

Five new records and one new species of Polycladida (Platyhelminthes) for the Cantabrian coast (North Atlantic) of the Iberian Peninsula

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The Iberian Peninsula is part of the South European Atlantic Shelf within the Lusitanian ecoregion. Given the characteristics of this region, a great invertebrate biodiversity is expected. Nevertheless, no literature records of Polycladida are known for the Cantabrian Sea. Here, we report the presence of six polyclad species, including one new species. Notoplana vitrea, considered endemic to the Mediterranean Sea, was found in the Cantabrian Sea, demonstrating its presence in Atlantic waters. This species was previously reported for these waters on two natural history photographic websites: the importance of searching, indexing and disseminating this type of record for the scientific community is discussed. Discocelis tigrina is reported for the first time for the Cantabrian Sea, and is the northernmost record to date. In this paper, Pleioplana atomata is reported for the second time for the Iberian Peninsula, yet is the first record for the Cantabrian Sea. Although a literature record of Leptoplana tremellaris for the Iberian Peninsula exists, it is considered a misidentification of L. mediterranea; therefore, this work provides the first record of L. tremellaris for the Iberian Peninsula. The cosmopolitan species Cycloporus papillosus is also reported for the Cantabrian Sea. A new species, Imogine fafai sp. nov., is described and taxonomically compared with other species of the genus.

Keywords: Notoplanidae, Pleioplanidae, Stylochidae, *Imogine fafai* sp. nov., Spain

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INTRODUCTION

Polyclad research of the European Atlantic coasts has mainly focused on the coastlines of Scandinavia, northern France and the United Kingdom (Müller, 1776; Montagu, 1815; Claparède, 1861; Giard, 1888, 1894; Bergendal, 1890; Gamble, 1893, 1900; Hallez, 1893, 1894; Plehn, 1896; Bock, 1913; Moore, 1937; Hendelberg, 1974). By the 21st Century, specific records can be found within the literature for the Iberian Peninsula, but usually from faunistic studies of a particular area (e.g. Faubel & Warwick, 2005) or due to the appearance of an invasive species (Faubel *et al.*, 2007).

The Iberian Peninsula forms part of the South European Atlantic Shelf within the Lusitanian ecoregion. The characteristics of this region (Spalding *et al.*, 2007) suggest a great invertebrate biodiversity (Noreña *et al.*, 2014). Nevertheless, no previous records of Polycladida are known for the Cantabrian Sea in the scientific literature (although photographs taken by marine photographers do exist). This fact reflects the knowledge gap about the biodiversity of this taxonomic group on the Northern Iberian coast. Here, we report the presence of five previously

described species and the description of a new one: *Notoplana vitrea* (Lang, 1884); *Pleioplana atomata* (Müller, 1776); *Imogine fafai* sp. nov.; *Discocelis tigrina* (Blanchard, 1847); *Leptoplana tremellaris* (Müller, 1773); and *Cycloporus papillosus* (Sars, 1878).

The Cantabrian Sea, characterized by strong waves and north-westerly winds, is a transitional sea between the cold waters of the North Atlantic Ocean and the temperate waters of the tropics. Cantabrian coastal waters are warm in summer (22–24°C) and cold in winter (10–12°C). The average salinity is 35‰, though lower salinities are possible due to high rainfall in the area. The tidal range, which is under the influence of the Gulf Stream, the Rennell Current and the North Atlantic Drift, is large.

Because of the Gulf Stream and the North Atlantic Drift, similar fauna would be expected on the American and European shores. However, despite a few exceptions (*Thysanozoon brocchii* (Risso, 1818) and *Pleioplana atomata* (Müller, 1776)), there are no common species for both Atlantic coasts. Moreover, the Rennell Current, a warm marine current considered a 'side arm' of the Gulf Stream and North Atlantic Drift, runs 'counter clockwise' along the coastal shore. The Rennell Current, in turn, facilitates the distribution of species from the Galician coast to the Atlantic coastline of France (Noreña *et al.*, 2007; Ax, 2008) (Figure 1).

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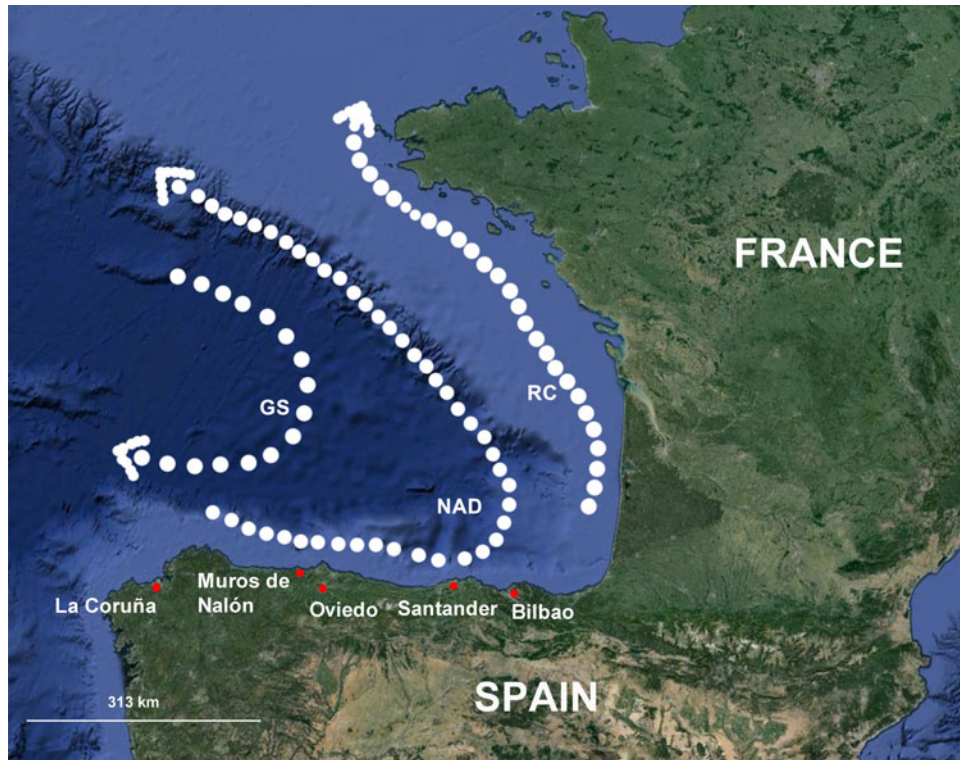


Fig. 1. Map of the Cantabrian Sea, with the Gulf Stream (GS), the North Atlantic Drift (NAD) and the Rennell Current (RC) indicated by white dots.

MATERIALS AND METHODS

A survey of polyclad biodiversity was performed in the Cantabrian Sea (northern Iberian Peninsula, [Figure 1](#)) between September and November of 2012. Collection localities of specimens studied are listed in [Table 1](#). Specimens were collected in the intertidal zone, on sand or on gravel under stones. In addition, the historical collection of the Iberian Fauna oceanographic campaign II was revised and two specimens of *Cycloporus papilosus* were histologically examined ([Table 1](#)).

Animals were anaesthetized in 7.5% magnesium chloride and fixed in Bouin's fluid, following the Newman & Cannon (2003) method. Photographs were taken of both live and fixed specimens to retain maximal information regarding shape, colour and external morphology. The material was subsequently embedded in Paraplast®, serially sectioned at 7 µm and stained with AZAN (trichrome staining method). Reconstructions of internal anatomy were derived from serial sagittal sections. All measurements were determined from fixed material.

Type specimens and voucher exemplars were deposited into the invertebrate collection of the Museo Nacional de Ciencias Naturales of Madrid (MNCN, CSIC) in Spain.

A search for polyclad flatworm photographs on Iberian websites specializing in natural history has revealed several accounts of *Notoplana vitrea*. To increase the knowledge about the distribution of this species in the Iberian Peninsula and to make this information available to the scientific community, these records were collected and codified as follows: Asturnatura.com (AN) and Biodiversidadvirtual.org (BV), followed by the number assigned to each photograph on the website. The polyclad flatworm photographs included

from these websites are up to date as of January 2014. Locality information is summarized in [Table 1](#).

SYSTEMATICS

Suborder ACOTYLEA Lang, 1884
 Superfamily LEPTOPLANOIDEA Faubel, 1984
 Family NOTOPLANIDAE Marcus & Marcus, 1966
 Genus *Notoplana* Laidlaw, 1903
Notoplana vitrea (Lang, 1884) Bock, 1913
 ([Figure 2](#))

LOCALITY

Los Chalanos Beach, Muros de Nalón (Asturias). Intertidal zone, among sand and gravel or under stones.

EXAMINED MATERIAL

One mature sagittally sectioned specimen in 18 slides MNCN 4.01/745–762.

DESCRIPTION

External characters

Elongated worms 21 mm long and 7 mm wide. Body leaf-shaped with light wavy margins, rounded anterior and slightly pointed posterior ends. Dorsal surface smooth. Coloration whitish, translucent, with characteristic white ratios-like prolongations at the anterior end ([Figure 2C](#)). Ventral side pale. Without tentacles. Tentacular eyes form small clusters of 10–15 eye spots; cerebral eyes scattered in two groups ([Figure 2D, E](#)). Characteristic ruffled pharynx near the anterior end (second quarter of the body), ventrally oriented; oral

Table 1. Collection localities of the Cantabrian specimens studied in this paper.

Species	Locality/ies	No. sps	Collection accession numbers
<i>Cycloporus papillosus</i> (Sars, 1878)	North of Cape Oyambre (Cantabria), 43°29'N 4°19'W	2	
<i>Discocelis tigrina</i> (Blanchard, 1847)	Rodiles beach, Villaviciosa (Asturias), 43°31'N 5°21'W	1	
	Las Represas beach, Tapia de Casariego (Asturias), 43°34'N 6°56'W	1	
<i>Imogine fafai</i> sp. nov.	Los Chalanos beach, Muros de Nalón (Asturias), 43°33'N 6°6'W	2	MNCN 4.01/835–907 (holotype) and MNCN 4.01/908–994
<i>Leptoplana tremellaris</i> (Müller, 1773)	Las Represas beach, Tapia de Casariego (Asturias), 43°34'N 6°56'W	1	
<i>Notoplana vitrea</i> (Lang, 1884)	Los Chalanos beach, Muros de Nalón (Asturias), 43°33'N 6°6'W	1	MNCN 4.01/745–762
	Photographs: Taurán beach, Valdés, Asturias (AN11586); Gijón, Asturias (AN11823*, BV291881*); Bizkaia, Basque Country (BV282937)		
<i>Pleioiplana atomata</i> (Müller OF, 1776) Faubel, 1983	Los Chalanos beach, Muros de Nalón (Asturias), 43°33'N 6°6'W	1	MNCN 4.01/763–834

*, both photographs are from the same exemplar.

pore in the centre of the pharyngeal cavity. Main digestive trunk forward and backwards from the pharynx extended. Male and female genital pores clearly separated and located in the middle of the body.

Reproductive system

Male copulatory apparatus is located anterior to male pore and immediately posterior to the pharyngeal cavity. Orientation mainly dorso-ventrally, but also directed caudally. The male system consists of a well developed, muscular seminal vesicle, a true interpolated prostatic vesicle with a glandular epithelium and a penis papilla armed with a long and slender stylet (Figure 2A, B, F). The *vasa deferentia*, running from the lateral sides of the body, enter separately into the seminal vesicle. The seminal vesicle is elongated and opens through the sperm duct into the prostatic vesicle. The prostatic vesicle is interpolated, pear-shaped, and its glandular epithelium forms a few longitudinal chambers. The stylet is surrounded by a sheath.

The female pore is clearly separated from the male pore, and the epithelium between both openings is higher and more developed than the rest of the ventral surface (Figure 2A, B). The female system is characterized by a short female atrium, the muscular *vagina externa* and the Lang's vesicle. Abundant cement glands are located around the female pore and the distal part of the vagina. The ovaries are dorsal. The oviducts, running lateral to the body, join together in a short common duct that opens ventrally into the proximal end of the internal vagina. Few developed cement glands can be observed along the female system. Posterior to the common oviduct's entry appears the well developed Lang's vesicle, which extends posteriorly to the female pore.

Taxonomic remarks

Due to the presence of tentacular and cerebral eyes clusters, the ruffled pharynx, a muscular penis papilla, a long and slender stylet and the muscular *vagina externa* of the female apparatus, the studied species belongs to the genus *Notoplana* and specifically to *Notoplana vitrea*. A small difference can be found between our exemplar and the original description of Lang (1884) and Bock (1913), and that is the size of the Lang's vesicle, larger and wider in our exemplars.

DISTRIBUTION

Until now, *Notoplana vitrea* was considered to be a Mediterranean endemism (Marquina *et al.*, 2014). This species is known for several localities within the Mediterranean Sea: Gulf of Naples (Lang, 1884); Gulf of Trieste (Micoletzky, 1910); and Catalonia (Novell, 2003).

The specimen described here and the photographs (see Table 1) from the Bay of Biscay constitute the only known records of this species for the Cantabrian Sea and the Atlantic Ocean.

Family PLEIOPLANIDAE Faubel, 1983

Genus *Pleioiplana* Faubel, 1983

Pleioiplana atomata (Müller, 1776) Faubel, 1983 (Figure 3)

LOCALITY

Los Chalanos Beach, Muros de Nalón (Asturias). Intertidal zone among sand and gravel under stones.

MATERIAL EXAMINED

One mature sagittally sectioned specimen in 72 slides MNCN 4.01/763–834.

DESCRIPTION

Few morphological differences between our specimens and the description of Bock (1913) are detected. Therefore, an updated description is provided.

External characters

Body shape leaf-like, anterior end wide and posterior end pointed, 2 cm long and 0.7 cm wide. Body margin slightly undulated. Coloration yellowish brown or beige, translucent. Without tentacles (Figure 3A). Tentacular and cerebral eyes clearly separated. The tentacular eyes are formed of clusters of 9–10 eye spots each; cerebral eyes scattered in two groups (Figure 3B). Frontal or marginal eyes absent. The ruffled pharynx has deep folds and lies in the first third of the body (Figure 3C). Oral pore near the posterior end of the pharynx. The main digestive trunk is highly branched but without anastomosis. Female and male gonopores separated by a corrugated surface and located posterior to the middle of the body (Figure 3D, E).

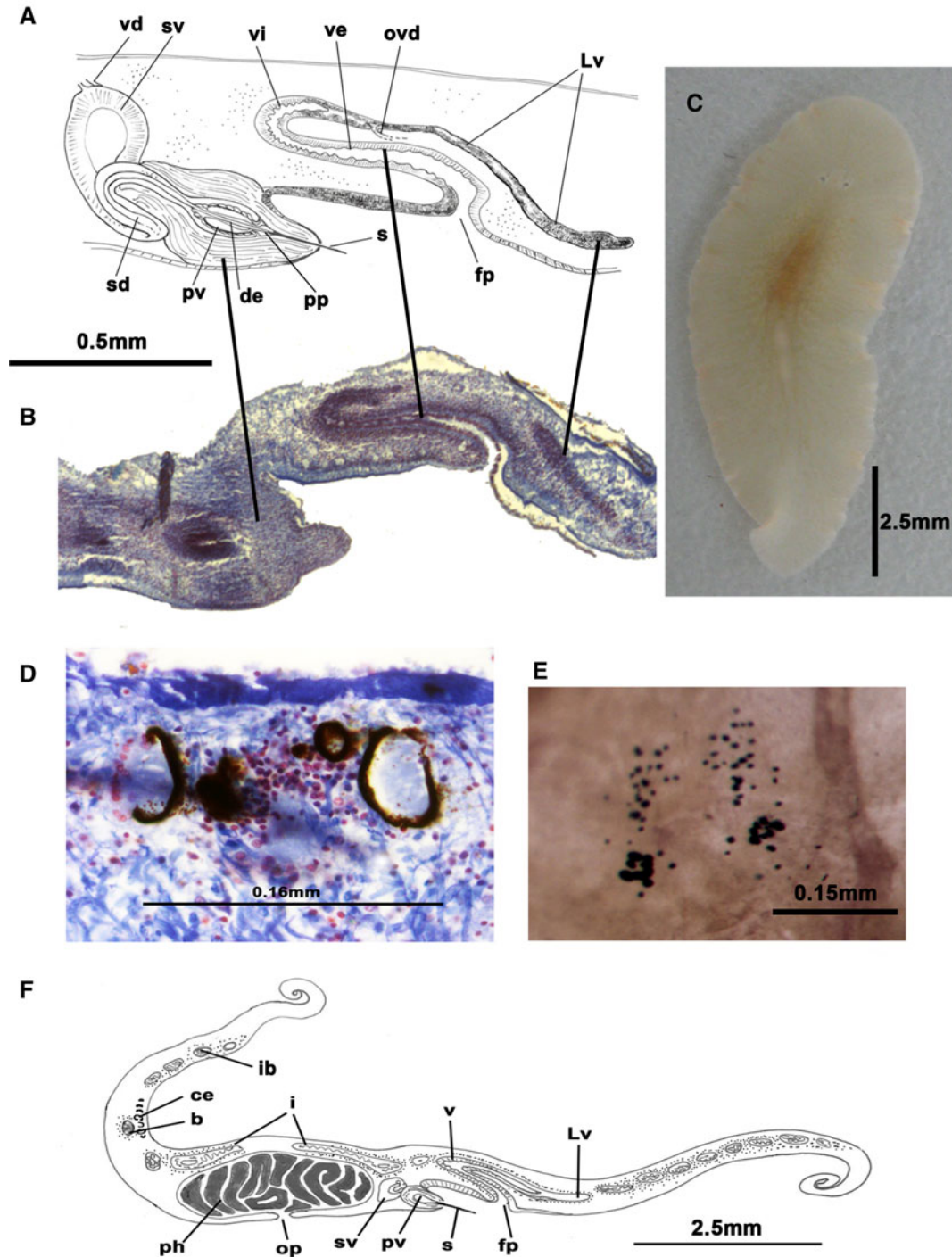


Fig. 2. *Notoplana vitrea* Lang, 1884: (A) sagittal reconstruction of the reproductive system; (B) histological section of the reproductive system; (C) dorsal view of a living specimen; (D) sagittal histological section of the cerebral eyes; (E) cerebral and tentacular eyes in a fixed specimen; (F) sagittal reconstruction of a whole specimen. Anterior to the left in A, B and F. b, brain; ce, cerebral eyes; de, ductus ejaculatorius; fp, female pore, i, intestine; ib, intestinal branch; Lv, Lang's vesicle; op, oral pore; ovd, oviduct; ph, pharynx; pp, penis papilla; pv, prostatic vesicle; s, stylet; sd, seminal duct; sv, seminal vesicle; v, vagina; vd, vas deferens; ve, vagina externa; vi, vagina interna.

Reproductive system

Male reproductive system characterized by a large seminal vesicle, an interpolated, pear-shaped prostatic vesicle (Figure 3E, F) and a copulatory organ armed with a long, slender stylet (Figure 3E, G, I). *Vasa deferentia*, running from lateral sides of the body, collect the sperm from the ventral testes and open proximally into the seminal vesicle.

Seminal vesicle elongated, muscular and located posterior to pharynx (Figure 3E, I). Seminal and prostatic vesicles connected by a long and winding ejaculatory duct that crosses the prostatic vesicle almost to its distal end. Prostatic vesicle with many elongated tubular chambers that give it, in transversal section, the appearance of a citrus fruit (Figure 3F) with the lumen of the ejaculatory duct in the centre. Long

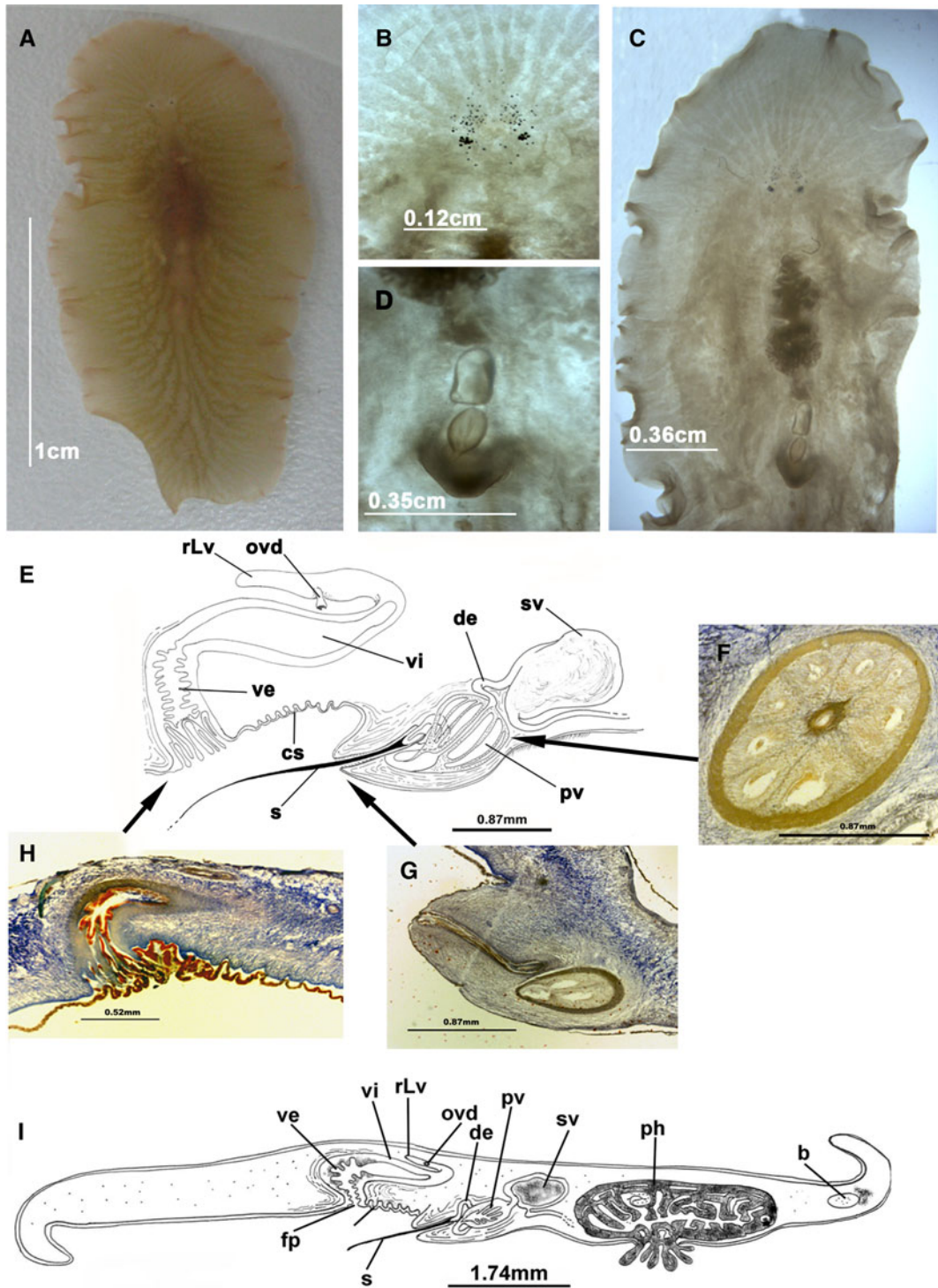


Fig. 3. *Pleioplana atomata* (Müller, 1776) Faubel, 1983: (A) dorsal view of a living specimen; (B) cerebral and tentacular eyes in a fixed specimen; (C) dorsal view of a fixed specimen; (D) dorsal view of the copulatory complex in a fixed specimen; (E) sagittal reconstruction of the reproductive system; (F) histological section of the prostatic vesicle; (G) histological section of the prostatic vesicle and the penis papilla; (H) histological section of the *vagina externa*; (I) sagittal reconstruction of a whole specimen. Anterior to the right in E, F, G, H and I. b, brain; cs, corrugated surface; de, *ductus ejaculatorius*; fp, female pore; ovd, oviduct; ph, pharynx; pv, prostatic vesicle; rLv, residual Lang's vesicle; s, stylet; sv, seminal vesicle; ve, *vagina externa*; vi, *vagina interna*.

stylet directed backwards, housed in an entirely ciliated penis sheath.

Female reproductive apparatus well developed (Figure 3E, H, I). Female pore broad. *Vagina externa* (also called *vagina bulbosa* in this species) covered with multiple folds

(Figure 3H) and muscle layers. Proximal part of *vagina externa* enlarged but smooth and without folds. Ovaries are dorsal. The *vagina interna* runs backwards and ventrally receives the common oviduct. A reduced Lang's vesicle is present following the entry of the oviduct.

Taxonomic remarks

Due to the presence of tentacular and cerebral eyes clusters, the absence of tentacles, a continuous ejaculatory duct with a large slender stylet and the presence of a muscular *vagina bulbosa*, the described species belongs to the genus *Pleioiplana*, concretely to *P. atomata*. Only the poor developed Lang's vesicle differs from the description given by Bock (1913) and Faubel (1983) for *Pleioiplana atomata*.

DISTRIBUTION

Pleioiplana atomata is well known for the coasts of Europe including Scotland (Fleming, 1823) and Plymouth (Gamble, 1893), United Kingdom; the Faroe Islands, Denmark (Steinböck, 1931); Norway (Steinböck, 1932); and for North America, Massachusetts, Maine (Verrill, 1893) New Hampshire (Rawlinson *et al.*, 2008) and Alaska (Hyman, 1953), United States and Canada (Hyman, 1940).

This is the first record for the Cantabrian Sea and the North Atlantic shores of the Iberian Peninsula. It was previously recorded for the Mediterranean coast (Catalonia) of the Iberian Peninsula (Novell, 2003).

Superfamily STYLOCHOIDEA Faubel, 1984

Family STYLOCHIDAE Stimpson, 1857

Genus *Imogine* Marcus & Marcus, 1968

Imogine fafai sp. nov.

(Figure 4)

TYPE LOCALITY

Los Chalanos Beach, Muros de Nalón (Asturias). Intertidal zone among sand and gravel under boulders.

TYPE

Holotype: one mature sagittally sectioned specimen in 73 slides MNCN 4.01/835–907.

ETYMOLOGY

The last author, Carolina Noreña, dedicates this species to Fernando Ángel Fernández-Álvarez (FAFA), who collected the specimens and thus began the study of Polycladida in Asturias.

DIAGNOSIS

Imogine with a wide, heart-shaped body. Margins with numerous deep folds. Gonopores close to each other but clearly separated. Medially located sperm duct opening; *ductus ejaculatorius* and penis papilla short.

DESCRIPTION

External characters

Oblate body shape with a firm consistency, 14 mm long and 10 mm wide. Anterior end of body wider than posterior end. Body margin highly undulated. In live specimens, colour bright orange on dorsal and ventral surfaces with small dark spots on the dorsal side. Conical tentacles present with numerous eyes; tentacular eyes on the inner tentacle's surface. Cerebral eyes in two not well separate clusters. Few frontal eyes; marginal eyes present in the first quarter anterior body edge. Pharynx short, located at the second third of the body. Oral pore in middle of the body, opening anterior to the centre of the pharyngeal cavity. The main digestive trunk extends forwards to the level of the brain and backwards without reaching the copulatory system.

Gonopores located near the posterior end of the body. Male and female pores are very close to each other.

Reproductive system

Male reproductive system with an anchor-shaped seminal vesicle, a free prostatic vesicle and a small penis papilla housed in an atrium. Testes ventrally located and scattered on both sides of body. *Vasa deferentia* enlarged, form spermiducal bulbs at end of their trajectory. Seminal vesicle (400 µm long and 438 µm wide) shows the characteristic tripartite, anchor-shaped pattern of the genus. The sperm duct is well developed, large and often bent. The prostatic vesicle is of the 'djiboutiensis' type (after Faubel, 1983), large (approximately 675 µm long and 404 µm wide), with a thick muscular envelope, a glandular folded inner epithelium and extravascular glands that pierce the wall and secrete into the lumen. The prostatic vesicle overlies the seminal vesicle and displaces it ventrally. Prostatic duct joins medially to the *ductus ejaculatorius* that opens at the tip of the small papilla, which is housed in a non-ciliated deep atrium.

Female system posterior to male copulatory organ. Male and female gonopores in close proximity but clearly separated. Ovaries dorsally arranged. Oviducts enter separately and ventrally at the proximal end of the *vagina interna*. Vagina runs upwards and forwards and turns downwards to female pore. Female atrium a straight, narrow and non-ciliated cavity. Cement glands open into *vagina externa*. Lang's vesicle absent.

Taxonomic remarks

Due to the presence of an anchor-shaped seminal vesicle enclosed in a strong muscular bulb, a polyglandular prostatic vesicle and an unarmed penis papilla, the new species belongs to the genus *Imogine* Marcus & Marcus, 1968.

Within the genus *Imogine*, three groups can be distinguished (Marquina *et al.*, 2014): (1) species with near but separated gonopore openings; (2) species with gonopores sharing a common atrium; and (3) species with gonopores clearly separated. *Imogine fafai* sp. nov. belongs to the first group with *I. ceylanica* Laidlaw, 1904, *I. hamanensis* Kato, 1944, *I. hyalina* Bock, 1913, *Imogine izuensis* Kato, 1944, *I. megalops* (Schmarda, 1859), *I. meganae* Jennings & Newman, 1996, *I. minima* Palombi, 1940, *I. nebulosa* (Girard, 1853), *I. rutilis* Yeri & Kaburaki, 1918 and *I. stellae* Marquina *et al.*, 2014.

Imogine stellae, *I. megalops*, *I. minima*, *I. nebulosa* and *I. rutilis* show either a proximal or distal seminal-prostatic junction in the prostatic duct, which differs from the medially located junction of *I. fafai*. *Imogine hyalinus*, *I. ceylanica*, *I. izuensis* and *I. meganae* have a larger penis papilla, which is very short in *I. fafai*, as well as in *I. hamanensis* and *I. rutilis*.

The new species can be distinguished from *I. rutilis* by the arrangement of the cerebral eyes: in *I. fafai*, they are arranged as two elongated diffuse patches, whereas in *I. rutilis*, they are distributed in a single patch between both tentacles. Furthermore, the body margins are highly undulated in *I. fafai* but smooth in *I. rutilis*, and the frontal eyes are scarce and only in the distal most frontal body edge in *I. fafai* (Figure 4D, E), but numerous and distributed along the entire frontal region in *I. rutilis* (see Yeri & Kaburaki, 1918).

Imogine fafai differs from *I. hamanensis* in several characteristics. The pigmentation of *I. hamanensis* is pale with dorsal brown spots, whereas in *I. fafai*, it is bright orange on both the dorsal and ventral surfaces (Figure 4A).

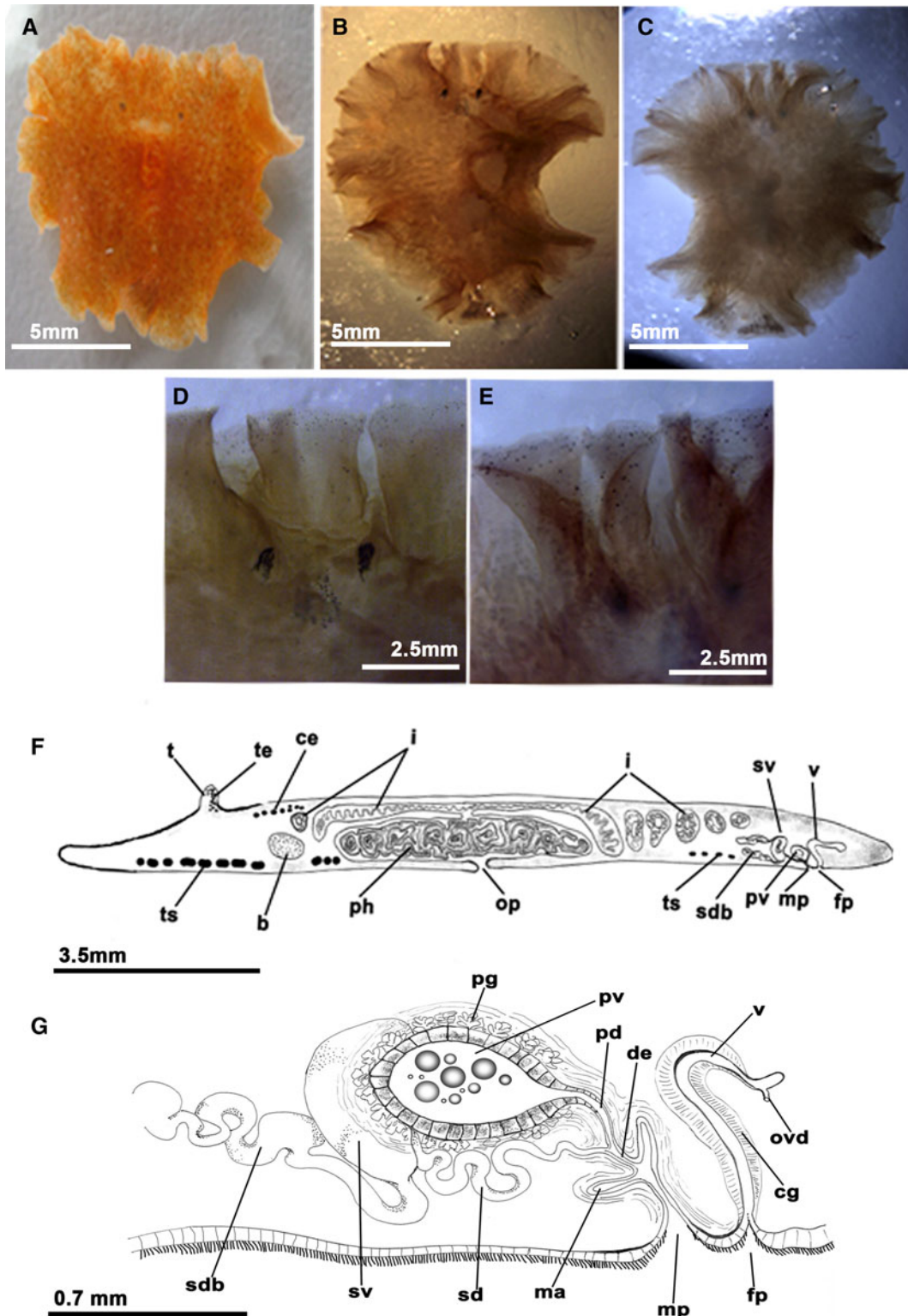


Fig. 4. *Imogine fafai* sp. nov.: (A) dorsal view of a living specimen; (B) dorsal and (C) ventral views of a fixed specimen; (D) dorsal and (E) ventral views of the anterior end of a fixed specimen focusing on the tentacles and the cerebral and marginal eyes; (F) sagittal reconstruction of a whole specimen; (G) sagittal reconstruction of the reproductive system. Anterior to the left in F and G. b, brain; ce, cerebral eyes; cg, cement glands; de, ductus ejaculatorius; fp, female pore; i, intestine; ma, male atrium; mp, male pore; op, oral pore; ovd, oviduct; pd, prostatic duct; ph, pharynx; pv, prostatic vesicle; sd, seminal duct; sdb, spermiducal bulb; sv, seminal vesicle; t, tentacle; te, tentacular eyes; ts, testes; v, vagina.

The highly undulated heart-shaped body of *I. fafai* (Figure 4B, C), in which the width, at times, appears to be greater than the total length of the animal (Figure 4C, D), differs from the body

shape of *I. hamanensis*. Other morphological differences in *I. fafai* (although they may be due to the maturity of the animal) include a larger prostatic vesicle and the presence of

spermiducal bulbs, which were not described in *I. hamanensis*. And last but not least, the distribution is very different in both species: *Imogine hamamensis* was captured in Lake Hamana, Totomi, Japan (Pacific Ocean) and *I. fafai* in Muros de Nalón, Asturias, Spain (Cantabrian Sea, Atlantic Ocean).

Well-known polyclad species newly recorded for the study area

The following species were mainly identified on the basis of their characteristic external anatomy.

Order ACOTYLEA Lang, 1884
 Superfamily LEPTOPLANOIDEA Faubel, 1984
 Family LEPTOPLANIDAE Stimpson, 1857
 Genus *Leptoplana* Ehrenberg, 1831
Leptoplana tremellaris (Müller, 1773) Oersted, 1843
 (Figure 5A)

Leptoplana tremellaris belongs to the family Leptoplanidae and is well known for the Atlantic coast of Europe. This species is characterized by an elongated, oval shaped body with wavy margins. Pigmentation brownish, translucent. Without tentacles. Tentacular eyes in two rounded clusters, and cerebral eyes in two patches, between or slightly anterior to the tentacular eye clusters. Pharynx ruffled, located in the first half of the body, often darker as the body pigmentation. Ovaries dorsal and testes ventral. Reproductive organs posterior to the pharynx. Male copulatory organ with interpolated prostatic vesicle. Penis papilla without stylet or cirrus. Female system with the typical truncated S-shape, with few muscles and abundant cement glands. A characteristic genital sucker is located between the male and female organs.

DISTRIBUTION

One specimen was found in Las Represas Beach, Tapia de Casariego (Asturias), intertidal region among sand and gravel under boulders. The identity of the specimens was confirmed based on the characteristic external morphology (Figure 5A) and the internal morphology, which was examined in histological sections. No remarkable morphological differences were found with the description by Faubel (1983) or with later descriptions (Faubel & Warwick, 2005).

Leptoplana tremellaris is a well-known species from the eastern coasts of the North Atlantic Ocean, particularly from Scotland (Fleming, 1823); Belgium (van Beneden, 1860); Saint Malo, France (Keferstein, 1868); the Irish Sea (Gamble, 1893); the Isles of Scilly (Faubel & Warwick, 2005); and the North Sea (Müller, 1773; Bock, 1913). The Mediterranean distribution of this species is controversial; it is likely that all of the Mediterranean records correspond to *L. mediterranea* (Bock, 1913) (see Gammoudi *et al.*, 2012 for a detailed discussion). Novell (2003) reported the presence of *L. tremellaris* in Catalonia, but according to Gammoudi *et al.* (2012), the morphology of this specimen is closer to *L. mediterranea* than *L. tremellaris*. Thus, the specimen reported in this paper is the first Iberian record for *L. tremellaris* and represents its southernmost locality.

Superfamily ILYPLANOIDEA Faubel, 1984
 Family DISCOCELIDAE Laidlaw, 1903
 Genus *Discocelis* Ehrenberg, 1836

Discocelis tigrina (Blanchard, 1847) Lang, 1884
 (Figure 5B–E)

Discocelis tigrina is characterized by a wide oval or elongated body shape, a yellow-whitish coloration marked with brown spots and a characteristic reproductive complex. Male and female systems empty into a common genital atrium where muscular dorsal folds form the penis papilla. Seminal vesicle absent. The prostatic secretion is provided by numerous prostatic glands (prostatoid organs) that open into the papilla and atrium. The female apparatus is characterised by a winding duct and horseshoe-shaped Lang's vesicle.

DISTRIBUTION

One specimen found in the intertidal zone of Las Represas Beach, Tapia de Casariego and another in Rodiles Beach, Villaviciosa (Asturias). The specimens were immature, therefore they were determined through the external morphology, characterized by a dorsal surface covered with dots and dark spots on a pale background, definite cerebral and tentacular eyes clusters, marginal eyes along the anterior periphery and a ruffled pharynx (see Figure 5B–E).

Discocelis tigrina is known for the Mediterranean Sea (Coast of Sicily (Blanchard, 1847), Gulf of Naples (Lang, 1884), Catalan coasts (Novell, 2003)), and for the North Atlantic Ocean (western Sahara and Mauritania (Palombi, 1939)). The records provided here are the first ones for the Cantabrian Sea and represent, to date, the northernmost Atlantic record for the species.

Suborder COTYLEA Lang, 1884
 Superfamily EURYLEPTOIDEA Faubel, 1984
 Family EURYLEPTIDAE Lang, 1884
 Genus *Cycloporus* Lang, 1884
Cycloporus papillosus (Sars, 1878) Lang, 1884
 (Figure 5F–I)

Cycloporus papillosus is characterized by an elongated, but wide, or plump body, with slightly undulated margins and rounded anterior and posterior ends. Dorsal surface with characteristic numerous papillae. The coloration varies from orange to yellowish or translucent grey. With tentacular and cerebral eyes. Tentacles, marginal and short. The ventral side is smooth and pale. Sucker in the middle of the body. Tubular pharynx anterior and frontally oriented. Oral pore behind the brain. Male and female genital pores separated and behind the pharynx.

Male organ with a short armed penis papilla (stylet), a true prostatic vesicle with a smooth glandular epithelium and a well-developed muscularized seminal vesicle; *vasa deferentia* sometimes very dilated. Female apparatus with a short female atrium, a female duct (vagina) and characteristic uterine vesicles.

DISTRIBUTION

One individual from Oyambre Cape, San Vicente de la Barquera (Cantabria) at a depth of 135 m recollected during the 'Fauna Ibérica' Oceanographic campaign II of the Cantabrian Sea realized during the summer (June) of 1991. Photographs from the fixed material were taken (Figure 5F–I). The Cantabrian individual was formaldehyde fixed and the serial sections were slightly damaged. However, it was possible to recognize the main diagnostic characters of the species. For the determination, the external characters were

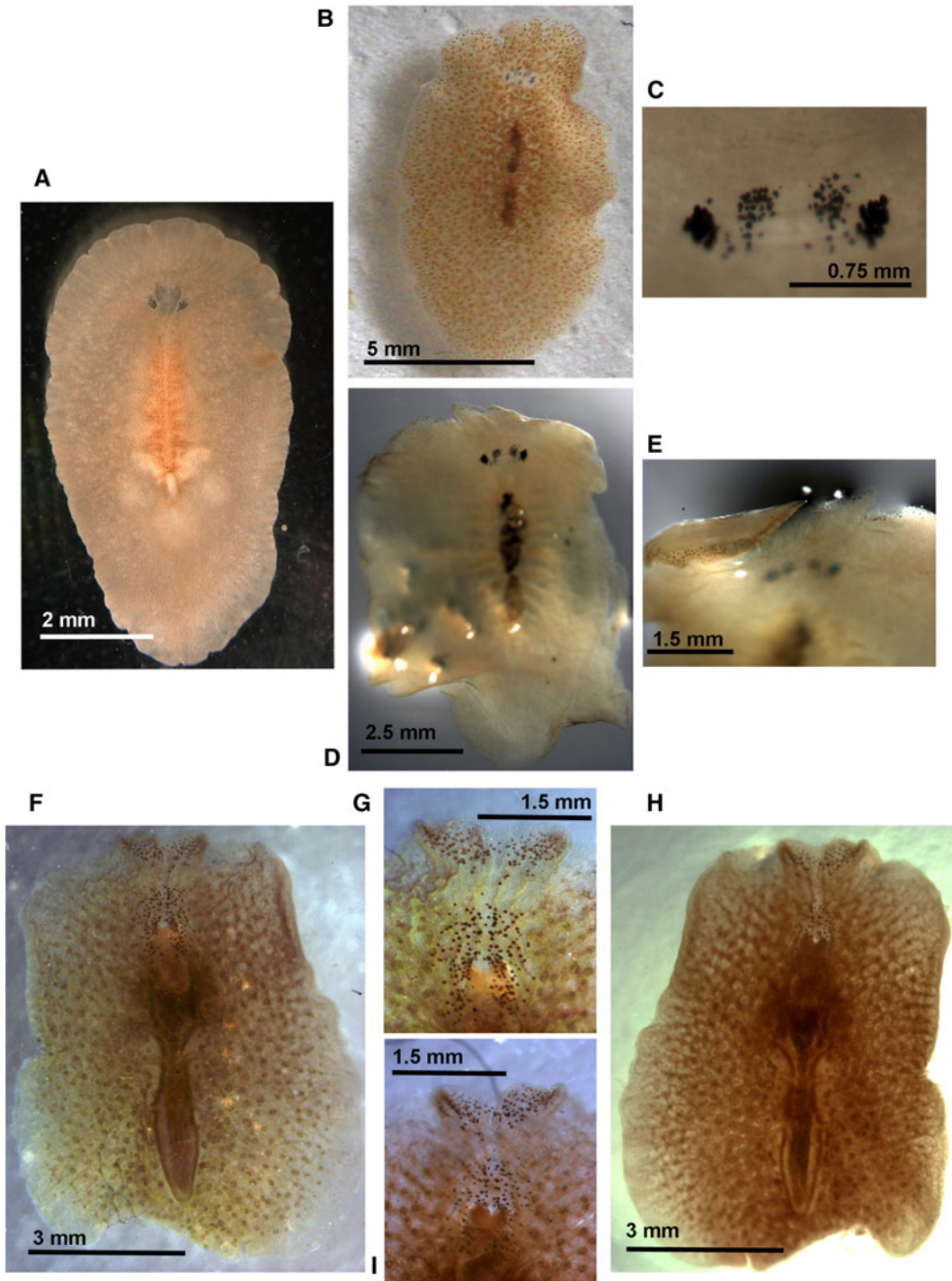


Fig. 5. Species identified mainly through external anatomy: (A) *Leptoplana tremellaris*, dorsal view of the fixed specimen; (B–E) *Discocelis tigrina*, (B) dorsal view of an alive specimen (C) detail of cerebral and tentacular eyes, (D) dorsal view of a cleared specimen (E) detail of the marginal eyes from the ventral side; (F–I) *Cycloporus papillosus*, (F) dorsal view of a fixed and cleared specimen (H) ventral view of a fixed and cleared specimen, (G) detail of the cerebral and tentacular eyes in dorsal and (I) ventral view.

decisive, as it were; the characteristic numerous papillae, the tentacular and cerebral eyes, the marginal tentacles, the presence of a ventral sucker and the tubular pharynx frontally oriented. Moreover, the specimen captured in Cantabria does not show differences with specimens previously found and described for Arosa Estuary, Galicia, (Noreña *et al.*, 2014) or with specimens from other localities of the North Atlantic Ocean.

Cycloporus papillosus is considered a likely cosmopolitan species. It has been recorded in the North Atlantic Ocean (Bergen, Norway (Jensen, 1878), Plymouth, United Kingdom (Gamble, 1893), Porto Praia, Cape Verde (Laidlaw, 1906) and Ría de Arosa, Galicia, Spain (Noreña *et al.*, 2014)). It is also found in the Mediterranean Sea (Rovigno, Croatia (Vátova, 1928)), and the eastern Pacific Ocean (Susaki near Simoda, Japan (Kato, 1944)). This is the first record for the Cantabrian Sea.

DISCUSSION

Although polyclad flatworms can easily be found in the marine environments of the Cantabrian Sea, no taxonomic studies cataloguing polyclad biodiversity have been performed until now. A focal study of localities along the Cantabrian Sea has revealed a new species of the genus *Imogine*, a new record for the Iberian Peninsula and three new records for the Cantabrian Sea. Minor differences were noted between the original descriptions and the exemplars described here for *Notoplana vitrea* Lang, 1884 and *Pleiolplana atomata* (Müller, 1776) Faubel, 1983. Thus, updated descriptions are provided for both taxa.

Until now, *N. vitrea* was considered endemic to the Mediterranean Sea. The new record and the photographs posted on natural history websites (Table 1) demonstrate the presence of this species in the Cantabrian Sea. The relatively short geographical distance between, and the similar environmental conditions of the Cantabrian and Mediterranean Seas facilitate the dispersion of this species along the Iberian Peninsula coastline. Similarly, *Discocelis tigrina* (Blanchard, 1847) Lang, 1884, has a known distribution that comprises the Mediterranean Sea (Lang, 1885, Prudhoe, 1985) and the western Sahara and Mauritania coasts (Palombi, 1939). This new record of *D. tigrina* for the Cantabrian Sea represents the northernmost locality in the Atlantic Ocean, even though new samples should be made in order to ascertain their real distribution.

Although an Iberian record of *Leptoplana tremellaris* (Müller, 1773) Oersted, 1843 exists in the literature (Novell, 2003), the morphology and distribution of these specimens point to a misidentification with a closely related species, *L. mediterranea* (see Gammoudi et al., 2012 for a detailed discussion). Therefore, the specimen described here, in which the identity was confirmed by anatomical examination, is the first record of *L. tremellaris* for the Iberian Peninsula. The known distribution of this taxon occurs in Northern Europe (Bock, 1913); however, this new Cantabrian Sea record extends the distribution range towards the south. *Pleiolplana atomata*, which has been widely reported in both the north-western and north-eastern parts of the Atlantic Ocean and in the Mediterranean Sea, is reported, for the first time, in the Cantabrian Sea.

The cosmopolitan species *Cycloporus papillosus* is reported, for the first time, for the Cantabrian coast. The existence of cosmopolitan marine invertebrate species is a commonly described phenomenon in the literature. Recently, however, several of these so-called cosmopolitan species have proven to be cryptic species complexes (e.g. Casu & Curini-Galletti, 2006; Sanna et al., 2009; Kawauchi & Giribet, 2010; Curini-Galletti et al., 2011; Jörger et al., 2012).

Two specimens were used to describe a new species, *Imogine fafai* sp. nov. To date, this species is only known from its type locality (Muros de Nalón, Asturias, Iberian Peninsula). Thus, it is not yet possible to hypothesize on its distribution.

Despite providing new data here, polyclad fauna for the Cantabrian Sea is still poorly known. Therefore, new sampling campaigns and studies are necessary for better assessing the actual level of biodiversity of this group of organisms, as occurs with other marine organisms (Fernández-Álvarez, in press). Recently, the importance of non-scientific natural history websites, containing photographs taken by amateur

and/or professional naturalists, has increased. In fact, several of these websites provide the first evidence of a taxon for a specific region (e.g. the Iberian records of *N. vitrea*, see Table 1) or could constitute the basis for a scientific publication (e.g. García et al., 2013; Merino-Sáinz et al., 2013, Annexe II). Searching and indexing the information of these websites provides valuable resources as it makes the work of amateur and/or professional naturalists available for scientific research and provides information on distribution and habitat, which can be integrated into the scientific literature.

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