



Research article

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New and non-indigenous species of Bryozoa from Iberian waters

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Abstract. Iberian material originally identified as *Hincksina flustroides* is revised and five different species are now identified: the Atlantic species *Hincksina flustroides* is present to the NW of the Iberian Peninsula, whilst the Mediterranean species *Hincksina synchysia* is here reported for the first time in Iberian waters. Two new species of *Hincksina* are described, one from the Strait of Gibraltar area, and another from the Alboran Sea, whereas another colony from this area actually corresponds to *Hincksina longispinosa*. A new description of *Electra angulata* is given, based on the original and other historical material, as well as on newly collected colonies. The taxonomic position of the species in the genus *Arbopercula* is discussed, and the diagnosis of the genus itself is amended. Finally, a new species of *Caberea* is described from deep waters off the north Iberian coast.

Keywords. *Arbopercula*, *Caberea*, *Hincksina*, *Electra angulata*, *Membranipora tenella*.

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Introduction

This contribution is part of an effort to collate all the previous knowledge about living marine Iberian Bryozoans. This involves compiling bibliography, reviewing material in collections and collecting new material. This effort has yielded several new contributions including corrections of previous identifications, new records for the Iberian Peninsula and descriptions of new species (e.g., Reverter-Gil *et al.* 2016, 2019a, 2019b; Souto *et al.* 2019; Souto & Reverter-Gil 2019; Reverter-Gil & Souto 2019, 2021a, 2021b). Nonetheless, our overall knowledge remains fragmentary and undoubtedly includes many taxonomic errors, which are gradually being corrected in various studies. The greater ease of access to original reference material and, above all, the use of the electron microscope enable better characterizations of species, and make it possible to detect misidentifications and misinterpretations of species concepts as well. Revision of material stored in collections has thus become an essential part of the work of taxonomists, either to redescribe known species or to describe new ones.

The original material of *Electra angulata* Levinsen, 1909, together with the study of a large colony collected in the Balearics ten years ago and material from the Strait of Gibraltar, has enabled us to redescribe this species and to discuss its taxonomic relationships. The genus *Hincksina* Norman, 1903, together with several species including the type species, has been recently redescribed by Berning *et al.* (2021). Moreover, part of the Mediterranean material previously reported as *Hincksina flustroides* (Hincks, 1877) was described as a new species, *Hincksina synchysia* Berning, Spencer Jones & Vieira, 2021. These new discoveries make it necessary to revise the previous records of *H. flustroides* in Iberian waters. Finally, the revision of material from deep waters housed in historical collections and originally identified as *Caberea boryi* (Audouin, 1826) has allowed us to describe a new Iberian species.

Material and methods

Samples deposited in the collections of the following museums have been revised:

MHNUSC	=	Museo de Historia Natural da Universidade de Santiago de Compostela, Spain
MNCN	=	Museo Nacional de Ciencias Naturales, Madrid, Spain
MNHN	=	Muséum national d'histoire naturelle, Paris, France
NHMD	=	Natural History Museum of Denmark, Copenhagen, Denmark

Samples from Portugal were collected in the frameworks of the campaigns EMEPC/M@rBis/Berlengas2012 and EMEPC/M@rBis/Arrábida2014, carried out on the Berlengas Islands and Arrábida coast, respectively, and organized by Estrutura de Missão para a Extensão da Plataforma Continental (EMEPC). A specimen of *Caberea* Lamouroux, 1816 was collected during the campaign INDEMARES 0710 (16 July to 28 August 2010). Studied material from these campaigns is now deposited in the MHNUSC.

We have also revised SEM photographs of some samples held at the NHMUK (Natural History Museum, London), as well as some material sent by C.M. López-Fé (Universidad de Sevilla).

The samples were examined with stereo microscopes and uncoated, clean specimens were selected to photograph with scanning electron microscopes: a Zeiss EVO LS15 (Santiago de Compostela, Spain), and an Inspect S50 (Vienna, Austria), always with a back-scattered electron detector in low variable vacuum mode. Measurements were taken with the software ImageJ® on SEM photographs.

Results

Order Cheilostomatida Busk, 1852
Suborder Membraniporina Ortmann, 1890
Superfamily Membraniporoidea Busk, 1854
Family Electridae Stach, 1937 (1851)

Genus *Arbopercula* Nikulina, 2010

Amended diagnosis

Colony encrusting, multiserial, unilaminar or multilaminar. Zooids elongated, oval, in serial rows separated by deep grooves. Gymnocyst reduced or slightly extended proximally. Mural rim narrow, surrounding an elliptical opesia. Cryptocyst granular, reduced, more developed proximally. Operculum well chitinized. Marginal spines present, but sometimes lacking in large parts of the colony or in the whole colony; sometimes bending across the opesium like a shield, but not fusing. Oral spines absent. A pair of processes, conical or spine-like, developed in the proximal gymnocyst of each zooid, inconstant; a single process in the first zooid of a row after bifurcation. Communication via two multiporous rosette-

plates, each situated in one of the basal corners of the distal wall. Distal half of each lateral wall with a single multiporous rosette-plate. Small, irregular kenozooids may be present, filling spaces between autozooids. Ovicell and avicularia absent. Ancestrula and early budding pattern undescribed.

Arbopercula angulata (Levinsen, 1909)

Figs 1–3, 12A; Tables 1–2

Electra angulata Levinsen, 1909: 149, pl. 22 fig. 4a.

Electra angulata – Harmer 1926: 207, pl. 13 fig. 11.

Electra tenella – Marcus 1937: 38, pl. 7 fig. 15a–c. — Silén 1941: 18, fig. 14. — Mawatari 1974: 42, fig. 7, pl. 3 figs 3–4. — Rosso 1994: 241–246, pls 1–2.

Electra cf. *tenella* – López de la Cuadra & García-Gómez 1994: 109.

Arbopercula tenella – Subías-Barata et al. 2022: 3, fig. 4b.

Arbocuspis angulata – Tilbrook & Gordon 2015: 260 (lapsus calami, see below).

Arbopercula angulata – Reverter-Gil & Souto 2021a: 15.

Non *Membranipora tenella* – Hincks 1880: 376, pl. 16 fig. 7 [= *Arbopercula tenella*].

Material examined

Holotype (by monotypy)

SOUTH CHINA SEA • several fragments on wood; Gulf of Thailand, near Koh Samet; coordinates not provided; depth 0 m (floating); 9 Feb. 1900; Mortensen leg.; NHMD-77254 (Fig. 1).

Other material

MALAY ARCHIPELAGO • 1 colony on a wooden slide; Philippines; 11° 37' N, 123° 31' E; stn 208; depth 18 fms; date unknown; Challenger exped. 1873–1876; NHMUK 1899.7.1.5088 • 1 colony on wood; Salah Bay, N. Suinbawa; coordinates not provided; stn 312; depth 274 m; 1899; Siboga exped.; NHMUK 1928.3.6.14, NHMUK 1928.3.6.16 • 2 colonies on wood; Java Sea, Indonesia, Strait of Bali; 8° 20' S, 114° 25' E; depth 30 m; 19 Jul. 1984; Snellius exped. II; G.C. Cadée leg.; boomkor [beam trawl]; CAD84/11; NHMUK 2003.2.28.104.

MEDITERRANEAN SPAIN • 1 large colony on a plastic debris; Balearic Islands, Menorca, Es Talaier; 39.92667° N, 3.90278° E; depth 0 m (washed upon the beach); 7 Jul. 2012; O. Reverter-Gil leg.; MHNUSC-Bry 643 (Figs 2–3).

NORTH AMERICA • 1 colony on drift plastic; Florida, Fort Pierce, N. Beach; coordinates not provided; depth unknown; date unknown; NHMUK 1986.8.14.7.

STRAIT OF GIBRALTAR • 1 young colony on wood, coated; Andalucía, La Línea; 36.18167° N, 05.33333° W; depth 0 m (floating); 7 Dec. 1986; C.M. López-Fé leg.; pers. coll. C.M. López-Fé • several fragments on wood; Andalucía, La Línea; 36.18167° N, 05.33333° W; depth: 0 m (floating); Aug. 2005; C.M. López-Fé leg.; MHNUSC-Bry 708.

Holotype of *Arbopercula tenella*

NORTH AMERICA • 1 colony on algae; Florida; coordinates unknown; depth unknown date; Hincks leg.; NHMUK 1899.5.1.648 (Fig. 4).

Other material of *Arbopercula tenella*

NORTH AMERICA • several colonies on glass; Florida, Biscayne Bay, Miami Beach; coordinates unknown; depth unknown; 1945; L.W. Hutchins leg.; NHMUK 1947.2.4.1.

Table 1. Measurements (in mm) of *Arbopercula angulata*, holotype (NHMD-77254). Abbreviations: N = number of measurements; SD = standard deviation.

	Mean	SD	Minimum	Maximum	N
Autozoid length	0.528	0.0455	0.450	0.676	46
Autozoid width	0.274	0.0271	0.216	0.349	46
Opesia length	0.408	0.0324	0.343	0.491	46
Opesia width	0.222	0.0257	0.177	0.296	46

Description

Colony encrusting, multiserial, unilaminar or occasionally multilaminar, forming extensive crusts that cover the substrate on which they grow. Autozooids elongate oval or rectangular, arranged in series, separated by shallow grooves. Distal wall generally ascending towards the frontal surface and angularly bent from side to side or arch-like. Gymnocyst reduced to the proximal region. Two (rarely three) conical, hollow processes, generally open at the end, developed on the proximal gymnocyst, half-way between the central line and the lateral margins. These processes may sometimes be rudimentary or even absent in large parts of the colony. The first zooid in each of both series after bifurcation bears a

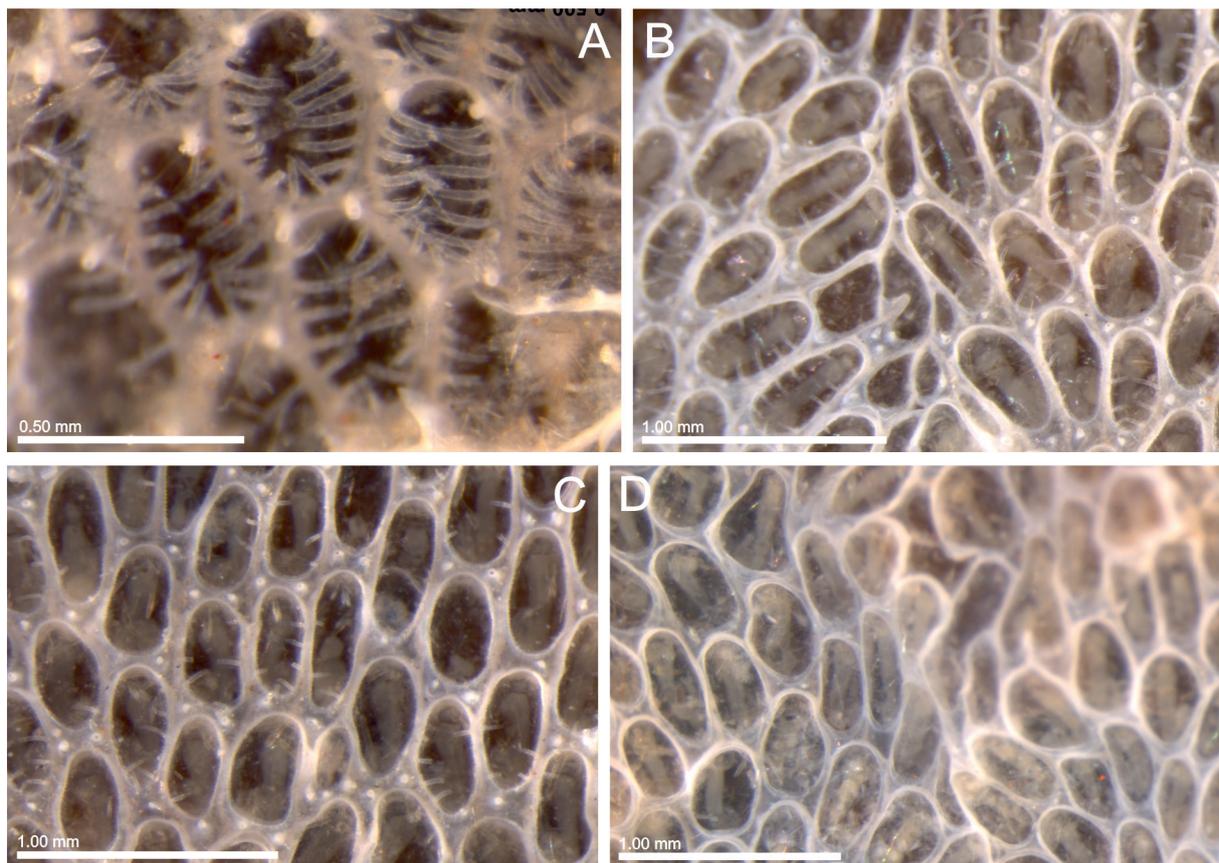


Fig. 1. *Arbopercula angulata* (Levinsen, 1909), holotype (NHMD-77254), Koh Samet (Gulf of Thailand). **A.** Autozooids with well-developed spines and gymnocal processes. **B–C.** Autozooids with fewer, poorly developed spines and gymnocal processes. **D.** Autozooids without spines and gymnocal processes.

single median process. Cryptocyst granular, poorly developed, absent at the distal end of the opesia, somewhat more evident at its proximal end, leaving an extensive, oval opesia. Communication via two rather large, multiporous rosette-plates situated in the basal corners of the distal wall. The distal half of each lateral wall has a single multiporous rosette-plate. Oral spines absent. The development of marginal spines shows great differences. Some zooids bear up to 8 pairs of marginal spines, not very

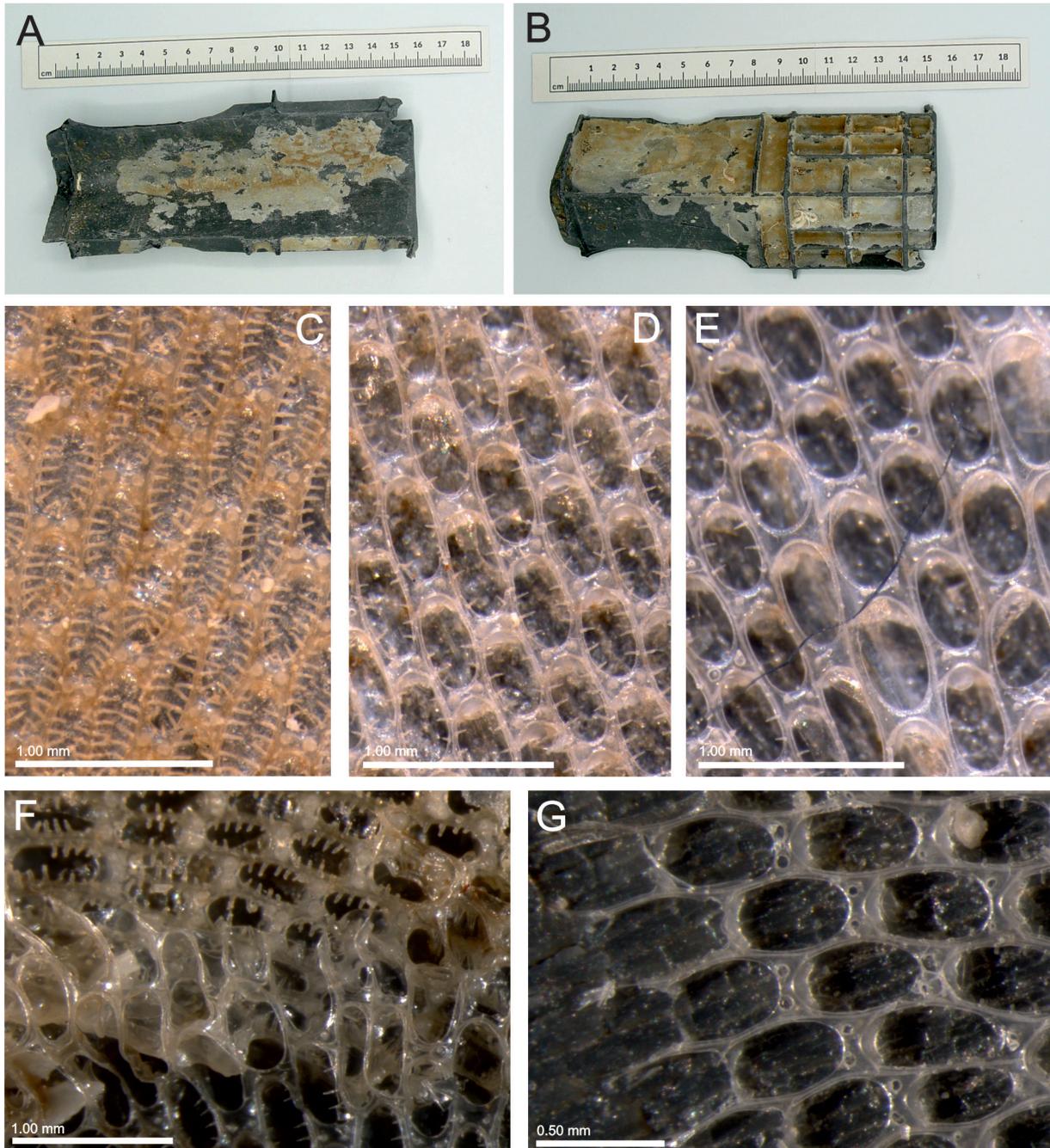


Fig. 2. *Arbopercula angulata* (Levinsen, 1909) (MHNUSC-Bry 643), Menorca (Balearic Islands). **A–B.** View of part of large colony on plastic. **C–E.** Autozooids with fewer and less-developed spines. **F.** Second layer of spineless autozooids covering the first layer of spiny zooids. **G.** Autozooids of the growing margin with developing gymnocystal processes.

Table 2. Measurements (in mm) of *Arbopercula angulata* (MHNUSC-Bry 643). Abbreviations: N = number of measurements; SD = standard deviation.

	Mean	SD	Minimum	Maximum	N
Autozoid length	0.578	0.0585	0.500	0.712	23
Autozoid width	0.279	0.0424	0.216	0.384	23
Opesia length	0.485	0.0393	0.405	0.578	23
Opesia width	0.234	0.0370	0.178	0.324	23

thick, somewhat flattened, recurved on the opesia, reaching the middle of the area or even surpassing it, but in general the spines are smaller and fewer, and many zooids are completely spineless. There are no ovicells or avicularia. Irregular intercalary kenozooids, small, scattered, filling gaps between autozooids. Ancestrula unknown.

Remarks

Electra angulata was originally described by Levinsen (1909) from colonies collected on a ligneous core floating near Koh Samit, Siam (Ko Samet, Thailand). The description is very clear and complete, but not so the only drawing (Levinsen 1909: pl. 22 fig. 4a), which provides no information on the variability of the species. Levinsen (1909: 149), however, clearly stated that “The best provided ones

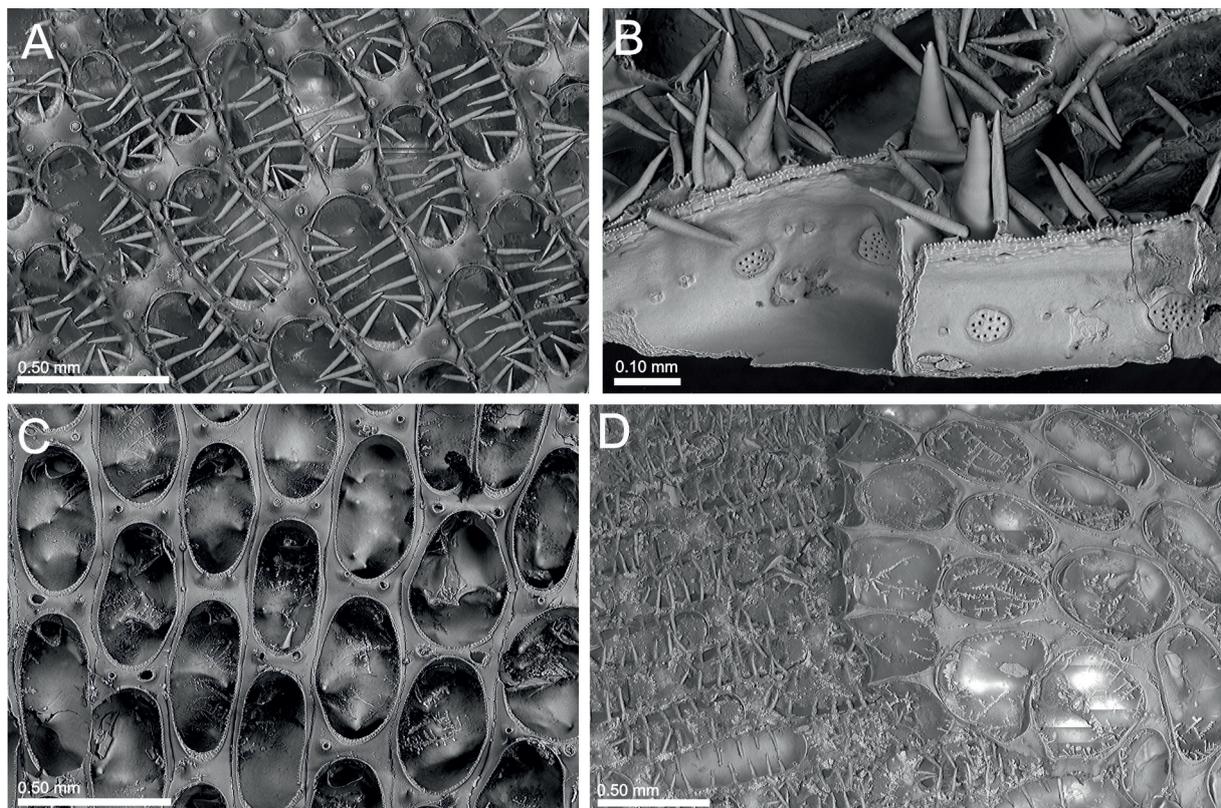


Fig. 3. *Arbopercula angulata* (Levinsen, 1909) (MHNUSC-Bry 643), Menorca (Balearic Islands). **A.** Autozooids with well-developed spines and gymnocrystal processes. **B.** Multiporous rosette-plates. **C.** Spineless autozooids. **D.** Second layer of spineless autozooids covering the first layer of spiny zooids.

[autozooids], which in the colonies examined are in a great minority, have on the margin 12 not very thick spines, which reach the middle of the area or even surpass it. A larger or smaller number of them is however often wanting, and many zooecia are altogether without spines. On the proximal gymnocyst we find in most zooecia 2 (more rarely a single median and still more seldom 3) short, thick, conical spines, generally open at the end, which are situated half-way between the central line and the lateral margins. These spines may sometimes be rudimentary, and in many zooecia (with or without marginal spines) they are absent". On page 156 of the same paper, it is also stated that "Here we may find in the same colony some zooecia, which are entirely without spines, and others provided with a larger number of these structures." It is clear then that according to Levinsen (1909) the zooids of *E. angulata* may have spines and gymnocystal processes at the same time, or only processes, or only spines, or even none of them, and both processes and spines may be very variably developed. We have been able to verify all this variation both in the type material of *E. angulata* (NHMD-77254 and Fig. 1), in our own material from the Mediterranean and the Strait of Gibraltar (MHNUSC-Bry 643, 708) (Figs 2–3), and in different museum samples (see Material examined above). Nonetheless, later authors have apparently incorrectly considered that only the presence of spines (as well as gymnocystal processes) is a typical character of the species.

The species also has a marked tendency to form multilaminar colonies due to the overgrowth of some layers over others (Figs 2F, 3D). This does not seem to have been pointed out by other authors, but is clearly visible in our own material, a large colony on plastic debris (MHNUSC-Bry 643) (Fig. 2A–B). The upper layers are often spineless to a great extent (Figs 2F, 3D).

Membranipora tenella Hincks, 1880 has also been subject to misinterpretation and even considered a synonym of *E. angulata* or at least misidentified (e.g., Marcus 1937; Silén 1941; Mawatari 1974; Rosso 1994; Subías-Baratau *et al.* 2022). However, as already stated about twenty years ago by Tilbrook *et al.* (2001), they are clearly separate species. These authors (Tilbrook *et al.* 2001: 40) first pointed out as a difference that *M. tenella* sensu stricto bears no marginal spines (see Fig. 4), but as we have already demonstrated (see above), zooids of *E. angulata* usually lack them. Tilbrook *et al.* (2001) did, however, accurately point out another important difference between the two species: the development of

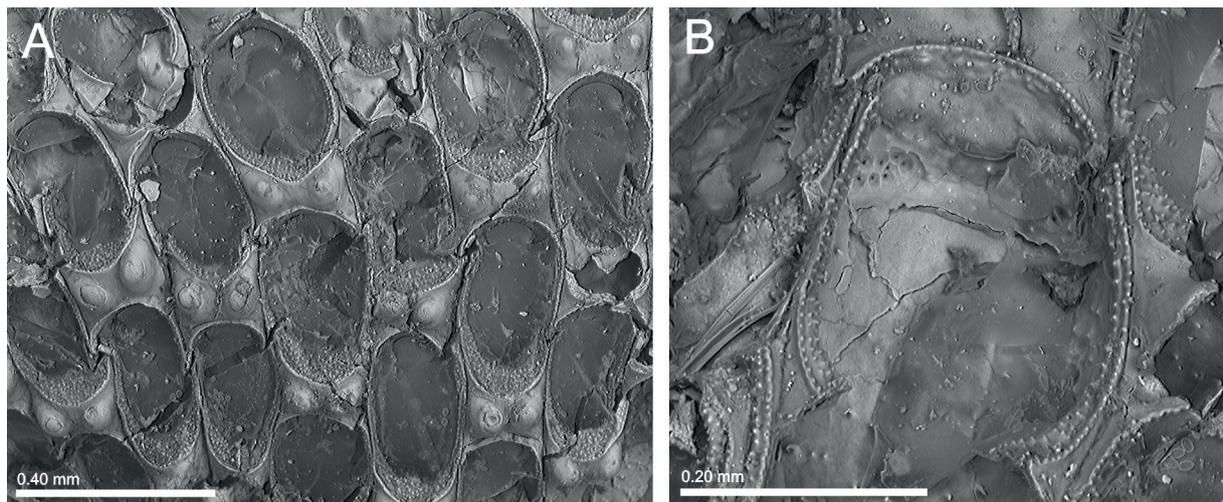


Fig. 4. *Arbopercula tenella* (Hincks, 1880), holotype (NHMUK 1899.5.1.648), Florida (USA). **A.** View of colony. Note the autozooids with well-developed proximal cryptocyst and gymnocystal processes. **B.** Autozooid with multiporous rosette-plates in basal corners of distal wall. (Photos by M.E. Spencer Jones).

the gymnocystal processes in *M. tenella*, which are far more robust and knob-like, occupying a greater area of the gymnocyst (Fig. 4A). Importantly, the revision of type material of *M. tenella* (NHMUK 1899.5.1.684, Fig. 4) shows that the proximal cryptocyst is characteristically much more developed in this species than in *E. angulata* (see Figs 3A, C, 4A).

The resemblance of *E. angulata* with *Conopeum papillorum* Tilbrook, Hayward & Gordon, 2001 was already discussed in the original paper (Tilbrook *et al.* 2001: 40) and we have nothing more to add. Finally, material of *E. angulata* was also considered as a new species (named *Electra inexpectata*) in the unpublished PhD by López de la Cuadra (1991), but this species was not formally published. It was reported later from the Strait of Gibraltar area by López de la Cuadra & García-Gómez (1994) as *Electra* cf. *tenella*.

The systematic position of *E. angulata* has also been subject of discussion ever since its original description. Levinsen (1909) placed the species in *Electra* with some reservations, closely allied to *Electra monostachys* (Busk, 1854). This position was also accepted by Harmer (1926). But the original author himself (Levinsen 1909: 160) also related his new species to *Aspidelectra melolontha* (Landsborough, 1852), the type species and, at that time, the only species of his new genus *Aspidelectra* Levinsen, 1909. Indeed, as Levinsen (1909) stated, both species share an angularly bent distal wall with a multiporous rosette-plate in each of the two basal corners, and 1–2 gymnocystal processes. These processes somehow replace the oral spines, absent in both species. Note that, for this reason, *Aspidelectra defensa* (Kirkpatrick, 1888) and *Aspidelectra densuense* Cook, 1968 cannot remain in this genus because they do have true oral spines and lack gymnocystal proximal processes. This requires further discussion, which is beyond the scope of the present work. Anyway, in our opinion *E. angulata* cannot be placed in this genus either because *Aspidelectra* is characterized by a frontal shield of fused, flattened spines.

In contrast, *M. tenella* was firstly placed in *Electra* Lamouroux, 1816 by Marcus (1937), and the name *Electra tenella* was widely used by later authors, even although the species cited by Marcus (1937) and others was actually *E. angulata*.

Nikulina (2007, 2010) and Nikulina & Schäfer (2008) distributed a number of species previously attributed to *Electra* to new genera, but these did not include *E. angulata* and *M. tenella*. Tilbrook & Gordon (2015) pointed out some similarities of both species with *Arbopercula bengalensis* (Stoliczka, 1869), the type species of the genus *Arbopercula* Nikulina, 2010, but they inadvertently erred in attributing both species to *Arbocuspis* Nikulina, 2010 in their paper. This was clearly a lapsus owing to the similarity of both generic names (D.P. Gordon pers. com.). *Electra angulata* and *M. tenella* do not conform to *Arbocuspis* as the cryptocyst in this genus is inconspicuous and spines are branching, bending across the opesia from its proximal end, forming a sort of shield. We agree with the original intention of the authors since the relationship between the three species is evident, but the inclusion of *E. angulata* and *M. tenella* in *Arbopercula* requires modifying the diagnosis of the genus, which also contains a serious error of understanding and an important omission:

Firstly, *Arbopercula* was originally characterized (and named) based on a pair of bifurcating, chitinous spines on the operculum, which are absent in *E. angulata* and *M. tenella*. As Tilbrook & Gordon (2015) pointed out, however, these spines may be very small and easily overlooked. In our opinion, this character can be useful to differentiate the type species, but not to characterize the genus, so it should be eliminated from the generic diagnosis. Otherwise, no other species could be integrated into the genus because this character is exclusive of *A. bengalensis*.

Secondly, the diagnosis of *Arbopercula*, but also *Arbocuspis*, is incorrect. Both diagnoses state that the zooids exhibit a pair of distal spines, stout, conical, non-articulated, but these are really gymnocystal

blunt processes (not true spines) and are located at the proximalmost end of the succeeding zooid, such as those present in *A. bengalensis*, *E. angulata* and *M. tenella* (but also in *A. melolontha*), probably replacing the oral spines, absent in these species.

Thirdly, the absence of marginal spines in *M. tenella* and in many zooids of *E. angulata* must be included in the diagnosis.

Finally, unfortunately no information was provided about the interzooidal communication pores of both genera. We have no information about *A. bengalensis*, but *E. angulata* and *M. tenella* have on either side a rather large, multiporous rosette-plate situated in one of the basal corners of the distal wall. In our opinion this must be also incorporated into the diagnosis of the genus *Arbopercula*.

Tilbrook & Gordon (2015) tentatively also added *Membranipora devinensis* Robertson, 1921 to *Arbopercula*, but the presence of proximal pores and a presumed ovicell prevents the inclusion of this species, at least until it is correctly described.

Material of *A. angulata* has been frequently incorrectly reported as *E. tenella* by many authors around the world, growing on different algae, on drifting or beach-stranded plastic or wood, as small colonies on the hulls of pleasure craft plying tropical and subtropical waters, or even as epibionts attached to the scales of sea snakes, shells of living nautilus or carapaces of sea turtles or horseshoe crabs (e.g., Key *et al.* 1995, 1996; Pfaller *et al.* 2008; Gordon 2009; Tan *et al.* 2011; Subías-Baratau *et al.* 2022). Its first record in European waters was published by Rosso (1994 as *E. tenella*) from Sicily. In Iberian waters (Fig. 12A), colonies have sometimes been observed on ligneous cores floating near the Strait of Gibraltar (López de la Cuadra & García-Gómez 1994, as *Electra* cf. *tenella*; C.M. López-Fé pers. com.; MHNUSC-Bry 708). Colonies have very recently also been reported near the coast of Catalonia growing on plastic debris (Subías-Baratau *et al.* 2022 as *A. tenella*). Moreover, we collected a large colony also growing on plastic debris washed upon a beach at Menorca (Balearics) in July 2012 (Reverter-Gil & Souto 2021a) (MHNUSC-Bry 643; Figs 2–3). Because colonies of this species were not observed in Iberian waters growing on fixed substrates, the large number of recent records shows that *A. angulata* must be considered as a non-indigenous species (NIS) in Iberian waters, attached to different floating substrates.

Suborder Flustrina Smitt, 1868
Superfamily Flustroidea Fleming, 1828
Family Flustridae Fleming, 1828
Genus *Hincksina* Norman, 1903

Hincksina flustroides (Hincks, 1877)
Figs 5, 12B; Table 3

Membranipora flustroides Hincks, 1877: 213.

Membranipora flustroides – Hincks 1880: 151, pl. 19 fig. 2.

Hincksina flustroides – Fernández Pulpeiro 1983: 472. — Reverter-Gil & Fernández-Pulpeiro 2001: 59.

— Reverter-Gil *et al.* 2019a: 10. — Berning *et al.* 2021: 335, fig. 1.

? *Hincksina flustroides* – Zabala & Gili 1985: 138. — Calvín Calvo 1986: 48. — Haya & Anadón 1989: 111, fig. 2. — Álvarez 1992: 276. — Madurell *et al.* 2013: 127.

Non *Hincksina flustroides* – Zabala 1986: 255, fig. 62, pl. 1 fig. a. — López de la Cuadra & García Gómez 1988: 23; 1994: 110 (part or whole). — López de la Cuadra 1991: 94 (part or whole), pl. 7 figs c–d. — Templado *et al.* 2002: 202; 2006: 207.

Material examined

ATLANTIC IBERIAN PENINSULA – **Galicia** • several small colonies on maerl; Ría of Vigo; 42.23889° N, 08.79639° W; depth 16 m; 16 Sep. 1986; E. Fernández-Pulpeiro leg.; MHNUSC-Bry 54 • 1 ovicelled colony on stone with more species; Ría of Ferrol; 43.45444° N, 08.31222° W; depth 15 m; 13 Jul. 1991; O. Reverter-Gil leg.; MHNUSC-Bry 163 • 1 large colony, ovicelled, on shell, together with more species; Cíes Islands; 42.21139° N, 08.90556° W; depth 12 m; 23 Aug. 2012; J. Souto leg.; MHNUSC-Bry 617 (Fig. 5) • 1 ovicelled colony on shell, together with more species; Cíes Islands; 42.21139° N, 08.90556° W; depth 12 m; 23 Aug. 2012; J. Souto leg.; MHNUSC-Bry 618 • several ovicelled colonies on shell, together with more species; Ría of Ferrol; 43.46480° N, 08.27001° W; depth 18 m; 24 May 2021; J. Souto leg.; MHNUSC-Bry 706, 707. – **Portugal** • several ovicelled colonies on shells and stones, together with more species; Arrabida; 38.49642° N, 08.92968° W; stn 20; depth 20–35 m; 23 Sep. 2014; J. Souto leg.; MHNUSC-Bry 710 to 716 • 1 colony on barnacle plate, together with more species; Estelas Islands; 39.42438° N, 09.52500° W; stn 48; depth 18.8–21 m; 26 Sep. 2012; J. Souto leg.; MHNUSC-Bry 717 • several ovicelled colonies on stone, together with more species; Berlengas Islands; 39.41957° N 09.50513° W; stn 30; depth 22–25 m; 22 Sep. 2012; J. Souto leg.; MHNUSC-Bry 718 • several ovicelled colonies on shells and stone, together with more species; Berlengas Islands; 39.41005° N 09.49483° W; stn 59; depth 27–27.4 m; 28 Sep. 2012; J. Souto leg.; MHNUSC-Bry 719–721 • 2 colonies on stone, together with more species; Farilhoes Islands; 39.47835° N, 09.54077° W; stn 46; depth 17–18.6 m; 26 Sep. 2012; J. Souto leg.; MHNUSC-Bry 722 • several colonies on shell, together with more species; Berlengas Islands; 39.41148° N, 09.50667° W; stn 37; depth 19.5–21 m; 24 Sep. 2012; J. Souto leg.; MHNUSC-Bry 723, 724 • 1 colony on stone, together with more species; Farilhoes Islands; 39.47850° N, 09.54170° W; stn 18; depth unknown; 20 Sep. 2012; J. Souto leg.; MHNUSC-Bry 726 • 2 ovicelled colonies on stone, together with more species; Farilhoes Islands; 39.47462° N 09.54358° W; stn 39; depth 15.3–24 m; 25 Sep. 2012; J. Souto leg.; MHNUSC-Bry 727 • several ovicelled colonies on stone, together with more species; Farilhoes Islands; 39.47728° N, 09.54365° W; stn 53; depth 29.5–33 m; 27 Sep. 2012; J. Souto leg.; MHNUSC-Bry 729.

Remarks

The revision of previous citations of *H. flustroides* in Iberian waters in the literature is of little help because most of them lack detailed descriptions and figures. We have therefore directly revised the available material. The material from Galicia, reported by Fernández Pulpeiro (1983), Reverter-Gil & Fernández-Pulpeiro (2001) and Reverter-Gil *et al.* (2019a), as well as newly collected material from the area (see Material examined), do correspond to *H. flustroides*. Also, newly collected material from

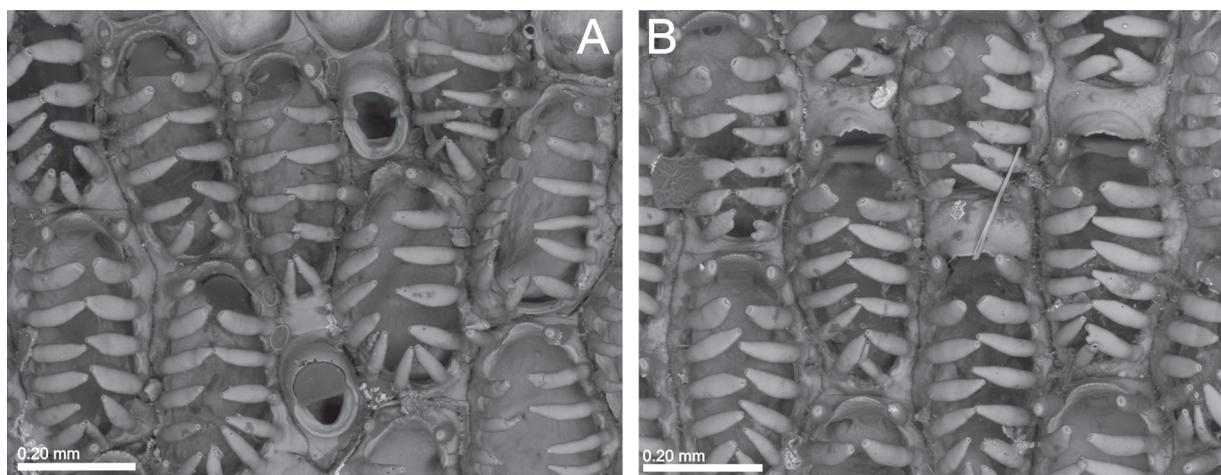


Fig. 5. *Hincksina flustroides* (Hincks, 1877) (MHNUSC-Bry 617), Cíes Islands (Galicia, NW Spain). **A.** Autozooids and avicularia. **B.** Ovicelled zooids.

Table 3. Measurements (in mm) of *Hincksina flustroides*. Abbreviations: N = number of measurements; SD = standard deviation.

	Mean	SD	Minimum	Maximum	N
Autozooid length	0.415	0.0300	0.328	0.494	38
Autozooid width	0.237	0.0252	0.164	0.285	38
Opesia length	0.365	0.0318	0.286	0.431	38
Opesia width	0.170	0.0217	0.122	0.223	36
Zooid avic. length	0.192	0.0392	0.148	0.240	4
Zooid avic. width	0.141	0.0235	0.115	0.172	4
Opesia. avic. length	0.130	0.0241	0.107	0.168	5
Opesia. avic. width	0.097	0.0139	0.085	0.121	5
Ovicell length	0.075	0.0176	0.045	0.105	9
Ovicell width	0.143	0.0185	0.117	0.170	9

several Portuguese localities (see Material examined) belongs to this species. Part of the material from Galicia and Portugal is similar to the type material of the species figured by Berning *et al.* (2021: fig. 1) and part to the material figured by De Blauwe (2009: figs 175–176). Since all of this material is actually *H. flustroides*, it is very likely that the material from nearby Asturias, reported by Haya & Anadón (1989) (Fig. 12B), is the same species, despite the doubts expressed by Berning *et al.* (2021).

The biometries of our own material (Table 3) are significantly similar to those included by Berning *et al.* (2021) in the redescription of the species, except for the size of the avicularia. Indeed, the measurements of these authors are much lower than ours, but this seems to reflect a calculation error. In fact, measuring on their photographs (Berning *et al.* 2021: fig. 1), the sizes of the avicularia are approximately 0.21×0.16 mm, very close to our own data. Size is also similar to the material figured in the British Fauna (Hayward & Ryland 1998).

The rest of the Iberian material labelled as *H. flustroides* that we have revised, from the Strait of Gibraltar to the Spanish Levant, does not really correspond to the species. This includes the records of *H. flustroides* published by Zabala (1986), López de la Cuadra & García Gómez (1988, 1994), López de la Cuadra (1991) and Templado *et al.* (2002, 2006), which correspond to other species (see below). Other records from the Mediterranean, such as those of Zabala & Gili (1985), Calvin Calvo (1986), Álvarez (1992) or Madurell *et al.* (2013), very probably do not correspond to this species either, but to *H. synchysia* (see below). Other species, however, could be involved, calling for new sampling in these areas.

According to Berning *et al.* (2021), *H. flustroides* was known with certainty only from western Great Britain, the Channel, and the southern North Sea, whereas its southern limit of distribution remained unclear. Here we considerably extend the southern limit of the species, which reaches at least the Portuguese coast around Lisbon. There does not seem to be at present any reliable record or material of *H. flustroides* from the south of Portugal, the area of the Strait of Gibraltar or from the Spanish Mediterranean (Fig. 12B).

Hincksina synchysia Berning, Spencer Jones & Vieira, 2021
Figs 6, 12B; Table 4

Hincksina flustroides f. *crassispinata* Gautier, 1962: 50, fig. 8.

Hincksina synchysia Berning *et al.*, 2021: 337, fig. 2.

? *Hincksina flustroides* – Zabala & Gili 1985: 138. — Calvín Calvo 1986: 48. — Álvarez 1992: 276. — Madurell *et al.* 2013: 127.

Hincksina flustroides – Zabala 1986: 255 (part), pl. 1 fig. a, not text-fig. 62. — Zabala & Maluquer 1988 (part): 80, text-fig. 86, pl. 3 fig. a, not text-fig. 87. — Templado *et al.* 2002: 202 (part or whole).

Non *Hincksina flustroides* – Fernández Pulpeiro 1983: 472. — López de la Cuadra & García Gómez 1988: 23; 1994: 110 (part or whole). — Haya & Anadón 1989: 111, fig. 2. — López de la Cuadra 1991: 94 (part or whole), pl. 7 figs c–d. — Reverter-Gil & Fernández-Pulpeiro 2001: 59. — Reverter-Gil *et al.* 2019a: 10. — Templado *et al.* 2006: 207 (part or whole).

Material examined

MEDITERRANEAN SPAIN • 1 colony on stone; Columbretes Islands, Plácer de la Barra Alta; 39.83067° N, 0.53867° E; stn 267B; depth 0–32 m; 11 Jul. 1994; Fauna Ibérica III exped.; MNCN 25.03/1490 • 1 ovicelled colony, with more species; Columbretes Islands, N of Columbrete Grande; 39.90000° N, 0.68500° E; depth 30 m; 1996; Fauna Ibérica IV exped.; MNCN 25.03/2106 • 1 colony with more species; same collection data as for preceding; MNCN 25.03/2417 • 1 colony with more species, on algae; same collection data as for preceding; MNCN 25.03/2424 • 1 small ovicelled colony; Columbretes Islands, south Horadada; no coordinates; depth 10 m; 1996; Fauna Ibérica IV exped.; MNCN 25.03/3092 • 1 colony with more species; Columbretes Islands, S of Horadada; 39.87283° N, 0.66950° E; stn 281B2; depth 20 m; 17 Jul. 1996; Fauna Ibérica IV exped.; MNCN 25.03/3325 • 1 colony with few, small spines, with more species; Columbretes Islands, near Islote Cerquero; 39.85017° N, 0.67317° E; depth 5 m; 1996; Fauna Ibérica IV exped.; MNCN 25.03/3350 • 1 colony with few, fine spines, with more species on a concretion; Balearics, SW of Menorca Island; 39.79667° N, 04.29000° E; stn 217B14; depth 15–20 m; 30 Jun. 1994; Fauna Ibérica III exped.; MNCN 25.03/879 • 1 colony on stone, with more species; Balearics, SW of Menorca Island; 39.79667° N, 04.29000° E; stn 217B14; depth 15–20 m; 30 Jun. 1994; Fauna Ibérica III exped.; MNCN 25.03/1033 • 1 ovicelled colony; Balearics, SW of Menorca Island; 39.79667° N, 04.29000° E; stn 217B14; depth 15–20 m; 30 Jun. 1994; Fauna Ibérica III exped.; MNCN 25.03/4153 • 1 colony with few, small spines; Balearics, Menorca Island, Cavallería Cape; 40.09333° N, 04.07333° E; depth 24 m; 1994; Fauna Ibérica III exped.; MNCN 25.03/1022 • one colony with few, small spines, together more species; same collection data as for preceding; MNCN 25.03/1114 • 1 colony with more species; Balearics, SW of Mallorca Island; 39.46067° N, 02.47367° E; stn 230B18; depth 35–43 m; 4 Jul. 1994; Fauna Ibérica III exped.; MNCN 25.03/816 • 1 large, ovicelled

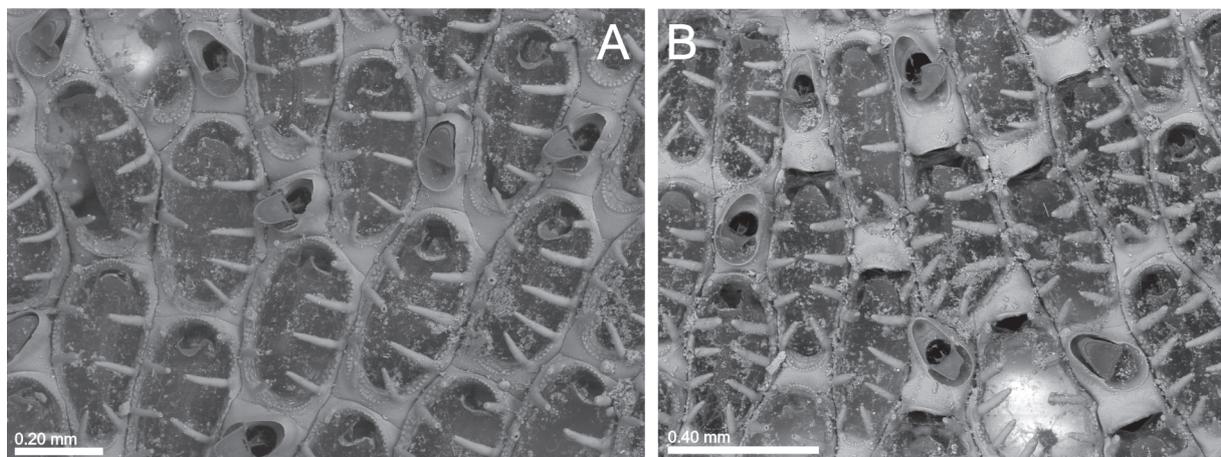


Fig. 6. *Hincksina synchysia* Berning *et al.*, 2021 (MNCN 25.03/2639), Hormigas Islands (Murcia, Mediterranean Spain). **A.** Autozooids and avicularia. **B.** Ovicells immersed in autozooids and in avicularia.

Table 4. Measurements (in mm) of *Hincksina synchysia* Berning *et al.*, 2021. Abbreviations: N = number of measurements; SD = standard deviation.

	Mean	SD	Minimum	Maximum	N
Autozooid length	0.429	0.0515	0.342	0.528	25
Autozooid width	0.266	0.0273	0.219	0.328	25
Opesia length	0.365	0.0310	0.296	0.417	25
Opesia width	0.220	0.0227	0.173	0.266	23
Zooid avic. length	0.205	0.0298	0.153	0.247	12
Zooid avic. width	0.168	0.0326	0.118	0.215	12
Opesia. avic. length	0.175	0.0262	0.135	0.226	21
Opesia. avic. width	0.103	0.0208	0.073	0.139	21
Ovicell length	0.100	0.0078	0.086	0.112	11
Ovicell length	0.162	0.0185	0.138	0.202	11

colony with more species; same collection data as for preceding; MNCN 25.03/841 • 1 small, eroded colony with more species; same collection data as for preceding; MNCN 25.03/1001 • 1 colony with more species on a polychaete tube; Balearics, north of Mallorca Island, Pollença Bay; 39.92233° N, 03.17817° E; stn 189A; depth 33–47 m; 26 Jun. 1994; Fauna Ibérica III exped.; MNCN 25.03/924 • 1 large, ovicelled colony, with more species; Balearics, Espardell Island; 38.79833° N, 01.48250° E; depth 20–25 m; 1994; Fauna Ibérica III exped.; MNCN 25.03/1346 • 1 large, ovicelled colony, with more species on a stone; Murcia, Hormigas Islands, Bajo de Fuera; 37.66450° N, 0.63500° W; stn 298B10; depth 15 m; 21 Jul. 1996; Fauna Ibérica IV exped.; MNCN 25.03/2639 (Fig. 6) • 1 colony, with more species; same collection data as for preceding; MNCN 25.03/2647 • 1 colony, with more species; same collection data as for preceding; MNCN 25.03/2653.

Remarks

Berning *et al.* (2021) described *H. synchysia* for several previous records of *H. flustroides* from the Mediterranean. At least part of the material from Catalonia reported by Zabala (1986) as *H. flustroides* does correspond to *H. synchysia*. This material was compiled later by Zabala & Maluquer (1988), a record that according to Berning *et al.* (2021) corresponds to *H. synchysia*.

All the material revised by us stemming from Spanish Mediterranean waters (Columbretes Islands, Balearics Islands, Hormigas Islands) and labelled as *H. flustroides* actually corresponds to *H. synchysia* (see Material examined and Fig. 6). This includes the record of *H. flustroides* by Templado *et al.* (2002, part or whole) from Columbretes Islands. Other records from the Iberian Mediterranean, such as those by Zabala & Gili (1985) (Balearics), Calvin Calvo (1986) (Murcia), or Madurell *et al.* (2013) (Catalonia), very probably also correspond to *H. synchysia* because material of the species has been detected in these areas. Nonetheless, other species might be involved as well, so new sampling in these areas is essential.

Comparing with the measures of Berning *et al.* (2021), based on two samples from Portofino, we find that the autozooids are smaller in our material, while the avicularia are larger.

In contrast, the record of *H. flustroides* from Alboran Island made by Templado *et al.* (2006) does in fact correspond to *Hincksina chimaera* sp. nov. and to *Hincksina longispinosa* Harmelin & d’Hondt, 1992 (see below). In any case, we cannot be certain whether we have revised all of the original material cited by these authors. At the same time, the record of the same species by Álvarez (1992) in the same area is doubtful because the original paper does not include a description or figures, whilst the original sample

(MNCN 25.03/223) only contains some small, eroded fragments impossible to identify at species level. Finally, the records of *H. flustroides* from the Strait of Gibraltar area in López de la Cuadra & García Gómez (1988, 1994) and López de la Cuadra (1991) really correspond to *Hincksina elephantina* sp. nov., at least in part (see below). Therefore, at present, *H. synchysia* seems to be absent from the Alboran Sea, the Strait of Gibraltar area and the whole Atlantic Iberian coast, so it perhaps must be confined to the inner part of the western Mediterranean (Fig. 12B).

Hincksina elephantina sp. nov.

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Figs 7, 12B; Table 5

Hincksina flustroides – López de la Cuadra & García Gómez 1988: 23; 1994: 110 (part or whole). —
López de la Cuadra 1991: 94 (part or whole), pl. 7 figs c–d.

Differential diagnosis

Hincksina with 12 thick marginal spines that increase in size distally and a pair of thick oral spines, long and gently curved, resembling elephant tusks. Together, the four distal spines give the autozoid a characteristic appearance. Interzoooidal avicularia abundant, with an oval mandible directed distally, usually present in dense clumps. Ovicell endozoooidal in distal avicularium or autozoid; proximal margin of oecium raised centrally, producing a developed central peak.

Etymology

The term ‘*elephantina*’ alludes to the appearance of the two oral spines in this species, which are thick, long and gently curved, resembling elephant tusks.

Material examined

Holotype

STRAIT OF GIBRALTAR • 1 ovicelled colony, coated; Andalucía, La Línea; 36.18167° N, 05.33333° W; depth 30–50 m; May 1985; López-Fé leg.; MHNUSC 10127 (Fig. 7).

Description

Colony encrusting, multiserial, unilaminar. Autozooids elongate oval, arranged in irregular series, separated by shallow grooves. Gymnocyst reduced to the proximal region, cryptocyst a narrow band with a coarse nodular surface, opesia extensive. Vertical walls with two or more uniporous pore plates per neighbouring zoid. A pair of long oral spines, thick and gently curved, resembling elephant tusks. Frontal membrane overarched by 12 (occasionally more) cylindrical mural spines, thick, tapering towards the uncalcified tip. Spines more or less folded over the frontal membrane, sometimes overlapping in the midline. Generally, the first pair is longer and more vertical but converging medially, while the height of the spines decreases proximally, the most proximal spines being the shortest. Spines apparently unjointed at their base. Avicularia interzoooidal, rectangular or square in outline, distal to many zooids; usually pointing distally next to autozooids and laterally or distolaterally in ovicelled zooids; rostrum semielliptical, at an acute angle to colony surface, mandible hinged on a pair of short triangular condyles delimiting an approximately semicircular proximal area distinctly wider than long. In concavities or convexities of the substrate, avicularia tend to form irregular clusters. Ovicell endozoooidal in distal avicularium or less frequently in the distal autozoid; oecium continuous with the gymnocyst of the avicularia or autozoid, forming a broad hemispherical cap; proximal margin raised centrally, producing a developed central peak. Ancestrula not observed.

Remarks

Material here described as *H. elephantina* sp. nov. was originally reported as *H. flustroides* by López de la Cuadra & García Gómez (1988, 1994) and López de la Cuadra (1991). However, *H. elephantina* clearly differs from this and other Iberian species of the genus by several characters:

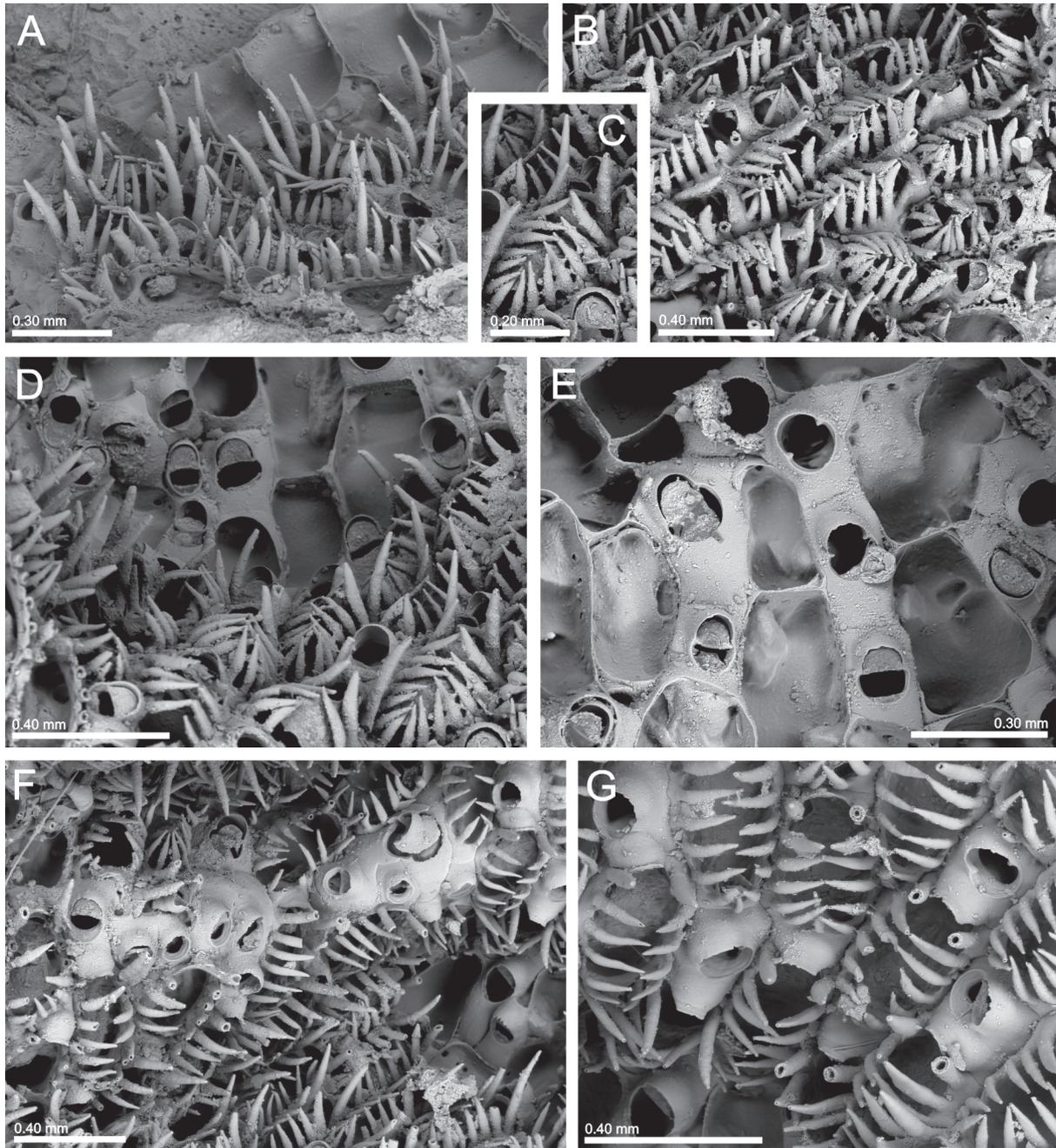


Fig. 7. *Hincksina elephantina* sp. nov., holotype (MHNUSC 10127), La Línea, Andalucía (Strait of Gibraltar). **A.** Young autozooids at the growing edge, showing the development of oral and marginal spines. **B.** Group of autozooids, avicularia and an ovicell immersed in a distal autozoooid (arrow). **C.** Detail of an autozoooid with stout oral spines. **D.** Cluster of avicularia on a concavity and autozooids with developed oral spines. **E.** Detail of a cluster of avicularia. **F.** Cluster of avicularia on a convexity. **G.** Several ovicells in distal avicularia and autozoooids; note developed proximal peak.

Table 5. Measurements (in mm) of *Hincksina elephantina* sp. nov., holotype (MHNUSC 10127). Abbreviations: N = number of measurements; SD = standard deviation.

	Mean	SD	Minimum	Maximum	N
Autozoid length	0.386	0.0382	0.325	0.465	10
Autozoid width	0.236	0.0306	0.210	0.314	10
Opesia length	0.305	0.0591	0.163	0.384	10
Opesia width	0.194	0.0676	0.157	0.383	10
Zooid avic. length	0.201	0.0236	0.155	0.232	9
Zooid avic. width	0.159	0.0281	0.122	0.201	9
Opesia. avic. length	0.121	0.0170	0.090	0.140	9
Opesia. avic. width	0.092	0.0113	0.075	0.114	9
Ovicell length	0.093	0.0127	0.073	0.118	10
Ovicell width	0.138	0.0108	0.116	0.151	10

The two oral spines are thick, long, and gently curved, resembling elephant tusks, while the first pair of the lateral spines is also very developed but shorter, curved and converging medially. Taken together, these spines give a characteristic appearance to the oral end of the autozoid (Fig. 7A–C). Moreover, the remaining spines are also stout, cylindrical and thinner at the tip, covering the opesia but not fusing along the medial line. The average number of marginal spines is 12 (Fig. 7A–C). The quadrangular avicularia are abundant, as in other species such as *H. synchysia* or *H. chimaera* sp. nov. (see below), but with a semielliptical rostrum distally directed. Moreover sometimes they appear in clusters, a character not seen in other *Hincksina* (Fig. 7D–F). Finally, the ovicell of *H. elephantina* sp. nov. can be immersed in an autozoid or in an avicularium (Fig. 7G), a character that Berning *et al.* (2021) considered exclusive of *H. synchysia*, but which is also present in *H. chimaera* (see below). The ovicell of *H. elephantina*, however, presents a developed central peak (Fig. 7G), which is characteristic of *H. flustroides* according to Berning *et al.* (2021).

At present, *H. elephantina* sp. nov. is known only from La Línea, Andalucía (Strait of Gibraltar area), collected at 30–50 m depth (Fig. 12B). López de la Cuadra & García Gómez (1988) and López de la Cuadra (1991) reported two colonies of *H. flustroides* from this locality, but only one is now preserved, here designated as the holotype of the species (MHNUSC 10127). López de la Cuadra (1991) also reported this species from Tarifa at 50–60 m depth, but as the original colony was not preserved we cannot be certain about its identity.

***Hincksina chimaera* sp. nov.**

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Figs 8, 12B; Table 6

? *Hincksina flustroides* – Álvarez 1992: 276.

Hincksina flustroides – Templado *et al.* 2006: 207 (part).

Differential diagnosis

Hincksina with 8–10 mural spines, frequently flattened and occasionally bifid, and a pair of oral spines usually flattened, somewhat triangular, with the beginning of a bifurcation, parallel or aligned oblique to zooidal midline and converging distally. Avicularia interzooidal, with the rostrum semielliptical

or rounded-triangular, usually pointing distolaterally. Ovicell endozooidal in distal avicularium or autozoid, often producing a central peak.

Etymology

From Latin '*chimæra*', and this from Greek '*χίμαιρα*' ('*chímaira*'), according to Greek mythology a monstrous creature composed of different animal parts. The term alludes to the morphology of the species, mixing up characters of three other Iberian *Hincksina*.

Material examined

Holotype

MEDITERRANEAN SPAIN • colony on a polychaete tube; Alboran Island; 35.92750° N, 03.05000° W; stn 305A; depth 33–49 m; 23 Jul. 1996; Fauna Ibérica IV exped.; MNCN 25.03/2450 (Fig. 8D–F).

Paratypes

MEDITERRANEAN SPAIN • several ovicelled colonies on a concretion; Alboran Island; 35.95283° N, 03.04167° W; stn 324A; depth 51–58 m; 28 Jul. 1996; Fauna Ibérica IV exped.; MNCN 25.03/2412 (Fig. 8A–C) • 2 colonies on a concretion, both marked in red; same collection data as for preceding; MNCN 25.03/2174 • several ovicelled colonies on a concretion; same collection data as for holotype; MNCN 25.03/2488 • 1 small colony on a concretion, marked in red; same collection data as for holotype; MNCN 25.03/2549 • several colonies on a concretion; same collection data as for holotype; MNCN 25.03/2602.

Other material examined

Hincksina sp.

MEDITERRANEAN SPAIN • several small, eroded fragments; N of Alboran Island; 35.95283° N, 03.03333° W; depth 45–52 m; 1991; Fauna Ibérica I exped.; MNCN 25.03/223.

Hincksina longispinosa Harmelin & d'Hondt, 1992

MEDITERRANEAN SPAIN • 1 ovicelled colony, with more species, on a concretion; SW of Alboran Island; 35.87333° N, 03.14017° W; stn 317A; depth 87–213 m; 27 Jul. 1996; Fauna Ibérica IV exped.; MNCN 25.03/2402 (Fig. 9).

Description

Colony encrusting, multiserial, unilaminar. Autozooids elongate oval, arranged in irregular series, separated by shallow grooves. Vertical walls with two or more uniporous pore plates per neighbouring zooid. Gymnocyst reduced to the proximal region, cryptocyst a narrow band with a coarse nodular surface, opesia extensive. A pair of oral spines cylindrical or more usually flattened, directed upwards, somewhat triangular, with the beginning of a bifurcation with uncalcified pores in the tips, parallel or aligned oblique to zooidal midline and converging distally. Frontal membrane overarched by 8–10 (occasionally fewer) mural spines, initially cylindrical but frequently flattened, well developed and reaching the zooidal mid-line; occasionally bifid. Spines apparently unjointed at their base. Avicularia interzooidal, distal to many zooids, usually pointing distolaterally but often distally or even laterally; oval in outline and distinctly longer than wide, widest proximal to condyles; rostrum semielliptical or rounded-triangular, at an acute angle to colony surface, mandible hinged on a pair of short triangular condyles delimiting an approximately semicircular proximal area with an immersed calcified shelf; interior of mandible with a large central oval lucida; gymnocyst usually reduced to cystid corners. Ovicell endozooidal in distal avicularium or autozoid; oecium continuous with the gymnocyst of the avicularian or autozooidal cystid, forming a short but broad hemispherical cap; proximal margin raised centrally, often producing a central peak. Ancestrula not preserved.

Remarks

Hincksina chimaera sp. nov. exhibits a curious mix of characters from three other Iberian species of the genus: *H. flustroides*, *H. synchysia* and *H. calpensis* Reverter-Gil, Souto & Fernández-Pulpeiro, 2012.

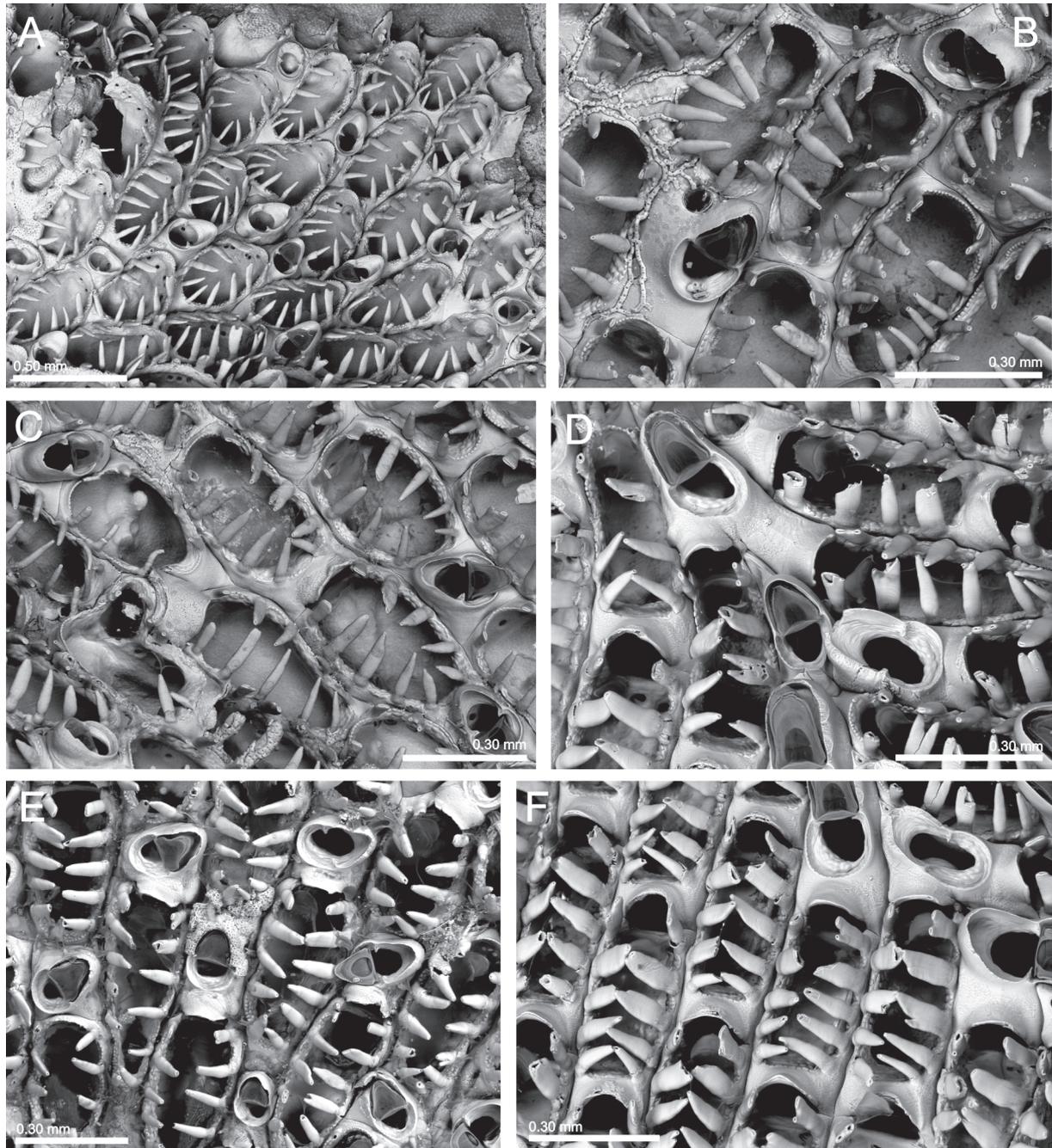


Fig. 8. *Hincksina chimaera* sp. nov., Alboran Island. **A–C.** Paratype (MNCN 25.03/2412). **D–F.** Holotype (MNCN 25.03/2450). **A.** Growing edge of colony showing interzooidal avicularia and autozooids. Note the thin spines, some bifurcated. **B.** Detail showing avicularia, oral spines and bifurcated spines (bottom left). **C.** Ovicells immersed in avicularia and in distal autozooid. **D.** Ovicelled zooids and avicularia. Note two ovicells associated with the same avicularium and flattened marginal spines. **E.** Ovicelled zooids and avicularia. Note the developed central peak in the ovicell. **F.** Flattened marginal and oral spines.

Table 6. Measurements (in mm) of *Hincksina chimaera* sp. nov., holotype + paratypes. Abbreviations: N = number of measurements; SD = standard deviation.

	Mean	SD	Minimum	Maximum	N
Autozoid length	0.453	0.0467	0.386	0.560	15
Autozoid width	0.264	0.0245	0.225	0.312	15
Opesia length	0.383	0.0342	0.311	0.424	15
Opesia width	0.193	0.0218	0.161	0.230	15
Zooid avic. length	0.194	0.0375	0.136	0.284	16
Zooid avic. width	0.191	0.0210	0.158	0.233	16
Opesia avic. length	0.204	0.0245	0.174	0.252	16
Opesia avic. width	0.117	0.0154	0.085	0.137	16
Ovicell length	0.069	0.0138	0.046	0.096	13
Ovicell width	0.144	0.0098	0.130	0.162	13

At first sight, *H. chimaera* sp. nov. closely resembles *H. flustroides*, also showing a high number of large marginal spines (8–10), flattened and sometimes bifid (especially the first pair) overarching the frontal membrane (Fig. 8). Moreover, the ovicell of *Hincksina chimaera* sp. nov. presents a developed central peak (Fig. 8E), which is characteristic of *H. flustroides* according to Berning *et al.* (2021).

In contrast, *H. chimaera* sp. nov. shares with *H. synchysia* the size, shape, orientation and abundance of avicularia (Figs 6 and 8). In addition, the ovicell can be immersed in an autozoid or in an avicularium (Fig. 8C–D), a character that Berning *et al.* (2021) considered exclusive of *H. synchysia*. The number of marginal spines is, however, lower in *H. synchysia* (6–9) than in *H. chimaera* (8–10).

Finally, the oral spines of *H. chimaera* sp. nov. closely resemble those present in the ovicelled zooids of *H. calpensis* (see Reverter-Gil *et al.* 2012: fig. 2b, d), being erect, flattened and somewhat triangular, with the beginning of a bifurcation and uncalcified pores in the tips, which are parallel or aligned oblique to the zooidal midline and converging distally (Fig. 8B–D).

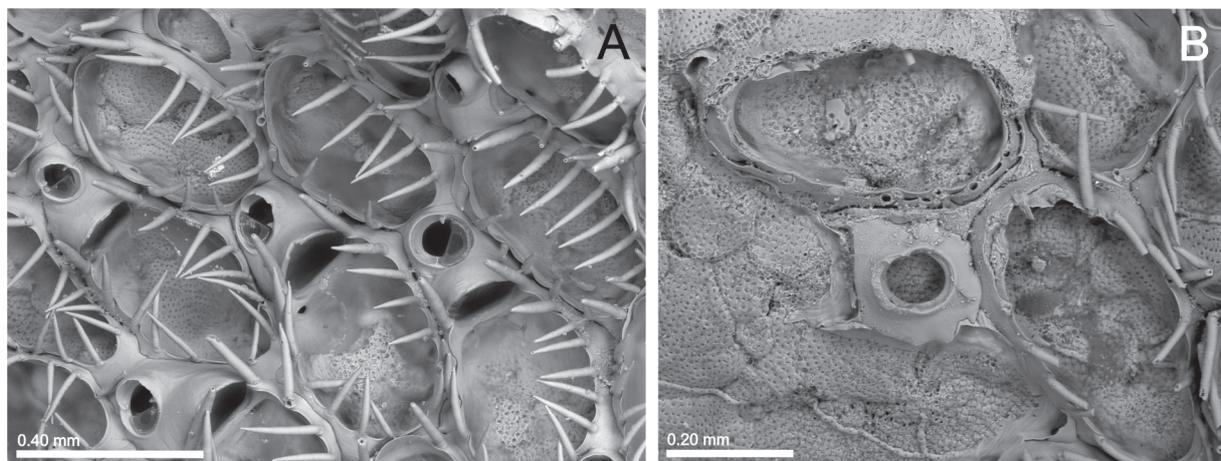


Fig. 9. *Hincksina longispinosa* Harmelin & d’Hondt, 1992 (MNCN 25.03/2402), Alboran Island. **A.** Group of ovicelled zooids with avicularia. **B.** Interzooidal avicularia.

The development of the spines is variable, as in other species of the genus (Berning *et al.* 2021), but contrary to what was stated by those authors, their development does not seem to be related to the degree of exposure of the colony to the substrate, but with the ontogeny of the colony, because the marginal and oral spines are often finer and more cylindrical near the periancestrular region whereas they are more developed and flattened in the areas furthest away from the colony. This is visible in sample MNCN 25.03/2488, which contains five colonies in different positions in a concretion. A similar variation also occurs in *H. calpensis*, although in this species the spines are much more markedly developed, forming a frontal shield.

Hincksina chimaera sp. nov. was previously reported from the Alboran Sea by Templado *et al.* (2006), as *H. flustroides* (in part) without further information. We have revised the original material, conserved at the MNCN (see material examined and Figs 8, 12B). Almost all the material actually corresponds to *H. chimaera*, but a single sample (MNCN 25.03/2402, Fig. 9) corresponds to an ovicelled colony of *Hincksina longispinosa* Harmelin & d'Hondt, 1992. This species was known only from its original description in the Gulf of Cadiz at 135–521 m depth, but it was very recently reported in the Alboran Sea at slightly shallower depths (112–120 m) by Ramalho *et al.* (2022). The present colony also comes from a similar depth (87–213 m) (Fig. 12B).

The record of *H. flustroides* made by Álvarez (1992) from the Alboran Island is doubtful, as the original paper does not include a description or figures, whilst the original sample (MNCN 25.03/223) contains only some small, eroded fragments impossible to identify at species level.

New sampling will be necessary in the Alboran Sea to verify if *H. chimaera* sp. nov. replaces here the Mediterranean *H. synchysis* or if both species do coexist, as is the case for *H. longispinosa*.

Superfamily Buguloidea Gray, 1848
Family Candidae d'Orbigny, 1851
Genus *Caberea* Lamouroux, 1816

***Caberea cantabra* sp. nov.**

urn:lsid:zoobank.org:act:49867901-41D6-42DB-94AF-FF3129A57F37

Figs 10, 12A; Table 7

? *Caberea boryi* – Jullien 1882: 32.

Caberea boryi – d'Hondt 1973: 368–371 (part or whole); 1974: 3.

Differential diagnosis

Caberea with two oral spines in the outer distal angle, the outermost stouter, and one spine in the inner distal angle. Opesia obscured by a thick, oval scutum, its distal edge curved or irregular, hiding the operculum. Frontal avicularium monomorphic, small, with rounded mandible, present in almost all autozooids. Ovicell as long as wide, with an irregularly rounded fenestra of uncalcified ectoocium directly above the aperture.

Etymology

Alluding to the geographic origin of the studied material.

Material examined

Holotype

ATLANTIC SPAIN • colony; Asturias; 43.71667° N, 06.08333° W; depth 342 m; 1 Aug. 2010; INDEMARES 0710 campaign; MHNUSC 10128 (Fig. 10A–C, F–G).

Paratypes

ATLANTIC SPAIN • 2 colonies; Galicia; 44.01167° N, 07.11500° W; depth 490 m; 10 Aug. 1967; J.-L. d'Hondt leg.; MNHN-IB-2008-6926 (Fig. 10D) • 1 colony; Galicia; 44.02667° N, 07.03167° W; depth 510–630 m; 11 Aug. 1967; J.-L. d'Hondt leg.; MNHN-IB-2008-6935 (Fig. 10E) • 1 colony; Asturias; 43.93333° N, 05.73333° W; depth 400–690 m; 10 Oct. 1970; J.-L. d'Hondt leg.; MNHN-IB-2008-7078.

Other material***Caberea boryi*** (Audouin, 1826)

ATLANTIC SPAIN • several fragments of the same colony; Galicia, Ria of Ferrol; 43.46470° N, 08.30441° W; depth 15 m; 23 May 2021; J. Souto leg.; MHNUSC-Bry 697, 705 (Fig. 11).

Description

Colonies forming erect tufts up to 4 cm high. Branches straight, cylindrical, dividing dichotomously at regular intervals, without visible joints. Autozooids in two alternating longitudinal series, with frontal planes angled at about 120° to each other, defining the frontal surface of the branch. Autozooids elongated rectangular, with arched distal end. Opesia oval, constituting about three-quarters of total frontal length, bordered by broad, coarsely granular cryptocyst. Frontal proximal gymnocyst smooth. Two oral spines in the outer distal angle, the outermost stouter; one spine in the inner distal angle. All of them broken in the studied material. Central autozoid in a bifurcation with 4–5 spines. Ovicelled zooids with one spine in each angle. Almost all the opesia obscured by a thick, oval scutum, attached by a thick stalk one-half of the distance down the inner margin of the opesia. Its distal edge is curved or irregular, hiding the operculum; proximal part forming an ovate lobe. Outer edge of scutum does not cover the cryptocyst. Lateral avicularium very small, directly next to the outermost spine and difficult to see, with a rounded triangular mandible directed outwards. Frontal avicularium monomorphic, small, present in almost all autozooids, occupying part of the proximal gymnocyst just between the opesia and the stalk of the scutum of the proximal autozoid of the other series. Mandible small, rounded triangular, directed upwards. Ovicell as long as wide, recumbent on distally succeeding autozoid, occupying all its gymnocyst and hiding also the proximal cryptocyst; frontal avicularium of distal zooid displaced, united to distal inner angle of oecium. An irregularly rounded fenestra of uncalcified ectooecium directly above the aperture. In ovicelled zooids the scutum tends to be slightly shorter, revealing part of the operculum. Abfrontal surface of colony covered by large, proximally tapered vibracula, with long and straight setal grooves, inclined to the branch axis; seta long, finely toothed along one edge. Setal groove of the central vibracula in the bifurcation shorter, located on the axis of the branch. Thin kenozooidal rhizoids arising from vibracular chambers, passing proximally along median abfrontal surface of each branch.

Remarks

The great majority of the species of *Caberea* are distributed around the Pacific Ocean (Bock 2023). Only two species have been reported in European waters: the northern species *Caberea ellisii* (Fleming, 1814) and the supposedly widespread *Caberea boryi* (Audouin, 1826). *Caberea ellisii* differs from *C. cantabra* sp. nov. most obviously by the lack of a scutum.

Although *C. cantabra* sp. nov. shows some similarities with *C. boryi* (it was previously reported under this name), both species clearly differ in several characters:

Autozooids are clearly smaller in *C. boryi* (0.37 × 0.23 mm according to Hayward & Ryland 1998). The scutum is completely different, being wider in *C. cantabra* sp. nov., projecting distally and covering the operculum (Fig. 10A–C), but lacking the projecting blunt process characteristic of *C. boryi* (Fig. 11B–C). Moreover, in this latter species the edge of the scutum is perfectly parallel to the edge of the opesia, leaving a fine separation (Fig. 11B–C), which does not occur in *C. cantabra* (Fig. 10C).

The cryptocyst is markedly granular in *C. cantabra* sp. nov. (Fig. 10C–D), whereas in *C. boryi* it is smooth (Fig. 11B–C).

The lateral avicularium is much smaller in *C. cantabra* sp. nov., almost inconspicuous and hidden by the base of a spine (Fig. 10C–D). Moreover, the large frontal avicularium that characterizes *C. boryi* (Fig. 11C) has not been observed.

The fenestra of the ovicell is large, about as long as wide (Fig. 10D), whilst in *C. boryi* the fenestra is clearly wider than long and usually has a wide calcified rim on the proximal edge (Fig. 11B–C).

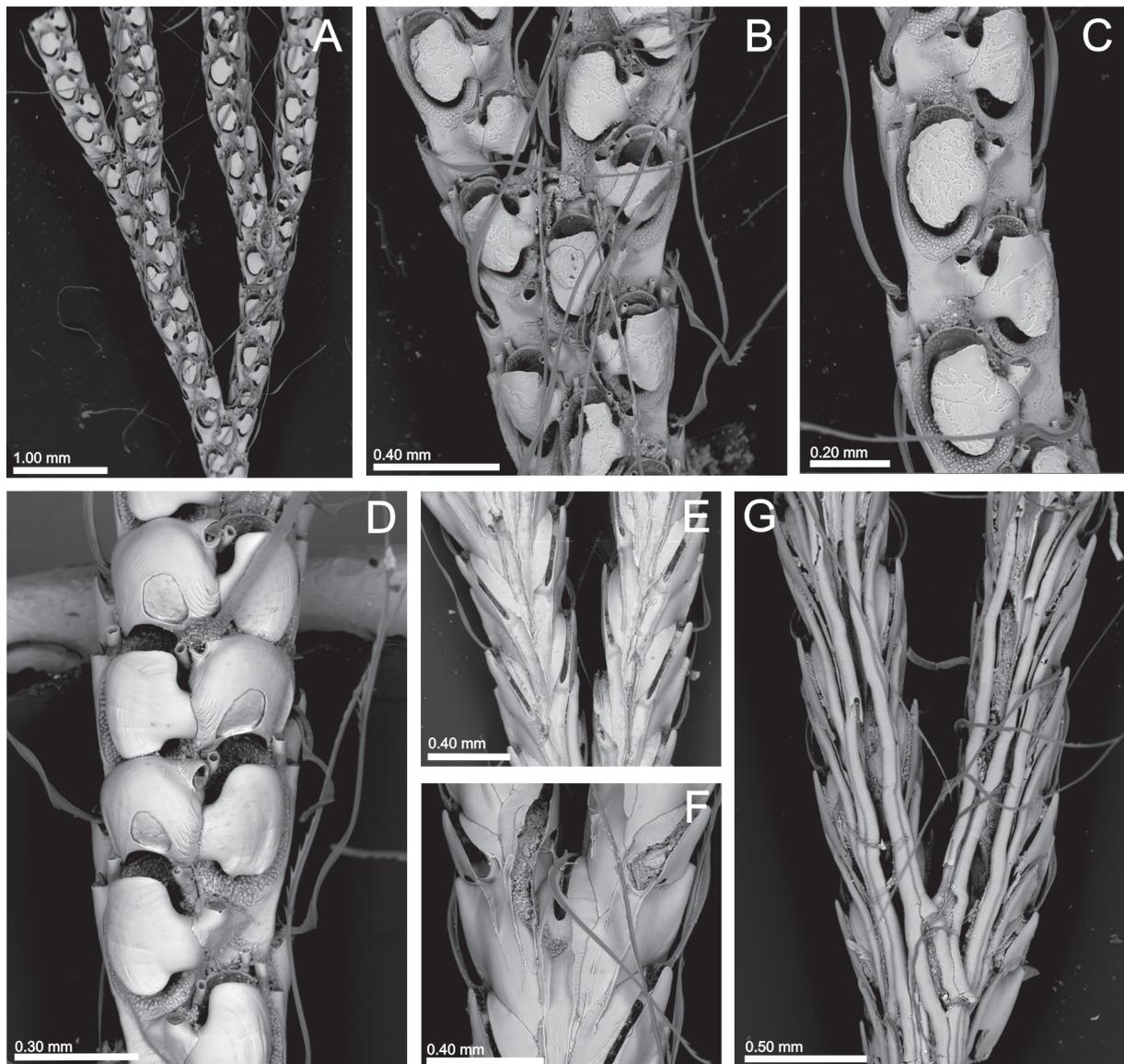


Fig. 10. *Caberea cantabra* sp. nov. A–C, F–G. Holotype (MHNUSC 10128). A. Frontal view of branching pattern. B. Branching pattern. C. Detail of autozooids. D. Paratype (MNHN-IB-2008-6926), ovicelled zooids. E. Paratype (MNHN-IB-2008-6935), basal vibracula. F. Basal view of branching pattern. G. Basal view with developed rhizoids.

Finally, *C. boryi* seems to be a shallow-water species, ranging from the intertidal to 100 m depth as much (Hayward & Ryland 1998), whilst the material here identified as *C. cantabra* sp. nov. comes from 342–690 m depth.

D'Hondt (1973) reported *C. boryi* from deep waters to the NW of the Iberian Peninsula. We have examined the only two samples stemming from this area held at the MNHN: MNHN-IB-2008-6926 (stn Thalassa T503, 490 m depth), and MNHN-IB-2008-6935 (stn Thalassa T512, 510–630 m depth). Both actually correspond to *C. cantabra* sp. nov. (see material examined and Fig. 10D–E). D'Hondt (1973) also reported *C. boryi* from a nearby locality (stn Thalassa 478, 513–550 m depth), but no preserved material was found, so we cannot be certain about its identity, although it is very likely that it is also *C. cantabra*. Jullien (1882) also reported *C. boryi* from a nearby locality (Travailleur stn 39b, 1037 m depth), but the lack of reference material and additional data prevents us from verifying the identification. We have not been able to locate coordinates for the station 39b, not reported by Jullien (1882), whereas stations 39a and 40, also corresponding to the same date, are correctly referenced in Calvet (1907). For the purposes of representation on the map, we have used the coordinates of station 39a (corrected following Ryland 1969) because, in sharing numbering and a very similar depth (1000 m), we assume that they must be located very close together. D'Hondt (1973) also reported *C. boryi* from several localities in the NW of the Gulf of Biscay at 332–560 m depth, but again the lack of material, description and figures prevents us from verifying this record, which in any case should be considered doubtful due to the depth of the samples. Finally, *C. cantabra* was also reported by d'Hondt (1974, as *C. boryi*) from off Cape Peñas (Asturias) at 400–690 m depth (stn Thalassa W405; MNHN-IB-2008-7078). Note that localities for each species were not included in this publication, and the only record of this species was taken by us from d'Hondt's handwritten list. The locality is also included in the label of the sample. We have also revised a single sample from Avilés Canyon (Asturias) collected at 342 m depth (MHNUSC 10128) which is here designated as the holotype of *C. cantabra* sp. nov. (see Material examined and Fig. 10A–C, F–G).

In summary, at present *C. cantabra* sp. nov. is known only from the north of the Iberian Peninsula, ranging from 342 to 690 m depth, and perhaps even deeper if the record in Jullien (1882 as *C. boryi*) at 1037 m depth were of the same species (Fig. 12A).

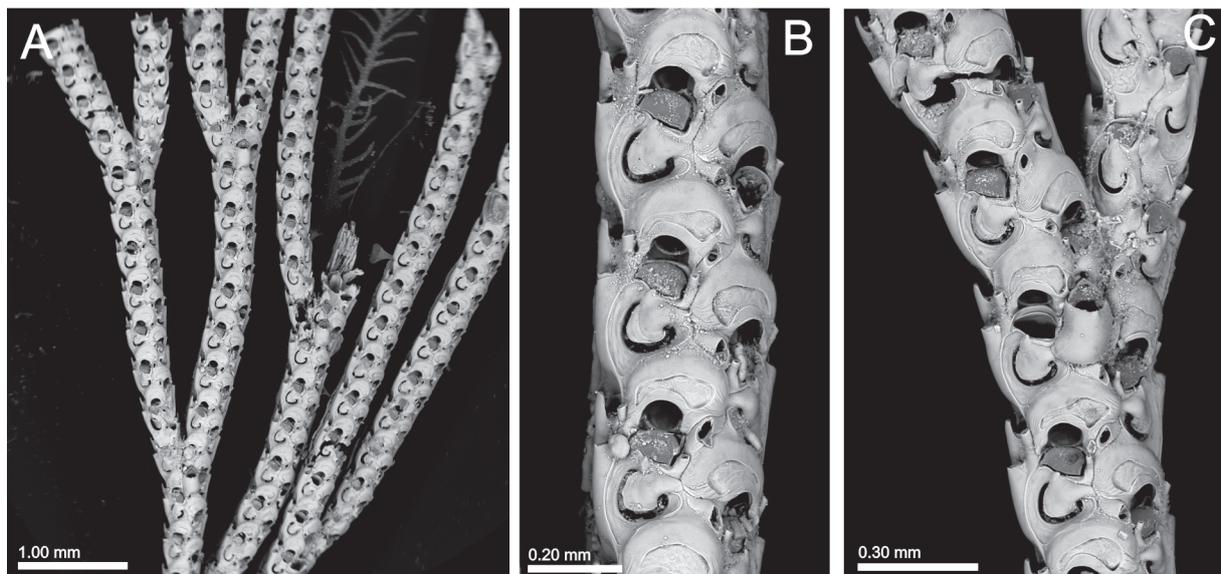


Fig. 11. *Caberea boryi* (Audouin, 1826) (MHNUSC-Bry 697), Ría of Ferrol (Galicia, NW Spain). **A.** A colony. **B.** Ovicelled zooids showing the scuta and the frontal and lateral avicularia. **C.** Frontal gigantic avicularium.

Table 7. Measurements (in mm) of *Caberea cantabra* sp. nov., holotype + paratypes. Abbreviations: N = number of measurements; SD = standard deviation.

	Mean	SD	Minimum	Maximum	N
Autozoid length	0.554	0.0316	0.484	0.602	19
Autozoid width	0.264	0.0245	0.233	0.301	19
Opesia length	0.329	0.0150	0.282	0.347	19
Opesia width	0.174	0.0126	0.155	0.198	19
Sutum length	0.264	0.0226	0.210	0.299	19
Scutum width	0.200	0.0155	0.173	0.234	19
Ovicell avic. length	0.073	0.0068	0.065	0.078	3
Ovicell avic. width	0.040	0.0040	0.036	0.044	3
Ovicell length	0.237	0.0142	0.210	0.255	12
Ovicell width	0.240	0.0332	0.186	0.273	12
Ovicell fenestre length	0.127	0.0125	0.104	0.146	12
Ovicell fenestre width	0.143	0.0149	0.128	0.173	12
Vibracula length	0.492	0.0364	0.421	0.553	19
Vibracula width	0.208	0.0331	0.152	0.267	19
Vibracula furrow	0.409	0.0312	0.356	0.464	19

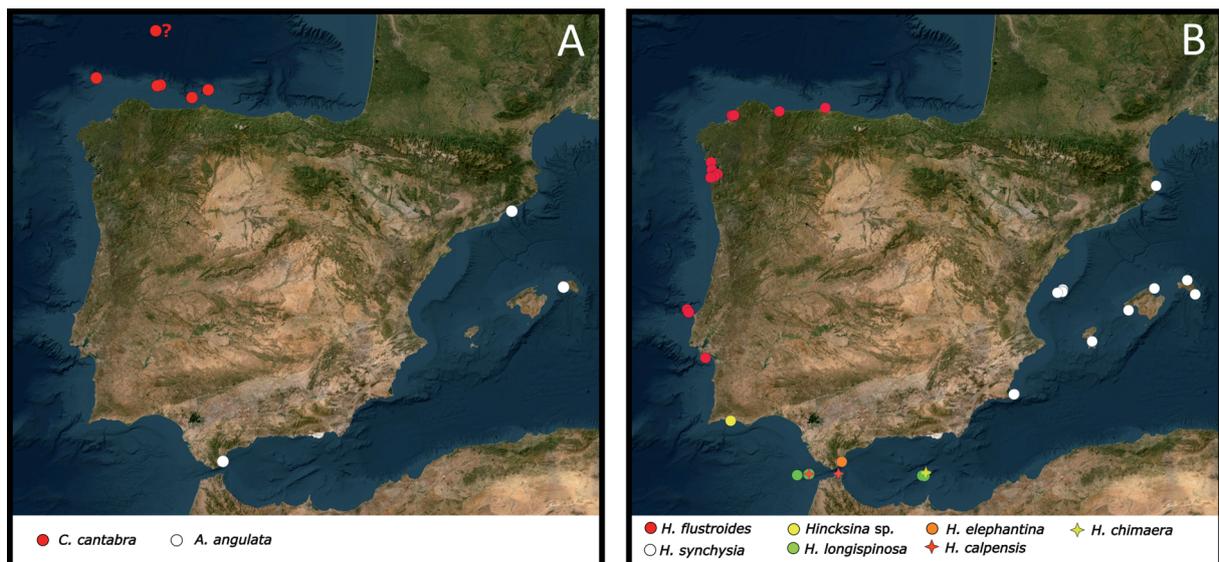


Fig. 12. Iberian distribution of the species treated in the present paper (see legends in the figures). **A.** *Arbopercula angulata* (Levinsen, 1909) and *Caberea cantabra* sp. nov. **B.** Species of *Hincksina* Norman, 1903.

Discussion

The study of the type specimens and other material of *E. angulata* and *M. tenella* has enabled us to confirm that they are different species. Even though Tilbrook *et al.* (2001) already demonstrated this 20 years ago, this seems to have escaped notice because most authors continue to confuse both species. Indeed, there is widespread confusion, since what is being cited as *E. tenella* actually corresponds to *E. angulata*. This species should be placed in the genus *Arbopercula*, as previously proposed by Tilbrook & Gordon (2015; erroneously as *Arbocuspis*, lapsus for *Arbopercula*), but to do so the diagnosis of the genus must be modified. In addition, we highlight the original description of *E. angulata*, which describes the great variation in spine number and development, a characteristic that seems to be overlooked by later authors.

The revision of original material is essential today. Moreover, the use of the electron microscope enables a better characterization of species. *Hincksina flustroides* has been reported from numerous Iberian localities, both Atlantic and Mediterranean, but the revision of samples that we conducted shows that, in reality, these records correspond to five different species with smaller distributions, two of them new to science (see Fig. 12B): *H. flustroides* in the Atlantic Ocean NW of the Iberian Peninsula, *H. synchysia* in the Eastern Iberian Mediterranean, *H. elephantina* sp. nov. in the Strait of Gibraltar, *H. chimaera* sp. nov. in the Alboran Sea and *H. longispinosa* also in the Alboran Sea, where it was already cited very recently. This last species was originally described from deep water in the Gulf of Cadiz. Present data reveal that the species is actually distributed on both sides of the Strait of Gibraltar, although its presence in the Mediterranean is limited to the Alboran Sea, which is considered to have a high affinity with Atlantic and more specifically Lusitanian species (Harmelin & d'Hondt 1993; Maldonado & Uriz 1995; Bianchi & Morri 2000; Riesgo *et al.* 2019). To all these species we should add *Hincksina* sp. from southern Portugal (see Souto *et al.* 2014; Berning *et al.* 2021), which clearly belongs to the same group as all these species. *Hincksina calpensis*, also present in the area, differs in the scutum of the adult zooids. The western coast of Iberia seems to be dominated by *H. flustroides* and the eastern one by *H. synchysia*. Few data are available for the north coast, but in the south there are up to five different species. A similar distribution has recently been reported for other genera such as *Watersipora* Neviani, 1896, with a single species on the western and northern coasts of Iberia [*W. subatra* (Ortmann, 1890)], another one on the eastern coast (*W. cucullata* (Busk, 1854)) and three species in the south (*W. subatra*, *W. soleourum* Vieira *et al.*, 2014 and *W. arcuata* Banta, 1969) (see Reverter-Gil & Souto 2019).

Finally, a SEM revision of material from deep waters demonstrates that, at least in Iberian waters, *C. boryi* is not a species with a wide bathymetric range, but rather two different species, with the deeper material belonging to a new, different species.

The bryozoological fauna of the Iberian Peninsula is one of the best known in European waters. Our own unpublished compilation, based on dozens of articles published over the last century and a half, and the revision of hundreds of samples – both our own and those in museum collections – has yielded approximately 545 Recent species cited in this region (Reverter-Gil *et al.* 2014; BOE 2020, and unpublished data). In comparison, only 556 species have been registered so far in a larger area as studied as the Mediterranean Sea as a whole, where there is an extensive bibliography on bryozoans dating back more than 200 years (Rosso & Di Martino 2016). Moreover, all European waters combined have yielded 945 indigenous species according to Gordon *et al.* (2019). The description here of three new species and a new record in a supposedly so well-known area – altogether with the description of nine new species and another three new records in the last five years (Ramalho *et al.* 2018, 2020a, 2020b, 2022; Reverter-Gil *et al.* 2019b; Reverter-Gil & Souto 2021b) – underlines the continued need for purely taxonomic and faunal works: they are key pillars to develop well-designed and useful biodiversity conservation policies (e.g., Wägele *et al.* 2011; Higgs 2017; Thomson *et al.* 2018). It is important that the publications include accurate descriptions and/or good figures, as well as reference material, to allow future authors to revise previous records. To publish acritic lists of species is of little help for this. Taxonomy and collections

are essential to know which species we are really dealing with. Without this information, all subsequent comments are worth little.

Our present results extend our knowledge on the bryozoan fauna in Iberian waters and in Europe as a whole.

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