. (nec Latreille, 1796) will not be fully resolved by the description of the new genus *Psychana* and may, in fact, become even more complicated. Sound comparative morphological studies, based not only on the last flagellomeres, are necessary for an acceptable division of the tribe. Worldwide it contains 447 species, 26 of which most probably belong to quite different tribes. Unfortunately, the clarification of their taxonomic status is hampered by the unavailability or poor condition of the type material. At any rate, future revisions of particular species groups are needed. The following species belong to the new genus: *Psychana absidata* (Quate & Quate, 1967) comb. nov. (from *Psychoda* Latreille, 1794) from New Guinea, *P. moleva* (Quate, 1965) comb. nov. (from *Psychoda*) from the Philippines, *P. pellucida* (Quate, 1965) comb. nov. (from *Psychoda*) from Malaysia, *P. pinguicula* (Quate & Quate, 1967) comb. nov. (from *Psychoda*) from New Guinea, and *P. rujumensis* sp. nov. from Yemen.

Psychana rujumensis sp. nov.

(Figs. 35-53)

Type material. HOLOTYPE: ♂, YEMEN: Ar Rujum, 15°29'N 43°41'E, 16.x.2000-15.i.2001, Malaise trap, A. van Harten leg. Slide, dissected specimen, Cat. No. 34264, Inv. No. 14053 (NMPC). PARATYPES: 3 ♂♂ 6 ♀♀ (slides, NMPC), the same locality, collector and trap. ALLOTYPE: ♀, 16.x.2000-15.i.2001, Cat. No. 34265, Inv. No. 14054. OTHER PARATYPES: ♂♂, same date, Cat. No. 34266-34267, Inv. No. 14055-14056; 16.i.-9.iv.2001, Cat. No. 34268, Inv. No. 14057; ♀♀, 16.x.2000-15.i.2001, Cat. No. 34269-34271, Inv. No. 14058-14060; 16.i.-



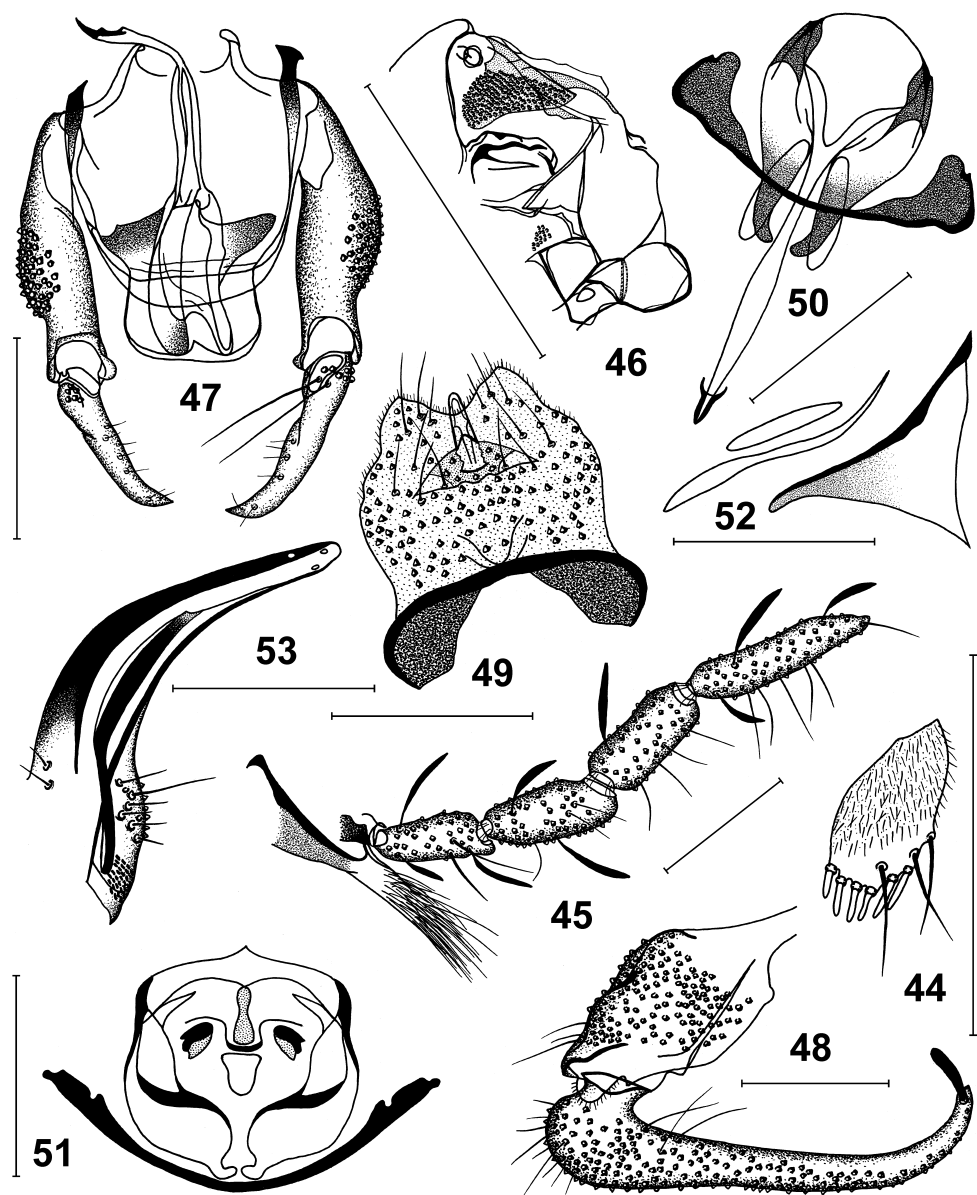
Figs. 35-43. *Psychana rujumensis* sp. nov., ♂. 35 – head; 36 – facets; 37 – basal antennomeres; 38 – apical antennomeres; 39 – wing; 40 – dorsal view of fore claw; 41 – lateral view of aedeagal complex; 42 – lateral view of gonocoxite and gonostyle; 43 – dorsal view of epandrium and surstyli. Scales = 0.1 mm (Figs. 35-38, 40-43); 1 mm (Fig. 39).

9.iv.2001, Cat. No. 34272, Inv. No. 14061; 9.iv.-5.vi.2001, Cat. No. 34273, Inv. No. 14062. Figures based mainly on the holotype, partially on paratypes.

Description. Male. Eyes separated, C-shaped (Fig. 35). Minimum distance between upper part of eyes hardly as wide as diameter of facet (Fig. 36). Eye bridge formed by four rows of facets. Frontoclypeus with large central three-lobed patch of insertions of hairs; medial stripe longest, not connected with vertex pits. Antennae 15-segmented (Figs. 37, 38); scape very short, wide, hardly globular; flagellomeres pitcher-shaped, symmetrical; last three flagellomeres gradually reduced; antennomere 13 pyriform, antennomere 14 almost globular with very short neck, both segments fused; antennomere 15 minute, conical, entirely separated. Sensory filaments long, paired, with three branches. Length ratio of maxillary palpomeres 1 : 1.1 : 1 : 1.6 (Fig. 45), palpomere 4 not annulate. Terminal lobe of labium with six digital protuberances (Fig. 44). Maximum length of cibarium equal to 1.3 times length of epipharynx. Thoracic sclerites as in Fig. 46, meropleural sclerite inconspicuously divided. Wing (Fig. 39) widely lancet-shaped, 1.7 mm (holotype) and 1.6-1.9 mm (paratypes) long, almost clear, clouded between fore margin and R_1 in small narrow area; following veins or their parts strengthened: Sc (conspicuously), R_1 , R_5 , M_{1+2} , M_4 and Cu; basal costal nodes well visible, Sc uninterrupted; M_3 and Cu hardly with connection to M_4 ; R_5 extends in apex of wing. Medial wing angle 79° (BCD); wing indices: AB : AC : AD = 1.4 : 2.1 : 1.6; BC : CD : BD = 1 : 1.1 : 1.4; maximum length of wing equal to 2.2 times its maximum width. Maximum length of haltere equal to 2.8 times its maximum width. Ratios of lengths of femora, tibiae and first tarsomeres: $P_1 = 2.8 : 2.6 : 1$; $P_2 = 2.9 : 3.2 : 1.2$; $P_3 = 3.3 : 3.8 : 1.3$. Fore claws as in Fig. 40. Basal apodeme (Figs. 41, 47) of male genitalia bent, narrow from dorsal view, widened from lateral one, pointed proximally; distal part of basal apodeme forked in two caudal arms. Copulatory organ with smooth surface outside, phallomeres of characteristic shape, sclerotized in some parts of lobes. Gonocoxite (Figs. 42, 47) long, cylindrical in lateral view and protruding laterally in dorsal view. Gonostylus somewhat shorter than gonocoxite, with acuminate apex, slightly arched. Epandrium (Figs. 43, 48) with two large patches of hair areas connected caudally, inside with two conspicuous spine-shaped protuberances, sclerotized remainders of tergite and sternite 10 missing. Basal aperture developed. Hypandrium (Figs. 41, 47) narrow, bare, slightly widened in middle. Epiproct and hypoproct small (Figs. 43, 48), hairy. Surstylus long, C-shaped, twice as long as epandrium, subapically with one retinaculum.

Female. Wing 1.6-2.0 mm long. Subgenital plate (Fig. 49) of characteristic shape, hairy, with large bilobed sclerotized basis; two small caudal lobuli separated by medial cleft. Sensory digit developed. Mesh-like structures of complicated sclerotized forms in the area of genital chamber not developed (Figs. 50, 51, 52). Cercus (Fig. 53) slightly bent, more than three times as long as its basal diameter.

Differential diagnosis. The new species is similar to *Psychana umbratica* Quate, 1965, in the shape of the terminal flagellomere, the form of male gonopode as well as surstylus and the shape of female subgenital plate, but is quite different in the structures of male genitalia. *Psychana rujumensis* sp. nov. is diagnosed by the conspicuously developed basal apodeme



Figs. 44-53. *Psychana rujumensis* sp. nov., ♂ (44-48) and ♀ (49-53). 44 – dorsal view of terminal lobe of labium; 45 – maxilla and maxillary palpus; 46 – lateral view of thoracic sclerites; 47 – dorsal view of aedeagal complex and gonopods; 48 – lateral view of epandrium and surstylus; 49 – subgenital plate; 50 – dorsal view of genital chamber; 51 – same, anterior view; 52 – same, lateral view; 53 – lateral view of cercus. Scales = 0.1 mm (Figs. 44-45, 47-53); 0.5 mm (Fig. 46).

and ventral phallomere, short and partially fused dorsal phallomeres, and conspicuously sclerotized sides of the base of female subgenital plate (present as largely widened patches). *Psychana umbratica* has a rudimentary basal apodeme of the male genitalia and ventral phallomere, very long and entirely fused dorsal paired phallomeres, and a narrowly sclerotized base of subgenital plate.

Etymology. Named after the type locality.

Distribution. Yemen.

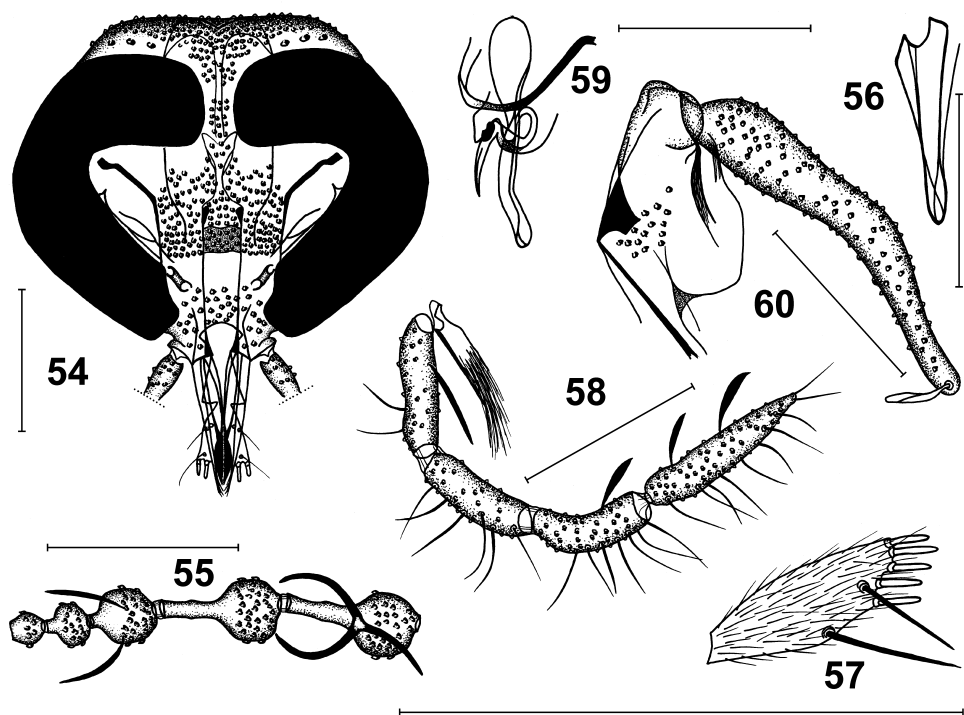
Bionomy. Unknown. The adults were trapped in a Malaise trap at Ar Rujum from October to June.

***Psychoda obscuripennis* sp. nov.**

(Figs. 54-69)

Type material. HOLOTYPE: ♂, **YEMEN**: Ar Rujum, 15°29'N 43°41'E, 9.iv.-5.vi.2001, Malaise trap, A. van Harten leg. Slide, dissected specimen, Cat. No. 34274, Inv. No. 14063 (NMPC). PARATYPES: 2 ♂♂ (slides, NMPC), 16.x.2000-15.1.2001, the same data, Cat. No. 34275-34276, Inv. No. 14064-14065. Figures based mainly on the holotype, partially on paratypes.

Description. Male. Head (Fig. 54) about 1.2 times as broad as long. Vertex reduced, conspicuously low, sunken and hairy. Upper edges of eyes separated by distance of 1.2 facet diameter (Fig. 61). Frontoclypeus with patch of scars extending to upper edges of eyes on each side and in midline; medial extension stretching between eye-bridges to level of second or third row of facets. Interocular suture absent. Eye-bridges composed of four rows of facets. Ratios of distance of apices of ends of eyes to minimum width of frons 7.6 : 1, to facet diameter 8.8 : 1. Antennae with 15 segments (Figs. 55, 62); scape very short, somewhat widened distally, 1.3 times as long as broad; pedicel almost globular, cut distally in peripheral margin; flagellomeres amphora-shaped, distal ones with rather long necks; last three flagellomeres separated. Antennomeres 14 and 15 of almost equal size, smaller in contrast to antennomere 13, antennomeres 13 and 14 with very short necks; apical antennomere cut distally. Sensory filaments (ascoids) larger than flagellomeres (Fig. 62), paired, with three branches. Length ratios of maxillary palpomeres 1.3 : 1.1 : 1 : 1.5, palpomere 4 not annulate (Fig. 58). Terminal lobe of labium with five digitiform projections and two long setae (Fig. 57). Maximum length of cibarium equal to 1.2 times length of epipharynx. Labrum as in Fig. 56, thoracic sclerites as in Fig. 63. Wing 1.3 mm (holotype) to 1.4 mm (paratypes) long, pointed, narrow, clear, anterior edge hardly less convex than posterior one, the latter not enlarged in cubital region (Fig. 64); following veins or their parts strengthened: Sc, R_1 , base of R_4 , R_5 , basal part of M_{1+2} , M_4 and Cu; reduced R_2 recurved and jointed to R_1 ; inconspicuous and reduced R_{2+3} connected basally to base of R_4 ; radial fork not developed in contrast to medial one. Basal costal nodes well visible, Sc long and bent; M_4 and Cu connected basally, M_3 free; R_5 in apex of wing; wing length equal to 2.5 times its maximum width. Maximum length of haltere equal to 3 times its maximum width. Ratios of lengths of femora, tibiae and first tarsomeres: $P_1 = 2.2 : 2.1 : 1$; $P_2 = 2.3 : 2.9 : 1.2$; $P_3 = 2.5 : 3.2 : 1.2$. Fore claws tapering and bent distally (Figs. 65, 66). Basal apodeme of male genitalia (Figs. 59, 67) compressed

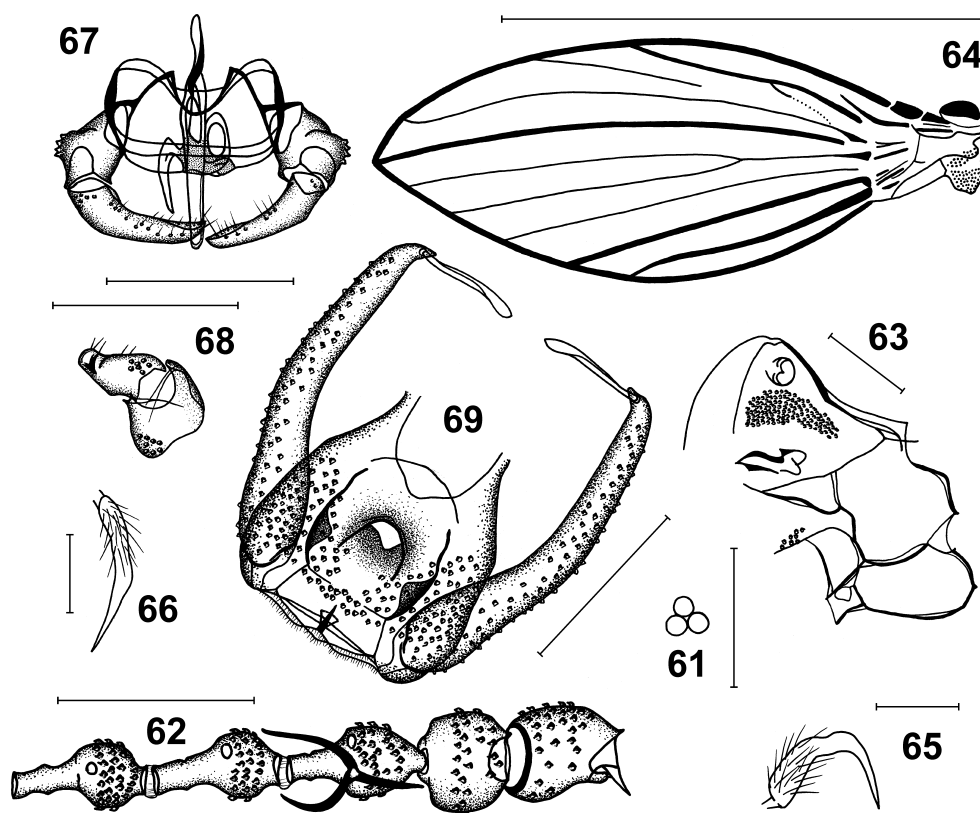


Figs. 54-60. *Psychoda obscuripennis* sp. nov., ♂. 54 – head; 55 – apical antennomeres; 56 – labrum; 57 – dorsal view of terminal lobe of labium; 58 – maxilla and maxillary palpus; 59 – lateral view of aedeagal complex; 60 – lateral view of epandrium and surstylus. Scales = 0.1 mm.

laterally, narrow and almost straight in dorsal view, conspicuously widened and proximally rounded in lateral view; distal part of basal apodeme forked into two caudal parts connected with aedeagal complex. Phallobasis of irregular shape with three phallomeres around gonopore; dorsal phallomeres long, thick, fused, of grooved form (lateral view), rounded on top; ventral phallomere slightly shorter, hooked and pointed, parallel to dorsal phallomeres; circular loop in basis of aedeagal complex of characteristic shape. Gonocoxite (Figs. 67, 68) very short, thick, protruded laterally. Gonostylus elongate, somewhat bent, enlarged in basal parts, longer than gonocoxite from dorsal view, setose. Epandrium (Figs. 60, 69) broad and short, with single large central opening, two large triangular patches of scars connected distally in medial line. Sclerotized remainders of tergite and sternite 10 inside of epandrium reduced to two almost triangular areas. Hypandrium narrow (Figs. 59, 67), bare. Epiproct and hypoproct in a form of hairy fold, inconspicuous (Fig. 69). Epiproct bilobed, hypoproct with one lobulus. Surstylus approximately twice as long as epandrium, slightly twisted in lateral view and inconspicuously C-shaped in dorsal view, with many scars, one long retinaculum subapically (Figs. 60, 69).

Female. Unknown.

Differential diagnosis. *Psychoda obscuripennis* sp. nov. differs from *P. uniformata* Hase-man, 1907 in having the veins peculiarly ordered and the radial fork not developed (Fig. 64),



Figs. 61-69. *Psychoda obscuripennis* sp. nov., ♂. 61 – facets; 62 – basal antennomeres; 63 – lateral view of thoracic sclerites; 64 – wing; 65 – lateral view of fore claw; 66 – same, dorsal view; 67 – dorsal view of aedeagal complex and gonopods; 68 – lateral view of gonocoxite and gonostyle; 69 – dorsal view of epandrium and surstyli. Scales = 0.1 mm (Figs. 61-63, 67-69); 1 mm (Fig. 64); 0.01 mm (Figs. 65-66).

R_2 and R_{2+3} reduced, the rest of R_2 connected with R_1 , and R_{2+3} with R_4 basally; the phallobasis is bare, with the ventral phallomere conspicuously shorter than dorsal ones (Figs. 59, 67); sclerotized remainders of tergite and sternite 10 are reduced but present; and the surstyli are twice as long as the epandrium (Figs. 60, 69). In males of *P. uniformata* the radial fork is developed, R_2 and R_{2+3} are fully present, R_2 lacks a connection with R_1 , R_{2+3} is not jointed with R_4 ; the phallobasis is provided with two tufts of long hairs, the ventral phallomere is almost as long as the dorsal one; the remnants of tergite and sternite 10 are missing; and the surstyli are as long as the epandrium.

Etymology. Obscurus (Latin, adjective) = unclear, obscure; penna (Latin, substantive) = wing – in reference to the peculiar order of wing veins.

Bionomy. Unknown. The adults were trapped in a Malaise trap at Ar Rujum from October to June.

Distribution. Yemen.

Comments on the generic classification. The diagnosis, synonymy, biology and distribution of the genus *Psychoda* Latreille, 1796 in a strict sense (type species: *Tipula phalaenoides* Linnaeus, 1758) were given by JEŽEK (1984, 1990). The taxonomical position of the genus and its relationship to other genera were discussed by JEŽEK (1983).

***Psychodula harrisi* (Satchell, 1950) comb. nov.**

(Figs. 70-84)

Psychoda harrisi Satchell, 1950: 171.

Psychoda harrisi: TONNOIR (1953): 447; QUATE (1954): 354; QUATE (1959): 484; QUATE (1962a): 57; QUATE (1962b): 234; QUATE (1962c): 186; QUATE (1965): 883; DUCKHOUSE (1966): 196; QUATE (1966): 317; QUATE & QUATE (1967): 166; DUCKHOUSE (1973): 240; IPE et al. (1986): 130; DUCKHOUSE & LEWIS (1989): 176; WAGNER (1990): 47.

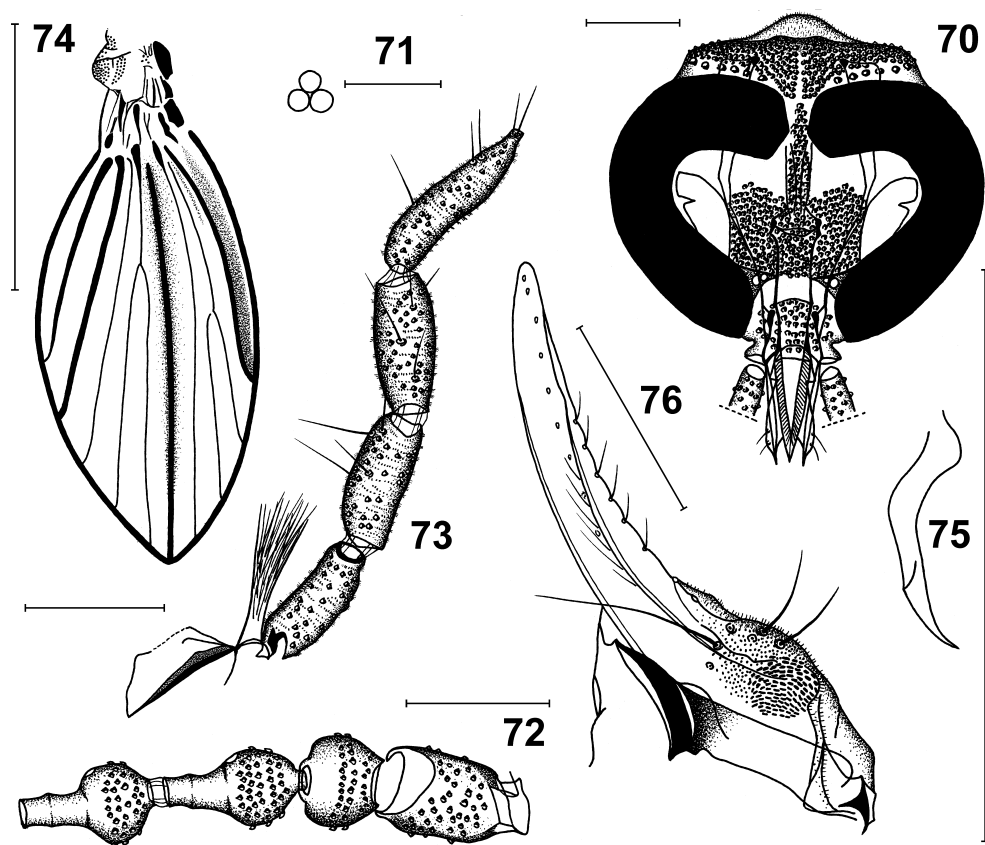
Psychoda bifurcata Tokunaga, 1958: 378 (female only).

Psychoda hamatifera Tokunaga, 1958: 385 (male only).

Chodopsycha harrisi: JEŽEK (1984): 138; SASAKAWA (1986): 3; ANONYMUS (1990): 13-14.

Material examined. **YEMEN:** Ar Rujum, 15°29'N 43°41'E, Malaise trap, A. van Harten leg., 8 ♀♀, dissected, slides (NMPC): 16.i.-9.iv.2001, Cat. No. 34277-34282, Inv. No. 14066-14071; 9.iv.-5.6.2001, Cat. No. 34283, Inv. No. 14072; 16.x.2000-15.i.2001, Cat. No. 34284, Inv. No. 14073. Figures based on Inv. No. 14066-14070.

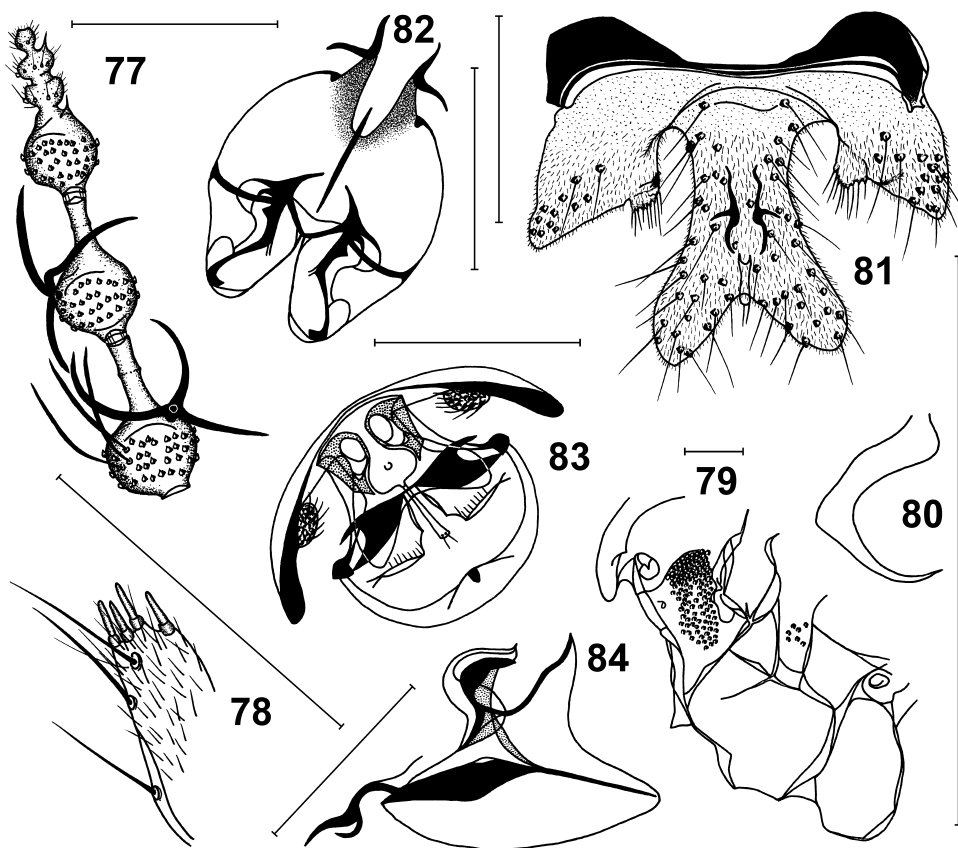
Redescription. Female. Upper edges of eyes separated (Fig. 70), ocular bridge composed of four rows of facets (Fig. 71). Lower part of frontoclypeus with large, almost rectangular patch of inserted hairs, narrow medial stripe of pits ending between upper edges of eyes, and short stripe on both sides. Minimum distance between upper edges of eyes slightly larger than facet diameter. Ratios of distance of tangential points of ends of eyes to minimum width of frons 6.3 : 1, to facet diameter 7.3 : 1. Antennae with 16 segments (Figs. 72, 77). Scape cylindrical, twice as long as pedicel, the latter is bowl-shaped. Flagellomeres 1-10 amphora-shaped, last four flagellomeres fused, almost globular and almost gradually reduced, last three flagellomeres minute (apical one smallest) and in comparison to preceding segments with long neck. Antennomeres 13 and 15 spined. Sensory filaments (Fig. 77) conspicuous and well visible, with three branches. Length ratio of maxillary palpomeres 1.1 : 1 : 1 : 1.4 (Fig. 73). All palpomeres with transversal rows of small bristles. Terminal lobe of labium with four digitiform projections and three long setae (Fig. 78). Maximum length of cibarium equal to 1.2 times length of epipharynx. Thoracic sclerites as in Fig. 79. Wing (Fig. 74) widely lancet-shaped, 2.0-2.4 mm long, inconspicuously clouded, conspicuously and narrowly so only between costal margin and R_1 and in short line between R_1 and R_{2+3} . Vein R_5 bordered by narrow longitudinal cloud; following veins or their parts strengthened: R_1 , Sc, base of R_4 , R_5 , base of M_{1+2} , M_4 and Cu; basal costal nodes distinct, Sc uninterrupted, twice constricted and bent; M_3 and Cu without connection to M_4 ; R_5 in apex of wing; veins r-r, r-m and m-m not visible; medial wing angle (BCD) 100°; wing indices: AB : AC : AD = 2.9 : 3.4 : 2.7; BC : CD : BD = 1 : 1.6 : 2; maximum length of wing equal to 2.4 times its maximum width. Maximum length of haltere equal to 3.5 times its maximum width. Ratios of lengths of femora, tibiae and first tarsomeres: $P_1 = 2.7 : 2.9 : 1$; $P_2 = 3.3 : 3.9 : 1.2$; $P_3 = 3.5 : 4.3 : 1.2$. Fore claws S-shaped



Figs. 70-76. *Psychodula harrisi* (Satchell, 1950), ♀. 70 – head; 71 – facets; 72 – basal antennomeres; 73 – maxilla and maxillary palpus; 74 – wing; 75 – dorsal view of fore claw; 76 – lateral view of cercus. Scales = 0.1 mm (Figs. 70-73, 75-76); 1 mm (Fig. 74).

(Figs. 75, 80). Subgenital plate of characteristic shape (Fig. 81) with three lobes: middle lobe long, Y-shaped, external lobes shorter, pointed, with small inner lobuli, hairy; sensory digit of middle lobe developed, with two setae and characteristic three-armed sclerites below, connected with genital chamber (Figs. 82, 83, 84); plate with numerous long setae distally. Cercus long, slightly bent (Fig. 76).

Male. Unknown to us; shortly described and figured (male genitalia) by Satchell (1950). **Differential diagnosis.** The female of this species is similar to *Psychodula minuta* (Banks, 1894) by its size and the fusion of the last flagellomeres; however, its subgenital plate (Fig. 81) uniquely shaped, composed of three characteristic lobes (Figs. 82, 83, 84), and bearing numerous long setae. In *P. minuta*, the subgenital plate is compact, shortly tongue-shaped and without deep clefts or long setae, but with two small, apical, horizontally oriented lobuli.



Figs. 77-84. *Psychodula harrisi* (Satchell, 1950), ♀. 77 – apical antennomeres; 78 – dorsal view of terminal lobe of labium; 79 – lateral view of thoracic sclerites; 80 – lateral view of fore claw; 81 – subgenital plate; 82 – dorsal view of genital chamber; 83 – same, anterior view; 84 – same, lateral view. Scales = 0.1 mm.

Bionomy. DUCKHOUSE (1966) stated that the species breeds in cow dung, chicken dung or wet garden rubbish.

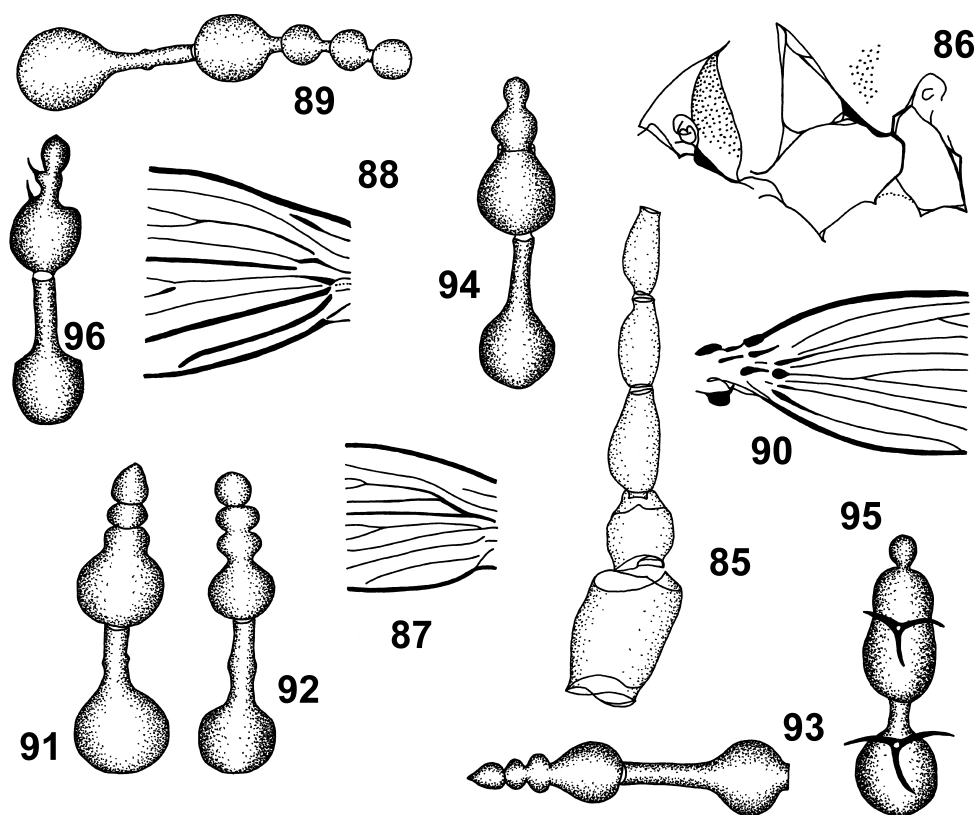
Distribution. New Zealand, Australia, Papua New Guinea, Pacific Islands, Hawaii, Japan (Ryukyu Islands), the Philippines, Indonesia, Borneo, Malaysia and India. New to the fauna of the Afrotropical region; DUCKHOUSE & LEWIS (1980) did not list this species.

Comments on the generic classification. The diagnosis, synonymy, biology and distribution of the genus *Psychodula* Ježek, 1984 (type species: *Psychoda minuta* Banks, 1894), separated from the genus *Psychoda* Latreille, 1796, were discussed by JEŽEK (1984, 1990). The taxonomical position of the genus and its relationships to other genera were discussed by JEŽEK (1983).

Preliminary key to the tribes of the Psychodinae and the world genera of the Psychodini

The preliminary key to the world genera of the Psychodini is based mainly on the size and form of the antennal segments, and the presence or absence of the fusion among the flagellomeres.

- 1 Basal flagellomeres spindle-shaped (Fig. 85) **Pericomini**
- Basal flagellomeres (Fig. 27) bulbous (nodes), with rather long and narrow necks (internodes) 2
- 2(1) Pteropleurite trapezoidal (Fig. 84), always with conspicuously marked upper suture. **Psychodini** 4
- Pteropleurite not as above, upper suture partially developed or missing (Fig. 86) 3
- 3(2) Wing basally with prolonged R_{2+3} , with connection of R_4 (Fig. 87) **Mormiini**
- Wing basally with prolonged R_4 , with connection of R_{2+3} (Fig. 88) **Paramormiini**
- 4(2) Antenna 16-segmented, last three flagellomeres reduced, almost of equal size (Fig. 89) 5
- Antenna 14- or 15-segmented, terminal flagellomeres of different size – Fig. 38 (swelling without insertions of macrotrichiae or spines is not here recognized as a segment) 9
- 5(4) Antennomeres 13-16 always separated; base of M_{1+2} widened as circular patch (Fig. 90); male surstylus club-shaped, short (type species *Psychoda cinerea* Banks, 1894) **Psychodocha Ježek, 1984**
- Antennomeres 13-16 not always separated; base of M_{1+2} not circular; surstylus long and bent 6
- 6(5) Head extended in dorso-ventral line (frontal view); antennomeres 13 and 14 fused, antennomere 15 separated, (apical) antennomere 16 pyriform (Fig. 91); terminal lobe of labium with three digitiform projections (type species *Psychoda grisescens* Tonnoir, 1922) **Psycha Ježek, 1984**
- Head almost circular in frontal view, antennomeres 13-16 fused differently; terminal lobe of labium mostly with four digitiform projections, if only three projections developed then ventral male phallomere needle-shaped, very long and bent backwards to phallobasis 7
- 7(6) Antennomeres 15 and 16 fused (Fig. 77); M_3 and M_4 separated at base of wing; phallobasis or aedeagal complex with two large triangular sclerotizations (type species *Psychoda minuta* Banks, 1894) **Psychodula Ježek, 1984**
- Antennal segments 15 and 16 separated; M_3 and M_4 connected at wing base; phallobasis or aedeagal complex without conspicuous additional sclerotizations 8
- 8(7) Apical flagellomere globular (Fig. 92); index of facet diameter to minimum width of frons 6.0 (type species *Psychoda lobata* Tonnoir, 1940) **Chodopsycha Ježek, 1984**
- Apical flagellomere droplet-shaped (Fig. 93); index of facet diameter to minimum width of frons 2.3 (type species *Psychoda trinodulosa* Tonnoir, 1922) **Psychomora Ježek, 1984**
- 9(4) Antenna 15-segmented 10
- Antenna 14-segmented, antennomere 13 (frequently only indicated as swelling) with one or more lateral spines (Fig. 28), sensory filament (ascoid) with three or four branches 13
- 10(9) Last three antennomeres separated, antennomeres 14 and 15 of equal size, minute (Fig. 55), antennomere 13 larger (type species *Tipula phalaenoides* Linnaeus, 1758) **Psychoda Latreille, 1796**
- Not as above 11
- 11(10) Antennomeres 13 and 14 fused, antennomere 15 separated and conical (Fig. 38); meropleural suture conspicuously or slightly developed, as in Fig. 46 (type species *Psychana rujumensis* sp.n.) **Psychana gen. nov.**
- Antennomeres 13-15 fused, antennomere 15 not conical; meropleural suture entirely missing 12
- 12(11) Antennomere 13 with conspicuous circular distal fold (Fig. 94), sensory filaments with large branches, longer than flagellar nodes; terminal lobe of labium with three digitiform projections; apices of wing veins without dark patches of hairs (type species *Psychoda setigera* Tonnoir, 1922) **Ypsydocha Ježek, 1984**
- Antennomere 13 without fold, sensory filaments with small branches (Fig. 95), shorter than flagellar nodes; terminal lobe of labium with five digitiform projections; dark patches of hairs near apices of veins developed (type species *Psychoda alternata* Say, 1824) **Tinearia Schellenberg, 1803**



Figs. 85-96. 85 – *Pneumia plumicornis* (Tonnoir, 1922), basal antennomeres; 86 – *Orgaoclogmia caboverdeana* Ježek & van Harten, 1996, thoracic sclerites; 87 – *Hemimormia bartaki* Ježek, 2001, part of wing; 88 – *Telmatoscopus hajeki* Ježek, 1997, same; 89 – *Psychodocha cinerea* (Banks, 1894), apical antennomeres; 90 – *Psychodocha gemina* (Eaton, 1904), part of wing; 91 – *Psyscha grisescens* (Tonnoir, 1922), apical antennomeres; 92 – *Chodopsycha lobata* (Tonnoir, 1940), same; 93 – *Psychomora trinodulosa* (Tonnoir, 1922), same; 94 – *Ypsydocha setigera* (Tonnoir, 1922), same; 95 – *Tinearia lativentris* (Berdén, 1952), same; 96 – *Logima satchelli* (QUATE, 1955), same. Schematically adapted from JEŽEK (1977, 1985, 1990, 1997, 2001) and JEŽEK & van HARTEN (1996).

- 13(9) Sensory filaments of basal flagellomeres with four branches (Fig. 27); gonocoxite very short, with hemispherical lateral protuberance, gonostylus with one long seta at middle (type species *Psychoda savaiensis* Edwards, 1928) **Falsologima Ježek & van Harten, 1996**
- Sensory filaments of basal flagellomeres with three branches; gonocoxite long, without conspicuous lateral protuberance, gonostylus not as above 14
- 14(13) Antennomere 12 with conspicuous neck, small or large swelling between antennomeres 13 and 14 frequently developed (Fig. 96), with or without one or more lateral spines; ventral phallomere without basal ring embracing dorsal phallomeres (type species *Psychoda erminea* Eaton, 1893) **Logima Eaton, 1904**
- Antennomere 12 without neck (Fig. 11), swelling between antennomeres 13 and 14 always missing; ventral phallomere with more or less developed basal ring (type species *Psychoda brevicornis* Tonnoir, 1940) **Copropsychoda Vaillant, 1971**

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