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Research Article

First record of *Paraprionospio coora* Wilson, 1990 (Polychaeta: Spionidae) in the Atlantic Ocean

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Abstract

During two benthic research cruises carried out by AZTI-TECNALIA, two specimens of the spionid *Paraprionospio coora* Wilson, 1990 were collected. The genus *Paraprionospio* had not been previously reported from the Bay of Biscay, while the species *P. coora* is reported for the first time from the Atlantic Ocean. The specimens were found in circalittoral soft bottoms of the continental shelf of Basque coast (SE Bay of Biscay). In this paper, morphological descriptions, photographs, comments on the habitat, and geographical distribution of this species were provided.

Key words: first record; Polychaeta; Spionidae; *Paraprionospio coora*; Bay of Biscay; Atlantic Ocean

Introduction

The global exchange of species has been accelerating in the last decades due to human transport (Thieltges 2005). Maritime traffic across and between the oceans and culturing of non-native organisms at the edge of the sea has contributed to the spread and establishment of an ever increasing number of alien species in coastal and brackish water environments (Reise et al. 1999). These events can affect the biodiversity in newly settled areas, including in the Basque Country.

In recent years, the number of oceanographic surveys carried out along the Basque coast has increased considerably and substantially improved knowledge of the marine benthic fauna. Although most of these studies have a predominantly taxonomic character, some contributions about alien species have begun to appear (Ceberio et al. 1998; Martínez and Adarraga 2001, 2005, 2006, 2011; Martínez et al. 2006; Adarraga and Martínez 2011, 2012).

The phenomenon of the introduction of exotic organisms to the Basque coast affects all taxonomic groups but this study focussed on polychaetes. In the first general census of marine and estuarine alien species in the Basque Country, eighty-two alien and cryptogenic polychaete species, originally from tropical, subtropical, and temperate areas, were listed (Martínez and Adarraga 2005, 2006). Since then, we have identified three more cryptogenic species from circalittoral soft bottoms: the flabelligerid *Diplocirrus stopbowitzi* Darbyshire and Mackie, 2009, the scalibregmatid *Axiokebuita* cf. *minuta* (Hartman, 1967), and the cirratulid *Chaetozone carpenteri* (McIntosh, 1911). According to our research, *Paraprionospio coora* may be the most recent alien polychaete species detected in the Basque coast.

Paraprionospio was erected at the subgeneric level by Caullery (1914) to accommodate *P. pinnata* Ehlers, 1901, a Chilean species that was originally included in the genus *Prionospio*. The heterogeneous morphology of spionids that were grouped in this genus resulted in studies on the systematic position of the various forms included in it. With few exceptions (e.g., Söderström 1920; Light 1978), most researchers considered *Paraprionospio* at the generic level (e.g. Berkeley

1927; Foster 1971; Fauchald 1972; Blake and Kudenov 1978; Maciolek 1985; Blake 1996). The characteristic fusion of the prostomium, the arrangement of branchiae, their number and structure were considered characters of sufficient weight to warrant recognition at the generic level (Maciolek 1985). Following this approach, *Paraprionospio* is recognized today as a genus, member of the *Prionospio* generic complex that includes the genera: *Aurospio* Maciolek, 1981; *Laubieriellus* Maciolek, 1981; *Orthoprionospio* Blake and Kudenov, 1978; *Prionospio* Malmgren, 1867; and *Streblospio* Webster, 1879 (Sigvaldadóttir et al. 1997; Sigvaldadóttir 1998).

After the revision of Yokoyama (2007) and the contribution of Zhou et al. (2008), the genus *Paraprionospio* comprises ten valid species: *P. africana* (Augener, 1918); *P. alata* (Moore, 1923); *P. coora* Wilson, 1990; *P. cordifolia* Yokoyama, 2007; *P. cristata* Zhou, Yokoyama and Li, 2008; *P. inaequibranchia* (Caullery, 1914); *P. lamellibranchia* Hartman, 1975; *P. oceanensis* Yokoyama, 2007; *P. patiens* Yokoyama, 2007; and *P. pinnata* (Ehlers, 1901).

During two sampling campaigns recently carried out on the continental shelf of the Basque coast (SE Bay of Biscay), 234 species of polychaetes were identified, one of which was *P. coora*. This is the first record of *P. coora* in the Atlantic Ocean and the northernmost record in the world.

Originally described from the Pacific coasts of Australia (Wilson 1990), *P. coora* has recently been reported in the Mediterranean Sea from the Port of Valencia (Spain) as *P. pinnata* (Redondo and San Martín 1997), several sites in the Aegean Sea and the Sea of Marmara in Turkey (Yokoyama et al. 2010), and the Saronikos Gulf in Greece (Simboura et al. 2010).

Paraprionospio coora is a selective, surface deposit and suspension feeder that has been collected in a wide variety of habitats: estuaries, semi-enclosed bays, and the continental shelf. It can inhabit different sediment types in shallow water and circalittoral bottoms (Wilson 1990; Yokoyama and Choi 2010).

Material and methods

Study area

The Basque coast is located in the innermost part of the Bay of Biscay, between the west-east oriented coast of Spain and the north-south oriented coast of France. The two specimens were collected from soft-bottom sites on the continental shelf of the Basque Country (Figure 1, Table 1). This continental shelf is narrow, ranging from 7 km off Matxitxako Cape, to 20 km off the Oria River (Uriarte 1998).

Sample collection and analysis

Bottom samples were taken in 2010 and 2012 by AZTI-TECNALIA. One or three benthic replicates (depending on the program) were collected at each station using a Shipeck dredge (0.04 m^2) and a Smith-McIntyre dredge (0.1 m^2). The sediments were washed through a 1-mm mesh sieve, fixed with a 4% formalin solution, and stained with rose bengal. In the laboratory the samples were sorted and transferred to 70% ethanol. Afterwards, the fauna was identified to species or lowest possible taxon under an Olympus stereomicroscope and a Zeiss microscope. Specimens were measured using an ocular micrometer. Photographs were taken with a Nikon D50 digital camera adapted to an Olympus stereomicroscope and a Zeiss microscope. The two specimens of *P. coora* were temporarily stained with an alcoholic methyl blue solution. One specimen was deposited in the collections of the Museo Nacional de Ciencias Naturales de Madrid, Spain (Code MNCN 16.01/11288).

At each station, a supplementary sample was taken for sediment analysis. The granulometric analyses were carried out using a column of 8 sieves (4 mm to 31 µm). The percentages of gravel, sand, and mud were calculated as >2 mm fraction, 63 µm to 2 mm, and <63 µm, respectively (Holme and McIntyre 1971 in Borja et al. 2006). The organic matter content was calculated using the ¨loss on ignition¨ method (Kristensen and Anderson 1993 in Borja et al. 2006).

Results

Two specimens of *P. coora* were identified, one in 2010 and one in 2012, from two stations in the SE Bay of Biscay (Figure 1) at depths 107 and 125 m. The substrate was muddy sand and mud (5.70 and 48.70% mud) with moderate organic matter content (2.50 and 2.78%). A total of 346 organisms were identified from these two sampling stations, belonging to 98 species or higher taxa. The annelids were numerically dominant with 76.01% of the total abundance. The molluscs comprised 11.27%, the arthropods 6.65%, and the other taxa accounting for 6.07% of the total

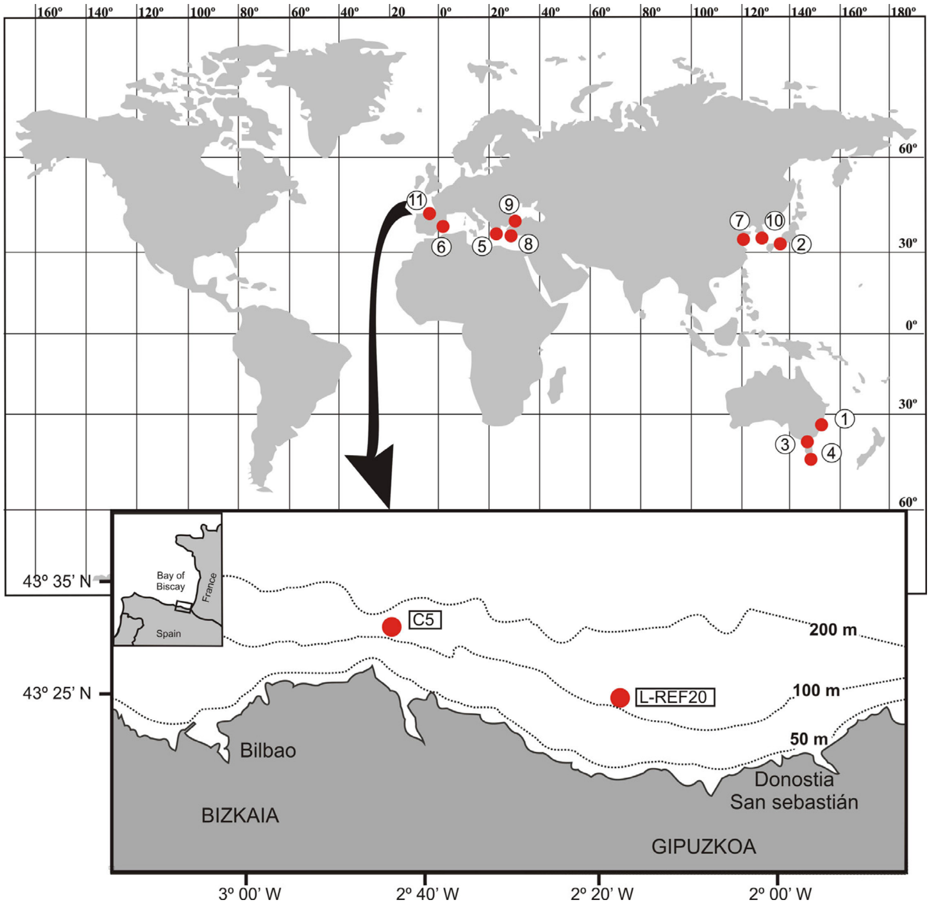

Figure 1. Occurrence of *Paraprionospio coora* in the world and map of the study area with the two stations where this species was collected. See Table 3 for details of the locations numbered 1 to 11.

number of individuals. The trophic structure shows a dominance of surface-deposit feeders (69.36%), carnivores (17.63%) and subsurface-deposit feeders (7.80%). The more abundant species, the composition of the sediment, and ecological parameters at each station are summarised in Table 1.

SYSTEMATICS

Family SPIONIDAE Grube, 1850
Genus *Paraprionospio* Caullery, 1914
Paraprionospio coora Wilson, 1990
(Figure 2)

Material examined

1 specimen, Deba-Zumaia, station L-REF-20 (43º24´N 02º18´W), mud, 107 m depth, 15/04/2010. 1 specimen, Bermeo, station C5 (43º21´N 02º42´W), muddy sand, 125 m depth, 13/07/2012.

Description

A complete specimen from station C5, 47.5 mm long, 1.21 mm wide for 90 chaetigers. Maximum length in literature 71 mm for 114 chaetigers (Yokoyama and Choi 2010). Prostomium fusiform with rounded or bluntly pointed anterior end, continuing posteriorly as short caruncle or low raised ridge to chaetiger 1. Two pairs of black eyes, arranged trapezoidally. Peristomium extending dorsally, forming conspicuous lateral wings enfolding prostomium (Figure 2A). Each peristomial wing with a small papilla on its posterior margin and some orange-brown pigmented patches on its lateral side. A pair of grooved palps with membranous basal sheath (Figure 2B). Three pairs of branchiae on chaetigers 1–3. First pair slightly longer than second ones; third pair clearly shorter (Figure 2C). Basal region of first branchial shaft with 4–5 conic processes placed

Table 1. Principal features for the two stations where *Paraprionospio coora* was collected.

Feature	Continental shelf of Basque coast			
	Station L-REF20		Station C5	
Sampling sites				
Date	15/04/2010		13/07/2012	
Location	Deba-Zumaia		Bermeo	
Coordinates	43º24´N 02º18´W		43º21´N 02º42´W	
Depth (m)	107		125	
Physical-chemical parameters				
Type of sediment	Mud		Muddy sand	
Silt/clay (<0.063 mm) (%)	48.7		5.70	
Organic matter (%)	2.50		2.78	
Ecological parameters				
Abundance (ind./m^2)	2450		1300	
Number of species	80		29	
Species diversity (H´)	5.53		4.64	
Trophic structure				
Carnivores (%)	17.47		19.23	
Omnivores (%)	1.71		-	
Suspension feeders (%)	1.37		13.46	
Surface-deposit feeders (%)	71.23		61.54	
Subsurface-deposit feeders (%)	8.22		5.77	
Rank Species (ind./m^2)				
1	*Terebellides stroemi*	(258)	*Timoclea ovata*	(40)
2	*Paradiopatra calliopae*	(175)	*Ampelisca spinipes*	(40)
3	*Galathowenia oculata*	(175)	*Onchnesoma steenstrupii*	(40)
4	*Prionospio fallax*	(100)	*Hyalinoecia tubicola*	(30)
5	*Praxillella affinis*	(100)	*Prionospio multibranchiata*	(30)
6	*Thyasira flexuosa*	(75)	*Auchenoplax crinita*	(30)

along the anterior face (Figure 2D). All branchiae bearing lamellar plates enclosing lateral and posterior surfaces, in middle and distal regions flabellate. A small papilla present near base of third pair of branchiae (Figure 2E). Postsetal lamellae of notopodia long, foliaceous and pointed on the first three chaetigers and smaller and more rounded thereafter, from chaetiger 10 elevated, with increasingly triangular to lanceolate shape. Neuropodial lamellae prominent and pointed anteriorly on chaetigers 1–3, low and rounded posteriorly. Dorsal crests as well as semi-transparent dorsal cuticle absent. Granulate limbate capillary chaetae in both rami anteriorly, replaced by smooth, slender and non-limbate capillaries from about chaetiger 17 in the notopodium and from chaetiger 9 in the neuropodium. Hooded hooks appear in the neuropodia from chaetiger 9 accompanied by one or two inferior sabre chaetae. Notopodial hooded hooks from chaetigers 32–34. Individual hooks with 2–3 pairs of teeth above the main fang in the neuropodium (Figure 2F), and 2–3 pairs in the notopodium. Dorsum of chaetigers 12–17 with transverse series of lighter coloured, slightly raised ridges, 2 or 3 ridges per chaetiger. Pygidium with median long cirrus and two lateral short cirri (Figure 2G).

Remarks

Paraprionospio coora differs from all known species of the genus in lacking a semi-transparent dorsal cuticle. *P. coora* most closely resembles *P. pinnata*, but differs in having a papilla on the posterior margin of the peristomium, several conic processes in the basal region of the first branchial shaft, and a small globular papilla near the base of the third branchia (all these structures absent in *P. pinnata*). On the other hand, the branchiae in *P. coora* are noticeably different in length (similar in size in *P. pinnata*), and *P. coora* lacks the semi-transparent dorsal cuticle (present in *P. pinnata*). Another similar species is *P. oceanensis*. *P. coora* differs from *P. oceanensis* in lacking a filament at the base of the third branchia and lacking a semi-transparent dorsal cuticle. The number of anal cirri is also different, one in *P. oceanensis* and three in *P. coora*.

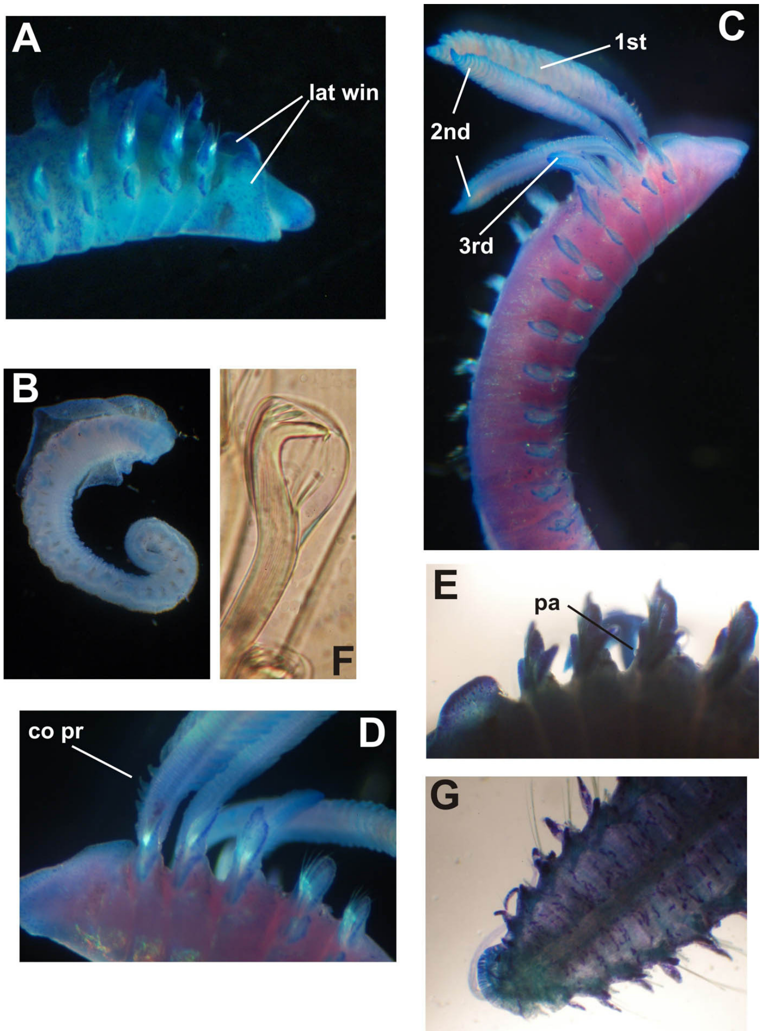

Figure 2. *Paraprionospio coora*: (A) anterior end, in lateral view; (B) palp; (C) anterior end, in dorso-lateral view; (D) branchial region, in lateral view; (E) chaetigers 1–4, in ventro-lateral view; (F) neuropodial hooded hook from chaetiger 30; (G) posterior end, in ventral view. lat win, lateral wings; 1st, first branchia; 2nd, second pair of branchiae; 3rd, third branchia; co pr, conic processes; pa, papilla.

Ecology

Paraprionospio coora is an eurytopic species that is widely distributed in various water depths, sediments, and benthic community structures (Tamai 1985). Bathymetrically, it occurs in water 6 to 150 m deep (Wilson 1990; Yokoyama and Choi 2010). On the Japanese coast, it inhabits shallow waters and circalittoral soft bottoms, preferably on mud and sandy mud, both in sediments poor and rich in organic matter (Tamai 1985; Yokoyama et al. 2010). In Korea *P. coora* has been recorded in estuaries and environmentally degraded areas including: areas heavily impacted by an oil spill, organically enriched semi-enclosed bays, the outfall of a sewage treatment plant, a semi-enclosed harbour, and a dumping site on the continental shelf (Yokoyama and Choi 2010). The Greek specimens were reported on muddy sand circalittoral bottoms from a disturbed area (Simboura et al. 2010). In the present study, the specimens were collected in open sea, on the continental shelf in two stations characterized by moderate organic matter content.

Distribution

Pacific coasts of western Japan (Yokoyama 2007), Yellow Sea, East China Sea (Tamai 1981; Zhou et al. 2008), Korea (Yokoyama and Choi 2010), New South Wales to Tasmania in Australia (Wilson 1990), Mediterranean Sea (Yokoyama et al. 2010; Simboura et al. 2010), Atlantic Ocean: Basque coast (Bay of Biscay) (this study).

Table 2. Main features of *Paraprionospio coora* from different areas of the world.

	Wilson (1990)	Yokoyama (2007)	Yokoyama and Choi (2010)	Yokoyama et al. (2010)	This study
Largest specimen					
Size	20 mm long – 0.8 mm wide	76 mm long – 1.8 mm wide	71 mm long – 1.9 mm wide	42 mm long – 1.3 mm wide	47 mm long – 1.2 mm wide
Number of chaetigers	71	111	114	95	90
Peristomium					
Pigment spots	Usually present	Usually present	Usually present	Usually present	Present
Papilla on the posterior margin	Present	Present	Present	Present	Present
Branchiae					
1st and 2nd pair branchiae	1st pair usually longer than the 2nd one	1st pair longer than the 2nd one	Similar in length or 1st pair slightly longer than the 2nd one	1st pair slightly longer than the 2nd one	1st pair slightly longer than the 2nd one
3rd pair branchiae	Shortest	Shortest	Shortest	Shortest	Shortest
Conical processes on the 1st pair branchiae	Present	Present	Present	Present	Present
Number of conical processes	?	2–9	2–6	2–5	4–5
Shape of the lamellar plate of the branchiae	Flabellate	Flabellate	Flabellate	Flabellate	Flabellate
Parapodia					
Papilla at the base of the 3rd pair branchiae	?	?	Usually present	Usually present	Present
Transverse dorsal crests	Absent	Absent	Absent	Absent	Absent
Transparent dorsal cuticle	Absent	Absent	Absent	Absent	Absent
Interramal pouches	Present or absent	Present or absent	Present or absent	Absent	Absent
Neuropodial hooks start chaetiger	9	9	9	9	9
Pair of apical teeth in neuropodial hooks	2	2–4	2–3	2–3	2–3
Notopodial hooks start chaetiger	38–41	24–54	30–38	> 33	32–34
Pair of apical teeth in notopodial hooks	2	2–3	3	3	2–3
Hábitat					
Sediment type	Clayey sand, Sand-silt-clay	Sand, Muddy sand, Mud	Sand, Sandy mud, Muddy sand, Mud	Sandy mud, Mud	Muddy sand, Mud
Depth (m)	6–124	8–110	7–150	17–135	107–125
Locality	Australia (Pacific)	Japan (Pacific)	Korea (Pacific)	Turkey (Mediterranean Sea)	Spain (Atlantic)

Table 3. Records of *Paraprionospio coora* in the world.

Map ref.	Location/Country	Water body	Record coordinates		Date	Reference
			Latitude	Longitude		
1	Stockton Bight, Australia	Pacific	32º 51´S	151º 54´E	1970	Blake and Kudenov (1978) as *P. pinnata*
	Off Malabar, Australia	Pacific	33º 58´S	151º 18´E	1972	Blake and Kudenov (1978) as *P. pinnata*
2	Beppu Bay, Japan	Pacific	33º 15´N	131º 35´E	1975	Yokoyama and Tamai (1981) as *Paraprionospio* Form CI
	Tosa Bay, Japan	Pacific	33º 28´N	133º 43´E	1976	Yokoyama and Tamai (1981) as *Paraprionospio* Form CI
	Osaka Bay, Japan	Pacific	34º 14´N	134º 57´E	1976	Yokoyama and Tamai (1981) as *Paraprionospio* Form CI
	Kii Channel, Japan	Pacific	33º 50´N	135º 02´E	1976	Yokoyama and Tamai (1981) as *Paraprionospio* Form CI
3	Central Bass Strait, Australia	Pacific	40º 10.9´S	145º 44,3´E	1981	Wilson (1990)
	Eastern Bass Strait, Australia	Pacific	39º 44.8´S	148º 40,6´E	1981	Wilson (1990)
4	D´ Entrecasteaux Channel, Tasmania	Pacific	43º 10.0´S	147º 16.0´E	1985	Wilson (1990)
5	Bay of Gera, Greece	Mediterranean	39º 09´N	26º 12´E	1983	Diapoulis and Bogdanos (1983) as *P. pinnata*
	Saronikos Gulf, Greece	Mediterranean	?	?	2010	Simboura et al. (2010)
6	Between Cape San Antonio and Valencia Harbour, Spain	Mediterranean	?	?	1995	Redondo and San Martín (1996) as *P. pinnata*
7	Jiaozhou Bay, Yellow Sea, China	Pacific	36º 08´N	120º 16´E	?	Zhou et al. (2008)
8	Izmir Bay, Aegean Sea, Turkey	Mediterranean	36º 35´N	26º 47´E	1999	Yokoyama et al. (2010)
	Saroz Bay, Aegean Sea, Turkey	Mediterranean	40º 27´N	26º 29´E	2000	Yokoyama et al. (2010)
	Gokceada Island, Aegean Sea, Turkey	Mediterranean	40º 10´N	25º 40´E	2000	Yokoyama et al. (2010)
	Kusadasi Bay, Aegean Sea, Turkey	Mediterranean	37º 55´N	27º 07´E	2000	Yokoyama et al. (2010)
	Gökova Bay, Aegean Sea, Turkey	Mediterranean	36º 54´N	28º 09´E	2000	Yokoyama et al. (2010)
	SW Dilek Peninsula, Aegean Sea, Turkey	Mediterranean	37º 38´N	27º 01´E	2000	Yokoyama et al. (2010)
	Agathonisi Island, Aegean Sea, Turkey	Mediterranean	37º 23´N	27º 06´E	2000	Yokoyama et al. (2010)
	Gerence Bay, Aegean Sea, Turkey	Mediterranean	38º 26´N	26º 29´E	2008	Yokoyama et al. (2010)
9	Erdak Bay, Sea of Marmara, Turkey	Mediterranean	40º 18´N	27º 46´E	2008	Yokoyama et al. (2010)
10	Masan Bay, Korea	Pacific	35º 08.63´N	128º 36.40´E	2005	Yokoyama and Choi (2010)
	Shelf off Ulsan, Korea	Pacific	35º 38.53´N	129º 50.29´E	2007	Yokoyama and Choi (2010)
	Sori-do coast, Korea	Pacific	34º 30.54´N	127º 48.06´E	2007	Yokoyama and Choi (2010)
	Jinhae Bay, Korea	Pacific	35º 01.14´N	128º 35.38´E	2007	Yokoyama and Choi (2010)
	Busan Harbor, Korea	Pacific	35º 06.40´N	129º 03.12´E	2009	Yokoyama and Choi (2010)
	Taean coast, Korea	Pacific	36º 56.20´N	126º 16.33´E	2009	Yokoyama and Choi (2010)
	Gwangyang Bay, Korea	Pacific	34º 52.30´N	127º 39.47´E	2009	Yokoyama and Choi (2010)
	Ulsan Bay, Korea	Pacific	35º 29.58´N	129º 23.48´E	2009	Yokoyama and Choi (2010)
	Okpo Bay, Korea	Pacific	34º 53.07´N	128º 42.18´E	2009	Yokoyama and Choi (2010)
11	Deba-Zumaia Continental Shelf, Spain	Atlantic	43º 24´N	02º 18´W	2010	This study

Discussion

Basque specimens of *P. coora* agree well with the description and illustrations given by Wilson (1990). However, minor differences between our specimens and those from Australia have been observed. The number of apical teeth in neuropodial hooded hooks ranges between 2 and 3 pairs (only 2 pairs in the Wilson´s original description), and the interparapodial pouches were absent. Precisely these same discordant features were first pointed out by Yokoyama (2007) from Japanese specimens and later by Zhou et al. (2008) in China, Yokoyama and Choi (2010) in Korea, and Yokoyama et al. (2010) in specimens collected in the Mediterranean Sea (Table 2), so these authors suggest that both characters should not be used in distinguishing species, being taxonomically insignificant. This point of view is also accepted here. In this sense, the variability in number and arrangement of apical teeth has been pointed out by Blake (1996) and Ohwada and Nishino (1991) in others Spionidae species, like *Apoprionospio pygmaea* (Hartman, 1961) and *Prionospio japonica* Okuda, 1935. Similarly, the number of interparapodial pouches varies from zero to about 30 even in local populations of *P. coora* from Australia and East Asia (Yokoyama and Choi 2010).

The geographical distribution of *P. coora* is unclear. The confusion with other species, mainly with the type species *P. pinnata*, has contributed to this. The morphological characters treated by Ehlers (1901) in the original description of *P. pinnata* were rather general, so different forms were included in this single taxon, and consequently *P. pinnata* was regarded as a monotypic species (Foster 1971) with a cosmopolitan distribution (Light 1978; Maciolek 1985). However, the consideration of certain anatomical features previously ignored, such as the filament at the base of the third branchia, pigment papilla and spots on the peristomium, ventral bilobed flap on setiger 8 and transverse dorsal crests, has contributed to the discovery of several new species and improved the knowledge about the geographical distribution of other ones (Tamai 1981, Yokoyama and Tamai 1981, Wilson 1990, Yokoyama 2007).

In Japan *P. pinnata* was considered to be the only member of the genus *Paraprionospio* (Okuda 1937; Imajima and Hartman 1964) until Tamai (1981) and Yokoyama and Tamai (1981) pointed out that Japanese *P. pinnata* comprises four different morphological forms, which were later identified as *P. coora*, *P. cordifolia*, *P. oceanensis,* and *P. patiens* (Yokoyama 2007). Subsequently, in Australia, Wilson (1990) identified specimens of *P. coora* during a re-examination of older material from New South Wales that had previously been identified as *P. pinnata* by Blake and Kudenov (1978). Recently, Zhou et al. (2008) suggested that all records of *P. pinnata* in China are actually *P. coora, P. inaequibranchia,* and *P. cristata*. Similar taxonomic confusion was pointed by Yokoyama and Choi (2010) for specimens collected is Korean waters previously identified as *P. pinnata* but in reality they are *P. cordifolia, P. coora,* and *P. patiens*. As well, Yokoyama et al. (2010) questions the validity of all Mediterranean references to *P. pinnata*, suggesting they are *P. coora.* Lastly, Yokoyama and Sukumaran (2012) pointed out that *Paraprionospio* species from Indian waters were also misidentified as *P. pinnata* instead of *P. cordifolia, P. cristata* and *P. patiens*. Based on these observations, it seems obvious that all previous records of *P. pinnata* should be reviewed and its cosmopolitan distribution re-examined. In fact, Yokoyama (2007) restricts its established distribution to the type locality, the coast of Chile. The analysis of the records of *Paraprionospio* species shows that most of them are distributed around their type locality. *P. africana* is only known from West Africa; *P. alata* from North America; *P. cordifolia* from Japan to India; *P. cristata* from China to India; *P. inaequibranchia* from Indonesia to India; *P. lamellibranchia* from Mozambique; *P. oceanensis* from Japan; *P. patiens* from Japan to India; and *P. pinnata* from Chile. Indeed, *P. coora* is exceptional because it is found from Japan, Australia, Korea, China and the Mediterranean Sea.

Originally described from the Pacific coasts of Australia (Wilson 1990), *P. coora* has recently been reported in the Mediterranean Sea. Some records include: Port of Valencia (Spain) as *P. pinnata* (Redondo and San Martín 1997), Gerence Bay, Izmir Bay, Saroz Bay, Gokceada Island, Kusadasi Bay, Gökova Bay, Agathonisi Island, Erdak Bay (Turkey) (Yokoyama et al. 2010) and Saronikos Gulf (Greece) (Simboura et al. 2010). Based on available records, *P. coora* shows a preference for subtropical and warm-temperate regions (Table 3). This factor, together with its significant geographic separation in relation to the Basque coast and the improbability of taxonomic errors, leads us to suggest that this spionid could be another alien species that has arrived on the Basque coast. This current study represents the first record of specimens of this genus in the Bay of Biscay. The particular morphology of branchiae and their arrangement are features that make confusion with other species of the *Prionospio* complex unlikely.

In recent years, we have recorded in the Basque Country a considerable number of alien species from warm and subtropical areas (Martínez and Adarraga 2005, 2006; Adarraga and Martínez 2011, 2012). This is due, in part, to the biogeographic peculiarities of the Basque coast. The greater warming of the surface-water layer of the Bay of Biscay during the summer, compared to adjacent areas, favours the existence and acclimatization of southern species (Fischer 1938; Ibáñez 1978, 1985, 1989). In the absence of marine farming areas near the area where the species has been collected, the most likely pathway for introduction is through the ballast water of a ship. It is most likely that the global nature of the shipping industry, with faster ships transporting large quantities of ballast between geographically separate areas, has an increasing potential to transport non-indigenous species to new areas (Leppäkoski et al. 2002). This way, there have been reported invasions of spionids in several regions (Bastrop et al. 1997; Çinar et al. 2005; Dagli and Çinar 2009), including the Basque coast (Martínez et al. 2006).

At the moment, we can not determine if this is a primary or secondary introduction. The possession of large, late-stage pelagic larvae in *Paraprionospio* species (about a month in *P. patiens*) (Tamai 1985), and their collection in oceanic waters suggests that this genus has a means for dispersal over long distances (Blake 1996).

Finally, regarding the effect of *P. coora* on the ecology of the Basque coast, we did not yet find any indication of an effect. The densities at the two stations are relatively low (8.33 and 10 ind./m^2). In particular, one of these stations (L-REF20) has been part of a monitoring program since 2000 and we have not observed any adverse impacts on macrofauna communities. Numbers of species, species diversity and community structure remain more or less the same.

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