

Occurrence of the interstitial nemertean *Otocyphlonemertes duplex* (Nemertea: Hoplonemertea) in the Cabo de Gata Natural Park (Mediterranean, south-east Spain)

ALFONSO HERRERA-BACHILLER AND JUAN JUNOY

EU-US Marine Biodiversity Research Group, Departamento de Ciencias de la Vida and Instituto Franklin, Universidad de Alcalá, AP 20 Campus Universitario, 28871 Alcalá de Henares, Madrid, Spain

The interstitial hoplonemertean Otocyphlonemertes duplex, originally described from Naples, is collected for the first time on the Spanish Mediterranean coast at the Cabo de Gata Natural Park (Mediterranean, south-east Spain). Morphological data and pictures of this species are provided.

Keywords: Nemertea, *Otocyphlonemertes duplex*, new record, Mediterranean, Spain, Cabo de Gata Natural Park

Submitted 17 July 2014; accepted 29 September 2014

INTRODUCTION

The knowledge about the nemerteans inhabiting beaches is scarce due to their low abundance in these habitats and they are slightly documented in books about beach ecology (e.g. McLachlan & Brown, 2006). Recent beach studies involving an intensive sampling (e.g. Junoy *et al.*, 2005, 2013) have discovered very unusual species such as *Lineus acutifrons* Southern, 1913 or *Psammamphiporus elongatus* (Stephenson, 1911) (Herrera-Bachiller *et al.*, 2008; Puerta *et al.*, 2010).

Interstitial nemerteans are more elusive to collect in benthic samples due to their size (like many other invertebrates the nemerteans also have their smallest species in the interstitial fauna) and there are fixation problems that make their identification difficult.

Sampling of beaches from Cabo de Gata Natural Park (south-east Spain) (Figure 1) revealed the presence of the nemertean *Otocyphlonemertes duplex* Bürger, 1895. The aim of this paper is to document this record and provide morphological data for the species.

MATERIALS AND METHODS

Sedimentary samples of volcanic coarse sand from the Embarcadero beach (36°47.603'N 2°3.695'W) (Figure 1) were collected and examined following the method described in Corrêa (1949). Nine specimens (five ♂, four ♀) of *O. duplex* were obtained on 21 June 2014. The specimens

were examined alive both before and after anaesthetization in 7.5% MgCl₂. The nine specimens were live squeezed to observe the stylet region. Sediment samples also contained specimens of the heteronemertean *Ramphogordius lacteus* Rathke, 1843.

RESULTS

The body is extremely slender. Colour is orange in the intestine region, the anterior part is whitish and it is reddish around the cerebral ganglia (Figure 2A, C). Specimens measure up to 16 mm in length but no more than 1 mm in width. Head is bluntly rounded in shape (Figure 2D, E), not demarcated from the trunk, but in motion sometimes slightly oval; lacks eyes. A pair of statocysts is found dorsal to the cerebral ganglia; each one contains a statolith with two granules (Figure 2F). One cephalic furrow posterior to statocysts is observed reaching around body, dorsally forming an angle pointing caudally and ventrally pointing anteriorly (Figure 2C). Tactile cirri are present in the cephalic region; their number and position are variable (Figure 2E). The back end is slightly pointed with adhesive plate; caudal cirri are present. The proboscis occupies only the anterior third part of the body (Figure 2C). The stylet is smooth; all specimens have two accessory stylet pouches containing up to 3 stylets each (Figure 2G); the direction of the accessory stylets is both forward and backward in six specimens and forward in three specimens. The middle chamber is bulbous. Measurements of the stylet apparatus of the specimens are shown in Table 1. Specimens were sexually mature in June (Figure 2C). They move quickly in the trays with sand and survive in captivity in small containers without any special care for several weeks.

Corresponding author:

J. Junoy

Email: juan.junoy@uah.es

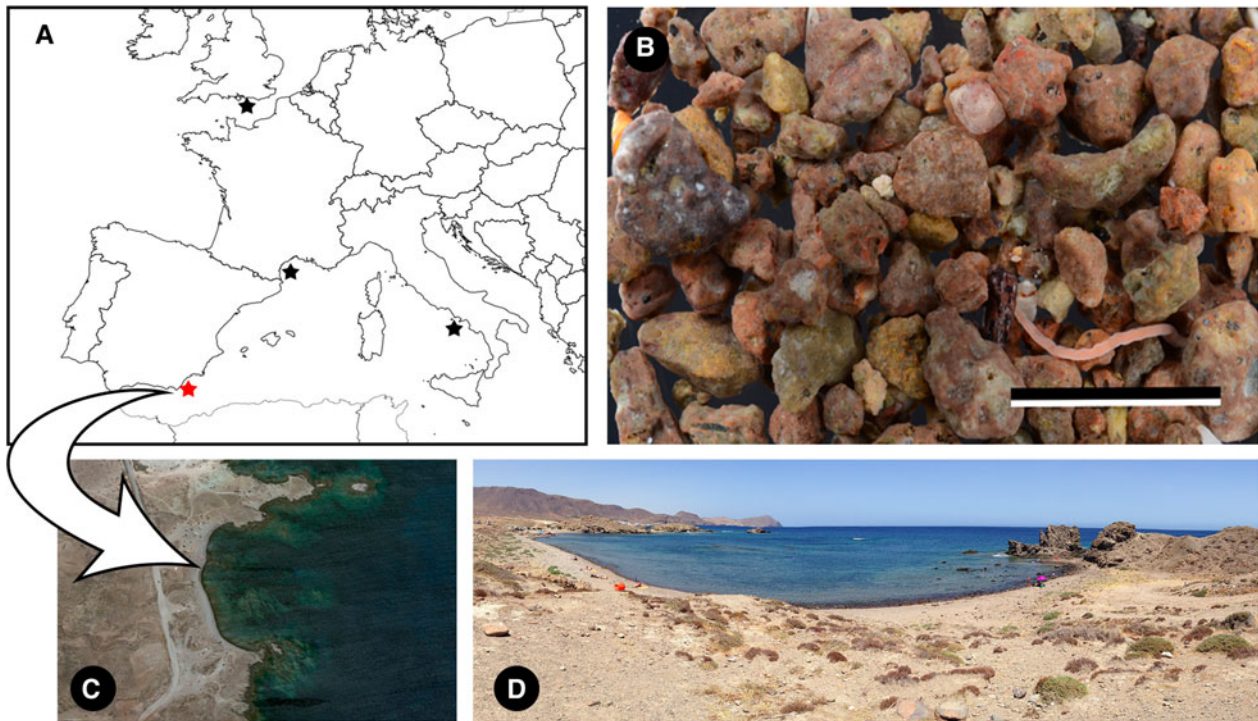


Fig. 1. Location of sampled specimens of *Ototyphlonemertes duplex*: (A) distribution of *O. duplex* in European waters, data from Bürger (1895), Corrêa (1953) Kirsteuer (1971) and Envall (1996), new record (red star); (B) volcanic coarse sand of the Embarcadero beach; (C) aerial photograph of the Embarcadero beach; (D) panoramic photograph of the Embarcadero beach. Scale bar: B, 1 cm.

DISCUSSION

Ototyphlonemertes duplex has been recorded in Mediterranean waters of Naples (Italy), Villefranche-sur-Mer (France) and the south of England (Bürger, 1895; Corrêa, 1953; Kirsteuer, 1971; Envall, 1996). The specimens from Cabo de Gata Natural Park constitute the first record of the species in Spain. There were only two records of the genus *Ototyphlonemertes* from the Iberian Peninsula. Envall & Norenburg (2001) collected a single specimen of *O. brunnea* from Barcelona beaches and Norenburg (2008) listed *O. macintoshi* from Mindelo (Portugal).

The morphology of the Spanish specimens is consistent with the descriptions of *O. duplex* provided by Bürger (1895), Corrêa (1953) and Envall (1996). They have the same colour pattern as the one represented in the original description by Bürger (1895: plate 2, figure 6) (Figure 2B). Kirsteuer (1977) suggested an intraspecific constancy in number and distribution of cirri and Norenburg (1988)

proposed a system to account for it. A basic distributional pattern has not been detected in the Spanish specimens; only some specimens showed a regular pattern similar to *O. duplex* represented by Envall (1996: figure 1b). The validity of the cirri as a specific character has been discussed by Envall & Norenburg (2001).

Spanish specimens were collected together with the heteronemertean *Ramphogordius lacteus* (= *Lineus lacteus*). The common occurrence of both species in the same area has been also reported by Bürger (1895) and Corrêa (1953); the ecological significance of these data remain still unknown.

ACKNOWLEDGEMENT

We are extremely grateful to two anonymous referees for their constructive comments about the original manuscript.

Table 1. Measurements recorded for the stylet apparatus of nine specimens of *Ototyphlonemertes duplex*.

Specimen	1	2	3	4	5	6	7	8	9
Length of central stylet (μm)	40	45	45	46	40	45	42	37	37
Length of basis (μm)	35	40	40	40	43	40	38	40	37
Maximum width of basis (μm)	12	15	15	15	13	13	15	13	15
Ratio of basis length to central stylet length	0.87	0.89	0.89	0.87	1.08	0.89	0.91	1.08	1
Ratio of basis length to basis width	2.92	2.67	2.67	2.67	3.31	3.08	2.53	3.08	2.47
Number of accessory stylet pouches	2	2	2	2	2	2	2	2	2
Number of reserve stylets per pouch	2.2	3.3	3.3	3.2	2.2	2.2	1.3	2.3	22

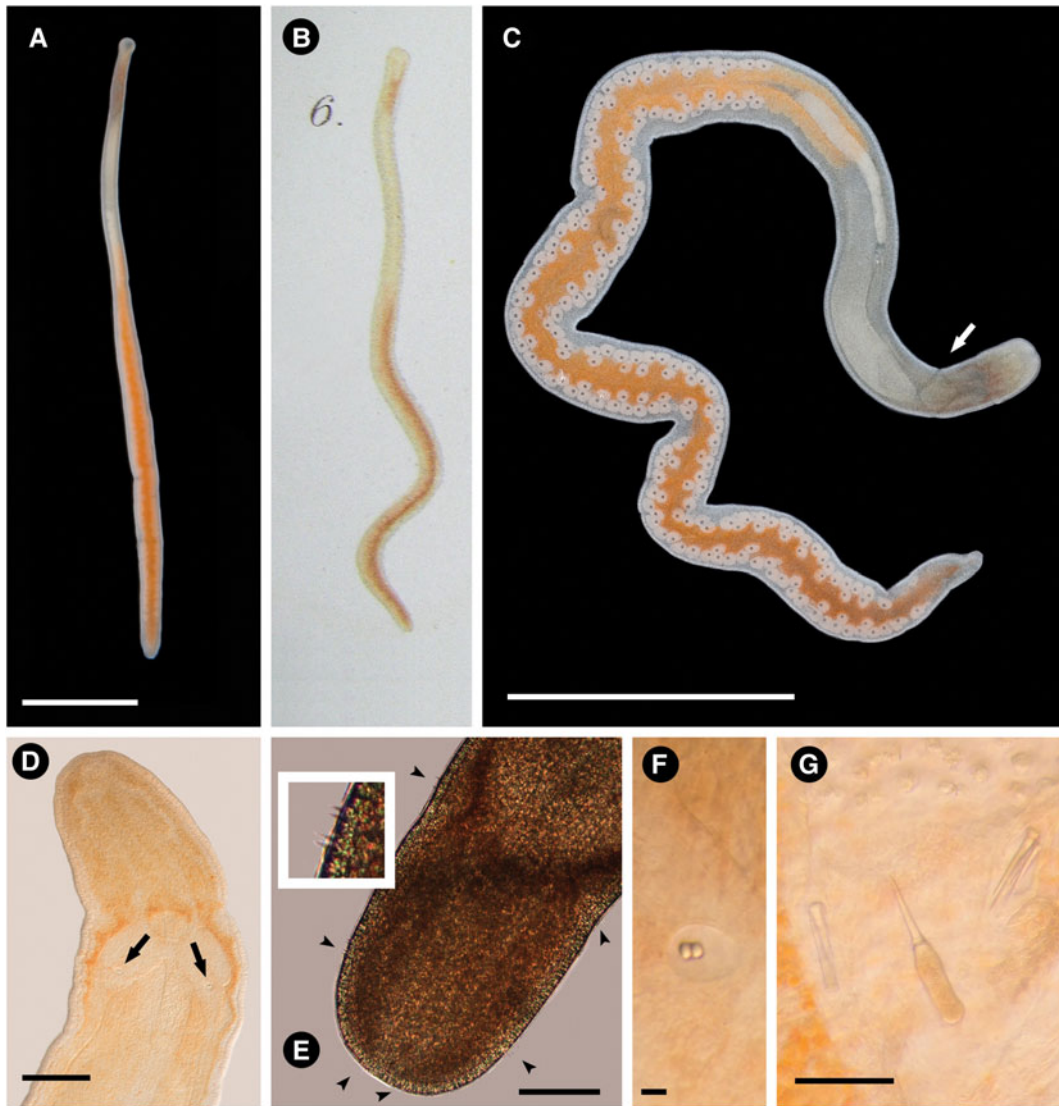


Fig. 2. *Ototyphlonemertes duplex*: (A) photograph of a complete specimen (dorsal view); (B) original illustration, reproduced from Bürger (1895: plate 2, figure 6); (C) photograph of a complete live squeezed female specimen showing the gonads. Cephalic furrow (arrow); (D) microphotograph of the head of a live squeezed specimen showing the position of the statocysts (arrows); (E) microphotograph of a live squeezed specimen showing the head and the position of the tactile cirri (arrowheads). Inset shows a detail of the cirri; (F) microphotograph of the statocyst; (G) microphotograph of a live squeezed specimen showing the central stylet and its basis and the two pouches of accessory stylets. Scale bars: A, 2 mm; C, 3 mm; D–E, 0.5 mm; F, 10 μ m; G, 50 μ m.

REFERENCES

- Bürger O.** (1895) Die Nemertinen des Golfes von Neapel und der angrenzenden Meeres-Abschnitte. *Fauna und Flora des Golfes von Neapel* 22, 1–743.
- Corrêa D.D.** (1949) Ecological study of Brazilian *Ototyphlonemertes*. *Comunicaciones Zoológicas del Museo de Historia Natural de Montevideo* 3, 1–7.
- Corrêa D.D.** (1953) Sobre a neurofisiologia locomotora de hoplonemertinos e a taxonomia de *Ototyphlonemertes*. *Anais da Academia Brasileira de Ciências* 25, 545–555.
- Envall M.** (1996) *Ototyphlonemertes correae* sp. nov. and a redescription of *O. duplex* (Nemertea: Monostilifera: Ototyphlonemertidae), with a phylogenetic consideration of the genus. *Journal of Zoology, London* 238, 253–277.
- Envall M. and Norenburg J.L.** (2001) Morphology and systematics in mesopsammic nemerteans of the genus *Ototyphlonemertes* (Nemertea, Hoplonemertea, Ototyphlonemertidae). *Hydrobiologia* 456, 145–163.
- Herrera-Bachiller A., García-Corrales P., Roldán C. and Junoy J.** (2008) The ignored but common nemertine *Psammamphiporus elongatus* from the Galician beaches (Spain), affected by the Prestige oil spill. *Marine Ecology* 29 (Supplement 1), 43–45.
- Junoy J., Castellanos C., Viéitez J.M., De la Huz M.R. and Lastra M.** (2005) The macroinfauna of the Galician sandy beaches (NW Spain) affected by the Prestige oil-spill. *Marine Pollution Bulletin* 50, 526–536.
- Junoy J., Castellanos C., Viéitez J.M. and Riera R.** (2013) Seven years of macroinfauna monitoring at Ladeira beach (Corrubedo Bay, NW Spain) after the Prestige oil spill. *Oceanologia* 55, 393–407.
- Kirsteuer E.** (1971) The interstitial nemertean fauna of marine sand. In Hulings N.C. (ed.) *Proceedings of the First International Conference on Meiofauna, Tunis, Tunisia, 1–11 July 1969. Smithsonian Contributions to Zoology*. Washington, DC: Smithsonian Institution Press, pp. 17–19.

Kirsteuer E. (1977) Remarks on taxonomy and geographic distribution of the genus *Otothyphlonemertes* Diesing (Nemertina, Monostilifera). *Mikrofauna Meeresbodens* 61, 167–181.

McLachlan A. and Brown A.C. (2006) *The ecology of sandy shores*. 2nd edition. Burlington, VT: Academic Press.

Norenburg J.L. (1988) Remarks on marine interstitial nemertines and key to species. *Hydrobiologia* 156, 87–92.

Norenburg J.L. (2008) *MCZBASE: The Database of the Zoological Collections: Otothyphlonemertes macintoshi Bürger, 1895*. Museum of Comparative Zoology, Harvard University. Available at: <http://www.gbif.org/occurrence/736303183> (accessed 15 July 2014).

and

Puerta P., Andrade S.C.S. and Junoy J. (2010) Redescription of *Lineus acutifrons* Southern, 1913 (Nemertea: Piliidiophora) and comments on its phylogenetic position. *Journal of Natural History* 44, 2363–2378.

Correspondence should be addressed to:

J. Junoy

Departamento de Ciencias de la Vida

Universidad de Alcalá

28871 Alcalá de Henares, Spain

email: juan.junoy@uah.es