



A new Nearctic species of *Atrichopogon* (*Meloehalea*) and a redescription of *Atrichopogon* (*M.*) *chilensis* Ingram & Macfie (Diptera: Ceratopogonidae)

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Abstract

A new species of Ceratopogonidae from Canada, *Atrichopogon* (*Meloehalea*) *ladislavi* Tóthová, is described. The Patagonian species *Atrichopogon* (*M.*) *chilensis* Ingram & Macfie is restored from synonymy, its female is redescribed and the male is described for the first time.

Key words: Diptera, Ceratopogonidae, *Atrichopogon*, *Meloehalea*, new species, biting midge, Neotropical, Nearctic, distribution

Introduction

The diverse biting midge genus, *Atrichopogon* Kieffer, contains 506 species worldwide (A. Borkent, pers. comm.).

The subgenus *Meloehalea* Wirth includes ectoparasitic species that feed on the haemolymph of blister beetles (Coleoptera: Meloidae) and false blister beetles (Oedemeridae) (Borkent & Rocha-Filho 2006). Currently, there are 16 species in this subgenus that are known from non-Neotropical regions, 10 of which occur in the Palearctic, three in the Nearctic, two in the Holarctic and one in the Afrotropical Region (Wirth 1980, Szadziewski & Borkent 2004). The Nearctic and Holarctic species of *Meloehalea* were treated by Wirth (1956, 1980).

With regard to the Neotropical species, Borkent & Picado (2004) published a detailed study on the *Atrichopogon* species of Costa Rica, describing 18 new species based mainly on males with distinctive features on their genitalia, but they did not find any species that could readily be assigned to *Meloehalea*. However, the Holarctic species *A. (M.) oedemerarum* Storå was recently reported from Guatemala by Tóthová (2008). Spinelli & Wirth (1992) redescribed *A. obnubilus* Ingram & Macfie from Argentinean and Chilean Patagonia, a species bearing two spermathecae and with well-developed mandibular teeth. They placed the species in the subgenus *Meloehalea*, and recognized *A. chilensis* Ingram & Macfie and *A. assimilis* Ingram & Macfie as junior synonyms. This synonymy was accepted in several subsequent publications (Borkent & Wirth 1997; Borkent & Spinelli 2000, 2007; Spinelli *et al.* 2006), but a recent study of the types of the three species by one of us (GRS) in the Natural History Museum, London (BMNH) revealed that *A. chilensis* should be restored from synonymy.

Adults of *Atrichopogon* (*Meloehalea*) are usually distinguished by their morphological characters such as TR (tarsal ratio), number of mandibular teeth, proboscis length, etc. (Wirth 1956, 1980, Szadziewski *et al.* 1995, Szadziewski *et al.* 2007). As indicated by Szadziewski *et al.* (1995), Borkent & Picado (2004) found little to no support for distinguishing subgenera based on morphological features of the adults of the Neotropical Region, but we believe that the females of the two Patagonian species have distinctive mouthparts

and can be distinguished from other Neotropical *Atrichopogon* mainly by this character. Moreover, the above mentioned rediscovery of southern South American species fully corresponding with the subgeneric characters is therefore noteworthy.

The purpose of this paper is to describe a new Nearctic species of the subgenus *Meloehalea*, to recover from synonymy *Atrichopogon (Meloehalea) chilensis*, providing as well its female redescription and the first description of the male.

Material and methods

The slide-mounted adult male and female specimens of *Atrichopogon (Meloehalea)* are housed in the Canadian National Collection of Insects, Ottawa (CNCI), and the Collection of the División Entomología, Museo de La Plata, Argentina (MLP), as noted. The material collected in Lago Conguillio National Park, Chile, and Québec, Canada was examined, measured and photographed with a Leica DM5500 compound microscope and a Leica DFC320 digital camera.

Terminology follows McAlpine *et al.* (1981), and special terminology and ratios for *Atrichopogon* follow Borkent & Picado (2004). Terminology for wing veins follows the system of McAlpine *et al.* (1981), with modifications proposed by Szadziewski (1996). The male aedeagus and parameres of most species of *Atrichopogon* are difficult to distinguish and in many taxa, including those of *Meloehalea* species, form a partially fused aedeagal-parameral complex (Borkent & Picado 2004).

Results

Atrichopogon (Meloehalea) chilensis Ingram & Macfie, 1931

Atrichopogon (Kempia) chilensis Ingram & Macfie, 1931: 175 (female; Argentina, Chile).

Atrichopogon chilensis: Wirth, 1974: 13 (in Catalog of south USA; distrib., Brazil record erroneus).

Atrichopogon (Meloehalea) obnubilus: Spinelli & Wirth, 1992: 94 (synonymy); Spinelli & Wirth, 1993: 24 (in list; Argentina); Borkent & Wirth, 1997: 26 (in World Catalog); Borkent & Spinelli, 2000: 11 (in Catalog, southern USA); Spinelli *et al.*, 2006: 314 (diagnosis; distrib.); Borkent & Spinelli, 2007: 46 (in Neotropical Catalog).

Diagnosis: *Male adult*: only extant species of *Atrichopogon (Meloehalea)* in the Neotropical region with posterodorsal projection of aedeagal-parameral complex tapering to cap-like process and the lateral margins of posteroventral process sinuate, its posteromedial portion notched. *Female adult*: not distinguishable from those of *A. oedemerarum*.

Description: *Male adult*: Descriptive measurements in Table 1. **Head**: Ommatidia without interfacet pubescence (Fig. 1D). Antenna light brown; with plume well developed; with 13 flagellomeres, proportions as shown in Fig. 1B; flagellomeres separate; flagellomere 13 with apical projection not constricted basally. Maxillary palpus light brown (Fig. 1B); third segment moderately long, with well-developed pit located at midlength; segments 4, 5 separate. **Thorax** (Fig. 1A) dark brown; scutum with setae arising directly from surface; paratergite with 1 seta. Anepisternum well developed, sharply bilobed posteriorly. **Wing** (Fig. 1E) without pattern of pigmented membrane, with macrotrichia at the apex of r_3 and m_1 . **Halter**: white. **Legs**: Light brown; empodia present. **Abdomen** (Fig. 1A): medium brown. **Genitalia** (Fig. 1C): Of moderate size, segment 9 about equal in width to segment 8, tergite 9 short, not extending to apex of gonocoxite; posterior margin rounded. Sternite 9 with posterior margin concave, with scattered setae. Gonocoxite without medial lobe. Gonostylus tapering from base, gently curved, apex pointed. Aedeagal-parameral complex broad; posterodorsal projection tapering to cap-like process; lateral margins of posteroventral process sinuate, posteromedial portion notched; gonocoxite length/ width 2.00–2.14. Cercus short, lobe-like, ventral to tergite 9.

TABLE 1. Measurements of the diagnostic characters of *Atrichopogon* (*Meloehalea*) species.

	<i>A. (M.) chilensis</i>		<i>A. (M.) ladislavi</i>
	MALE n=5	FEMALE n=11	FEMALE n=2
Wing length (mm)	1.42–1.72	1.60–2.04	1.1
Costal ratio	0.63–0.65	0.71–0.75	0.70–0.71
Head width/mouthpart length	1.9–2.2	1.50–2.0	1.0–1.1
Antennal ratio	1.02–1.10	1.81–2.27	1.96–2.06
Tarsal ratio	2.46–2.72	2.35–2.69	2.20–2.45
Palpal ratio	3.11–3.50	2.75–3.08	4.76–4.89
Flagellomeres 9/10	0.61–0.69	-	-
Gonocoxite length/width	2.00–2.14	-	-
Length of spermatheca (µm)	-	86.47–115.9	68.40–86.72

Female adult: As for male, with following differences. Descriptive measurements in Table 1. **Head:** Antenna medium brown, with 13 flagellomeres, flagellomeres 1–8 moniliform, proportions as shown in Fig. 2E. Mandible well developed, with 26–33 small, fine teeth (Fig. 2D). Laciniae with pale indistinct teeth, elongate spicules. Palpus (Fig. 2B) moderately elongate, pit at midlength. **Thorax:** scutum brown, with faint, narrow, pale lateral stripes from pale humeral areas, scutellum pale brown (Fig. 2A). **Wing** (Fig. 2F) without pattern of pigmented membrane, with macrotrichia on entire membrane, not below basal radial cell, macrotrichia very abundant in r_3 and m_1 , 30–35 in m_2 , 10–15 in cua_1 , and 22–35 in anal cell. **Abdomen** (Fig. 2C): light brown. **Genitalia:** Two equal ovoid spermathecae, each with moderately elongated neck.

Distribution and bionomics: *Atrichopogon chilensis* inhabits *Nothofagus* forests within the Valdivian forests of Chile and Argentina. The dominant species in these forests are *N. dombeyi* (“coihue”), *N. pumilio* (“lenga”) and *N. antarctica* (“ñire”), from sea level to an elevation of 791 m. Most specimens were collected in the Valdivian rain forests, a very humid environment with an annual rainfall of 2000 to 4000 mm, which possesses a very rich biota.

Taxonomic discussion and notes on types: On the basis of the variability of characters used by Ingram & Macfie (1931) to distinguish the Patagonian species *A. assimilis*, *A. chilensis* and *A. obnubilus*, Spinelli & Wirth (1992) proposed that *A. assimilis* and *A. chilensis* be considered as junior synonyms of *A. obnubilus*. A recent reexamination of the slide-mounted types of *A. assimilis*, *A. chilensis* and *A. obnubilus* revealed that *A. chilensis*, a species only represented by female specimens in the type-series, has pale humeral areas (scutum uniformly dark brown in the male holotype and female paratype of *A. obnubilus*) and possesses 29 macrotrichia in the anal cell and 15 in cua_1 (2 and 3, respectively, in the female paratype of *A. obnubilus*). Moreover, the collections by J.A. Downes in the 1980s in Chile and the specimens recently obtained in Argentina, provided specimens that perfectly match with the female paratype of *A. chilensis* that was collected and associated with males showing differences when compared to the male holotype of *A. obnubilus*. The male wing of *A. obnubilus* is lacking macrotrichia, and its male genitalia are easily distinguished from those of *A. chilensis* by the rounded posteroventral margin of the aedeagal-parameral complex.

The genitalia of the male holotype of *A. assimilis* are not in position to be examined, and it is almost impossible to observe the features of the aedeagal-parameral complex. Because of this, and the fact that the extragenital characters are very similar to those of *A. obnubilus*, the species must remain under synonymy. The male of *A. oedemerarum* shares with *A. chilensis* the presence of macrotrichia in r_3 and m_1 , but differs in the triangular posterodorsal projection of the aedeagal-parameral complex (tapering to cap-like process in *A. chilensis*).

Specimens examined: Argentina, Bariloche, 1.xii.1926, F. & M. Edwards (female holotype, BMNH); Parque Nacional Nahuel Huapi, Puerto Blest, Estación Biológica, 41°01'34.4"S 71°48'55.7"W, 791 m, 13/

16.xii.2006, A. Garré – F. Montes de Oca, 2 females, 1 male, light trap; Parque Nacional Nahuel Huapi, Mallín La Cortadera, 41°05'13"S 71°48'26"W, 769 m, 8.i/3.ii.2007, A. Garré – F. Montes de Oca, 1 female, Malaise trap; Parque Nacional Nahuel Huapi, La Cantera, 41°21'16"S 71°42'27.3"W, 764 m, 11/30.xii.2006, A. Garré – F. Montes de Oca, 3 males, Malaise trap; same data except 15.i/7.ii.2007, 1 female (MLP).

Chile, Cautín Prov., Lago Conguillio, 6. xii. 1984, J. A. Downes, 1 female (1661/8/3), 7.xii. 1984, J. A. Downes, 1 female (1662/1/5), 16.xii. 1984, J. A. Downes, 1 female (1670/3/8), 22.xii.1984, J. A. Downes, 2 females (1677/1/4, 1677/1/8), 1 male (1677/1/6), 1.i. 1985, J. A. Downes, 1 female (1688/1/2), 12.–14.i. 1985, J. A. Downes, 1 female (1696/5/23), (CNCI).

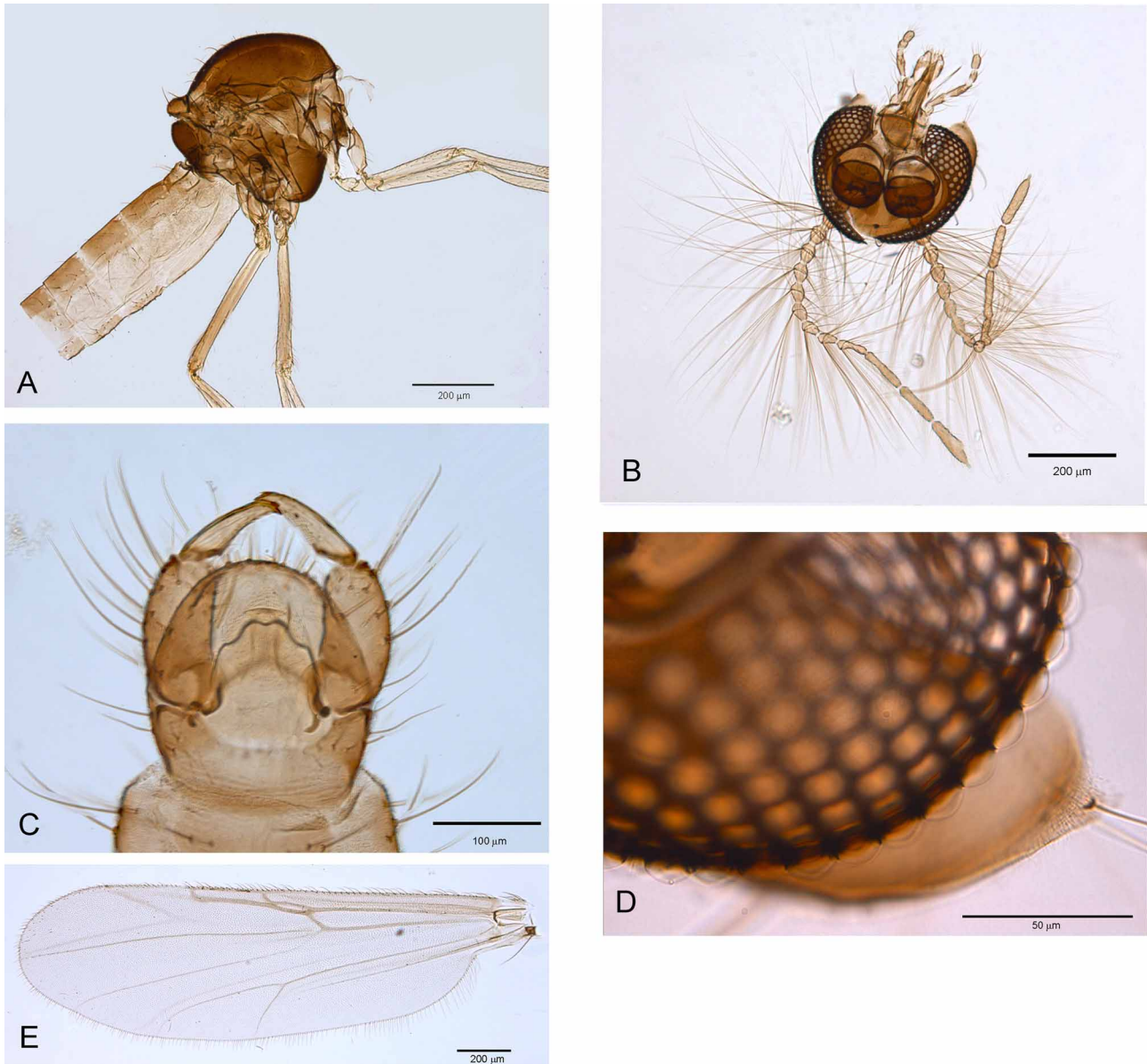


FIGURE 1. Male of *Atrichopogon (Meloehalea) chilensis* Ingram & Macfie. A—thorax (lateral view), B—head (dorsal view), C—hypopygium (ventral view), D—compound eye (dorsal view), E—wing

***Atrichopogon (Meloehalea) ladislavi* Tóthová, new species**

Diagnosis: *Female adult:* only extant species of *Meloehalea* in the Nearctic Region with a very long slender third palpal segment with $PR > 4$ and about 22 large mandibular teeth.

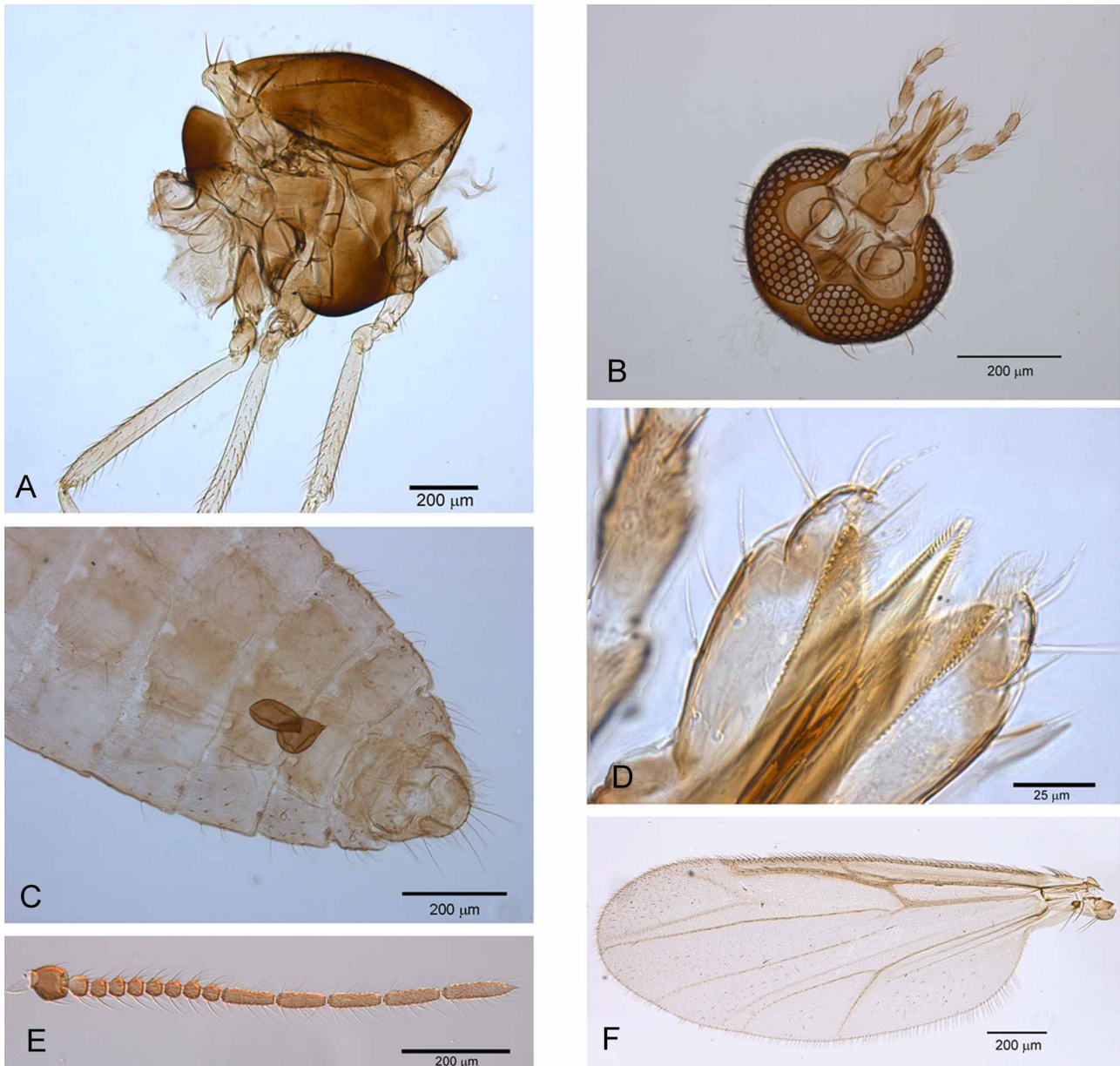


FIGURE 2. Female of *Atrichopogon (Meloehalea) chilensis* Ingram & Macfie. A—thorax (lateral view), B—head (dorsal view), C—terminal abdominal segments and spermathecae (ventral view), D—mouthparts (dorsal view), E—antenna, F—wing

Description: *Female adult:* Descriptive measurements in Table 1. **Head:** Antenna medium brown, with 13 flagellomeres, flagellomeres 1–8 disciform, proportions as shown in Fig. 3B. Mandible well developed, with 20–22 teeth, 5–6 distal teeth very small, 9 at midlength broad. Laciniae with 12–13 teeth. Palpus (Fig. 3C) with very long, slender third palpal segment, pit at midlength. **Thorax:** scutum, scutellum dark brown (Fig. 3A). **Wing** (Fig. 3E) without pattern of pigmented membrane, with many macrotrichia on the entire membrane. **Halter:** white. **Legs:** Light brown; empodia present. **Abdomen** (Fig. 3D): light brown. **Genitalia:** 2 equal ovoid spermathecae, each with short neck.

Male adult: unknown.

Distribution and bionomics: The specimens of *A. ladislavi* were collected in a woodland habitat not far from a river near Rowanton, Québec, Canada (46°24' N, 77°45' W, 380 m).

TAXONOMIC DISCUSSION: According to a key to the subgenus *Meloehalea* which includes New World

species (Wirth, 1980), the characters of *A. (M.) ladislavi* indicate that it belongs in the *lucorum* group. This species is similar to the European *A. (Melohelea) winnertzi* Goetghebuer, 1922, which also has a distinctive very long and slender 3rd palpal segment (PR>4.3), however the difference in mandibular teeth is obvious. While *A. (M.) winnertzi* has mandibles with 31–36 fine teeth, *A. (M.) ladislavi* has 20–22 large mandibular teeth.

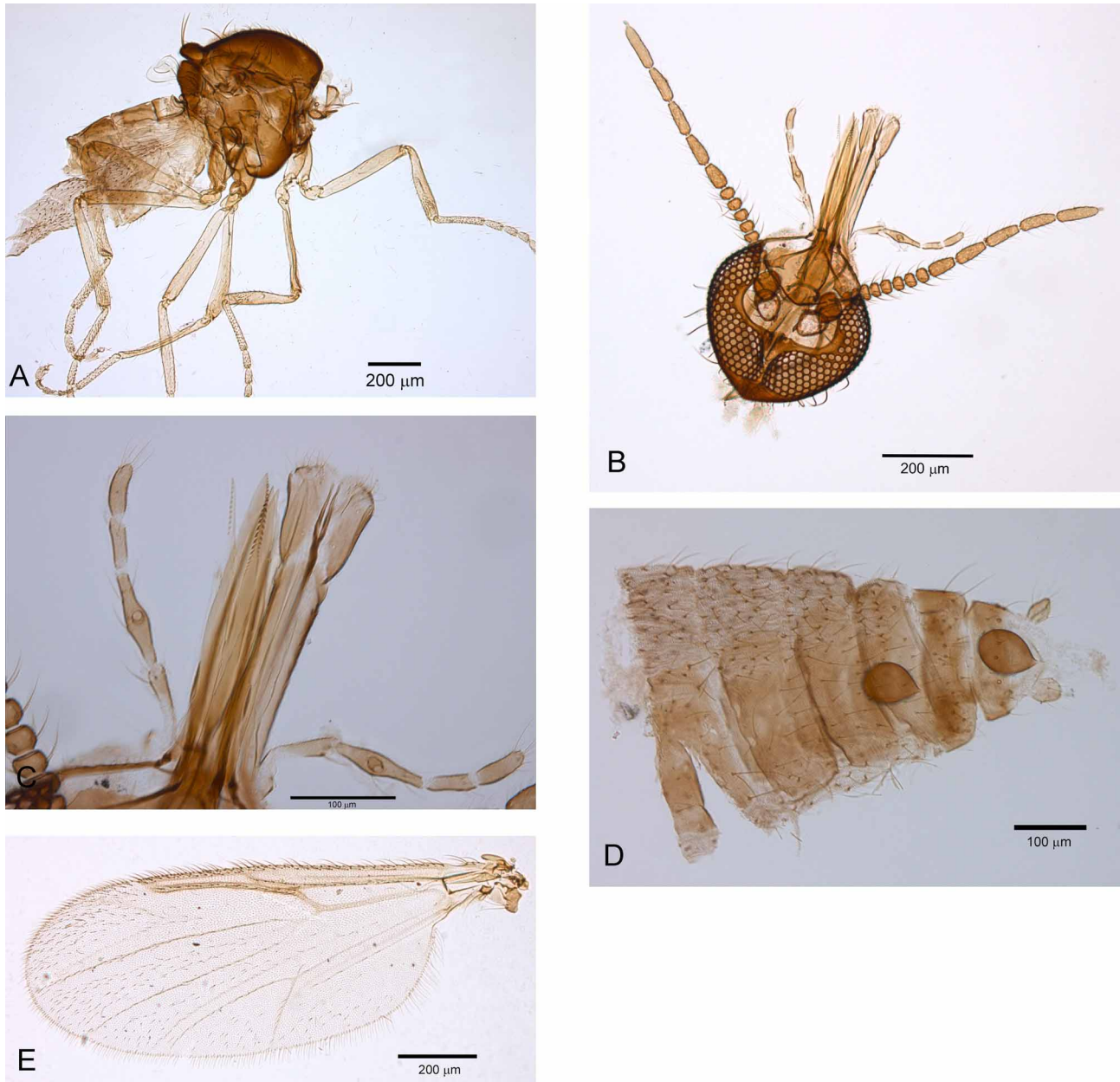


FIGURE 3. Female of *Atrichopogon (Melohelea) ladislavi* Tóthová **sp.n.** A—thorax (lateral view), B—head (dorsal view), C—mouthparts, D—terminal abdominal segments and spermathecae (dorsal view), E—wing.

Types: Holotype, female adult on microscope slide, labeled “HOLOTYPE *Atrichopogon ladislavi* Tóthová, nr. Rowanton, P.Q., 29. vii. 1954, J.A. Downes, No. J.A.D. 126/4/29, CNC”; paratype: 1 female, from type locality, 29. vii. 1954, J.A. Downes, No. J.A.D. 126/4/28.

SPECIMENS EXAMINED: Canada, Québec, Rowanton, 29. vii. 1954, J.A. Downes, 2 females No. J.A.D. 126/4/29, 126/4/28.

Derivation of specific epithet: This species is named after the senior author's beloved father who will stay in her loving memory.

Conclusions

Borkent & Picado (2004) pointed out that the currently recognized subgenera of *Atrichopogon* “appear to apply only on a local level or are recognized as a small group of distinctive species (with the likelihood that a paraphyletic group remains)”. However, *Meloehalea* has distinctive mouthparts and is likely monophyletic. The features of the new species described here from both the Nearctic and Neotropical regions fully correspond with those of other members *Meloehalea* sg.

Of the presently known 19 species of *Meloehalea* worldwide, only three are reported from the Neotropical region, strongly suggesting that further studies in this area are warranted. As pointed out by Spinelli *et al.* (2006) two other species from Brazil, *A. insignipalpis* Macfie, 1940 and *A. taeniatus* Macfie, 1939 both have two well developed spermathecae, but their subgeneric status will remain unclear until a detailed study of their holotypes is carried out.

We propose the following update to the key by Wirth (1980) to Holarctic species to include *A. ladislavi*:

4. Claws stout; proboscis short and stout, section B shorter than C or subequal to it; legs uniformly brownish; mandible with 15–20 teeth; proximal teeth large *A. (M.) epicauteae* Wirth
- Claws slender; proboscis longer and more slender; section B longer than C; mandibular teeth various; legs various..... 5
5. Third palpal segment slender; palpal ratio 4.0 or more; palpal sensory pit usually deep; halter pale; legs yellowish... .. 6
- Third palpal segment shorter and stouter; palpal ratio 3.5 or less; palpal sensory pit usually shallow; legs and halter various..... 7
6. Mandible with 20–22 large teeth; those in midportion greatly enlarged..... *A. (M.) ladislavi* Tóthová
- Mandible with up to 33 fine teeth; those in midportion only slightly enlarged..... *A. (M.) winnertzi* Goethgebuer
7. Legs yellowish, only extreme tips of femora brownish; halter pale; 3rd palpal segment with sensory pit about as deep as pore opening; smaller species, wing length 1.42 mm..... *A. (M.) downesi* Wirth
- Legs dark brown; halter infuscated, 3rd palpal segment with pit deeper than diameter of pore opening, large species, wing length 1.55 mm *A. (M.) lucorum* Meigen

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