

**Rapid Communication****The first UK records of the purple fan-worm,  
*Bispira polyomma* Giangrande & Faasse, 2012 (Annelida: Sabellidae)**John D.D. Bishop<sup>1,\*</sup> and Teresa Darbyshire<sup>2</sup><sup>1</sup>Marine Biological Association of the UK, Citadel Hill Laboratory, Plymouth PL1 2PB, UK<sup>2</sup>Amgueddfa Cymru – National Museum Wales, Department of Natural Sciences, Cathays Park, Cardiff CF10 3NP, Wales, UK

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**OPEN ACCESS****Abstract**

The sabellid polychaete *Bispira polyomma* Giangrande & Faasse, 2012 was found during summer–autumn 2021 in substantial numbers in two adjacent marinas in Plymouth, SW England. These are apparently the first UK reports, coming over a decade after the species' discovery and description, as a presumed non-native, in the SW Netherlands. Further morphological details of the species and notes on variation between individuals are provided. It seems probable that records of *Bispira fabricii* in Le Havre commencing in 2010, and at other sites on the French north coast, also relate to *B. polyomma*. An apparent association with marinas and ports suggests roles for recreational boats and commercial shipping in the dispersal of this species.

**Key words:** non-native, non-indigenous, marine, range extension, Great Britain, England**Introduction**

Over 20 species belonging to the Sabellidae (Annelida: Polychaeta) have become established beyond their natural geographical range as a result of human activities (Çinar 2013; Keppel et al. 2015; Capa et al. 2021). It is probable that the propensity of many sabellids to settle on artificial structures and surfaces increases the likelihood of anthropogenic transport beyond their native range, and that their tubicolous habit provides a degree of protection during the journey (Keppel et al. 2015). Introduced sabellids can achieve high densities, competing for food with native suspension feeders and potentially interfering with larval recruitment and modifying the habitat and nutrient cycling. One example, *Branchiomma bairdi* (McIntosh, 1885), reaches densities in excess of 18,000 individuals·m<sup>-2</sup> in the Gulf of California (Tovar-Hernández et al. 2014). A second, *Sabella spallanzanii* (Gmelin, 1791), a large European species introduced in Australia, has been ranked among the top ten Australian marine non-native species on the basis of combined (actual or potential) human-health, economic and environmental impact (Hayes et al. 2005; Ross et al. 2013).

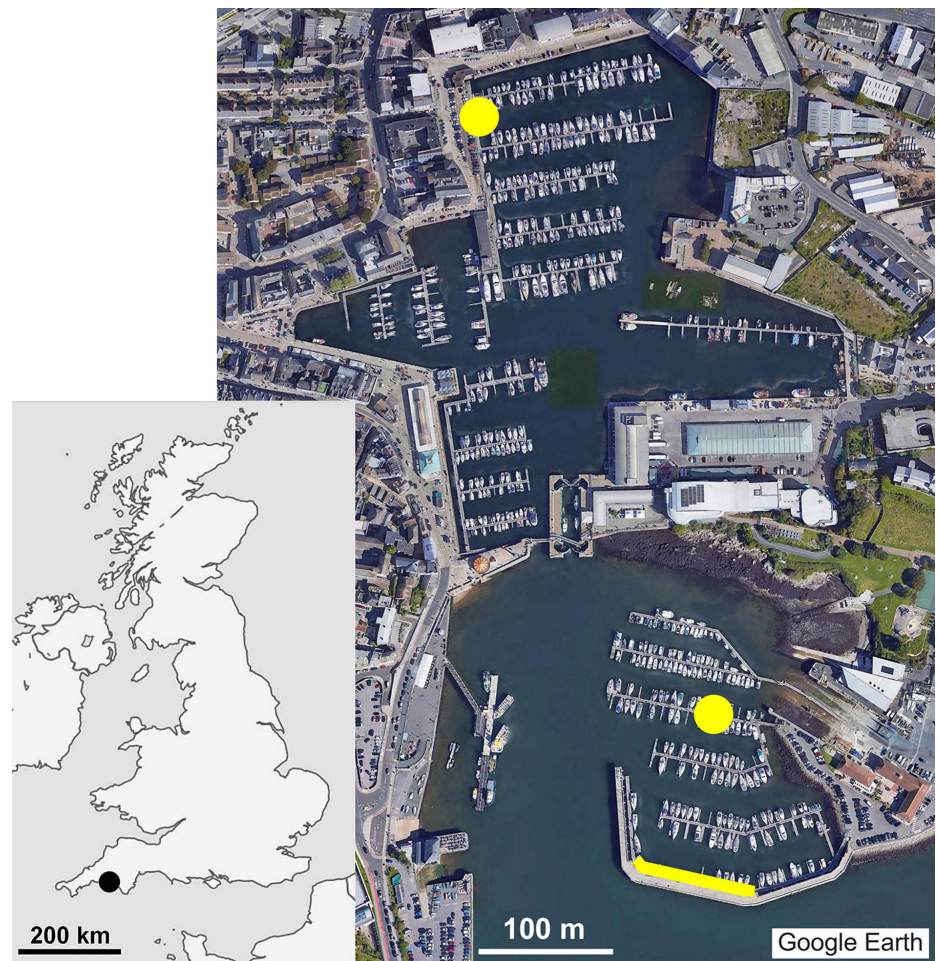
The sabellid *Bispira polyomma* Giangrande & Faasse, 2012 was named and described from Yerseke (Netherlands) as an apparently undescribed taxon, found in 2010, that had not previously been noted in that well-studied site (which included a marina and nearby oyster storage basins) or in the wider surrounding region (Faasse and Giangrande 2012). The species was thus believed to be a recent arrival in the Netherlands from an unknown source. Subsequently, *B. polyomma* was noted in a marina at Wemeldinge, 5 km east of Yerseke, in 2014 (Karremans 2015), and at the Roompot Marina, Kamperland (Noord-Beveland), about 20 km west of Yerseke, in 2015 (Gittenberger 2015). A series of further records from the Oosterschelde region of the Netherlands followed from 2016 onwards (GBIF 2022), and the species has now also been found in several places in the Grevelingenmeer (Gmelig Meyling 2021). In addition, records were made every year between 2018 and 2021 from the Zeebrugge (Belgium) dock basin housing the Royal Belgian Sailing Club and the Westhinder Marina (GBIF 2022). A single specimen from the Lagoon of Venice (Italy) collected in 2014 was identified as *B. polyomma* by Langeneck et al. (2020). Langeneck et al. (2020) further suggested that the record of *Bispira fabricii* (Krøyer, 1856) from the port of Le Havre (France) by Breton (2014) is likely to have been *B. polyomma* (see Discussion).

## Methods and results

*Bispira polyomma* was encountered fortuitously while collecting ascidians for unrelated research. A settlement panel with worms attached was collected by hand and maintained in recirculating seawater at the Marine Biological Association's Citadel Hill Laboratory pending expert identification. Worms were examined and photographed live after narcotization with 7% MgCl<sub>2</sub>. Photographs were taken with a Canon EOS 80D digital camera attached to a Leica Z6 stereomicroscope, and layered images were processed and stacked using Helicon Focus 8 software. Animals were then fixed in 4% formaldehyde for 2 days followed by washing in freshwater with final preservation in 70% ethanol, and are deposited at Amgueddfa Cymru-National Museum Wales (NMW.Z).

### *UK occurrence*

*Bispira polyomma* was first noticed on 11 August 2021 at Lat. 50.3641, Long. -4.1314 in a Plymouth marina, on the low intertidal level of the marina wave-screen and on a small, vertical polypropylene settlement panel suspended c.1.5 m below the surface from an adjacent floating pontoon. The species was not identified and the extent of the population was not investigated at that time, but on 05 November 2021 the species was



**Figure 1.** Extent (yellow line) of *Bispira polyomma* on the marina wave-screen shown in Figure 3C, plus the furthest-north sighting in the same marina and the sighting further north in the second marina (both yellow circles). Inset: Position of Plymouth in the UK.

found to be present along the entire length of the inner wave-screen, a distance of 96 m, both above and below the water line at the time of low water (predicted height 0.7 m) (Figures 1 and 3C). On 21 October 2021, *B. polyomma* was also encountered on additional pontoons across the extent of the marina, again on similar settlement panels and on a keep-cage suspended from the pontoons. On 01 October 2021, the species was seen in a second, adjacent Plymouth marina at Lat. 50.3697, Long -4.1341, growing densely on similar settlement panels suspended c. 1.5 m below floating pontoons close to the harbour wall (Figure 1). Part of a panel with a near-continuous array of expanded radiolar crowns was estimated from photographs to have a density of 11,500 tubes·m<sup>-2</sup>. One of these panels was collected. This site is c. 500 m north of the nearest occurrence noted in the first marina; some of the specimens from this site were seen to release eggs when removed from their tubes. The other pontoons in this marina were not investigated. The wave-screen population in the first marina was still present all along the inner wave-screen on 31 March 2022.

### *Taxonomic account*

Sabellidae Latreille, 1825

*Bispira* Krøyer, 1856

*Bispira*: Knight-Jones & Perkins 1998: 405–406

Type species: *Amphitrite volutacornis* Montagu, 1804

### ***Bispira polyomma* Giangrande & Faasse, 2012**

Figures 2, 3

Giangrande et al. 2015: 70; Langeneck et al. 2020: 247.

*Material examined*: 24 specimens, Lat. 50.3697, Long. –4.1341, Plymouth, UK, on a polypropylene settlement panel hung from a floating pontoon, depth c. 1.5 m, 01 October 2021, NMW.Z.2022.003.0001–0004.

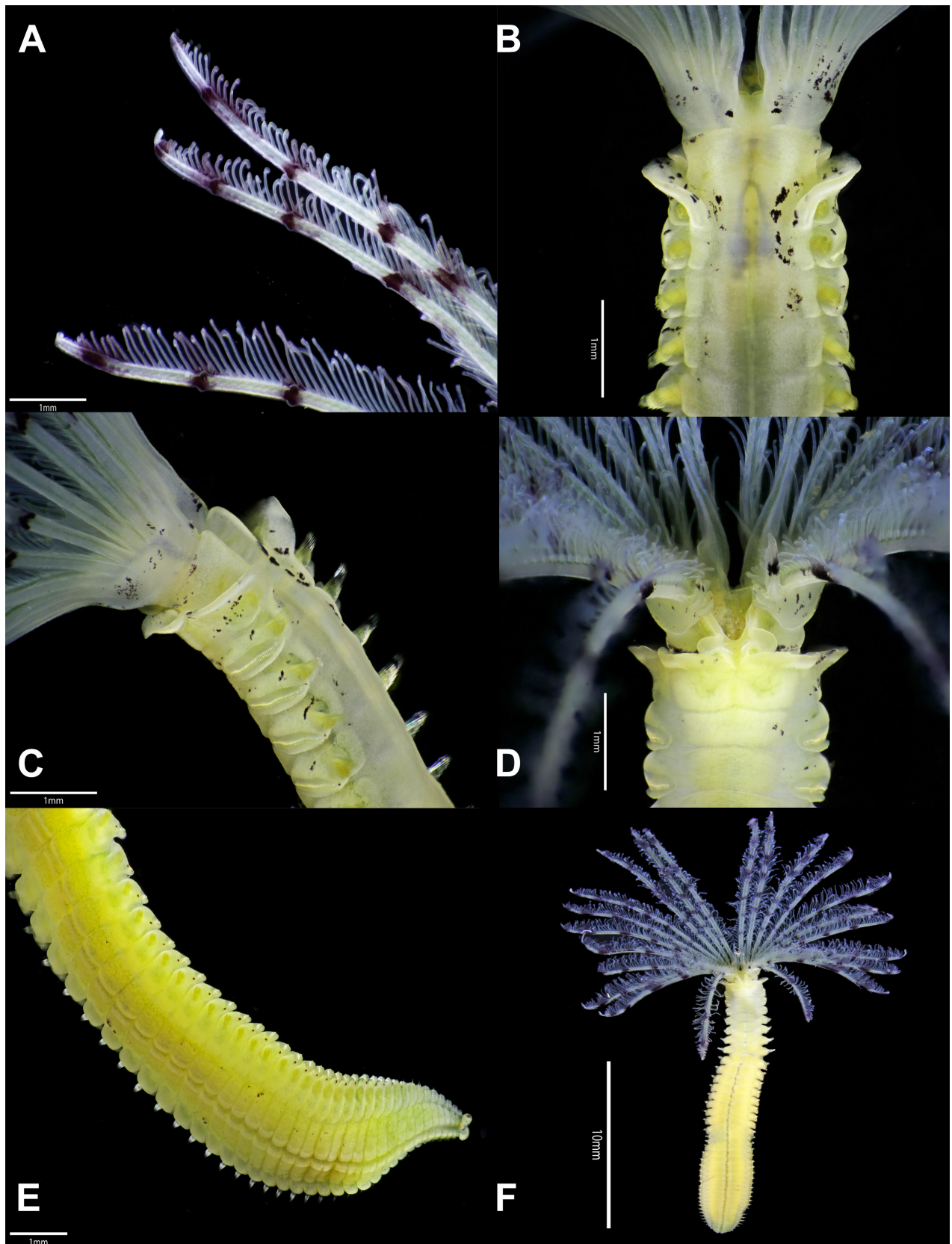
### Description

The specimens examined match the description provided in Faasse and Giangrande (2012) with some account needing to be taken of the variability reported in that paper. Expansion of the character ranges reported by Faasse and Giangrande (2012) is detailed below but characteristics that do not vary from the original description are omitted.

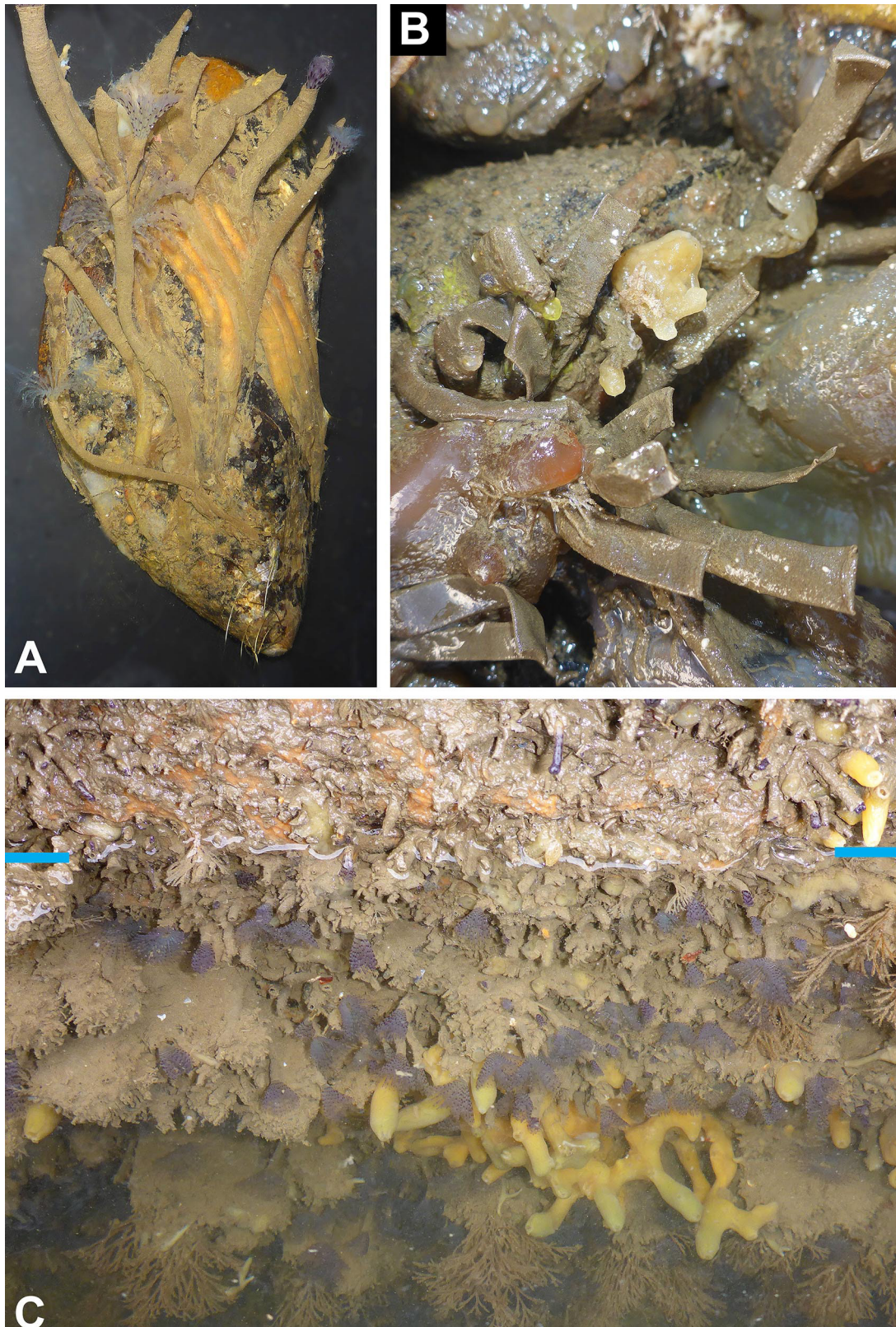
Body length (excluding the radiolar crown) 11–44 mm, width 1–2.25 mm for 39–52 chaetigers of which the first 8 on all specimens are thoracic. Radiolar crown 7–16 mm long. Colour of body yellowish with some speckled black pigment on the thorax (Figure 2B–D), mainly dorsal and lateral. Radiolar crown bluish-purple (Figure 2F), all with 4–8 (rarely 9) darkly pigmented bands (Figure 2A, F). Crown with basal membrane of about 1/8–1/6 length of crown (Figure 2C). Each radiolar lobe with 9–16 radioles (Figure 2F). Radioles with very thin flanges and smooth, tapered tips, shorter than pinnules (Figure 2A). All radioles with 1–6 (usually 4–6) pairs of dark compound eyes, situated in the dark-pigmented bands along the radioles (Figure 2A) but usually absent from the most distal and proximal bands. Dorsal lips tapered, about 1/8–1/6 length of crown (Figure 2D), no dark pigment. Thoracic tori long, but only reaching ventral shield margins in chaetigers 5–8 (Figure 2 C, D). Pygidial eyes present (Figure 2E). Tube diameter up to 3 mm.

### Variability

The size range of specimens studied was greater than that investigated by Faasse and Giangrande (2012), being 18–56.5 mm including radiolar crown. Notably, the specimens were narrower, the widest reported here being 2.25 mm for the longest specimen recorded (44 mm, body only), less than half that reported for the holotype (6 mm), which was itself only 20 mm in length for the body. The tubes, also, were narrower than previously reported, being recorded at a maximum of 3 mm in width in comparison to 5 mm. Their general appearance and composition however, were as originally described.



**Figure 2.** *Bispira polyomma*, live (A, E. NMW.Z.2022.003.0001; B–D, F. NMW.Z.2022.003.0002). (A) Radioles showing the paired radiolar eyes, flanges and tips. (B) Antero-dorsal view. (C) Antero-lateral view. (D) Antero-ventral view. (E) Posterior view. (F) Whole animal, dorsal view. Photographs by Teresa Darbyshire.



**Figure 3.** (A) A mussel shell (*Mytilus* sp.) c. 75 mm in length with attached tubes of *Bispira polyomma*; a group of c. seven tubes, upper-left, growing in parallel across the shell and closely touching, creating a yellow patch where the worm's bodies show through the translucent proximal sections of the tubes. (B) *B. polyomma* tubes out of water, collapsed into a flat, square-ended ribbon-like form c. 4 mm in width. (C) *B. polyomma* amongst other fouling on the wooden slats of a wave-screen in a Plymouth marina viewed from above on 05 November 2021, at the time of low water with a predicted height of 0.7 m. The density of *B. polyomma* shown was typical of the wave-screen population on the day. Below the water line (level indicated by short blue lines), the expanded crowns are seen as grey-mauve, rather diffuse-looking, patches. Several additional tubes are seen above the water line. Photographs by John Bishop.

Number of segments showed little variation: although the smallest specimen had only 39 chaetigers, most specimens examined had 46–52 chaetigers over a wide range of body length. Despite being substantially larger than the largest specimens studied from the Netherlands (56.5 mm versus 32 mm), the number of radioles did not exceed 16 (up to 20 reported by Faasse and Giangrande 2012).

Significant variability in the presence or absence of radiolar eyes and pygidial eyes was reported by Faasse and Giangrande (2012), however all UK specimens possessed eyes on all radioles and all animals possessed pygidial eyespots. No pigmentation was noted on the dorsal lips of any of the specimens observed here. Radiolar flanges were clearly visible in both live and preserved specimens.

#### *Additional notes on appearance in the field*

The species occurs in dense patches, sometimes involving aligned contiguous growth of the attached parts of the tubes (Figure 3A). Out of water, with the worms fully withdrawn, the empty distal part of the tube flattens, collapsing into a square-ended ribbon-like configuration with the opening completely closed (Figure 3B). Blue colouration of the radiolar crown is most noticeable in bright light, such as direct sunlight; in shade or dull illumination, the expanded crown can appear as a diffuse, relatively inconspicuous grey-mauve smudge (Figure 3C).

We suggest the common English name Purple Fan-worm for *Bispira polyomma*, following the use of the Dutch designation “paarse kokerworm” (purple tubeworm) for this species by Gmelig Meyling (2021), but preferring the term “fan-worm” as more specific to the family Sabellidae than the more general expression “tube-worm”.

## **Discussion**

The two marinas occupied by *B. polyomma* in Plymouth offer contrasting settings, in that the first is separated from the open water of Plymouth Sound only by a partial, porous wave-screen, while the second is in a stone dock basin with a lock-gated entrance separating it from the body of water occupied by the first marina, and with limited exchange with the open water. Faasse and Giangrande (2012) reported the occurrence of *B. polyomma* in both a marina with extremely restricted water movement and in strongly running water from the outlet of an oyster basin. It thus seems that *B. polyomma* has quite wide tolerance of different levels of water movement.

As noted above, Langeneck et al. (2020) suggested that the record of *Bispira fabricii* (Krøyer, 1856) from the port of Le Havre (France) by Breton (2014) is likely to have been *B. polyomma*. Breton (2014) made relatively brief mention of the occurrence *B. fabricii* in old, non-tidal dock basins, without discussing the identification, and gave 2011 as the year of first

confirmed occurrence. Breton (2014) also referred to earlier records, attributed to [C.] Dancie *pers. comm.*, in the tidal basins of the port. Other publications from the Le Havre group offer more detail of the reasoning behind the identification of the species in Le Havre as *B. fabricii*. Ruellet and Breton (2012) report the identification with reference to the account of *B. fabricii* in Fauvel (1927), illustrate Le Havre specimens, and state that the species became locally abundant in 2011 in the (non-tidal) Bassin de La Citadelle, but with a probable earlier occurrence there in 2010. Berno et al. (2018) list the species in Le Havre as *Bispira fabricii sensu* Fauvel (1927). Baffreau et al. (2018) and Pezy et al. (2021) indicate additional occurrences of *B. fabricii* on the French north coast, extending as far west as northern Cotentin (Normandy). However, it appears very unlikely that *B. fabricii* is the true identity of the French north-coast populations in light of the redescription of the species, as part of a revision of the genus, by Knight-Jones and Perkins (1998), who considered *B. fabricii* to be restricted to Arctic regions of the North Atlantic. The redescription was based on two syntypes of *B. fabricii* from Greenland, plus additional specimens also from Greenland. The description and figures published of the Le Havre specimens (Ruellet and Breton 2012) do not illustrate the characters (radiolar flanges and length of thoracic tori) that could distinguish *B. polyomma* (flanges present, tori long) from *B. fabricii* (flanges absent, tori short). Thus the possibility cannot be discounted that the Le Havre specimens reported as *B. fabricii* were correctly identified.

Dense aggregations of *B. polyomma* were reported by Faasse and Giangrande (2012) and in the present study, while specimens referred to *B. fabricii* became numerous in the Bassin de La Citadelle in Le Havre during 2011 (Ruellet and Breton 2012). In the last example, a marked reduction was noted in numbers of the native sabellid *Sabella pavonina* Savigny, 1822 in the basin following the “invasion” by the smaller sabellid, thought by Ruellet and Breton (2012) to indicate invasive behaviour by the newcomer. A similar pattern was reported by Mastrototaro et al. (2014) in the Gulf of Taranto, Mediterranean Sea, whereby the arrival and increase to high density of the non-native sabellid *Branchiomma luctuosum* (Grube, 1870) heralded a marked decline in abundance of the larger (and there, native) sabellid *Sabella spallanzanii*. However, *S. spallanzanii* subsequently recovered and the two sabellid species were seen to coexist at similar abundances (A. Giangrande, *pers. obs.* in Mastrototaro et al. 2014).

The Plymouth record represents a substantial extension of the known range of *B. polyomma*, whether regarding northern Belgium or the Cotentin peninsula as the nearest existing site. The species’ apparent association with marina sites and ports suggests roles for recreational boats and commercial shipping in spreading *B. polyomma*, while Faasse and Giangrande (2012) also note the potential for accidental transport of the



species in association with bivalve aquaculture. The Plymouth occurrence was extensive at the time of its discovery and appeared well established, and might presumably have been overlooked for some time. Ongoing spread and the occurrence of further populations in the western English Channel seem probable.

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## Authors' contribution

TD undertook the detailed morphological examination to confirm the identification, produced Figure 2, and drafted the sections on taxonomy and variability. JB undertook the field visits and drafted the remaining sections of the manuscript. Both authors reviewed and agreed the final version of the manuscript.

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