

The identity of *Scatopse diabolica* Duda, 1928, with description of a new genus from Mexico (Diptera, Scatopsidae)

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The identity of *Scatopse diabolica* Duda, 1928, with description of a new genus from Mexico (Diptera, Scatopsidae). - *Scatopse diabolica* Duda, 1928 is redescribed and the genus *Aztecatopse* gen. n. is erected for this species. The systematic position of the new genus is discussed.

Keywords: Scatopsidae - systematics - *Aztecatopse* - new genus - Mexico.

INTRODUCTION

Mexican Scatopsidae have received little attention in the past with scattered records and descriptions of new species in papers by Duda (1928) and Cook (1956a, 1956b, 1958, 1978). In contrast several recent papers by Huerta & Ibáñez-Bernal (2008), Huerta & Dzul (2010, 2013) and Huerta (2013) added 18 species to the 12 (rightly 11, as *Parascatopse sonorensis* Cook, 1955 is from Arizona) listed by Ibanez (2005), thus bringing to 29 the number of species known from Mexico.

However, some of the species originally described in genus *Scatopse* by Duda (1928) have not been revised since their original description and their generic placement remains uncertain. This is the case for *S. diabolica* Duda, 1928, which has been successively placed in *Rhegmoclemina* (*Rhegmoclemina*) by Cook (1967) and in *Quateiella* by Amorim (2008). Specimens belonging to this species were caught during a recent survey of the Diptera in an arid region of the state of México. No less than three undescribed species clearly congeneric with *S. diabolica* were found in the material of the same survey and will be described elsewhere (Huerta & Haenni, in prep.). This group of species does not fit into any of the known genera of the family and a new genus is proposed for them in the present paper.

MATERIAL AND METHODS

Dry preserved type material of *Scatopse diabolica* Duda, 1928, and, for comparison, types of *Pararhexosa flavipalpis* (Edwards, 1928) and *Reichertella* (*Pharsoreichertella*) *producta* (Cook, 1957) were studied from museum collections by the senior author (JPH). Additional recent material was collected in 2007-08 by means of a Malaise trap operated by D. Hernández Zetina in Coyotepec near Otumba (Estado

de México) (altitude 2530 m, coordinates 19°39'09.3"N; 98°45'25.7"W) (Fig. 1). The material is preserved in 70% ethyl alcohol and Diptera were sorted for scatopsids by the junior author (HH). Some of the specimens were then cleared in 10% KOH, dissected and mounted in Euparal on microscope slides and microphotographs were made using a digital camera Infinity 1, through an Olympus compound microscope by the junior author (HH). Some photos were edited using Adobe Photoshop by HH. The drawing of the lectotype of *S. diabolica* was made by Mathieu Rapp using a camera lucida.

ACRONYMS OF COLLECTIONS

- CAIM Colección de Artrópodos con Importancia Médica, Ciudad de México, Mexico
MHNN Muséum d'histoire naturelle Neuchâtel, Switzerland
NHM Natural History Museum, London, U.K.
SI Smithsonian Institution, Washington, U.S.A.
ZMB Museum für Naturkunde der Humboldt-Universität zu Berlin, Germany

RESULTS

Aztecatopse gen. n.

TYPE-SPECIES: *Scatopse diabolica* Duda, 1928 (by present designation).

DIAGNOSIS: Antennal flagellum 8-segmented; flagellomeres 2-7 twice as wide as long, with single whorl of setae on each flagellomere; palpus reniform, moderately elongate; thorax longer than wide, anterior spiracular sclerite as high as long, bearing acute anterodorsal projection, with large spiracular opening; wings densely microtrichose, R_{4+5} reaching costa at or slightly beyond mid of wing, and slightly beyond level of medial fork; medial fork longer than stem, without indication of an angle or an anteriorly directed stem of vein; second costal section shorter than first; a fold present between M_2 and CuA_1 ; CuA_2 smoothly angled midway to apex, reaching the hind margin of the wing rather abruptly, though obliquely; halteres with setae on stem; posterior tibia with longitudinal-transverse apical comb of setae posteriorly; abdominal tergites and sternites normally sclerotized, but sternites 2-4 narrower; sternites with pilosity and scattered microtrichia present, tergites with pilosity and microtrichia diversely reduced; tergite 7 of male with a pair of more or less developed lateral posterior projections; sternite 7 with complex meso-posterior emargination; male genitalia rotated 180°, capsule-like, elongate, epandrium projected into a more or less developed beak-like projection directed ventrally *in situ*, with 2 pairs of elongate appendages (parameres and gonocoxites), aedeagus long and thick, diversely modified, densely pilose apically; female terminalia with tergite 8 broad, bearing spiracles, tergite 10 divided into pair of triangular sclerites, sternite 8 bilobed posteriorly or entirely divided into pair of basal lobes joined by basal sclerotized bridge; genital furca present; spermatheca rounded-oval.

DESCRIPTION: Length between 1.8 and 2.5 mm; dark brownish in general colour, shining. Head slightly higher than long or as high as long, antennae longer than head height, with 8 flagellomeres, with flagellomeres 2-7 twice as wide as long, micro-



FIG. 1

Habitat of *Aztecatoxpe diabolica* in Coyotepec, near Otumba (Estado de México) at the location of the Malaise trap (photograph Dulce Hernández Zetina).

sculptured and bearing single whorl of setae, last flagellomere longer, with 3 whorls of setae. Compound eyes not particularly large, with broad supra-antennal bridge, interfacetal setae present; ocelli equal in size; frons pilose under eye-bridge; face pilose; palpi reniform, moderately elongate, somewhat pointed apically with a subapical sensorial pit; labella more or less equal in length to palpi or somewhat shorter; cardo-stipes not fused medially; distal end of postmentum projecting between the labella. Occipital sensilla 2-3, close to eye margin. Thorax longer than wide, notum covered with short pilosity and a row of distinct supra-alar setae, scutellum with 12-14 longer marginal setae. Pronotal apodeme curved; anterior spiracular sclerite as high as long, setose, with large spiracular opening and an acute antero-dorsal projection; pleura with setae on antepnotum, proepimeron, proepisternum, anepisternum, katepisternum and metepimeron; meron and metepisternum devoid of pilosity and micropilosity; katepisternum largely devoid of micropilosity; anepisternum rectangular in shape; metepimeron with pointed posterolateral projection. Wings 1-2 mm long, membrane densely microtrichose, devoid of macrotrichia except usual row along posterior margin. Costa extending to middle of wing or slightly beyond (0.47-0.51), second section shorter than first; stem of M shorter than fork, forking before level of merging of R_{4+5} to costa; M_1 and M_2 diverging towards wing margin, no indication of an anteriorly directed stem of vein or angle on M_1 ; a fold ("false vein") present between M_2 and CuA_1 ; CuA_1 more

or less straight, reaching wing margin or nearly so; CuA_2 with only one bend, smoothly angled about midway, reaching hind margin of wing quite abruptly but obliquely. Halteres with 1-6 setae on stem. Legs setose on all parts; anterior coxa longer than median and posterior coxa; hind femora longer than anterior and mid femora; hind tibia with a longitudinal-transverse apical comb of setae posteriorly; first tarsomere longer than second, fourth shortest; claws curved, with empodium developed. Abdomen with seven well developed pre-genital segments; tergites pilose, only very sparsely microtrichose; paired lunula-like pretergites developed in tergite 2; sternite 1 absent, sternites 2-7 normally developed, sclerotized, 2-4 narrower, all pilose and microtrichose; segment 7 with narrow anterior ring of sclerotization, tergite 7 with more or less developed paired lateral projections and an inner weakly sclerotized concave structure; sternite 7 with deep complex posterior emargination and pair of posterolateral lobes more or less developed; male genital capsule elongate, epandrium ventrally (when genital capsule *in situ*) projected into more or less developed beak-like projection; aedeagus long and thick, sperm duct modified, thickly microtrichose apically; parameres elongated, widening and bearing setae apically, articulated to base of aedeagus through a small sclerite; gonocoxites more or less claw-like or spatulate, elongate, apically pilose. Sperm-pump large. Female as male in general features; tergites 1-4 only very sparsely pilose, devoid of micropilosity, tergites 5-8 pilose, 7-8 also micropilose; abdominal segment 7 not strongly modified, posterior margins of tergite and sternite somewhat emarginated; tergite 8 broad, with slightly emarginated posterior margin, bearing pair of basal spiracular openings, tergite 10 divided into pair of triangular sclerites; sternite 8 complex, more or less divided, bilobed, with pair of submedian pointed posterior projections or with lateral lobes widely separated and joined medially by a bridge-shaped structure; genital furca present, weakly sclerotized; spermatheca rounded-oval.

Species included. Nearctic. *Scatopse diabolica* Duda, 1928 and three additional, yet undescribed species from Mexico (Huerta & Haenni, in prep.).

ETYMOLOGY: The new genus is named after the former Aztec Empire which extended over Central Mexico from the 14th to the 16th centuries. The name is a contraction of the words 'Aztec' and 'Scatopse' and the gender of the new genus is feminine.

DISCUSSION: The new genus presents a mixture of characters of the Swammerdamellini and the Scatopsini making its placement difficult. On one hand, the shape of CuA_2 reaching costa rather abruptly (but more obliquely than in most genera of Swammerdamellini), the short costa and radial sector reaching costa about middle of wing or hardly beyond, with second costal section shorter than first are considered synapomorphies of Swammerdamellini (Cook, 1972). This is also the case for the shape of the palpus, reniform-elongate and more or less pointed apically (Cook, 1972). However, a somewhat elongate, apically pointed palpus is also present in *Reichertella* of the Scatopsini, which also has a rather similarly abruptly bent CuA_2 joining the hind margin of wing obliquely. Moreover, *R. nigra* (Meigen, 1804), the type species of *Reichertella*, also has a shortened costa and R. On the other hand the presence of an acute antero-dorsal projection on the anterior spiracular sclerite is a

clear synapomorphy of the Scatopsini (which includes *Scatopse*, *Apiloscatopse* and *Reichertella*) according to Amorim (1982). Furthermore, the genital capsule presents several features characteristic of the Scatopsini: the elongate apically modified aedeagus, the presence of gonocoxites, and the development of parameres. The sclerotized abdominal sternites 2-6 and the short, practically as high as long anterior spiracular sclerite are plesiomorphic features seen in the Scatopsini, but also present otherwise in *Pararhexosa* Freeman of the Swammerdamellini.

The holotype of *Pararhexosa flavipalpis* (Edwards, 1928) was re-examined by the senior author (JPH) in the course of the present study. In this species, the anterior spiracular sclerite is devoid of an anterodorsal pointed projection and the palpus is large, reniform, broadly rounded at both ends, not more or less pointed apically as in *Reichertella* and the new genus. The key problem in this matter is thus the position of *Pararhexosa* and its delimitation. It is most unfortunate that the type species of this genus is known from the female only. The female terminalia of *Aztecatoxpe* gen. nov. do not seem to differ strongly from those of *Pararhexosa* regarding the more or less bilobed sternite 8. The development of tergite 8, however, is very different: it is almost entirely divided into a pair of lateral lobes by a deep posterior incision in *Pararhexosa*, while it is entire, hardly emarginate posteriorly in the new genus. In its original concept, *Pararhexosa* was established by Freeman (1990) for a unique Oriental species, *P. flavipalpis*, with very large sausage-shaped palpi. Freeman (1990) noted in the original description of the genus that "its relationships are not completely clear cut, but wing venation, large palpi and triangular spiracular sclerite suggest it should be placed near *Rhexosa* in the Swammerdamellini". Later, Amorim & Haenni (1997) confirmed this placement and transferred to this genus the Neotropical *P. tubifera* (Edwards, 1930) (also known from the female only) based on the shape of the palpus and of the anterior spiracular sclerite, and the normally developed abdominal sternites 2-6. Amorim (2007) considered *Pararhexosa* as the basal genus of the Swammerdamellini and transferred to this genus two Australasian species, *P. chelata* (Cook, 1971) and *P. senticosa* (Cook, 1971) originally described in *Rhexosa* (Cook 1971), plus two undescribed Neotropical species. He noted, however, that "the placement of these species still does not guarantee a monophyletic genus" (Amorim, 2007). Despite this restriction, he described the characters of the male [figured for the Australasian *P. chelata* (Amorim, 2007: figs 1-3)]. These species share the following characters: anterior spiracular sclerite not elongate and abdominal sternites 2-6 normally sclerotized. However, the palpus of *P. senticosa* as described by Cook (1971) is short, in contrast with the large, sausage-shaped palpus of the type species of the genus. This and other facts bring some doubt on the congeneric status of the species tentatively added by Amorim (2007). In particular, the Australasian *P. chelata* and *P. senticosa* are very probably not congeneric with the type species of *Pararhexosa*. Although the precise affinities of this genus are very difficult to establish on the basis of female characteristics only, *Pararhexosa* may possibly be better placed in the vicinity of the genera *Pharsoreichertella* and *Reichertella* within the Scatopsini, since it shares several characters with these genera, rather than in Swammerdamellini. The attribution of Neotropical (Amorim & Haenni, 1997; Amorim, 2007) and Australasian species (Amorim, 2007) to *Pararhexosa* seems not well founded according to our present

lacunar knowledge. Particularly, the discussion of the position of the genus based on male characters of Australasian or Neotropical species appears untimely. In our opinion, a sound discussion of the position of this genus should await the discovery of males of the type species or of another Oriental species that would be indisputably related to the type species of *Pararhexosa*. In a wider perspective, the question of the limits between Scatopsini and Swammerdamellini and even of the validity of these tribes is worth asking. On the basis of the points enumerated above and pending a general reconsideration of the Scatopsini and Swammerdamellini, *Aztecatoapse* is for the time being placed within the Scatopsini because the new genus appears to be more closely related to *Reichertella* and *Pharsoreichertella*.

The type material of the Nearctic *Pharsoreichertella producta* (Cook, 1957) was also examined in the course of this study. The species of *Aztecatoapse* are clearly not congeneric with this species. In *Pharsoreichertella* the tergite 8 of the female is practically divided into 2 lateral lobes while it is entire, hardly emarginated in the new genus; in the wing, C is long in *Pharsoreichertella*, reaching 2/3 or even 3/4 of wing length, while it is short, hardly reaching the middle of the wing in *Aztecatoapse*; the aedeagus is long, simple, unmodified in *Pharsoreichertella* while it is strongly modified in *Aztecatoapse*. The new genus differs from *Reichertella* in numerous male and female genital characters: in the male, the general shape of the genital capsule is elongate in the new genus whereas it is much shortened in *Reichertella*; the gonocoxites are well developed in the new genus whereas they are not recognizable in *Reichertella*; the parameres are elongate in *Aztecatoapse* whereas they are not apparent or short in *Reichertella*; in the female, the sternite 8 is more or less deeply divided into a pair of lateral lobes in the new genus whereas it bears a pair of strongly developed valvifers in *Reichertella*. The shape and development of the pregenital segment in the male and female also strongly differ in both genera.

***Aztecatoapse diabolica* (Duda 1928), comb. n.**

Figs 2-16

Scatopse diabolica Duda, 1928: 285, figs 15 (♂ hypopygium), 16 (♂ wing).

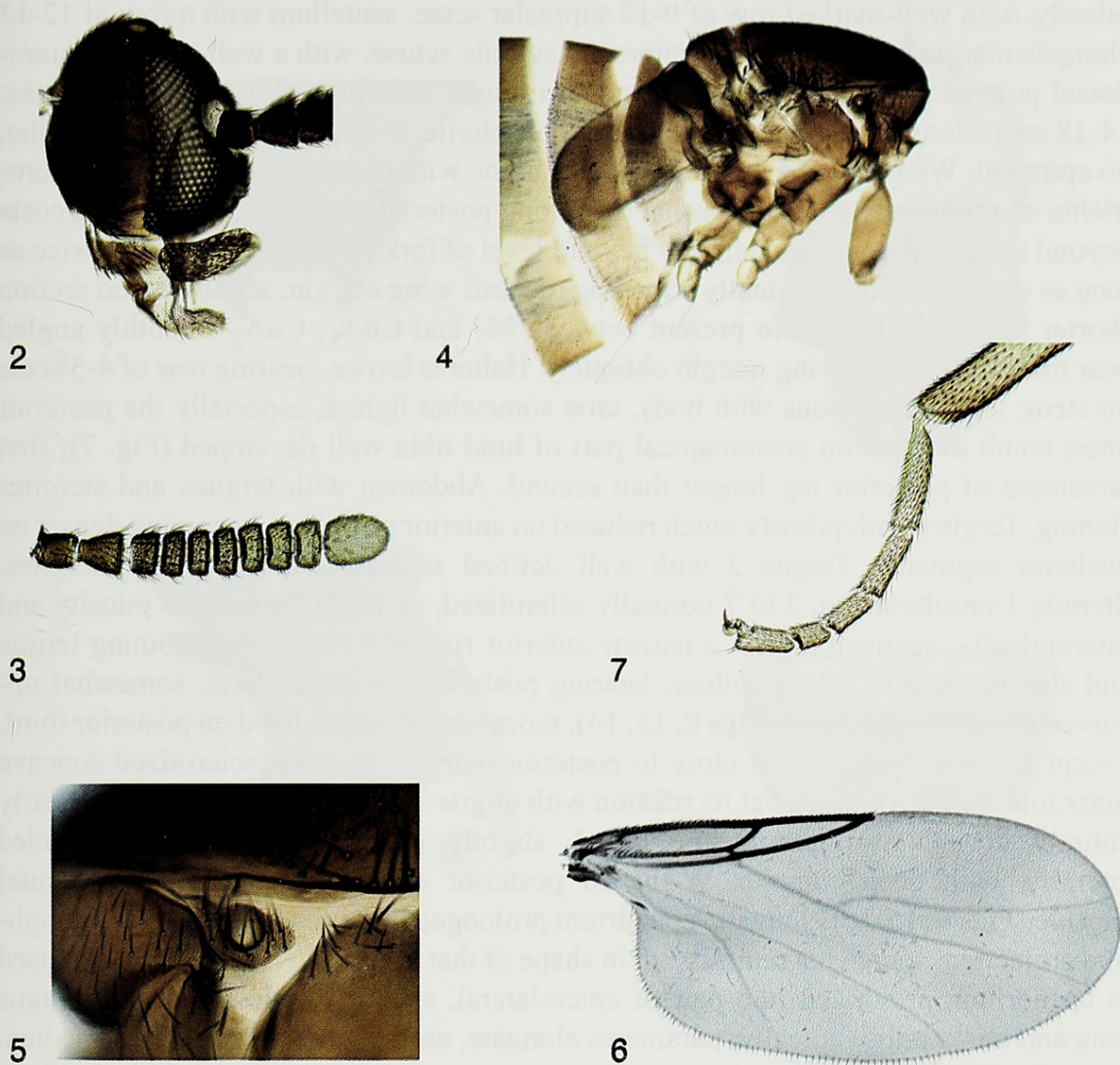
Rhegmoclemina (Rhegmoclemina) diabolica. – Cook, 1967: 3.

Quateiella diabolica. – Amorim, 2008: 12.

MATERIAL STUDIED: Type material: the first author has examined 3 males syntypes labelled respectively “MB 5.III.24 / Chapingo Garten”, “*diabolica* n.sp. ♂ det. Duda” [in Duda’ handwriting], “Syntypus”; “MB 58 30.5.24, Chapingo”, “*S. diabolica* n.sp.”, “Syntypus Zool. Mus. Berlin”, “*Scatopse diabolica* Duda, 1928 ♂ Lectotype, des. Haenni & Huerta 2008”, “*Aztecatoapse diabolica* (Duda), det. J.-P. Haenni 2008”; “MB 222” 23.IV.1924 [?], “*diabolica* ♂”, “Syntypus”, all deposited in ZMB. These three specimens are micropinned and double mounted. The first two are well preserved while the third is in a poorer state of conservation. The second specimen is here designated as lectotype and has been labelled accordingly.

OTHER MATERIAL: 4 ♂♂, 8 ♀♀, Mexico: Estado de México, Otumba, loc. Coyotepec, 2530 m, 19° 39' 09.3" N; 98° 45' 25.7" W, 12.IV-4.V.2007, Malaise Trap, D. Hernández Zetina leg., CAIM/MHNN (partly in alcohol, partly slide mounted). – 1♂, 1♀, same data except 24.V-14.VI.2007. – 2♂♂, 1♀, same data except 5-26.VI.2007. – 2♀♀, same data except 4-13.X.2007. – 1♂, same data except 23.I-13.II.2008, all in CAIM.

DIAGNOSIS: Males of *A. diabolica* are readily distinguished by the shape of tergite 7, bearing posteriorly a pair of pointed and somewhat upcurved lateral projections (Figs 8, 14) and by the ventrally projected, plough-like genital capsule



FIGS 2-7

Aztecatopse diabolica (Duda, 1928). (2) Head, ♀, lateral view. (3) Antenna, ♂. (4) Thorax, ♀, lateral view. (5) Spiracular sclerite, ♂. (6) Wing, ♂. (7) Tip of hind tibia, ♂. (2-7: Coyotepec) (Photographs Herón Huerta).

(Figs 13, 16). Females are distinguished by the shape of sternite 8, triangular with a deep and narrow U-shaped median incision densely beset with long pilosity (Fig. 12).

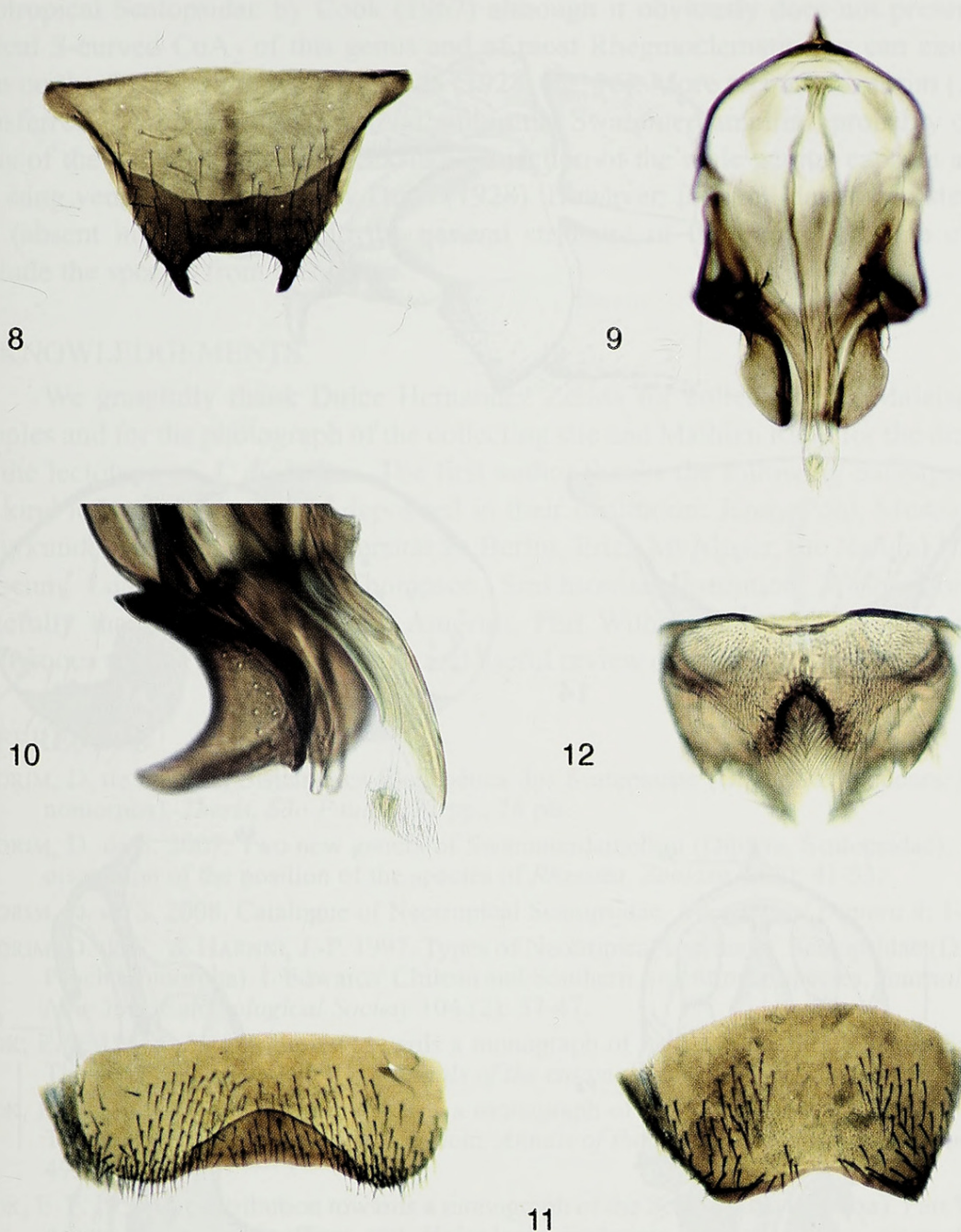
DESCRIPTION

Male: A shining brownish-black species in general colour; body length 1.5-1.75 mm (in pinned material, nearly 3 mm long in distended material in alcohol), wing length 2 mm. Head shining black, higher than long, antennae (Fig. 3) longer than head height, 8 flagellomeres, first rather quadrate, the following twice as wide as long, each bearing a whorl of setae, last flagellomere rounded, as long as 2 preceding ones, bearing 3 whorls of setae; palpi elongate, reniform, apically pointed; labella nearly as long as palpi. Thorax. Notum narrow, much longer than wide, covered with dense short

pilosity, with well-marked row of 9-12 supraalar setae, scutellum with a row of 12-14 elongate marginal setae; anterior spiracular sclerite setose, with a well-marked antero-dorsal pointed projection, spiracle large, not longer than high (Fig. 5); pleural setae: 14-18 anepisternal, in upper anterior corner of sclerite, 9-11 subalar, 5-8 subspiracular, no epimeral. Wing (Fig. 6) 2 mm long, membrane with dense microtrichia; no macrotrichia on membrane except for usual row along posterior margin; R_{4+5} reaching costa beyond middle of wing, and slightly beyond level of fork of M; M fork nearly twice as long as stem, with fork gradually widening towards wing margin; second costal section shorter than first, false vein present between M_2 and CuA_1 ; CuA_2 smoothly angled near middle, reaching wing margin obliquely. Halteres brown, bearing row of 4-5 setae on stem; legs concolorous with body, tarsi somewhat lighter, especially the posterior ones; comb of setae on posteroapical part of hind tibia well developed (Fig. 7); first tarsomere of posterior leg longer than second. Abdomen with tergites and sternites shining. Tergites with pilosity much reduced on anterior segments, becoming denser on posterior segments. Tergite 2 with well defined sublateral lunula-like pretergites. Sternite 1 unsclerotized, 2 to 7 normally sclerotized, regularly beset with pilosity and micropilosity; segment 7 with a narrow anterior ring of sclerotization joining tergite and sternite; tergite 7 long, pilose, bearing posteriorly paired lateral, somewhat up-curved pointed projections (Figs 8, 13, 14), more heavily sclerotized on posterior third, except for oval median zone close to posterior margin; apparent sclerotized concave inner fold well developed, but its relation with tergite 7 not fully clear; sternite 7 nearly entirely devoid of micropilosity, broad, slightly emarginate anteriorly, rounded laterally, with deep complex W-shaped posterior emargination (Fig. 14); genital capsule (Figs 9, 15-16) elongate, epandrium prolonged into broadly triangular, plough-like projection, somewhat reminiscent in shape of that in *Quateiella*; gonocoxites fused to epandrium, prolonged into pair of apico-lateral, spatulate, pilose lobes; aedeagus long and thick, pilose apically; parameres elongate, narrow, Y-shaped, bearing median, ventrally directed, apically pilose process; aedeagus with sperm-duct enlarged, pilose apically (Figs 10, 16); sperm pump elongate, large, with comparatively small vesica.

Female: Body 2.4 mm (somewhat longer in alcohol-preserved distended specimens), wing 1.9 mm. Similar to male in morphology and coloration, but palpi somewhat shorter and less pointed apically (Fig. 2). Thorax (Fig. 4). Terminalia: tergite 7 (Fig. 11) with posterior margin slightly emarginate medially, narrowly more sclerotized than rest of tergite; sternite 7 (Fig. 11) with posterior margin weakly undulate, with well-sclerotized rounded inner fold; tergite 8 long, bearing pair of basal sub-median spiracles, entire, only weakly emarginate posteriorly; sternite 8 a triangular plate with deep and narrow U-shaped median incision densely beset with long pilosity (Fig. 12); tergite 10 divided into pair of short triangular sclerites; genital furca present, weakly sclerotized; spermatheca oval-rounded.

Bionomics. In the original description Duda (1928) mentions that the material collected by Dampf was swept in different localities in Central Mexico from plants along a brook and along a drainage ditch, and in fallow land. In the recent 2007-08 survey *A. diabolica* was caught by Malaise trap in an arid environment dominated by Agavaceae and Cactaceae (Fig. 1). The flight-period covers January to June and October.

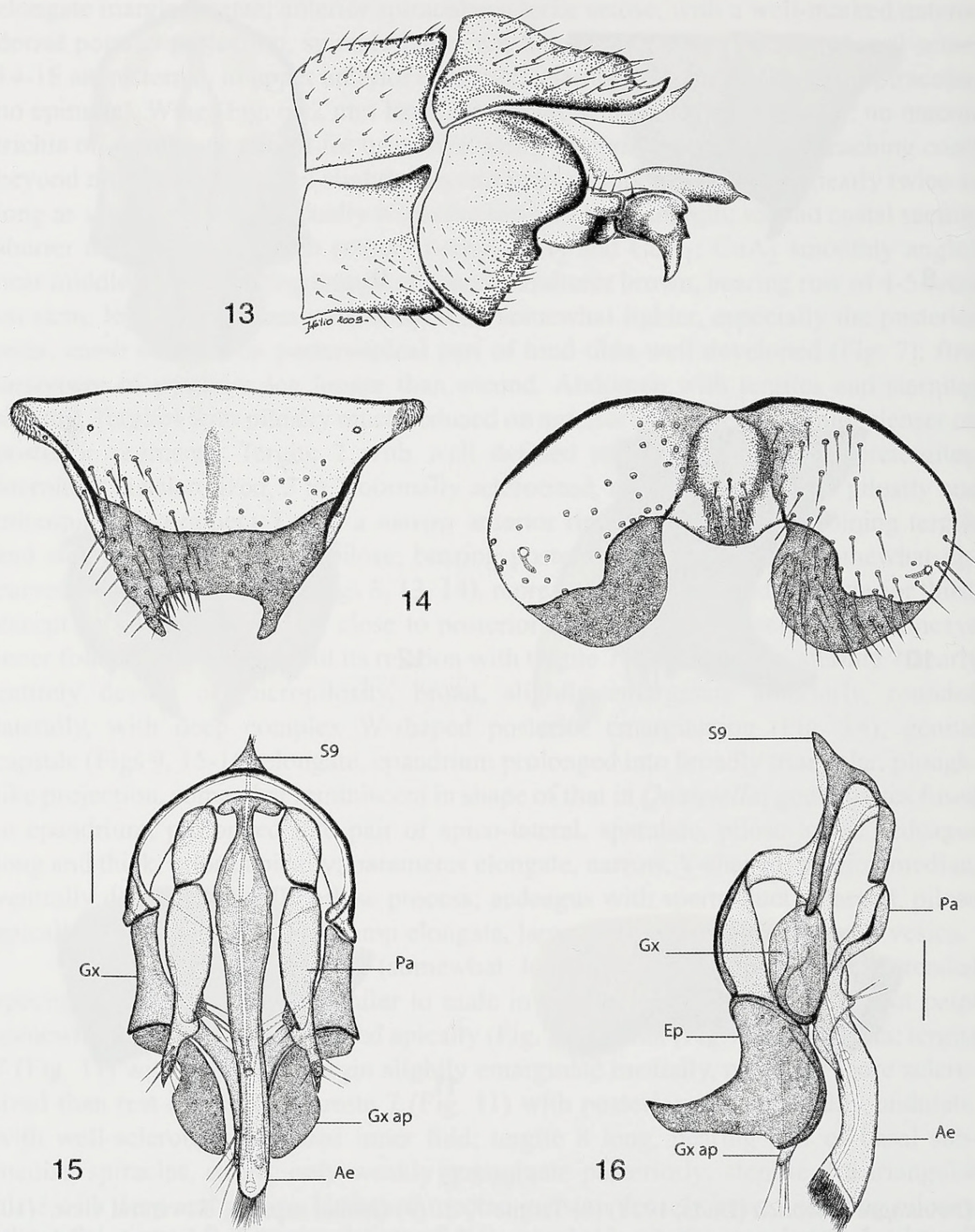


FIGS 8-12

Aztecatopse diabolica (Duda, 1928) (8) Tergite 7, ♂. (9) Genital capsule, ♂, ventral view. (10) Genitalia ♂, lateral view, with tip of aedeagus. (11) Pregenital segment 7, ♀ (sternite left, tergite right). (12) Sternite 8, ♀, ventral view. (8-12: Coyotepec) (Photographs Herón Huerta).

DISTRIBUTION: Known till now only from four localities in a small region of Estado de México.

DISCUSSION: The species was thoroughly described and figured by Duda (1928) in the catch-all genus *Scatopse*, but it has not been collected again until now. The species was included in *Rhegmoclemina* (*Rhegmoclemina*) in the Catalogue of



FIGS 13-16

Aztecatopse diabolica (Duda, 1928), ♂ (13) Lectotype ♂, tip of abdomen, lateral view. (14) Pregenital segment 7, ♂ (tergite left, sternite right). (15) Genital capsule, ♂, ventral view. (16) Genital capsule, ♂, lateral view. (13: Chapingo, 14-16: Coyotepec). Abbreviations: Ae = aedeagus; Ep = epandrium; Gx = gonocoxite; Gx ap = gonocoxal apodeme; Pa = paramere; S9 = sternite 9 [drawings by Mathieu Rapp (13) and Herón Huerta (14-16)].

Neotropical Scatopsidae by Cook (1967) although it obviously does not present the typical S-curved CuA₂ of this genus and of most Rhegmoclematini, as can easily be seen on the figure of the wing by Duda (1928: fig. 16). More recently Amorim (2008) transferred *S. diabolica* to *Quateiella* within the Swammerdamellini, probably on the basis of the ventrally directed beak-like projection of the male genital capsule and of the wing venation as figured by Duda (1928). However, the well-developed sternites 2-4 (absent in *Quateiella*) and the general structure of the genital capsule clearly exclude the species from this genus.

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