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NEW FINDINGS OF NUDIPLEURA (MOLLUSCA: GASTROPODA) ALONG THE CENTRAL-EASTERN COAST OF SICILY (IONIAN SEA)

SUMMARY

The present short note reports the finding of five Nudipleura species: one (*Taringa* cf. *telopia*) new for the Mediterranean, two (*Doto maculata* and *Okenia longiductis*) new for Sicily, one (*Berthella stellata*) new for the central-eastern coast of Sicily and, finally, a new record of *Taringa tritorquis* for the same area. For each species, information on date and site of finding, external morphology, taxonomic history, previous reports and remarks, are discussed. The finding of these species could depend on two different reasons: 1) the examined areas are transit zones for several ships which could transport the veligers or/and juvenile stages through fouling or ballast water; 2) since in these areas the marine Heterobranchia fauna has been poorly studied, many of the found species could have been overlooked until now. This work highlights the importance of a continuous monitoring to expand and deepen the knowledge of marine Heterobranchia fauna.

INTRODUCTION

Recently, LOMBARDO and MARLETTA (2020a) produced a list of the marine Heterobranchia fauna present along the central-eastern coast of Sicily (Italy). Through this list, 95 taxa, representing the 17.27% of all Mediterranean marine Heterobranchia, subdivided in several groups (Rhodopoidea, Nudipleura, Sacoglossa, Umbraculida, Aplysiida, Cephalaspidea and Runcinida), were reported (LOMBARDO and MARLETTA, 2020a). Moreover, from the time the list has been generated until today, further species have been found in the previously studied areas. In this short note, five species of the superorder

Nudipleura, have been found: a new report of *Taringa tritorquis* Ortea, Perez and Llera, 1982 for the previously investigated areas, one record of *Berthella stellata* (Risso, 1826) new for the central-eastern coast of Sicily, one record of *Doto maculata* (Montagu, 1804) and one record of *Okenia longiductis* Pola, Paz-Sedano, Macali, Minchin, Marchini, Vitale, Licchelli and Crocetta, 2019 new for Sicily and one record of *Taringa* cf. *telopia* Er. Marcus, 1955 new for the Mediterranean. Therefore, considering the small size of the investigated area, the central-eastern coast of Sicily could be considered a hot spot of marine Heterobranchia diversity (LOMBARDO and MARLETTA, 2020a).

MATERIAL AND METHODS

The species here reported have been found in different areas located along the central-eastern coasts of Sicily: Catania, Aci Trezza, Santa Maria La Scala and Santa Tecla. The diving sites within the municipality of Catania were "Ognina" (37.530528 N; 15.120028 E) and "Bellatrix" (37.533917 N; 15.126778 E). In Aci Trezza only one diving site, called "Padre Pio" (37.566083 N; 15.166361 E), located in the "Isole Ciclopi" Marine Protected Area (MPA), has been studied. Moreover, another explored station is named "Santa Maria La Scala" (37.6125 N; 15.175389 E) and is located between Aci Trezza and Santa Tecla. The latter includes two diving sites: "Scalo Pennisi" (37.639778 N; 15.184722 E) and "Acque Fredde" (37.637583 N; 15.181167 E). All the species have been observed during several scuba dives conducted by the authors from May to October 2020. Each specimen has been photographed through an Olympus TG-4 underwater camera and identified according to the reference bibliography (see below).

RESULTS

For each species, information on date and site of finding, external morphology, taxonomic history, previous reports and remarks, are discussed.

-*Doto maculata* (Montagu, 1804)

Doto maculata (Montagu, 1804) is a nudibranch belonging to the family Dotidae Gray, 1853. Since its original description, this species has been considered as a synonym of *Doto coronata* (Gmelin, 1791). Subsequently, LEMCHE (1976) reinstated its taxonomical validity (URGORRI and BESTEIRO, 1986). Indeed, this species differs from *D. coronata* for the body colouring, which presents several crimson dots never interconnected and tending to be elongate in longitudinal direction, and for rhinophore sheaths with a tongue-like

anterior extension (LEMICHE, 1976; THOMPSON and BROWN, 1984; URGORRI and BESTEIRO, 1986). Moreover, *D. maculata* lacks crimson pigment on the inner faces of the ceratal bases, on the terminal tubercles of the cerata and on the rhinophore sheaths (THOMPSON and BROWN, 1984).

Previously, *D. maculata* was known only for British Islands and Ireland (LEMICHE, 1976; THOMPSON and BROWN, 1984). Subsequently, this species was always found in the Atlantic Ocean: in Ría de Ferrol (Galicia, Spain) (URGORRI and BESTEIRO, 1986) and in the area of Donostia-San Sebastián (Basque Country, Spain) (NAYA GARMENDIA, 2016). Only in 2013, *D. maculata* was observed in the Mediterranean Sea, in Cala Margarida (Girona, Spain) (BALLESTEROS *et al.*, 2012-2020).

On 19th May 2020, one *D. maculata* specimen (Fig. 1 A-F) has been found in Santa Maria La Scala. The individual, 5-6 mm long, was seen on a *Halopteris scoparia* (Linnaeus) Sauvageau thallus at a depth of 8.4 m. The indi-

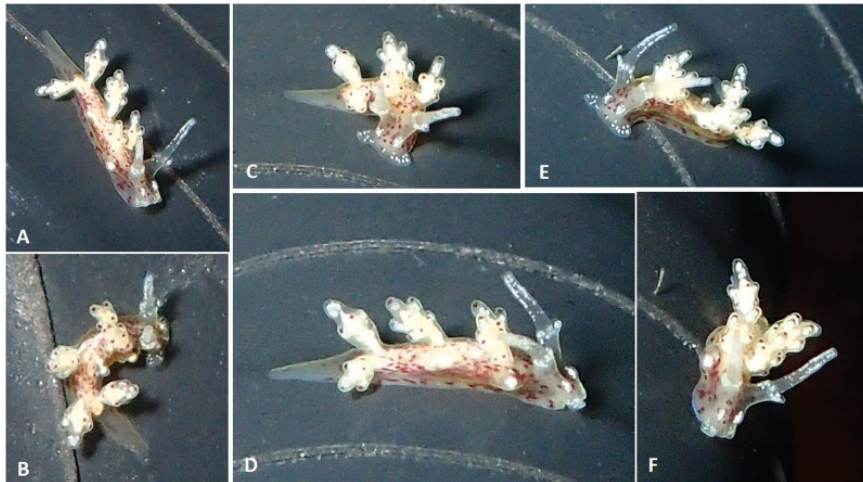


Fig. 1 - *Doto maculata* specimen: A) Antero-dorsal view of the specimen; B) Dorsal view; C) Antero-dorsal view; D) Right lateral view; E) Left lateral view; F) Detail of the rhinophore sheaths. (Photos: A. Lombardo).

vidual had a transparent whitish body with crimson dots scattered on the back, on the flanks and on the head. Furthermore, white bright dots were present on the head, the oral veil, rhinophore sheaths and rhinophores' surface. The individual had three pair of cerata on the back and each cerata presented two rings of tubercles. Rhinophore sheaths showed tongue-like anterior extensions, which characterize this species. The specimen found by us corresponded to that figured in Plate 6, figures e and f, in THOMPSON and BROWN (1984). In the Ionian Sea, MICARONI *et al.* (2018) reported the presence of another species, *Doto cf. koenneckeri* Lemche, 1976, showed in Fig. 3 D,

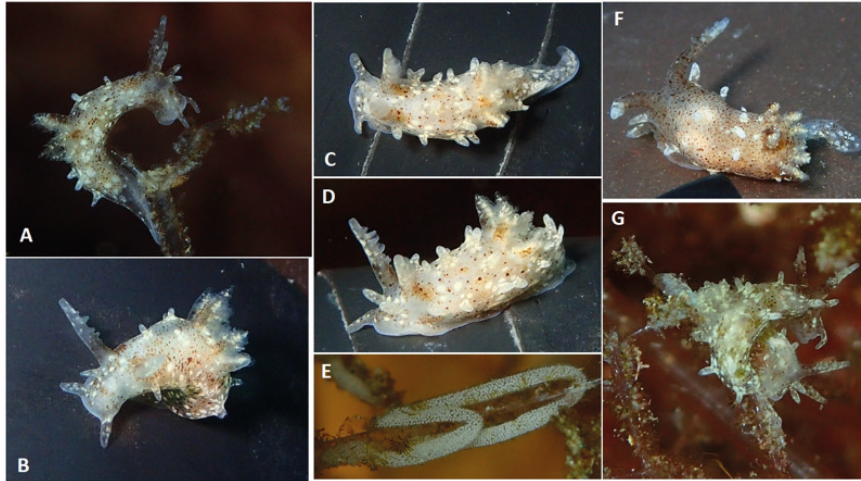


Fig. 2 – Some *Okenia longiductis* specimens and eggs from different localities: A) A specimen on *Amathia* sp.; B) Antero-dorsal view; C) Dorsal-view; D) Left antero-lateral view; E) An egg mass on *Amathia* sp.; F) Dorsal view of the greatest found specimen; G) Two specimens before breeding on *Amathia* sp. (Photos: A. Lombardo).

which is very similar to our specimen of *D. maculata*. However, THOMPSON and BROWN (1984) highlighted that in *D. koenneckeri* “the dorsal surface of the body, the flanks and the head are blotched with superficial epidermal brownish black pigment”. Instead, the individual figured in MICARONI *et al.* (2018) presents several crimson dots on the body, as the specimen found by us. Therefore, we believe that the individual found by MICARONI *et al.* (2018) is probably *D. maculata* and their report represents the first record of this species in the Ionian Sea. Consequently, the present note represents the third record of *D. maculata* in the Mediterranean Sea, and the first record for Sicily.

-*Okenia longiductis* Pola, Paz-Sedano, Macali, Minchin, Marchini, Vitale, Licchelli and Crocetta, 2019

Recently, a new species belonging to the genus *Okenia* Menke, 1830 has been described by POLA *et al.* (2019) under the name *Okenia longiductis* Pola, Paz-Sedano, Macali, Minchin, Marchini, Vitale, Licchelli and Crocetta, 2019. This species is very similar to *O. zoobotryon* (Smallwood, 1910) and to *O. angelensis* Lance, 1966. In fact, all these species present a translucent body colouring with scattered white, yellow and brown spots. Nevertheless, there are several external differences among these species in the number of dorsal papillae, gill branches, rhinophore lamellae and small distinctions in colour pattern (POLA *et al.*, 2019).

During summer and autumn of 2020, some specimens of *O. longiductis*

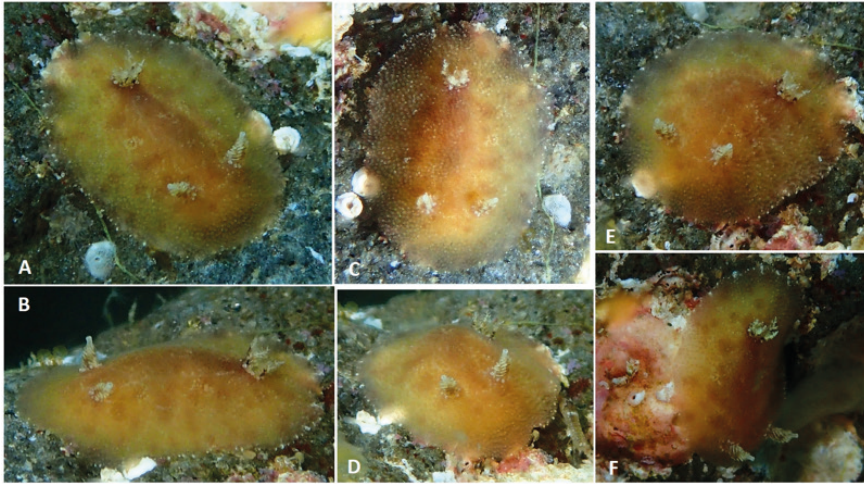


Fig. 3 – *Taringa tritorquis* specimen: A) Right antero-dorsal view of the specimen; B) Left lateral view; C) Dorsal view; D) Anterior view; E) Left antero-dorsal view; F) The specimen crawling on a stone. (Photos: A. Lombardo).

(Fig. 2 A-G) have been found in different localities of the central-eastern coast of Sicily: Catania, Aci Trezza, Santa Maria La Scala and Santa Tecla (Tab. 1). All specimens match to the description of POLA *et al.* (2019): the body colouring is greyish translucent with cream spots and more numerous brownish dots, scattered on the dorsum, the flanks and the tail. Most of the brownish dots are usually located between the base of rhinophores and in front of the gill branches. The tail is pointed, and the body shape is almost longitudinally elongated. In the observed specimens there are 5 to 8 lateral papillae, distributed as follows: 2 in front of rhinophores, 3-4 on each side of the notum, 1-2 behind gills. Instead, the counted dorsal papillae were usually 3 (arranged transversally respect to the body) in front of the gills and 1-2 (arranged longitudinally respect to the body) behind the rhinophores. Moreover, on each rhinophore from 4 to 6 lamellae have been observed. These specimens presented from 6 to 7 gills. The smallest individual was 4-5 mm long, while the greatest one was about 10 mm long. As reported by POLA *et al.* (2019) and also observed in our specimens, this species was found exclusively on bryozoans of the genus *Amathia* Lamouroux, 1812. Moreover, also the eggs (Fig. 2 E), which are white and elongated ring shaped, have been seen coiled on branches of this bryozoan, The eggs are like the ones figured in Fig. 3 C in POLA *et al.* (2019).

Both specimens and eggs have been found at a range of 3.1 – 6.3 m of depth. Furthermore, during a night scuba dive in the site of Aci Trezza, two specimens were found before breeding (Fig. 2 G).

Tab. 1 - Observations of *Okenia longiductis* specimens reported from different localities along the eastern coast of Sicily.

Observation date	Location	Coordinates	Number of specimens	Depth	Eggs
20 July 2020	Ognina	37.530923°N, 15.120087°E	3	4.8 m	-
26 July 2020	Santa Maria La Scala	37.612215°N, 15.174729°E	1	4 m	-
27 July 2020	Ognina	37.530923°N, 15.120087°E	1	4.5 m	Present
31 July 2020	Aci Trezza	37.565619°N, 15.195016°E	2	6.3 m	-
3 August 2020	Santa Tecla	37.639348°N, 15.183511°E	4	3.7 - 5.8 m	Present
11 August 2020	Santa Maria La Scala	37.612215°N, 15.174729°E	1	3.2 m	Present
18 August 2020	Acque Fredde	37.637583°N; 15.181167°E	1	3.1 m	Present
25 October 2020	Ognina	37.530923°N, 15.120087°E	1	4.6 m	-

Hitherto, *O. longiductis* has been found in Taranto, Naples, Latina, Grosseto (Italy), and La Grande-Motte (France). According to POLA *et al.* (2019), the Mediterranean records of *O. zoobotryon* belong to this taxon. Therefore, according to this last consideration, this species has been found also at Sant Feliu de Guíxols (Spain) (BALLESTEROS *et al.*, 2016), in Ravenna (Italy) (TRAINITO and DONEDDU, 2014) and along the Slovenian coastline (LIPEJ *et al.*, 2018). Consequently, with the present work this species has been recorded for the first time in Sicily.

-*Taringa tritorquis* Ortea, Perez and Llera, 1982

Taringa tritorquis Ortea, Perez and Llera, 1982 is a rare nudibranch of the family Discodorididae Bergh, 1891, described in Canary Islands (ORTEA *et al.*, 1982). Hitherto, this species has been only found in Madeira (ESPINOSA and ORTEA-RATO, 2001) and recently along the central-eastern coast of Sicily, Italy (GEROVASILIEU *et al.*, 2020; LOMBARDO and MARLETTA, 2020b). In particular, two specimens have been observed in 2018 and 2019 in the locality of Santa Maria La Scala (GEROVASILIEU *et al.*, 2020) and another individual has been found in Catania (LOMBARDO and MARLETTA, 2020b). Since the specimens found till now are small-sized, from 4 to 8 mm (ORTEA *et al.*, 1982; GEROVASILIEU *et al.*, 2020; LOMBARDO and MARLETTA, 2020b), and this species shows a cryptic and sciaphilous behaviour, it is still unclear if *T. tritorquis* has a Macaronesian or Mediterranean origin. Consequently, it could be a cryptogenic species.

On 9th June 2020 a specimen of *T. tritorquis* (Fig. 3 A-F), 6-7 mm long, has been seen under a stone at 4.3 m of depth, in Acque Fredde (Santa Tecla) diving site. The individual had a yellowish-orange body, with scattered orange-brownish patches on the notum. The edge of the notum presented small white bright dots as well as the surface of the notum. Both gills and rhinophores were white with maroon spots. Rhinophores presented a heart-shaped section, with 5-6 lamellae, and were mucronate at the tip. Rhinophore and gill sheaths had white spiculous crown-shaped tubercles. On the notum, as previously observed in other specimens (GEROVASILIEU *et al.*, 2020; LOMBARDO and MARLETTA, 2020b), there were slight white lines resembling scars. As for the other specimens previously seen along the Ionian coast of Sicily, this individual has been found under a stone covered by sponges, in shallow waters (GEROVASILIEU *et al.*, 2020; LOMBARDO and MARLETTA, 2020b). The present record represents the third report of *T. tritorquis* for Sicily and for the whole Mediterranean.

-*Taringa* cf. *telopia* Er. Marcus, 1955

On 24th June 2020 in the 'Acque Fredde' dive site, in Santa Tecla, a dorid nudibranch has been found under a stone at 4 m of depth. The specimen (Figs 4 A-F), which measured about 10 mm, presented a body that was approximately two times greater in length than in width and was pale yellow coloured. The entire surface of the notum was covered by evident tubercles. These latter, disposed in the centre of the mantle, were closer to each other than those in the sides of mantle. On the mantle there were scattered

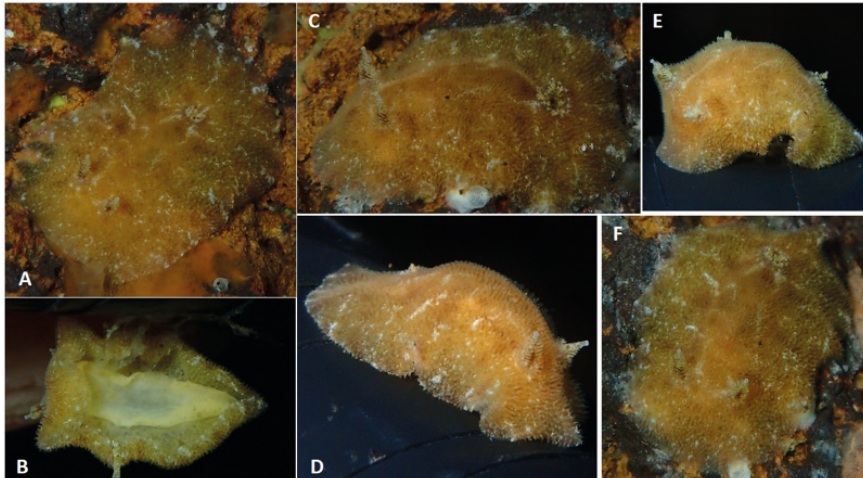


Fig. 4 - *Taringa* cf. *telopia* specimen: A) Dorsal view of the specimen; B) Ventral view; C) Left dorsal-lateral view; D) Right lateral view of the contracted specimen; E) Aspect of the specimen strongly contracted; F) Antero-dorsal view. (Photos: A. Lombardo).

marron patches, bright white spots and lines white translucent variously arranged. Rhinophores were beige with brownish spots, with eight lamellae and a white cylindrical apex. Gills were beige with brown-black spots. Both rhinophore and gill sheaths had white spiculous tubercles. The specimen presented white lines that radially surrounded the base of rhinophores and gills. The foot was whitish-yellow and had grey spots laterally scattered. Considering these features, probably the specimen, found by us, could match to *Taringa telopia* Er. Marcus, 1955. In fact, the Sicilian individual resembles the morphotype figured in Fig. 2F in ALVIM and PIMENTA (2013). Indeed, ALVIM and PIMENTA (2013) highlighted that this species presents high variation in external coloration, ranging from light orange to black, and the pattern of brown patches and white spots is highly variable. Hitherto, this species has been reported only in Colombia and Brazil (ALVIM and PIMENTA, 2013). Consequently, the present note could be the first record of this species in the Mediterranean Sea.

-*Berthella stellata* (Risso, 1826)

Berthella stellata (Risso, 1826) is a notaspidean, belonging to the family Pleurobranchidae Gray, 1827, which until recently has been considered a cosmopolitan species (TRAINITO and DONEDDU, 2014). Nevertheless, GHANIMI *et al.* (2020) revealed that the widely distributed species *B. stellata* is a complex of at least eight different species. Notwithstanding this, GHANIMI *et al.* (2020) maintained the name *B. stellata* for Eastern Atlantic and Mediterranean specimens.

On 8th July 2020, a specimen of *B. stellata* (Fig. 5 A-C) has been found under a stone at 7.3 m of depth in the site dive of Bellatrix (Catania). The individual measured approximately 15 mm and had a translucent pink-orange notum with scattered bright white dots, 5-6 white patches and a central transverse white bar. Furthermore, the notum presented a reticulate aspect. Rhinophores, oral veil and foot were transparent grey. The oral veil had a trapezoidal shape and presented some bright white dots on it. Furthermore, on the tip of each rhinophore there was a bright white spot. In the analysed specimen, it was not possible to observe the gill. Consequently, all mentioned features match to the description of *B. stellata* reported by GHANIMI *et al.* (2020). Moreover, GHANIMI *et al.* (2020) stated that the geographical distribution of this species is in eastern and western Mediterranean and north-eastern Atlantic Ocean, from northern Spain to Cape Verde, including the Azores, Madeira, and the Canary Islands. Although this species has been already found in Sicily, considering two specimens collected in Bastione (Milazzo) and reported in GHANIMI *et al.* (2020), with this note *B. stellata* is recorded for the first time in the central-eastern coast of Sicily.

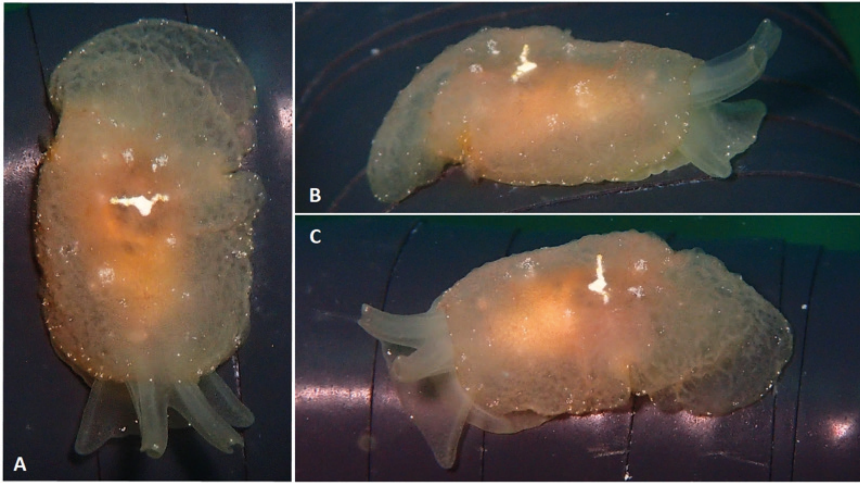


Fig. 5 - *Berthella stellata* specimen: A) Dorsal view of the specimen; B) Right lateral view; C) Left lateral view. (Photos: A. Lombardo).

DISCUSSION AND CONCLUSIONS

Through the present study, five species new for the examined areas, for Sicily or for the Mediterranean Sea, have been found. The continuous monitoring of these areas highlighted that a high level of biodiversity in the marine Heterobranchia fauna is present. This occurrence probably could depend on two different reasons. The first one is that these areas are transit zones for several ships which could transport the veligers or/and juvenile stages through fouling or ballast waters. In fact, two of the found species, *Doto maculata* and *Tarlinga cf. telopia* come from the Atlantic Ocean (URGORRI and BESTEIRO, 1986; ALVIM and PIMENTA, 2013; NAYA GARMENDIA, 2016). Consequently, it is likely that these species could have been carried through anthropic ways. The second reason is that these areas are poorly studied under this point of view and thus many species of marine Heterobranchia could have been overlooked until now. For example, *T. tritorquis* has been repeatedly found in different areas of the central-eastern coast of Sicily, from 2018 until now (GEROVASILIEU *et al.*, 2020; LOMBARDO and MARLETTA, 2020b; present work). Therefore, this species, originally described and found in the Macaronesia (ORTEA *et al.*, 1982; ESPINOSA and ORTEA-RATO, 2001) could have yet been present in the Ionian Sea but never found before, due to its cryptic and schiaphilous behaviour. Consequently, *T. tritorquis* could be a Mediterranean species, which subsequently have moved to Macaronesia. Another species which could have been overlooked until now is *O. longiductis*, probably due to its cryptic appearance.

In the last years, through the research on the marine heterobranchs along the central-eastern coasts of Sicily, an increasing number of allochthonous species has been found (LOMBARDO and MARLETTA, 2019a; 2019b; 2020a; 2020b; 2020c). The presence of these species in the examined areas could notify natural changes in the hydrodynamic regime between the Atlantic and the Mediterranean (LASRAM et al. 2009), or an intensification of maritime traffic. Future investigations, conducted also in other Mediterranean areas, could highlight a possible expansion of these species within the Basin, and the changes that these species might bring to local communities. Consequently, it is appropriate continuing and intensifying the studies on this peculiar group of molluscs.

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