



## A new species and new continental record for the genus *Aclitus* Foerster (Hymenoptera: Braconidae, Aphidiinae)

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### Abstract

*Aclitus wyomingensis* Martens **new species** is described and *Aclitus* Foerster is reported from North America for the first time. A revised key to all described *Aclitus* species is presented, and the potential host associations and biology of *Aclitus* species are summarized.

**Key words:** Taxonomy, biodiversity, Wyoming, North America, endoparasitoid, root-feeding aphids

### Introduction

The subfamily Aphidiinae (Hymenoptera: Braconidae) comprises a cosmopolitan group of parasitoids that utilize aphids (Hemiptera: Aphididae) as hosts. Many species within this subfamily are important biological control agents of native and invasive aphid pests. Currently, the subfamily includes 38 genera and more than 500 described species worldwide (Yu *et al.* 2016, Gadallah *et al.* 2022, Ferrer-Suay *et al.* 2025), and is organized into three tribes: Aphidiini, Ephedrini, and Praini (Belshaw and Quicke 1997, Shi and Chen 2005, Gadallah *et al.* 2022). While the majority of aphidiine species parasitize aphids feeding on the aboveground tissues of plants, at least nine species from the genera *Aclitus* Foerster, *Paralipsis* Foerster, and *Pseudaclitus* Starý are reported as specialized parasitoids of root-feeding aphids (Starý 1961, Farahani *et al.* 2017). These genera are morphologically specialized for a subterranean lifestyle and parasitize both true root aphids as well as root-collar aphids (Starý 1961).

The enigmatic genus *Aclitus* is currently represented by two described species: *A. obscuripennis* Foerster and *A. sappaphis* Takada and Shinga. Both species are uncommonly collected and have been reported exclusively from the Palearctic realm. *Aclitus obscuripennis* is known from the Czech Republic (Starý 1966, 1989, 2006), France (Starý *et al.* 1971, Starý 1981), Germany (Kirchner 1867, Starý 1959, Mackauer 1962, Belokobylskij and Taeger 2001, Belokobylskij *et al.* 2003), Hungary (Polgár 1981, 1983, 1987), Iran (Farahani *et al.* 2017, Rakhshani *et al.* 2019, Gadallah *et al.* 2022), Poland (Wiackowski *et al.* 2001), and Serbia (Tomanović *et al.* 1998, Žikić *et al.* 2000, Kavallieratos *et al.* 2004, Žikić *et al.* 2012). *Aclitus sappaphis* has been documented from Japan (Takada and Shinga 1974, Takada and Hashimoto 1983) and adjacent regions of Russia (Davidian 2007), and recently from South Korea (Kim *et al.* 2025).

*Aclitus obscuripennis* was associated as a parasitoid *Anoecia* Koch species (Aphididae: Anoeciinae) including records of an unknown *Anoecia* species on the roots of *Bromus hordeaceus* L. (Poaceae: Bromeae) (Mackauer 1962), *Anoecia vagans* (Koch) on the roots of *Elymus repens* (L.) Gould (Poaceae: Triticeae) (Starý *et al.* 1971), and *Anoecia corni* (F.) on the roots of “various wild Gramineae” (Starý 1981). Additional records from Wiackowski

*et al.* (2001) include *Thelaxes dryophila* (Schrank) (Aphididae: Thelaxinae), *Tuberculatus annulatus* (Hartig) (Aphididae: Calaphidinae), and *Tuberculatus neglectus* (Krzywicz) as hosts of *A. obscuripennis*. The biology and behavior of *A. sappaphis* was studied by Takada and Shinga (1974), who documented the life cycle and ecological interactions of this species with *Sappaphis pyri* Matsumura (Aphididae: Macrosiphini) on the roots of *Artemisia princeps* Pampanini (Asterales: Anthemideae). Additional research examined the ecological relationships of *A. sappaphis* and *Paralipsis eikoeae* (Yasumatsu) with ant-tended aphid colonies on the roots of *A. princeps* (Takada and Hashimoto 1985).

Here we report the discovery of a species of *Aclitus* new to science, representing the first record of this genus from North America. This finding significantly expands the known geographic distribution of *Aclitus* and raises questions about the diversity and distribution of root aphid parasitoid communities in North American ecosystems.

## Materials and Methods

Specimens were point-mounted and imaged using a Canon EOS RP camera with an LM Scope Universal Adapter on an Olympus SZX12 microscope. Images were processed and plates were constructed in Adobe Photoshop 2021. All material examined came from the University of Wyoming Insect Research Collection (ESUW), Laramie, and the Centre for Biodiversity Genomics (BIOUG), Guelph. The holotype and two paratypes will be returned to the ESUW and seven paratypes to BIOUG as specified below. Type specimens will be deposited in the University of Wyoming Insect Research Collection (ESUW) and the Centre for Biodiversity Genomics (BIOUG). Morphological terminology follows Sharkey and Wharton (1997) and the Hymenoptera Anatomy Ontology (Yoder *et al.* 2010).

## Results

### *Aclitus* Foerster

*Aclitus* Foerster 1863: 248.

**Type species.** *Aclitus obscuripennis* Foerster 1863: 248, by original designation.

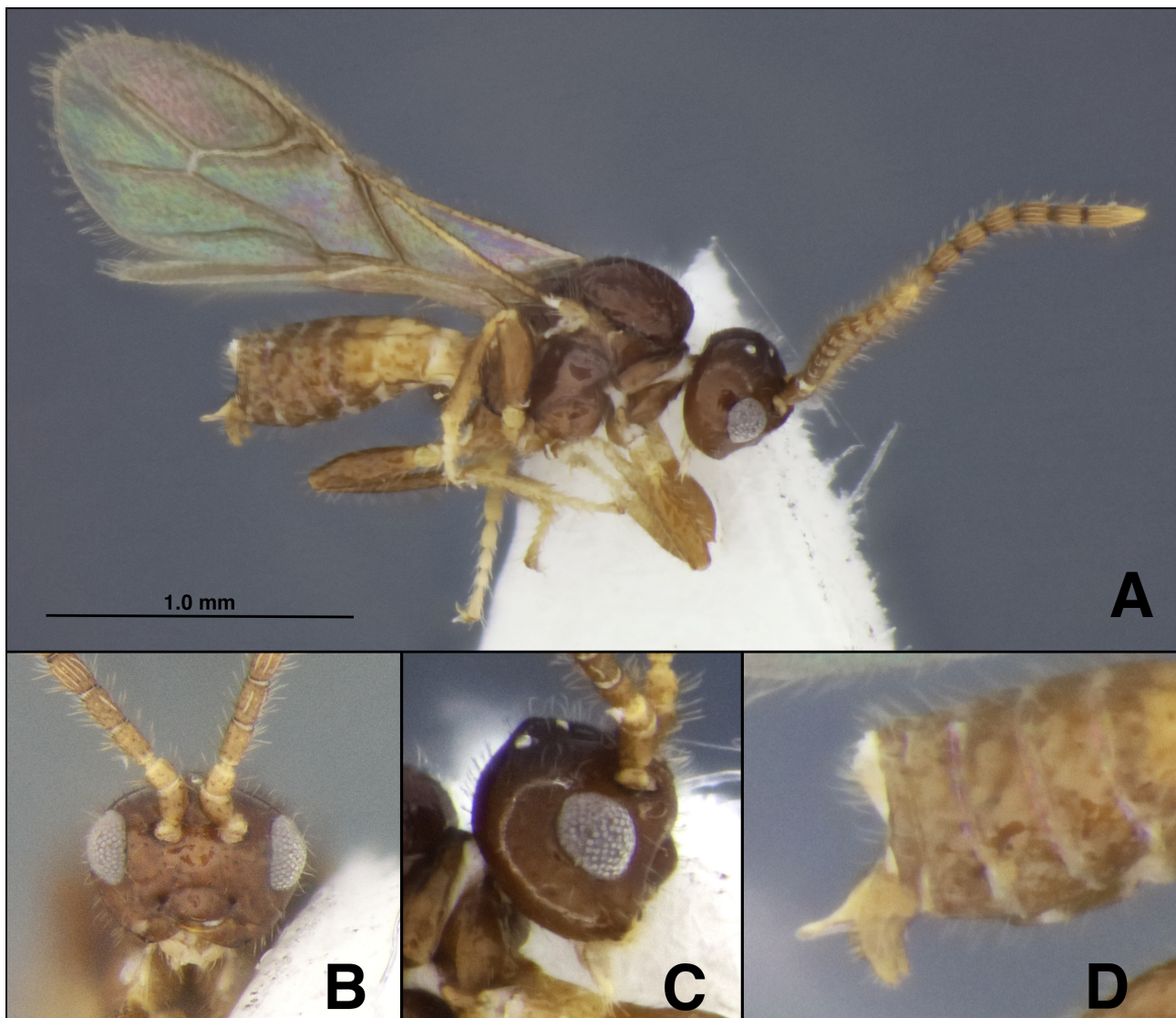
**Diagnosis.** Fore wing venation with closed disco-submarginal cell and with R1, r+RS, and M veins extending toward or connecting with the wing margin and nearly or entirely closing the marginal and 3rd submarginal cells. Pterostigma lanceolate and at least 10 × longer than wide. Compound eyes small and round. Antenna with flagellomeres 3–9 subequal in length. Fore and mid legs with tarsomeres 2–4 rounded, globular. Petiole width at spiracles greater than length. Body covered with elongate, erect setae.

### *Aclitus wyomingensis* Martens species novum

Figures 1A–D, 2A–C

**Material examined. Holotype** • ♀; USA, Wyoming, Albany Co., Medicine Bow Natl. Forest, ½ mi. S. Lincoln Monument, 26 May to 10 June 1992, S.R. Shaw and G. Wright, Malaise trap (Meadow). Deposition: Holotype ♀ in University of Wyoming Insect Museum (UWIM), Laramie, Wyoming, USA. **Paratypes** • 1 ♀; Grand Teton Nat'l Park; WY, USA, AMK Ranch; Malaise Trap 8/2 to 8–10; 2012, Research Permit; #GRTE-2012-SCI-0050; Col'r: Larry Haimowitz. 1 ♀; Grand Teton Nat'l Park, WY, USA, ¼ mi. NW of Potholes Turnout, Teton Park Road, Canopy Trap, lodgepole with *D. ponderosae*, 7/24 to 8/10 2012, Research Permit #GRTE-2012-SCI-0050, Col'r: Larry Haimowitz. 1 ♀ United States, Colorado, Teller County, near Divide, 38.9114, -105.199, August 15, 2022. BIOUG91283-F01. Coll. M.J. Sharkey. 1 ♀ United States, Colorado, Teller County, near Divide, 38.9114, -105.199, July 15, 2022, 2,878 meters, BIOUG91282-G05, Coll. M.J. Sharkey. 1 ♀ United States, Teller County, near Divide, 98.9112, -105.198, July 15, 2022, 2,878 meters, BIOUG91279-F03, Coll. M.J. Sharkey. 1 ♀ Canada, British Columbia, Smithers, Det San Ecoreserve, near 850 Viewmont Rd., 54.774, -127.108, 570 meters, July 21, 2014, BIOUG94670-E02, Coll. R. Pojar. 1 ♀ Canada, Ontario, Milton, Chris Hadfield School, EQP-CLL-723, 43.5364, -79.866, September 30, 2016,

209 meters, BIOUG31026-D12, Coll. J. Arcand. 1 ♀ Canada, Ontario, Peterborough, 44.318, -78.372, July 11, 2015, 267 meters, BARS\_2015\_26\_403, Coll. B. McClenaghan. 1 ♀ Canada, Ontario, Windsor, Ojibway Prairie Provincial Park, 42.2628, -83.0725, September 3, 2014, 175 meters, BIOUG35317-A09, Coll. CBG Collections Staff.



**FIGURE 1.** *Aclitus wyomingensis* Martens sp. nov., holotype ♀. **A)** Habitus, lateral view. **B)** Head frontal view. **C)** Head lateral view. **D)** Female terminalia.

**Deposition.** The holotype and two Wyoming paratype specimens will be deposited in the University of Wyoming Insect Museum (UWIM), Laramie, Wyoming, USA. The remaining seven paratype specimens will be deposited at the Centre for Biodiversity Genomics (BIOUG), University of Guelph, Guelph, Ontario, Canada.

**Diagnosis.** *Aclitus wyomingensis* differs from *A. obscuripennis* and *A. sappaphis* based on the female with antenna 12 antennomeres; fore wing with R1 and RS extending toward margin of fore wing but not closing the marginal cell; petiole nearly parallel-sided; ovipositor sheath short, downward-curved; and geographic distribution.

**Description.** Female. Body length, 1.75 mm; length of antenna, 1.10 mm; length of fore wing, 1.50 mm.

**Head.** Head globular, width subequal to mesosoma width at tegulae (Fig. 1B, 2C, 2C). Compound eyes small and rounded, height-width ratio 1.0:0.78 (Fig. 1B, 1C). Face with sparse elongate setae (Fig. 1B, 1C). Malar space  $0.6 \times$  eye height. Tentorio-ocular distance  $0.63 \times$  inter-tentorial distance. Antenna 12 antennomeres, sub-moniliform with elongate, erect setae (Fig. 1A, 2A). Total antenna length  $0.8 \times$  total body length. Flagellar segment 1 (= F1)  $2.3 \times$  longer than wide, without placodes. F1  $1.1 \times$  longer than F2. F2  $1.9 \times$  longer than wide, with 3 placodes. Flagellomeres 3–9 subequal in length and width. Flagellomeres 3–6 with 6–9 placodes each. Flagellomeres 7–10

with 7–12 placodes each. Outline of vertex in lateral view forming an angle of nearly 90° with that of frons; distance between antennal sockets slightly greater than between antennal socket and eye.

**Mesosoma.** Mesonotum with notauli present on the anterior declivity, effaced dorsally (Fig. 1A, 2C). Mesoscutum with elongate erect setae laterally, smooth medially. Propodeum smooth, with no carinae, medial portion slightly raised (Fig. 2B). Fore wing with pterostigma lanceolate,  $11.0 \times$  as long as wide (Fig. 1A); disco-submarginal and subdiscal cells closed; RS nearing wing margin almost closing marginal cell; R1 elongate, ending adjacent to the end of RS; M extending beyond r-m, approaching wing margin; m-cu meeting r-m to close disco-submarginal cell. Tarsomeres 2, 3, and 4 of fore legs and mid legs short and globular.

**Metasoma.** Petiole with spiracles in anterior region;  $0.8 \times$  as long as width at anterior;  $0.5x$  as long as width at posterior; dorsal surface smooth and shining (Fig. 2B). Tergites 2–8 sparsely setose with setae elongate and erect, smooth, and shining. Ovipositor sheath sharply curved downward with elongate setae on dorsal margin (Fig. 1D).



**FIGURE 2.** *Aclitus wyomingensis* Martens **sp. nov.**, holotype ♀. **A)** Antenna. **B)** Mesosoma and metasoma, dorsal view. **C)** Head and mesosoma, dorsal view.

**Color.** Antenna, head, and mesosoma medium brown. Legs medium brown with tarsi yellowish. Metasomal tergites 1 and 2 light brown, remaining tergites and ovipositor sheath medium brown (Fig. 1A).

**Male.** Unknown.

**Host.** Unknown.

**Distribution.** United States: Wyoming, Colorado. Canada: Ontario, British Columbia.



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