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First record of *Propolydesmus dismilus* (Berlese, 1891) in South America (Polydesmida: Polydesmidae)

Первая находка *Propolydesmus dismilus* (Berlese, 1891) в Южной Америке (Polydesmida: Polydesmidae)

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КЛЮЧЕВЫЕ СЛОВА: многоножка-диплопода, интродукция, Богота, парк.

ABSTRACT. The millipede species *Propolydesmus dismilus* (Berlese, 1891) has only rarely been recorded within its distribution range in Western Europe and North Africa. This study reports for the first time the occurrence of the family Polydesmidae Leach, 1815 both in South America and Colombia, with adults of *P. dismilus* collected in the Humedal Santa María del Lago parkland in Bogotá, D. C.

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РЕЗЮМЕ. Многоножку-диплоподу *Propolydesmus dismilus* (Berlese, 1891) довольно редко отмечали в пределах ее ареала в Западной Европе и Северной Африке. Данное сообщение — это первая находка семейства Polydesmidae Leach, 1815 как в Южной Америке, так и в Колумбии, представленного взрослыми особями *P. dismilus*, собранными в парке в Боготе.

Introduction

Propolydesmus Verhoeff, 1895, is a genus of millipedes that presently includes 13 accepted species ranging from Macaronesia in the west to Central Europe in the east. Over the last few decades, this genus underwent some taxonomic changes: Djursvoll *et al.* [2001] promoted *Propolydesmus* to full genus based on an analysis of two species: *P. laevidentatus* (Loksa, 1967) (= *Polydesmus brincki* Demange, 1970) and *P. miguelinus* (Attems, 1908). Subsequently, Enghoff and Golovatch [2003] redefined the genus by examining the two species recorded in the Canary Islands and added 12 species previously included in *Polydesmus* Latreille, 1802/1803. However, Djursvoll [2008] transferred *P. mauriesi* (Vicente, 1979) to *Schizomeritius* Verhoeff, 1931 and then he [Djursvoll, 2019] transferred both *P. haroi* (Mauriès et Vicente, 1977) and *P. racovitzai* (Brölemann, 1910) to *Polydesmus* after a morphological revision of the genitalia. Finally, Su *et al.* [2023] described *Propolydesmus cretaceus* Su, Cai et Huang, 2023 †, the first fossil species of the genus based on material found in mid-Cretaceous Burmese amber. Yet the taxonomic assignment of *Propolydesmus cretaceus* remains hypothetical since the characters of the course of the seminal groove are uncertain and the real positions of both distofemoral process (= acropodite) and exomerite are dubious.

Methods

Photographs of specimens were taken using a Nikon D5300 digital camera equipped with an Oshiro 60 mm macro lens (with a 68 mm macro extension tube for taking photographs of the gonopods) and a Viltrox JY670N ring flash; photographs of the sampling site were taken with a Samsung M54. The micrographs were processed using focus-stacking in Helicon Focus Pro 7 software, and the resulting stacked images were assembled in Adobe Photoshop CS6. Millipedes were collected using hand sampling and preserved in 70% ethanol. Specimens are deposited in the MHN-UPN, Museo de Historia Natural, Universidad Pedagógica Nacional, Bogotá, Colombia (curator: M. García).

Results

Order Polydesmida Pocock, 1887
Suborder Polydesmidea Pocock, 1887
Family Polydesmidae Leach, 1815
Genus *Propolydesmus* Verhoeff, 1895

***Propolydesmus dismilus* (Berlese, 1891)**
Figs 1C, 2, 3.

Polydesmus dismilus Berlese, 1891: 348.

Fig. 1. A–B — Humedal Santa María del Lago parkland in Bogotá. C — habitus of live *Propolydesmus dismilus* (Berlese, 1891) (MHN-UPN-MD-397) in dorsal view. Photographs A and B taken by Daniella Millán.

Рис. 1. A–B — парк Santa María del Lago в Боготе. C — общий вид живого *Propolydesmus dismilus* (Berlese, 1891) (MHN-UPN-MD-397) сверху. Фотографии Daniella Millán (A, B).

Fig. 2. Habitus of *Propolydesmus dismilus* (Berlese, 1891) in dorsal view (MHN-UPN-MD-339). Scale bar: 2.5 mm.

Рис. 2. Общий вил *Propolydesmus dismilus* (Berlese, 1891) сверху. Масштаб: 2,5 мм.

NEW RECORD. MATERIAL. 1 ♂ (MHN-UPN-MD-339), COLOMBIA, Cundinamarca, Bogotá, Humedal Santa María del Lago parkland (4°41′47.1″N, 74°05′36.6″W), 2574 m a.s.l., 07 Aug. 2024. J. Romero-Rincon & D. Millán leg.; 1 ♂ (MHN-UPN-MD-397); same locality data, but 04 Nov. 2024; 2 ♀♀ (MHN-UPN-MD-398); same collection data.

PREVIOUSLY KNOWN DISTRIBUTION. SPAIN, Balearic Islands, Canary Islands, Valencia, Granada, Zamora, Huesca, Salamanca, Álava, Madrid, Segovia, Cuenca, Zaragoza, Toledo, Alicante, Guadalajara, Burgos. ITALY, Florence. ALGERIA [Enghoff, Golovatch, 2003, Djursvoll, 2019].

OTHER SPECIES ASSIGNED. *Propolydesmus corsicus* (Schubart, 1931), *P. cretaceus* Su, Cai et Huang, 2023 †, *P. germanicus* (Verhoeff, 1896), *P. helveticus* (Verhoeff, 1894), *P. heroldi* (Schubart, 1931), *P. laevidentatus* (Loksa, 1967), *P.*

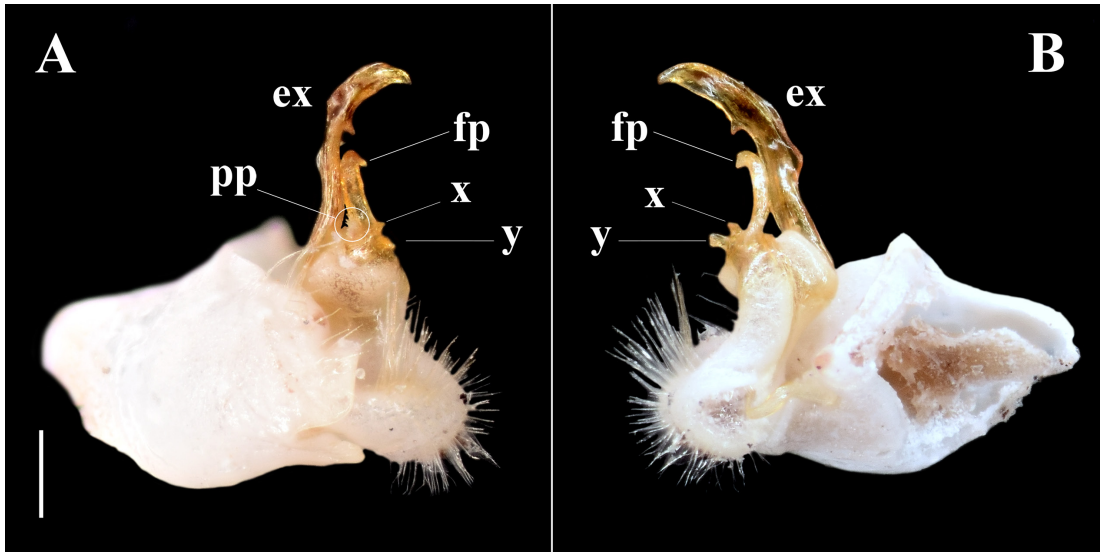

Fig. 3. Right gonopod of *Propolydesmus dismilus* (Berlese, 1891) (MHN-UPN-MD-339), lateral (A) and mesal views (B), respectively. Abbreviations: **ex** — exomere, **fp** — distofemoral process (= acropodite), **pp** — pilose pulvillus, **x, y, z** — protuberances on femorite. Scale bar: 0.25 mm.

Рис. 3. Правый гонопод *Propolydesmus dismilus* (Berlese, 1891) (MHN-UPN-MD-339), соответственно сбоку (A) и изнутри (B). Обозначения: **ex** — экзомер, **fp** — дистофеморвльный отросток (= акроподит), **pp** — опушенная подушка, **x, y, z** — выросты на феморите. Масштаб: 0,25 мм.

miguelinus (Attems, 1908), *P. mistrei* (Brölemann, 1902), *P. pectiniger* (Verhoeff, 1893), *P. plicatus* (Ceuca, 1962), *P. testaceus* (C.L. Koch, 1847), *P. troglobius* (Latzel, 1889).

IDENTIFICATION. Males of *P. dismilus* can be distinguished from other congeners by a simple exomere with the absence of protuberances/teeth, the presence of two teeth/protuberances on the femorite and a well-developed distofemoral process (Fig. 3).

DESCRIPTIVE NOTES. Body (Fig. 2) with 20 rings in males and females, size less than 20 mm, gonopod (Figs 1C, 2) with a strongly developed exomere (**ex**), unipartite, slightly curved, with a tooth located ventrally (exomere armature) near the middle of **ex**, distofemoral processs (**fp**) medium-sized, about half as long as **ex**, seminal groove evident, accessory seminal chamber quite well developed, pilose pulvilus (**pp**) located at base of **fp**, two characteristic protuberances (**x** and **y**) placed caudally to **pp** present.

Discussion

The Polydesmidae Leach, 1815 is a family of millipedes with an extensive diversity and distribution across the Northern Hemisphere, comprising more than 60 genera and 400 species and occurring mainly in the Mediterranean area [Hoffman, 1980, Golovatch, 1991]. So any species recorded from South America must be considered introduced. *Propolydesmus dismilus* is a species that to date has had few records within its known range and, although the reasons for its low abundance and sporadic occurrence are not yet clear, it is evident that it has a preference for subterranean habitats and therefore is often considered a troglophile species [Enghoff, Golovatch, 2003, Kime, Enghoff, 2011, Gilgado, Ortuño, 2023]. The individuals recorded from Colonbia were found in a natural relict parkland of the City of Bogotá, but neither in caves nor caverns, more specifically at a depth of 15 cm from the ground surface and in leaf litter in the Humedal Santa María del Lago parkland. This record confirms both the ecological inclinations to dwelling in subterranean microhabitats and the low abundance of the species.

Bogotá is the capital of the country and is located in the Eastern Cordillera of the Andes at an altitude of 2600 m a.s.l., with an average annual surface temperature of 15.3°C. This city is densely populated compared to other large cities in the country, as only 23% of its extension corresponds to urban areas [Alcaldía Mayor de Bogotá, 2021; Corrales, Osorno, 2018]. Although the capital is considered as one of the most important metropolises for Latin America due to its growth and urban development, it has a great diversity of vascular plants that to date amounts to 3017 species, 1013 genera and 194 families. However, about a third of this flora has been introduced (29%) due to trade and transfer of seeds, seedlings and private collections by inhabitants and institutions [Fajardo-Gutiérrez *et al.*, 2020].

It seems possible that this millipede species may have arrived in the country through trade or unintentional introduction of plants such as *Conium maculatum* L. (Apiaceae), *Hypochaeris radicata* L. (Asteraceae), *Plantago major* L. (Plantaginaceae), *Rumex crispus* L. (Polygonaceae), among others that are distributed in the Humedal Santa María del Lago, whose origin of distribution corresponds to the European continent [Secretaría Distrital de Ambiente, 2021]. Although sampling has been undertaken in other green areas of the city such as the Jardín Botánico de Bogotá, Parque Simon Bolivar, Quebrada La Vieja and patches of the Cordillera Oriental of the city, it seems that its distribution still remains focused, however, this result suggests further sampling in other urban areas, its surroundings and major cities with the presence of plants introduced from Europe, in order to establish the range of distribution of *Propolydesmus dismilus* and the environmental variables with which it is associated.

ADDITIONAL INFORMATION

Conflict of interest. The authors declare that no competing interests exist.

Ethical statement. No ethical statement is reported.

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Data availability. All data that support the findings of this study are available in the main text.

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