

Two new Patagonian species of *Atrichopogon* (*Meloehalea*) (Diptera: Ceratopogonidae)

PABLO I. MARINO¹, ANDREA TÓTHOVÁ² & GUSTAVO R SPINELLI¹

¹División Entomología, Museo de La Plata, Paseo del Bosque s/n, 1900 La Plata, Argentina. E-mail: pmarino@fcnym.unlp.edu.ar

²Department of Botany and Zoology, Faculty of Science, Masaryk University, Kotlářská 2, 61137 Brno, Czech Republic.
E-mail: tothova@sci.muni.cz

Abstract

Two new species of the subgenus *Atrichopogon* (*Meloehalea*) from Patagonia, *Atrichopogon* (*M.*) *macrodentatum* from the *Nothofagus* forests, and *A. (M.) monomorphicus* from steppe areas in the ecotone with forests, are described and a key of the Patagonian species of the subgenus is provided.

Key words: *Atrichopogon*, *Meloehalea*, new species, biting midge, Patagonia

Introduction

The diverse biting midge genus *Atrichopogon* Kieffer contains 512 species worldwide (Borkent, 2009). As indicated by Borkent & Picado (2004) found little to no support for distinguishing subgenera based on morphological features of the adults of the Neotropical Region. On the other hand, adults of the subgenus *Meloehalea* Wirth, which includes ectoparasitic species that feed on the haemolymph of blister beetles (Coleoptera: Meloidae) and false blister beetles (Oedemeridae), are distinguished by other authors by their morphological characters such as tarsal ratio (TR), number of mandibular teeth, proboscis length, presence of two well developed spermathecae, etc. (Wirth 1956, 1980, Szadziewski *et al.* 1995, Szadziewski *et al.* 2007, Tóthová *et al.* 2009). The subgenus is represented in the American fauna by 8 species, 4 Nearctic, 2 Holarctic, and the remaining 2 inhabiting Patagonia in the Neotropics (Tóthová *et al.*, 2009).

The purpose of this paper is to describe 2 new species of *Atrichopogon* (*Meloehalea*) recently collected in the Nahuel Huapi National Park, located in northern Argentinean Patagonia and to include them in the provided key for the Patagonian *Meloehalea* species.

Material and methods

The slide-mounted adult male and female specimens of *Atrichopogon* (*Meloehalea*) are housed in the Collection of the Division Entomología, Museo de La Plata, Argentina (MLP), and the Canadian National Collection of Insects, Ottawa (CNCI), as noted. The material 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* follows 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

Key to Patagonian species of *Atrichopogon* (*Meloehalea*)

1. Males 2
- Females 5
2. Antenna normally developed 3
- Antenna female-like *Atrichopogon* (*M.*) *monomorphicus* sp. n.
3. Aedeagal-parameral complex with lateral margins of posteroventral process sinuate, posteromedial portion deeply notched *Atrichopogon* (*M.*) *chilensis* Ingram & Macfie
- Aedeagal-parameral complex with lateral margins of posteroventral process convex, posteromedial portion slightly notched 4
4. Wing membrane without macrotrichia; gonostylus with three apical teeth *Atrichopogon* (*M.*) *obnubilus* Ingram & Macfie
- Wing membrane with macrotrichia on r_3 ; gonostylus with one subapical tooth. *Atrichopogon* (*M.*) *macrodentatum* sp. n.
5. Wing with numerous macrotrichia on cua_1 and anal cell *Atrichopogon* (*M.*) *chilensis* Ingram & Macfie
- Wing with scarce or without macrotrichia on cua_1 and anal cell 6
6. Mandible with small teeth 7
- Mandible with strong teeth *Atrichopogon* (*M.*) *macrodentatum* sp. n.
7. Wing with few macrotrichia on cua_1 and anal cell; flagellomeres 1–8 vasiform *Atrichopogon* (*M.*) *obnubilus* Ingram & Macfie
- Wing without macrotrichia on cua_1 and anal cell; flagellomeres 1–8 compressed, slightly broader than long *Atrichopogon* (*M.*) *monomorphicus* sp. n.

Atrichopogon (*Meloehalea*) *macrodentatum* new species

Diagnosis. *Male adult:* only extant species of *Atrichopogon* (*Meloehalea*) from Patagonia with one subapical tooth in the gonostylus and aedeagal-parameral complex with posteromedial portion slightly notched. *Female adult:* only extant species of *Meloehalea* from Patagonia with very strong mandibular teeth.

Description. *Male adult:* **Head:** Dark brown (Fig. 1A). Ommatidia without interfacet pubescence, abutting medially for length of 3 ommatidia. Antenna brown; with plume well developed; flagellomeres 5–8 at least partially fused; flagellomere 9–10 with plume setae, 10–13 elongated; flagellomere 13 with apical projection slightly basally constricted; AR 1.00. Maxillary palpus brown (Fig. 1B); third segment slightly swollen at midlength, with well-developed pit located at midlength; segments 4, 5 separate; PR 3.00. Proboscis short, mouthparts length 0.20 mm; head width/mouthparts length 2.00. **Thorax:** dark brown (Fig. 1C); scutellum slightly paler than scutum; scutum with setae arising directly from surface; paratergite with 1 seta. Anepisternum well developed, sharply bilobed posteriorly. Legs light brown; hindtibia slightly expanded at apex; hindtibial spur length less than width of hindtibia at midlength; hindtibial comb with 8 spines; prothoracic TR 3.20; mesothoracic TR 3.00; metathoracic TR 2.50; claws curved, bifid at tip, empodia present. **Wing** (Fig. 1D) without pattern of pigmented membrane, with macrotrichia apically on r_3 , wing length 1.40 mm; breadth 0.46 mm; CR 0.64. Halter white. **Abdomen:** tergites uniformly brown. Sternites more or less similarly rectangular shaped. **Genitalia** (Fig. 1E): segment 9 about equal in width to segment 8, tergite 9 short, extending midlength of gonocoxite, posterior margin rounded. Sternite 9 with posterior margin slightly concave, with single row of 10 setae. Gonocoxite without medial lobe, moderately stout, 1.7 times longer than greatest breadth; gonostylus 0.75 as long as gonocoxite, nearly straight, apex gently curved, pointed, subapical stout tooth. Aedeagal-parameral complex broad; posterodorsal projection tapering to cap-like process; posteroventrally broad, posteromedial portion slightly notched. Cercus elongate, barely extending beyond apex of 9th tergite.

Female adult: As for male, with following differences. **Head:** antenna dark brown, with flagellomeres 1–8 compressed, slightly broader than long; flagellomeres 9–13 elongate, proportions as shown in Fig. 2A, flagellomere 13 with apical nipple, slightly constricted basally; AR 2.47 (2.06–2.86, n=5). Maxillary palpus with third segment bearing sensory pit slightly beyond midlength; PR 2.95 (2.50–3.22, n=5); mouthparts length 0.20 (0.16–0.22, n=5) mm, head width/mouthparts length 1.78 (1.63–1.96, n=5). Mandible well developed (Fig. 2B), with 18 (15–20, n=5) strong teeth (Fig. 2B). Lacinae with pale indistinct teeth, without spicules. **Thorax:** Legs (Fig. 2D) light brown; hind tibia slightly expanded at apex; hindtibial spur length less than width of hind tibia at midlength; hindtibial comb with 8 spines; prothoracic TR 3.18 (3.00–3.40, n=5); mesothoracic TR 2.81 (2.61–2.92, n=5); metathoracic TR 2.48 (2.39–2.57, n=5); empodia present. **Wing** (Fig. 2C) without pattern of pigmented membrane,

with macrotrichia very abundant in r_3 and m_1 , 15–30 in m_2 , 1–8 in cua_1 , and 0–3 in anal cell; radial cells with broad lumen, second 4 times longer than first; wing length 1.50 (1.36–1.64, $n=5$) mm; breadth 0.63 (0.58–0.68, $n=5$) mm; CR 0.71 (0.69–0.73, $n=5$). Halter white. **Abdomen** (Fig. 2E): tergites uniformly brown. Sternite 8 without elongate, curved setae. Two subequal ovoid spermathecae, each with elongated neck, measuring $69 \times 49 \mu\text{m}$, neck $10 \mu\text{m}$, and $73 \times 54 \mu\text{m}$, neck $11 \mu\text{m}$. Cercus brown.

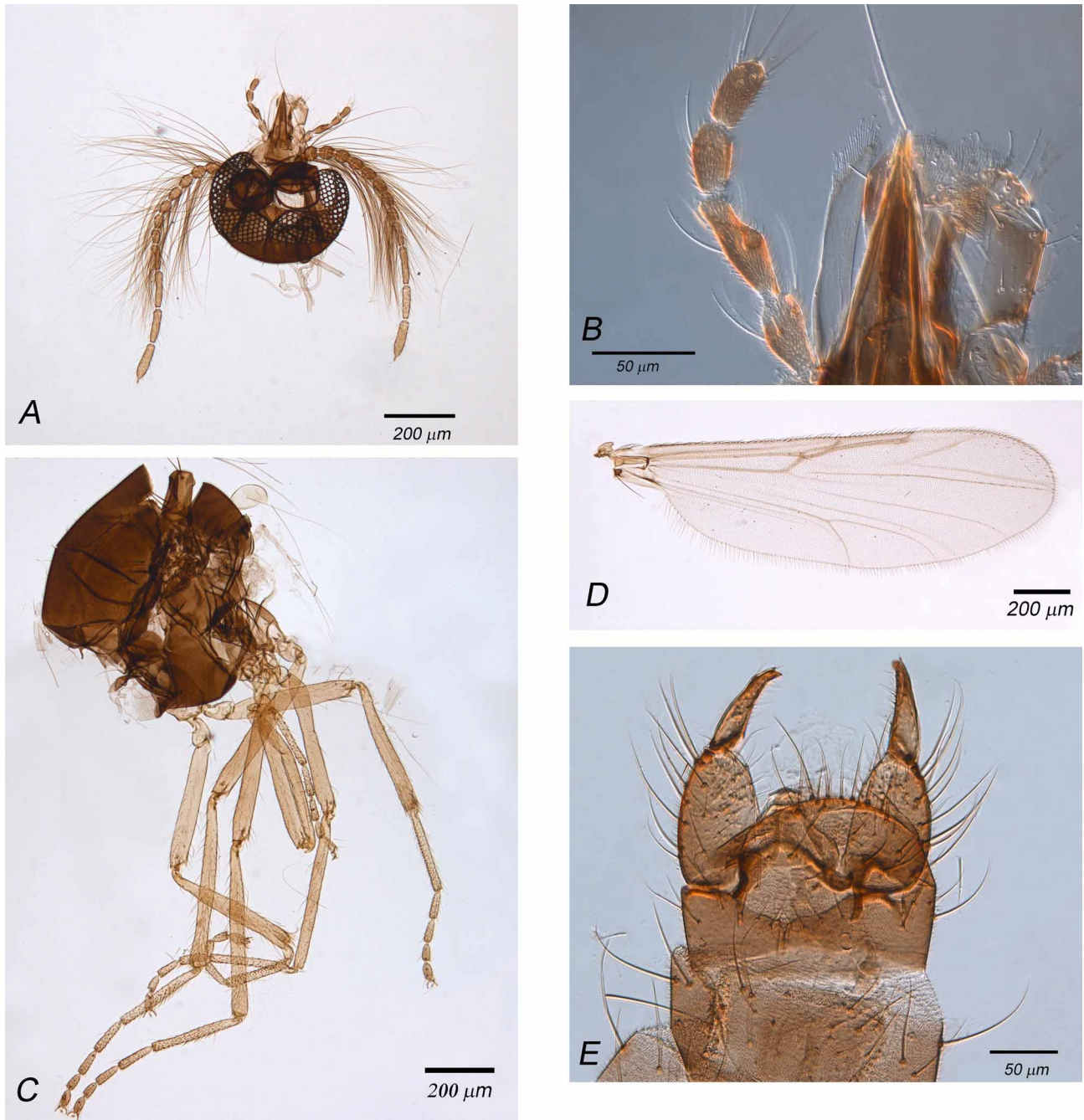


FIGURE 1. Male of *Atrichopogon (Meloehalea) macrodentatum* Marino, Tóthová & Spinelli, new species. A—head (dorsal view), B—mouthparts (dorsal view), C—thorax (dorsal view), D—wing, E—hypopygium (ventral view).

Distribution and bionomics. *Atrichopogon macrodentatum* inhabits *Nothofagus* forests within the Valdivian forests of Argentina and Chile, at elevations of 791–950 m. The dominant species in these forests are *N. pumilio* (lenga) and *N. antarctica* (ñire).

Specimens examined. Types: Holotype male, Argentina, Parque Nacional Nahuel Huapi, arroyo Neuquén-Co, $40^{\circ}28'48.3''\text{S } 71^{\circ}36'44.1''\text{W}$, 809 m, 23.i/4.ii.2008, A. Garré – F. Montes de Oca, Malaise trap. Allotype female, same data except CDC light trap (MLP). Paratypes, 4 females, as follows: same data as holotype, 1 female (MLP);

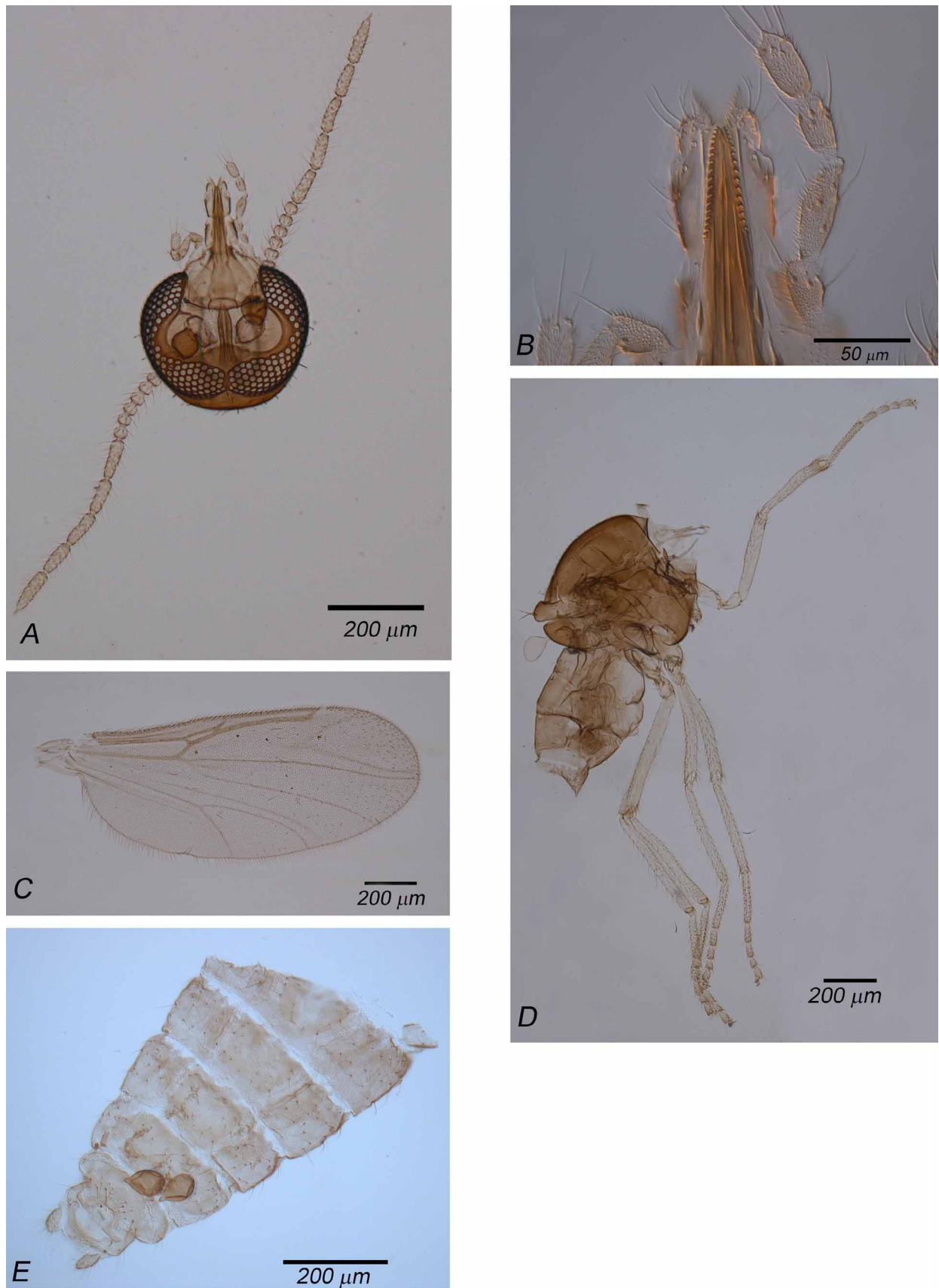


FIGURE 2. Female of *Atrichopogon (Meloehalea) macrodentatum* Marino, Tóthová & Spinelli, new species. A—head (dorsal view), B—mouthparts (dorsal view), C—wing, D—thorax (lateral view), E— terminal abdominal segments and spermathecae (ventral view).

Argentina, Parque Nacional Nahuel Huapi, Puerto Blest, Estación Biológica, 41°01'34.4''S 71°48'55.7''W, 791 m, 6/13.i.2007, A. Garré – F. Montes de Oca, 2 females, at light (MLP); Chile, Cautín Prov., Lago Conguillio, 6.xii.1984, J. A. Downes, 1 female (1661/8/1) (CNCI).

Taxonomic discussion. The female of this new species is easily distinguished from their congeners of the subgenus *Meloehalea* by the very strong mandibular teeth. The male have only one tooth in the gonostylus. Other characters to distinguish this species from the remaining Patagonian species may be found in the key.

Derivation of specific epithet. A reference to the strong female mandibular teeth.

Atrichopogon (Meloehalea) monomorphicus new species

Diagnosis. *Male adult:* only extant species of *Atrichopogon (Meloehalea)* from Patagonia without secondary sexual dimorphism. *Female adult:* only extant species of *Meloehalea* in the Neotropical Region without macrotrichia on cua_1 and anal cell.

Description. *Male adult:* **Head:** Brown (Fig. 3A). Ommatidia with interfacet pubescence, broadly abutting medially for length of 1–2 ommatidia. Antenna with plume not developed; flagellomeres separate, proportions as shown in Fig. 3A; flagellomeres 1–8 subspherical, 10–13 elongated; flagellomere 13 with apical projection slightly not constricted basally; AR 3.34 (3.20–3.45, n=4). Maxillary palpus with third segment slender, with well-developed pit located near midlength (Fig. 3B); segments 4, 5 separate; PR 3.10 (2.91–3.30, n=4). Proboscis short, mouthparts length 0.17 (0.16–0.18, n=4) mm; head width/mouthparts length 1.76 (1.74–1.78, n=4). **Thorax** (Fig. 3C): dark brown with very faint, narrow lateral pale stripes; scutum with setae arising directly from surface; paratergite with 1 seta. Anepisternum well developed, strongly bilobed posteriorly. Legs light brown; hindtibia not expanded at apex; hindtibial spur length less than width of hindtibia at midlength; hindtibial comb with 8 spines; prothoracic TR 2.98 (2.80–3.11, n=4); mesothoracic TR 2.64 (2.50–2.78, n=4); metathoracic TR 2.45 (2.36–2.55, n=4); claws curved, bifid at tip, empodia present. **Wing** (Fig. 3D) without pattern of pigmented membrane, with abundant macrotrichia on r_3 and few on m_1 ; wing length 1.06 (1.02–1.08, n=4) mm; breadth 0.44 (0.42–0.46, n=4) mm; CR 0.66 (0.65–0.67, n=4). Halter white.

Abdomen: tergites uniformly brown. Sternites more or less similarly rectangular shaped. Genitalia (Fig. 3E): segment 9 about equal in width to segment 8, tergite 9 short, extending midlength of gonocoxite, posterior margin rounded. Sternite 9 with posterior margin slightly concave, with single row of 10 setae. Gonocoxite without medial lobe, moderately stout, 1.7 times longer than greatest breadth; gonostylus 0.8 as long as gonocoxite, nearly straight, apex gently curved, pointed, subapical stout tooth. Aedeagal-parameral complex broad; posterodorsal projection tapering to cap-like process; lateral margins of posteroventral process sinuate, posteromedial portion slightly notched. Cercus short, lobe-like, ventral to tergite 9.

Female adult: As for male, only with sexual differences. **Head:** antenna dark brown, with flagellomeres 1–8 slightly broader than long; flagellomeres 9–13 elongated, proportions as shown in Fig. 4A, AR 2.19 (2.18–2.21, n=2), PR 3.55 (3.40–3.70, n=2); mouthparts length 0.165 (0.154–0.176, n=2) mm, head width/mouthparts length 1.80 (1.62–1.96, n=2). Mandible well developed, with 22 (20–26, n=2) small teeth (Fig. 4B). Laciniae with pale indistinct teeth, without spicules. **Thorax:** Legs (Fig. 4C) light brown; hindtibial comb with 7 spines; prothoracic TR 2.89 (2.89–2.90, n=2); mesothoracic TR 2.79 (2.78–2.80, n=2); metathoracic TR 2.56 (2.55–2.58, n=2). **Wing** (Fig. 4D) without pattern of pigmented membrane, with macrotrichia very abundant in r_3 and m_1 , 2–3 in m_2 , and 0–1 in cua_1 ; radial cells with broad lumen, second 4.25 times longer than first; wing length 1.13 (1.08–1.18, n=2) mm; breadth 0.51 (0.50–0.52, n=2) mm; CR 0.70 (0.69–0.71, n=2).

Abdomen (Fig. 4E): tergites uniformly brown. Sternite 8 without elongate, curved setae. Two subequal ovoid spermathecae, smaller measuring 68 x 59 μ m, neck 8 μ m and larger collapsed, each with moderately elongated neck. Cercus light brown.

Distribution and bionomics. *Atrichopogon monomorphicus* is known only from the type-locality at Nahuel Huapi National Park of Argentina, at elevations of 962 m. This species inhabits grassy steppes of the Subandean district (Leon *et al.*, 1998), where the semiarid Patagonia contact with the Subantarctic province. The Subandean district is characterized by rainfall exceeding 300 mm per year, joined the eastern sector of the deciduous forests of *Nothofagus* in a wide ecotone in form of patches or mosaics.

Specimens examined. Types: Holotype male, allotype female, 3 males and 1 female paratypes, Argentina, Parque Nacional Nahuel Huapi, Río Nireco, 41°11'51.9"S 71°19'40.5"W, 962 m, 23.i/18.ii.2007, A. Garré – F. Montes de Oca, Malaise trap.

Taxonomic discussion. This new species is the only New World *Atrichopogon* (*Meloehalea*) without secondary sexual dimorphism. However, this is not an uncommon characteristic of *Atrichopogon* spp., since it can be observed in the following American species: *A. inacayali* Spinelli & Marino from Patagonia, *A. homofacies* Spinelli and *A. carpinteroi* Marino & Spinelli from northeastern Argentina, and *A. asuturus* Borkent & Picado and *A. tirzae* Borkent & Picado from Costa Rica.

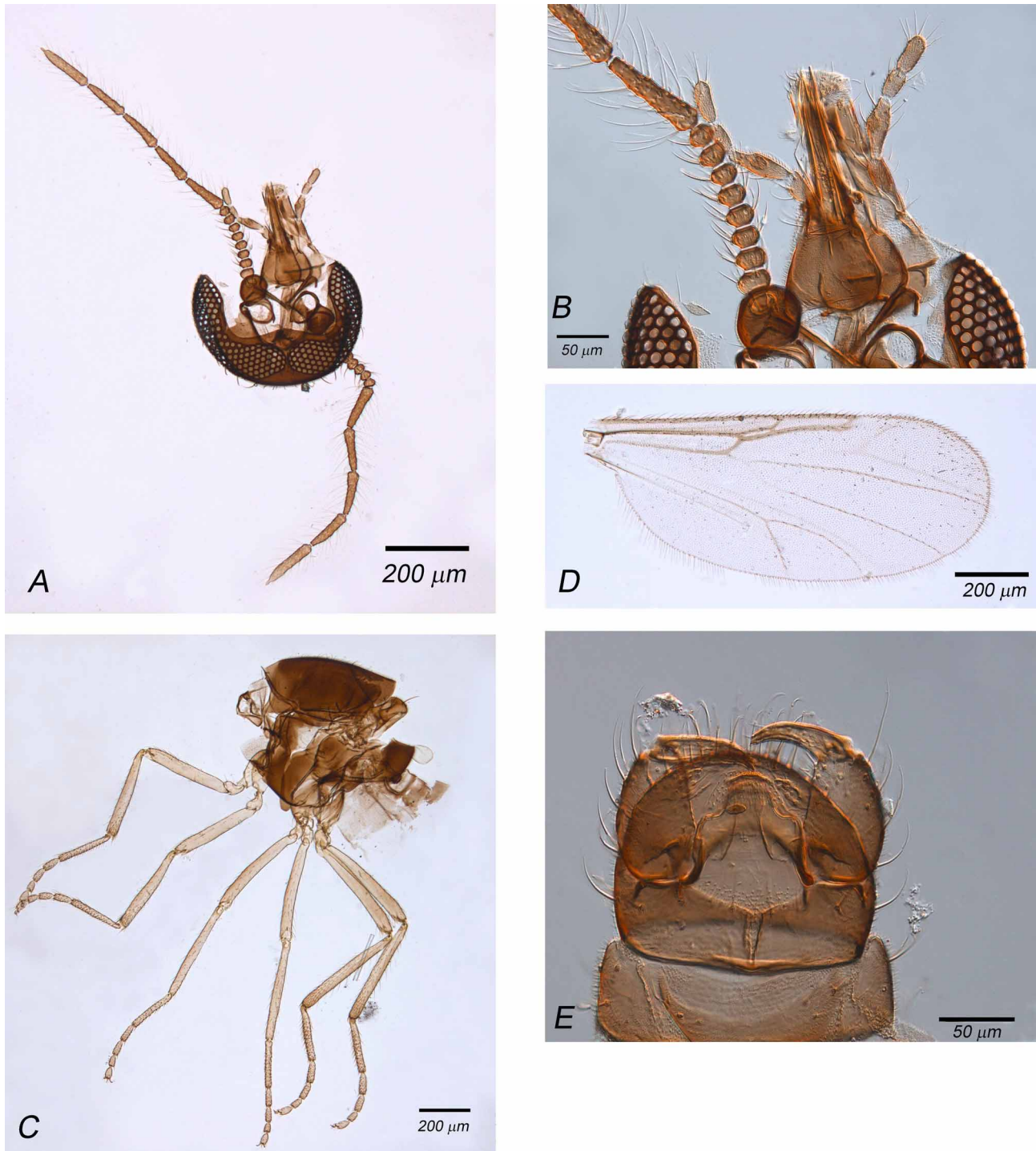


FIGURE 3. Male of *Atrichopogon* (*Meloehalea*) *monomorphicus* Marino, Tóthová & Spinelli, new species. A—head (dorsal view), B—mouthparts (dorsal view), C—thorax (dorsal view), D—wing, E—hypopygium (ventral view).

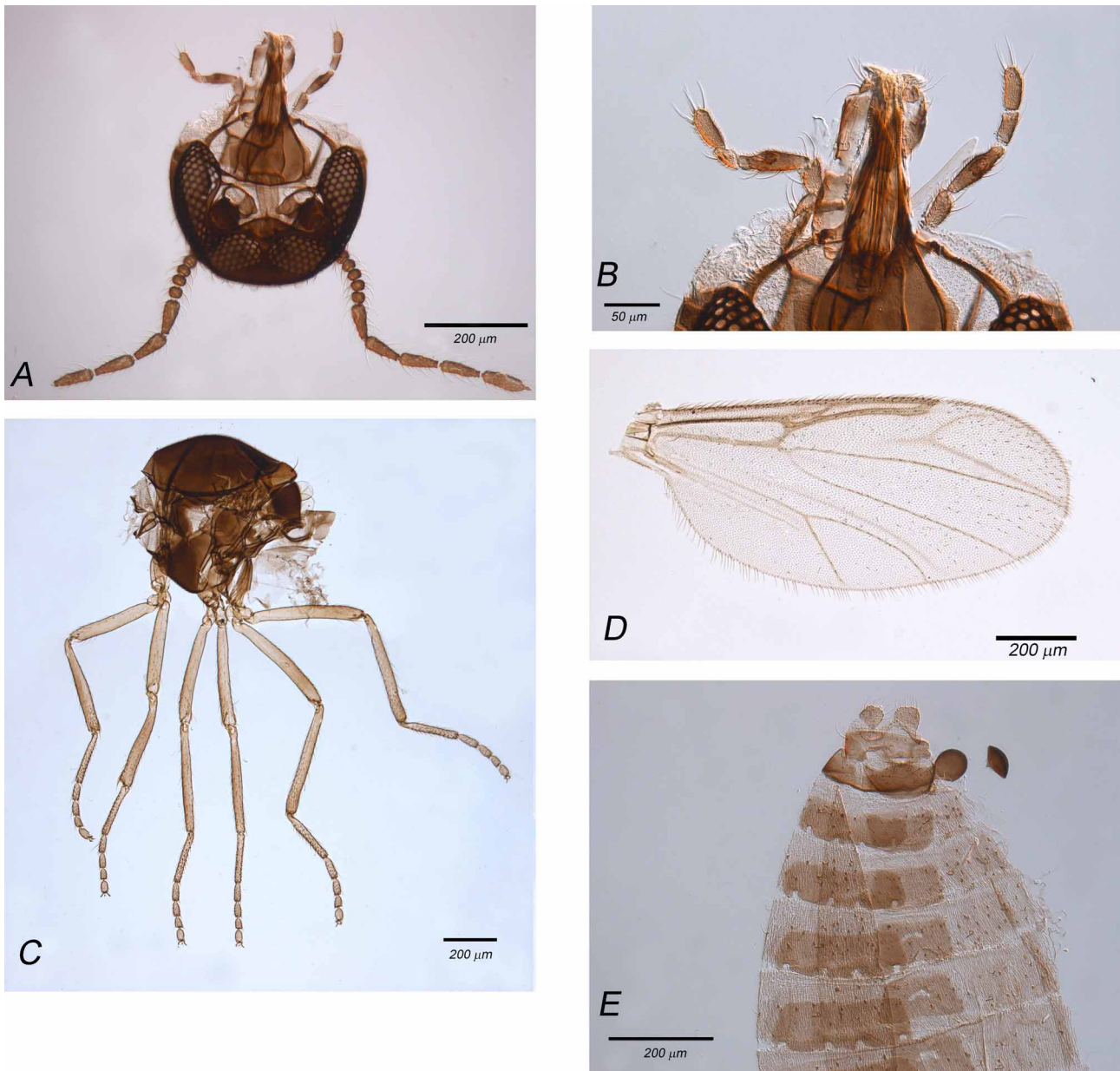


FIGURE 4. Female of *Atrichopogon (Meloehalea) monomorphicus* Marino, Tóthová & Spinelli, new species. A—head (dorsal view), B—mouthparts (dorsal view), C—thorax (lateral view), D—wing, E— terminal abdominal segments and spermathecae (ventral view).

The male genitalia of *A. (M.) monomorphicus* is very similar to that of *A. (M.) chilensis* but the 9th tergite is slightly elongated and almost reaches the apical part of gonocoxite in the last species. However, females of both species differ in the number of mandibular teeth (26–33 in *A. chilensis*) and in the number of macrotrichiae on wing membrane (more than 60 in r_3 , more than 50 in m_1 , more than 30 in m_2 , 15 in cua_1 and 29 in anal cell in *A. chilensis*).

Derivation of specific epithet. The name refers to the similar morphology of males and females in the extra-genital characters.

Acknowledgements

This study was supported by Darwin Initiative project “Capacity building for biodiversity studies of freshwater insects in Argentina”, and by the grant MSM No. 0021622416 of the Masaryk University. We are grateful to the staff of the Diptera Unit of CNCI, especially to Dr. Jeffrey M. Cumming for permission to study the specimens in his care.

References

- Borkent, A. (2009) World Species of Biting Midges (Diptera: Ceratopogonidae). Last updated: July 9, 2009. Available from: <http://www.inhs.illinois.edu/research/FLYTREE/CeratopogonidaeCatalog.pdf>.
- Borkent, A. & Picado, A. (2004) Distinctive new species of *Atrichopogon* Kieffer (Diptera: Ceratopogonidae) from Costa Rica. *Zootaxa*, 637, 1–68.
- León, R.J.C., Bran, D., Collantes, M., Paruelo, J.M. & Soriano, A. (1998) Grandes Unidades de Vegetación de la Patagonia. *Ecología Austral*, 8 (2), 125–144.
- McAlpine, J.F. (1981) 2. Morphology and terminology - adults. In: *Manual of Nearctic Diptera*. Volume 1. Agriculture Canada Monograph 27, pp. 9–63.
- Szadziewski, R. (1996) Biting midges from Lower Cretaceous amber of Lebanon and Upper Cretaceous Siberian amber of Taimyr (Diptera: Ceratopogonidae). *Studia Dipterologica*, 3, 23–86.
- Szadziewski, R., Dominiak, P. & Tóthová, A. (2007) European *Atrichopogon* biting midges of the subgenus *Meloehalea* (Diptera: Ceratopogonidae). *Polish Journal of Entomology*, 76, 267–284.
- Szadziewski, R., Gilka, W. & Anthon, H. (1995) Immature stages of two European species of the subgenus *Meloehalea* (Diptera, Ceratopogonidae), with keys to the European subgenera of *Atrichopogon*. *Entomologica Scandinavica*, 26, 181–190.
- Tóthová, A., Marino, P.I. & Spinelli, G.R. (2009) A new Nearctic species of *Atrichopogon* (*Meloehalea*) and a redescription of *Atrichopogon* (*M.*) *chilensis* Ingram & Macfie (Diptera: Ceratopogonidae). *Zootaxa*, 2023, 47–54.
- Wirth, W.W. (1956) The biting midges ectoparasitic on blister beetles (Diptera, Heleidae). *Proceedings of the Entomological Society of Washington*, 58, 15–23.
- Wirth, W.W. (1980) A new species and correction in the *Atrichopogon* midges of the subgenus *Meloehalea* attacking blister beetles (Diptera, Ceratopogonidae). *Proceedings of the Entomological Society of Washington*, 82, 124–139.