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Occurrence of the alien nudibranch *Melibe viridis* (Kelaart, 1858) (Opisthobranchia, Tethydidae), in the Maltese Islands

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Abstract

The alien dendronotacean nudibranch Melibe viridis (Kelaart, 1858), a tropical Indo-Pacific species that seems to have been introduced by shipping into the Mediterranean via the Suez Canal, and which has established populations in Greece, Turkey, Cyprus, Montenegro, Croatia, NW Sicily, southern peninsular Italy and Djerba Island in the Gulf of Gabes, is recorded for the first time from Malta. A thriving population was observed on a soft sediment bottom at a depth of 18-20 m off the western coast of the island of Comino (Maltese Islands). It is suggested that this species was introduced into Malta due to a natural range expansion of surrounding populations.

Keywords: Mollusca; Gastropoda; Nudibranchia; Dendronotina; Malta; Mediterranean; Dispersal.

Introduction

The dendronotacean nudibranch *Melibe viridis* has a wide distribution in the tropical Indo-West Pacific (GOSLINER & SMITH, 2003); however it is not known from the Red Sea (DESPALATOVIÇ *et al.,* 2002; ZENETOS *et al.,* 2004). It is also reported from the Mediterranean where its occurrence has been interpreted as due to transport via shipping, most likely through the Suez Canal (ZENETOS *et al.,* 2004). The first Mediterranean record of this species (as *Melibe fimbriata*) was from the island of Cephalonia in the Ionian Sea in 1970 (MOOSLEITNER, 1986) and it has also been recorded from the coastal waters off peninsular Greece, both the Ionian and Tyrrhenian coasts of Calabria, the Strait of Messina, north-eastern Sicily, the island of Djerba in the Gulf of Gabes (CATTANEO-VIETTI *et al.,* 1990), and from the island of Hvar, Croatia in the Adriatic Sea (maps and references in DESPALATOVIÇ *et al.,* 2002; ZENETOS *et al.,* 2004). Further records are from eastern Sicily (SCUDERI & RUSSO, 2003), the Gulf of Taranto

(CARRIGLIO *et al.,* 2004; MASTROTOTARO *et al.,* 2004), Turkey (YOKES & RUDMAN, 2004), Montenegro (JANCIC, 2004) and Cyprus (SANCHEZ VILLAREJO, 2007).

Mediterranean records of *Melibe* were originally referred to as *Melibe fimbriata* (Alder & Hancock, 1864), but as pointed out by GOSLINER & SMITH (2003) in their systematic review of the genus, RUDMAN (1999) could find no consistent characters for separating *Melibe fimbriata* from *Melibe viridis,* and suggested that the former be considered a junior synonym of the latter. The Mediterranean *Melibe* is now accepted as *Melibe viridis* (Kelaart, 1858) (RUDMAN, 2004; ZENETOS *et al.,* 2008).

This note reports the presence of *Melibe viridis* in Malta.

Methods

More than 10 individuals of *Melibe viridis* were encountered and photographed by scuba divers on 30th September, 2008, during a marine benthic survey off the western coast of the island of Comino (Maltese Islands; Fig. 1). The site (centred on Latitude N36° 00' 33.00"/Longitude E14° 19' 27.05") where the nudibranch was recorded, is charac-

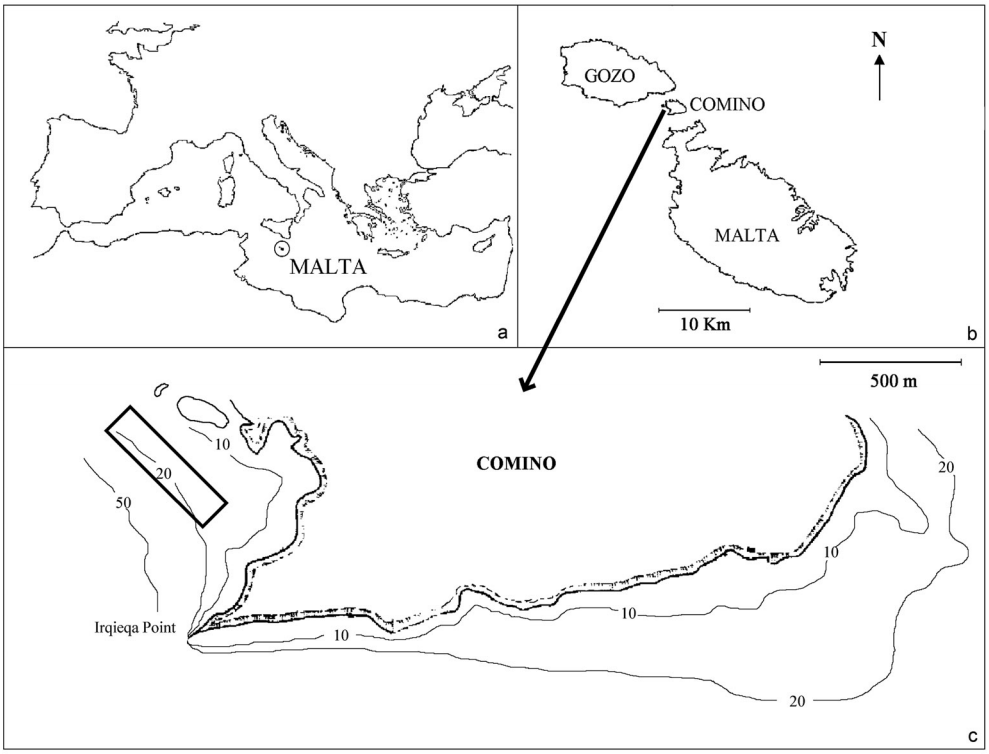

Fig. 1: Maps showing the location of: (a) the Maltese Islands in the Mediterranean; (b) Comino in the Maltese Islands; and (c) the site (rectangle) off western Comino where the specimens of *Melibe viridis* were recorded. The contour lines in figure (c) indicate the water depth in metres.

terised by a gently sloping bottom of gravelly sand, with small stones and pebbles, at a water depth of 18-20 m. Extensive algal forests (on bedrock and large boulders), together with meadows of Neptune Grass *Posidonia oceanica* and of Lesser Neptune Grass *Cymodocea nodosa,* surround the soft bottom where the nudibranch was encountered.

There is no doubt that this nudibranch is a species of *Melibe,* which, following RUDMAN (2004), is referred to as *Melibe viridis.* The animals had all the gross morphological characteristics of this species as described by GOSLINER & SMITH (2003), particularly the extremely characteristic expanded buccal hood fringed with tentacles, the large cerata on the dorsal surface, which are dorso-ventrally flattened at their distal ends, and the sheathed rhinophores (Fig. 2).

Results and Discussion

The specimens observed occurred on a bottom of gravelly sand with small stones and pebbles at a depth of 18-20 m. Sparse patches of *Cymodocea nodosa* were present in the vicinity but none of the specimens were recorded from amongst the seagrass. The individuals observed ranged in length between 8 cm

Fig. 2: Underwater photograph of a feeding *Melibe viridis* from western Comino, Maltese Islands, taken by Sarah Gauci Carlton on 30th September 2008 at a depth of 20 m. The animal in the photograph is about 16 cm long (© Ecoserv 2008).

and 16 cm. A few solitary individuals were observed, but six were aggregated together within a 2 m^2 area. The animals were observed feeding by the characteristic expansion and contraction of the buccal hood as described by THOMPSON & CRAMPTON (1984), and creeping slowly along the substratum. They did not react to the presence of the divers.

There seems to be a general consensus that *Melibe viridis* was introduced into the Mediterranean via shipping since it does not occur in either the Red Sea or the Levantine Sea, which is not what is expected for Lessepsian immigrants that have invaded the Mediterranean through the Suez Canal under their own power (ZENETOS *et al.,* 2004). GALIL (2006) suggests that *Melibe viridis* was introduced via ships' ballast. Within the Mediterranean, the species seems to have spread partly by range expansion from centres of establishment (for example, the populations around peninsular Italy) and partly by internal transport via shipping (for example, the Croatian population).

In the case of the Maltese population, although shipping may have been the vector, this species may also have reached the islands through natural dispersal from nearby populations, either those in Tunisia or those on the eastern coast of Sicily, or from as yet unreported populations closer to the Maltese Islands. We could find no information on the duration of the larval stage of *Melibe viridis,* however, the veliger larvae of *Melibe leonina* metamorphose after 30-59 days in the plankton (RUDMAN, 2001); if *Melibe viridis* is similar, this is ample time for larval dispersal from known surrounding populations.

The large size and bizarre morphology of this animal makes it stand out and it is unlikely that if it occurred in ports or yacht marinas or along coasts in the vicinity of shipping lanes in the Maltese Islands, it would have gone unnoticed, especially given the intense diving activity that takes place along practically all the accessible coastline of the islands. For this reason, the arrival and establishment of this species is likely to have been fairly recent.

It is interesting to note that this is the second alien opisthobranch that has been discovered in the same general area (the channel between the islands of Malta and Gozo) within a few months in 2008. In July 2008, an individual of the anapsid *Aplysia dactylomela* was photographed at Cirkewwa, which is only some 2 km distant from the site where *Melibe viridis* has been recorded (SCHEMBRI, 2008). The significance of this is obscure, although it may be pure coincidence.

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