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Notas / *Notes*

First record of *Gordius albopunctatus* Müller, 1927 in the Iberian Peninsula (Nematomorpha: Gordioida Rauther, 1930)

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ABSTRACT

Gordius albopunctatus Müller, 1927 (Gordioida) is reported for the first time from the Iberian Peninsula, based on one male and one female specimens collected in the Guadarrama Range (Madrid). This record is the southernmost of this species, notably expanding its known biogeographic range.

Keywords: Nematomorpha; *Gordius*; faunistics; Madrid; Spain; Iberian Peninsula.

RESUMEN

Primera cita de *Gordius albopunctatus* Müller, 1927 en la Península Ibérica (Nematomorpha: Gordioida Rauther, 1930)

Se hace referencia a la primera cita de *Gordius albopunctatus* Müller, 1927 (Gordioida) de la península ibérica, a partir de un ejemplar macho y otro hembra capturados en la Sierra de Guadarrama (Madrid). Esta cita es la más meridional de su distribución de modo que se amplía notablemente su distribución biogeográfica.

Palabras clave: Nematomorpha; *Gordius*; faunística; Madrid; España; península ibérica.

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Horsehair worms (Phylum Nematomorpha) are worms with life cycles including a parasitic phase in the body cavity of terrestrial insects, mainly beetles, crickets or praying mantids. Few species develop in aquatic insects, e.g. *Gordius albopunctatus* Müller, 1927 (see Schmidt-Rhaesa & Kristensen, 2006). At maturity, they leave their host and reproduce in freshwater (5 species are marine), where they lay eggs, from which larvae hatch and infect aquatic paratenic hosts (Hanelt *et al*., 2005; Schmidt-Rhaesa, 2013).

To date, only five studies have examined Nematomorpha from the Iberian Peninsula. Baker (1985) reported a single undetermined specimen; later, De Villalobos *et al*. (2001) reported four species (*Gordius aquaticus* Linnaeus, 1758, *Gordius plicatulus* Heinze, 1937, *Gordionus wolterstorffii* Camerano, 1888 and *Paragordius tricuspidatus* Dufour, 1828) and Schmidt-Rhaesa & Cieslak (2008) added two new species: *Gordionus barbatus* and *Paragordionus ibericus*. Recently Schmidt-Rhaesa & Martínez (2016) described the species *Gordius*

gonzalezi, from material collected in the region of Extremadura. Gerlach (1978) cited an additional four species from the Iberian fauna but without any further information on the locality of collection, deposition of voucher material or reference. In this note we present a new record of the species *Gordius albopunctatus* Müller, 1927 to be added to the Iberian fauna.

Material studied: 1 ♂, 1 ♀ of *Gordius albopunctatus* Müller, 1927. Locality: Rascafría, puente del Perdón, río Lozoya. Madrid. Guadarrama Range, Sistema Central. Date of collection: 22.08.2019. Leg. J.E. Expósito López de Felipe. Det. A. Schmidt-Rhaesa. Deposited in the Zoological Museum Hamburg (ZMH) (accession number ♀: ZMH V13460; accession number ♂ ZMH-V13461). The specimen was collected manually in the riverside and transferred to ethanol (70%). Pieces of the midbody region and the posterior end of the male were dehydrated in an increasing ethanol series, critical point dried and coated with gold in a sputter coater. Observations were made using a LEO scanning electron microscope (SEM) 1524.

The diagnosis of the species is made by a combination of two characters according to Schmidt-Rhaesa & Kristensen (2006): the presence of white dots (hence the specific name, *albopunctatus*) and polygonal areoles on the cuticle (Fig. 1A-C). The posterior end of the male (Fig. 1D) has the postcloacal crescent characteristic for the genus *Gordius*. Interestingly, while most species of *Gordius* develop in terrestrial hosts, this species has been exclusively reported from aquatic hosts, including caddisflies (Trichoptera), especially *Potamophylax cingulatus* (Stephens, 1837) (Schmidt-Rhaesa & Kristensen, 2006) and *Potamophylax latipennis* (Curtis, 1834) (in Heinze, 1941 as *Stenophylax stellatus* Curtis, 1834).

This record notably widens the distribution of this species towards southern Europe (currently is cited in Germany, Poland and Belgium) (Schmidt-Rhaesa, 2010, 2013).

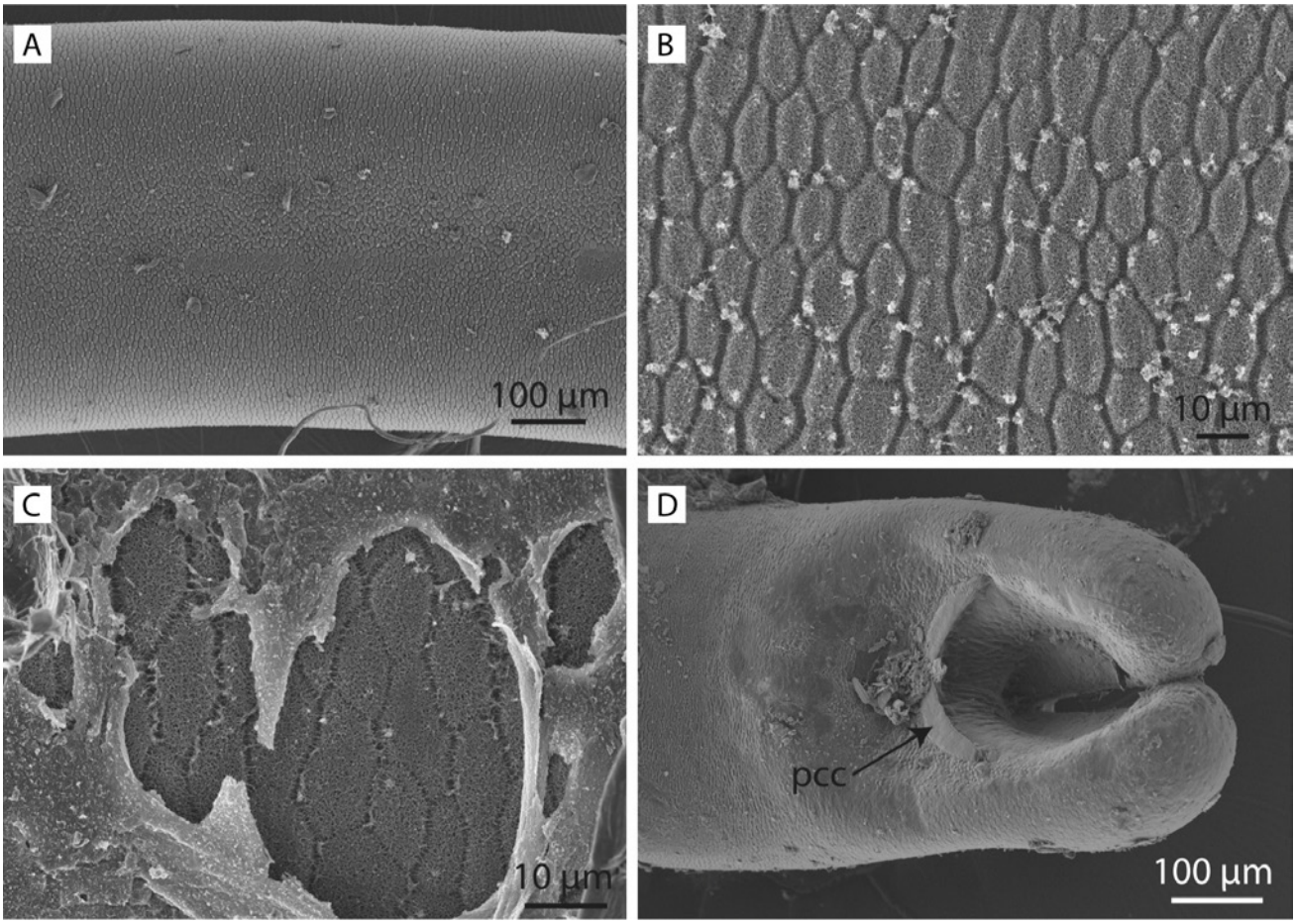

Fig. 1.— *Gordius albopunctatus*. A: Overview of the cuticle in midbody in male specimen. B: Magnification of the cuticle in midbody in male specimen. C: Adult cuticle with areoles still partly covered by the larval cuticle of the female specimen. D: Ventral view of the posterior end of the male with the semicircular postcloacal crescent (pcc).

Fig. 1.— *Gordius albopunctatus*. A: Vista general de la cutícula en la parte media del cuerpo del macho. B: Ampliación de la cutícula en la parte media del cuerpo del macho. C: Cutícula adulta con areolas todavía parcialmente cubiertas por la cutícula larvaria de la hembra. D: vista ventral del extremo posterior del macho con la media luna postcloacal semicircular (pcc).

Although the ecological importance of horsehair worms in freshwater ecosystems has been underestimated in many limnological studies, recent studies have shown this group plays a significant role in terrestrial and aquatic ecosystems. Specifically, they are relevant in the energy flow between terrestrial and aquatic trophic nets and in modifying the seasonality of spatial energy subsidies, which can be important for the dynamics of the community (Sato *et al*. 2008, 2011, 2012; Takimoto *et al*. 2009).

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References

Baker, G. H. 1985. Parasites of the millipede *Ommatoiulus moreletii* (Lucas) (Diplopoda: Iulidae) in Portugal, and their potential as biological control agents in Australia. *Australian Journal of Zoology*, 33: 23-32. https://doi.org/10.1071/ZO9850023

De Villalobos, L. C., Ribera, I. & Bilton, D. T. 2001. First data of Iberian Nematomorpha, with redescription of *Gordius aquaticus* Linnaeus, *G. plicatulus* Heinze, *Gordionus wolterstorffii* (Camerano) and *Paragordius tricuspidatus* (Dufour). *Contributions to Zoology*, 70: 73-84. https://doi.org/10.1163/18759866-07002002

Gerlach, S. 1978. *Nematomorpha*. In: Illies, J. (Ed.). *Limnofauna Europaea*. Gustav Fischer Verlag, Stuttgart: 50-53.

Hanelt, B., Thomas, F. & Schmidt-Rhaesa, A. 2005. Biology of the Phylum Nematomorpha. *Advances in Parasitology*, 59: 243-305.

Heinze, K. 1941. Saitenwürmer oder Gordioidea (Nematomorpha). In: Dahl, F. (Ed.). *Die Tierwelt Deutschlands* 39: 1–78. Gustav Fischer. Jena.

Sato, T., Arizono, M., Sone, R. & Harada, Y. 2008. Parasite-mediated allochthonous input: Do hairworms enhance subsidized predation of stream salmonids on crickets? *Canadian Journal of Zoology*, 86: 231-235. https://doi.org/10.1139/Z07-135

Sato, T., Egusa, T., Fukushima, K., Oda, T., Ohte, N, Tokuchi, N., Watanabe, K., Kanaiwa, M., Murakami, I., Lafferty, K. D. 2012. Nematomorph parasites indirectly alter the food web and ecosystem function of streams through behavioural manipulation of their cricket hosts. *Ecology Letters*, 15: 786-793. https://doi.org/10.1111/j.1461-0248.2012.01798.x

Sato, T., Watanabe, K., Kanaiwa, M., Niizuma, Y., Harada, Y. & Lafferty, K. D. 2011. Nematomorph parasites drive energy flow through a riparian ecosystem. *Ecology*, 92: 201-207. https://doi.org/10.1890/09-1565.1

Schmidt-Rhaesa, A. 2010. Considerations on the genus *Gordius* (Nematomorpha, horsehair worms), with the description of seven new species. *Zootaxa*, 2533: 1-35. https://doi.org/10.11646/zootaxa.2533.1.1

Schmidt-Rhaesa, A. 2013. Nematomorpha. In: Schmidt-Rhaesa, A. (Ed.). *Handbook of Zoology. Gastrotricha, Cycloneuralia and Gnathifera. Vol. 1. Nematomorpha, Priapulida, Kinorhyncha and Loricifera*. De Gruyter, Berlin: 29–145.

Schmidt-Rhaesa, A. & Cieslak, A. 2008. Three new species of *Paragordionus* and *Gordionus* (Nematomorpha, Gordiida) from Spain and Turkey, with comments on the taxon *Semigordionus*. *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut*, 105: 13-22.

Schmidt-Rhaesa, A. & Kristensen, P. 2006. Horsehair worms (Nematomorpha) from the Baltic island Bornholm (Denmark), with notes on the biology of *Gordius albopunctatus*. *Journal of Natural History*, 40 (9-10): 495-502. https://doi.org/10.1080/00222930600761803

Schmidt-Rhaesa, A. & Martínez, J., 2016. *Gordius gonzalezi*, a new species of horsehair worms (Nematomorpha) from Spain. *Zootaxa*, 4103(1): 63-67. https://doi.org/10.11646/zootaxa.4103.1.6

Takimoto, G., Iwata, T. & Murakami, M., 2009. Timescale hierarchy determines the indirect effects of fluctuating subsidy inputs on *in situ* resources. *The American Naturalist*, 173(2): 200-211. https://doi.org/10.1086/595759