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First report of *Caenonomada bruneri* (Hymenoptera: Apidae) in Uruguay

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ABSTRACT. This study presents the first collection records of *Caenonomada bruneri* Ashmead, 1899 (Hymenoptera: Apidae) in Uruguay, along with two additional records from the iNaturalist platform. The findings are derived from a larger sampling of beneficial insects conducted in Dolores, Soriano, Uruguay, and complementary with material obtained from the Museo de La Plata (Argentina). This study adds substantial new data on the distribution of *C. bruneri*, expanding its known range within the Neotropical region.

KEYWORDS. Neotropical. Oil-collecting bees. Tapinotaspidini. Wild bees.

Primer registro de *Caenonomada bruneri* (Hymenoptera: Apidae) en Uruguay

RESUMEN. Este estudio presenta los primeros registros de colección de *Caenonomada bruneri* Ashmead, 1899 (Hymenoptera: Apidae) para la Republica del Uruguay, junto con dos registros adicionales de la plataforma iNaturalist. Los hallazgos provienen de un muestreo más amplio de insectos beneficiosos realizado en Dolores, Soriano, Uruguay, y se complementan con material obtenido del Museo de La Plata (Argentina). Este estudio aporta datos nuevos y significativos sobre la distribución de *C. bruneri*, ampliando su rango conocido dentro de la región Neotropical.

PALABRAS CLAVE. Abejas colectoras de aceite. Abejas Silvestres. Neotropical. Tapinotaspidini.

Oil-flowered species are involved in specialized pollination, interactions that evolved through various morphological, behavioral, and chemical adaptations (Vogel, 1974). Floral oil occurs in at least 11 families and 1,500-1,800 species of plants (Danforth et al., 2019). However, most of these flowers are found and distributed mainly in the Neotropical region (Martins et al., 2015; Neff & Simpson, 2017; Rasmussen & Olesen, 2000). These species are visited almost exclusively by oil-collecting bees (Johnson & Steiner, 2000; Renner & Schaefer, 2010), which present special structures, mainly on their legs, that allow them to collect, manipulate, and transport oils (Neff & Simpson, 1981; Alves-dos Santos et al., 2007). Around 440 bee species from the families Apidae and Melittidae, distributed across seven tribes, have evolved morphological and behavioral adaptations for collecting floral oils, with phylogenetic evidence suggesting between three and six independent origins of this trait (Danforth et al., 2019). In this sense, Tapinotaspidini tribe, is one of the most morphologically diverse groups (Cocucci et al., 2000; Aguiar & Melo, 2009; Danforth et al., 2019). The bees of this tribe have peculiar structures, groups of specialized hairs on the forelegs, middle legs, and/or metasoma (posterior body region, primarily in Hymenoptera), which are used in oil collecting (Vogel, 1974; Neff & Simpson, 1981). These floral oils serve both as a lining for brood cells and as a primary larval food source, largely substituting for floral nectar (Neff & Simpson, 2017).

Caenonomada Ashmead is an exclusively Neotropical bee genus within Tapinotaspidini that includes only three species described (Zanella, 2002). *Caenonomada* species present the oil-collecting apparatus on frontal tarsomeres 1-4 and is composed of rigid and flattened setae on the outer surface and finely branched setae on the inner surface of the tarsomeres (Roig-Alsina, 1997; Cocucci et al., 2000; Aguiar & Melo, 2009). Initially, the status of *Caenonomada* as an oil-collecting bee was questioned due to the absence of distinct tarsal combs or obvious oil-collecting structures. However, females possess strongly flattened hind basitarsi and a scopal setae arrangement typical of many oil collectors (Simpson & Neff, 1981). Subsequently, Roig-Alsina (1997) proposed that the oil-collecting apparatus of this genus is morphologically adapted to the trichomatic oil glands of certain plants and consequently included *Caenonomada* within the tribe Tapinotaspidini. Some of the oil source



Figure 1. ***Caenonomada bruneri*.** a. Female in frontal view. b. Female in lateral in lateral view. c. Male in frontal view. d. Male in lateral view. Scale bars= 1 mm.

records for *C. bruneri* were in flowers of *Cypella gracilis* (Klatt) Baker (Iridaceae) (Schrottky, 1909; Cocucci et al., 2000), *Nierembergia graveolens* A.St.-Hil. (Solanaceae) (Maubecin et al., 2021), *Angelonia salicariifolia* Humb. & Bonpl., *A. perennis* Chodat & Hassler (Plantaginaceae) (Aguiar & Melo, 2009) and *Basistemon silvaticus* (Herzog) Baehni & J.F.Macbr. (Scrophulariaceae) (Martins et al., 2013). Although this highly specialized interaction was considered to have a high degree of mutualism, it was recently reported that *C. bruneri* illegitimately visits flowers of *Janusia guaranitica* (A. St. Hil.) A. Juss and *Heteropterys glabra* Hook. & Arn. (Malphigiaceae) to collect floral oils (Torretta et al., 2022). These "illegitimate" visits involve the exploitation of floral rewards without providing pollination services in return, challenging the assumption that all oil-collecting interactions are strictly mutualistic.

Despite its broad ecological interactions across South America, *Caenonomada bruneri* had not previously been recorded in Uruguay. In this context, our study documents the first confirmed occurrence of the genus *Caenonomada* and the species *C. bruneri* in the country. This study is derived from a larger sampling of beneficial insects that was carried out on a property in the city of Dolores, Soriano (-33.5286, -58.2388) in January 2022, within the framework of a project for the identification of beneficial arthropods of the National Biosafety System. An organic and non-transgenic soybean plot of 900 m^2 was selected in which various trapping and capture methods were used to be able to contemplate the different groups (guilds) of arthropods. Pitfall and color traps (yellow and blue) with propylene glycol as conserving liquid remained active for one week. The processing and conditioning of the samples and subsequent taxonomic identification work were carried out in the Entomology Laboratory of the Ministry of Livestock, Agriculture, and Fisheries of Uruguay (DGSA) and was deposited in the Laboratory Collection. This finding was complemented by material deposited in the Division de Entomología, Museo de La Plata, Argentina and a review of the records available on the iNaturalist of *C. bruneri* in Uruguay (iNaturalist, 2024). The occurrence map was generated using SimpleMappr

(Shorthouse, 2010). A total of 126 occurrence records were obtained from the Global Biodiversity Information Facility (GBIF, 2023), and material deposited in the entomological collection of the Museo de La Plata (MLP) was also included. Only a single doubtful record from Ceará, in the extreme north of Brazil, was excluded.

Caenonomada bruneri Ashmead, 1899

Diagnostic characters. The specimens were identified using taxonomic key and diagnostic characters given by Zanella (2002). Males and females of this species are easily distinguished from other species of the genus by the following combination of characters: short and dense velvet-like vestiture intermixed with long hairs on mesonotum (Fig.1a-d), pronotal lobe pointed, subtriangular and scutellum black. Females can be distinguished also by the yellow stripe on the apical half of the clypeus (Fig. 1a), fringe of long light-yellow hairs on the apical edge of the basitarsi (Fig. 1b). Males presents the labrum with sparse pilosity and straight apical rim (Fig. 1c), mesepisternum black and short and strong black bristles on posterior trochanter (Fig. 1d).

New records. *Material studied* (14♂ 4♀)*:* URUGUAY: Artigas; Bella Unión; -30.2513, -057.6087; 41 m a.s.l.; 15.I.1987; Abrahamovich leg.; 1♀, ac-8620 MLP. Artigas; San Gregorio; -30.5503, -057.8724; 39 m a.s.l.; 16.I.1987; Abrahamovich leg.; 1♀, ac-8619 MLP. Artigas; San Gregorio; -30.5503, -057.8724; 39 m a.s.l.; 16/I/1987; Abrahamovich leg.; 13♂, ac-8606-8618 MLP. Rivera**;** Paso de Arriera; -32.0296, -054.5672; 140 m a.s.l.; 19.I.1933; 1♀, ac-14677 MLP. Rivera; Paso de Arriera; -32.0296, -054.5672; 140 m a.s.l.; 19.I.1933; 1♂, ac-14677 MLP. Soriano; Dolores; -33.5298, -058.244; 4 m a.s.l.; 29.I.2022; M. Remedios-De León leg.; yellow trap; 1♀, FLE 11673 DGSA. *Photographic records:* Uruguay- Paysandú, Meseta de Artigas; -31.623267, -57.968893; 244m a.s.l.; 12.II.2020; Romi Galeota Lencina; 1♀; on flower of *Cypella* sp.; [https://www.inaturalist.org/observations/38978513]. Artigas, Bella Unión; -30.24595, -57.60547; 4.III.2022; Mauricio Silvera; 1♀; [https://www.inaturalist.org/observations/108513893] (iNaturalist, 2024).

Caenonomada bruneri inhabits northern Argentina, eastern Paraguay and Brazil; just west of Rio Grande do Sul, central area of the Chaco region, in drier areas to the west, near the Andes, and in wetter areas to the east (Fig. 2) (Zanella, 2002). The collection of *C. bruneri* in Uruguay provides valuable data on the distribution and ecological understanding of oil-collecting bees in the Neotropics. This finding not only fills a gap in the biogeography of *Caenonomada* but also supports the hypothesis that Uruguay lies within a zone of high species rarity for the Tapinotaspidini tribe (Velez & Vivallo, 2024). Additionally, the use of citizen

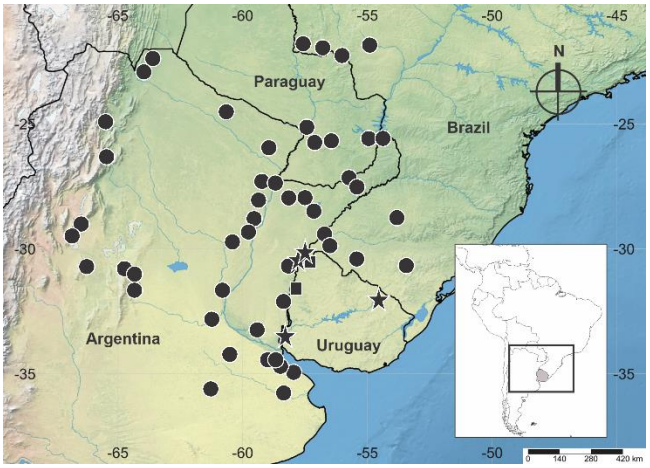


Figure 2. Geographic distribution of *Caenonomada bruneri*. References= Circles: known historical records of the species, stars: new records of specimens collected, squares: records in iNaturalist.

science platforms like iNaturalist highlighted the importance of these resources for complementing field-based research. The identification of *C. bruneri* in Uruguay, with records on iNaturalist serving as a valuable verification tool, suggests that citizen contributions can significantly enhance traditional scientific efforts. The presence of *C. bruneri* in a region where records of native bees are scarce, particularly for specialized groups like the Tapinotaspidini, underscores the importance of continued sampling and biodiversity studies in underexplored areas. While the bee fauna of Uruguay has traditionally been less studied compared to neighboring regions (Santos et al., 2020), these new records contribute to expanding the known range of this genus and species. Further, we highlight the need for more comprehensive surveys of native bees in the region, especially solitary species that engage in specialized interactions with plants.

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