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Abstract

The MARCOS cruise, which took place in the South Central Mediterranean Sea on board the RV 'Urania', resulted in the collection of 27 species of Echinodermata from shallow to bathyal depths, many from around Malta (the Fisheries Management Zone). The fauna is represented by common to rare taxa already reported from the Mediterranean with the exception of the amphi-Atlantic ophiuroid Ophiotreta valenciennesi rufescens (Koehler, 1896), recorded from the Mediterranean Basin for the first time. Odontaster mediterraneus (von Marenzeller, 1893) and Luidia sarsi Lutken, 1858 are also first records for the Maltese Islands.

Keywords: Echinodermata; South Central Mediterranean Sea; Maltese Islands; MARCOS.

Introduction

Deep-sea ecosystems in the South Central Mediterranean Sea, were investigated in the spring of 2007 during the MARCOS cruise of the RV *Urania.* One of MARCOS' main objectives was the assessment of biodiversity of the recently discovered *Lophelia* coral banks on offshore banks, South of the Maltese Islands (SCHEMBRI *et al.,* 2007; FREIWALD *et al.,* 2009). During the MARCOS cruise a number of bottom samples (Fig. 1) were recovered from infralittoral to bathyal depths, resulting in a significant collection of benthic organisms (MIFSUD *et al.,* 2008; MASTROTOTARO & MIFSUD 2008; TAVIANI *et al.,* 2009).

A qualitatively significant collection of echinoderm fauna was assembled during the MARCOS cruise and forms the subject of the present paper.

Material and Methods

Sampling was performed by means of a large volume (60 litres) modified Van Veen grab, a modified epibenthic trawl (Antolini) and an Agassiz trawl. Samples were

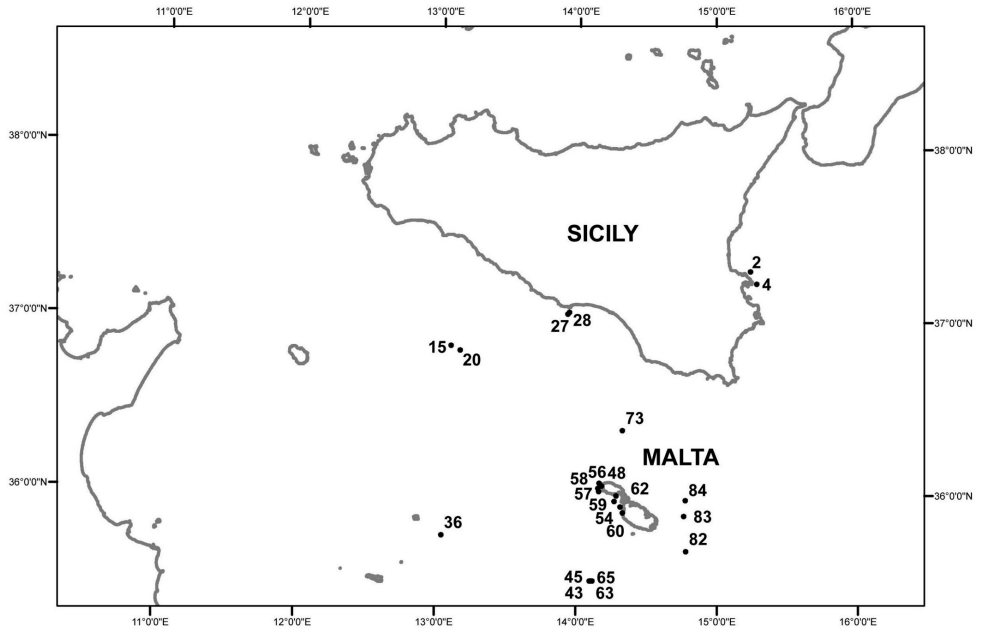

Fig. 1: RV '*Urania*' Marcos cruise (April 2007). Map of the cruise sampling sites.

washed over standard sieves (mesh sizes are 0.5, 1 and 2 mm) and sorted out by hand on board. Part of the material was photographed using a digital camera and aliquots were stored in 95% alcohol for genetic studies. Many of the specimens were determined to species level on board, but doubtful specimens that required a more detailed examination to identify were studied in the laboratory.

Results

In total, 27 species of Echinodermata were identified from the MARCOS collections, subdivided as follows: CRINOIDEA (2 species), HOLOTHUROIDEA (4 species), ASTEROIDEA (6 species), OPHIUROIDEA (10 species) and ECHINOIDEA (5 species). Taxa are listed in Table 1, together with characteristics of the sampling stations.

The collection is stored partly at the Naturhistoriska Riksmuseet, Sweden, and partly at the Natural History Museum, Mdina, Malta.

Discussion

Leptometra phalangium (J. Muller, 1841) was recovered in large numbers in deep-waters by the Agassiz trawl, while *Antedon mediterranea* Lamarck, 1816, was only encountered at one shallow water station and in a rather small number. This confirms the different habitats of these two species.

Holothurians were only seldom recovered during the MARCOS cruise. The three small-sized species belonging to family Cucumariidae were sampled in muddy sand

Table 1
Complete data for the echinoderms collected during the RV/Urania MARCOS cruise (April 2007).

Station	Species	No. off	Date	Gear	Location	Depth metres
MS 02 Augusta	*Trochodota venusta* (Semon, 1887) *Amphiura filiformis* (O.F. Müller, 1776) *Amphiura chiajei* Forbes, 1843	2 4 4	08-04-2007	grab	37°17.291' N - 15°14.521' E	81
MS 04 Augusta	*Labidoplax digitata* (Montagu, 1815) *Labidoplax thomsoni* (Herapath, 1865) *Amphiura chiajei* Forbes, 1843 *Amphiura filiformis* (O.F. Müller, 1776)	2 1 7 6	08-04-2007	grab	37° 13.794' N - 15°16.701' E	65.3
MS 15 Unnamed Bank	*Ophiopsila annulosa* (M. Sars, 1859) *Amphiura filiformis* (O.F. Müller, 1776) *Stylocidaris affinis* (Philippi, 1845)	1 5 1 juv.	10-04-2007	grab	36°51.783' N - 13°05.384' E	159
MS20 Unnamed Bank	*Amphipholis squamata* (Delle Chiaje, 1829)	2 juv.	10-04-2007	grab	36°50.249' N - 13°09.491' E	626
MS 27 Licata	*Astropecten irregularis pentacanthus* (Delle Chiaje, 1827) *Acrocnida brachiata* (Montagu, 1804)	1 3	10-04-2007	grab	37°04.729' N - 13°56.569' E	13
MS 28 Licata	*Ophiura albida* Forbes, 1839	1	10-04-2007	grab	37°04.741' N - 13°56.653' E	13
MS 36 Linosa	*Ophiotreta valenciennesi rufescens* (Koehler, 1896)	1 juv.	11-04-2007	Epibenthic Trawl	Start: 35°46.010' N - 13°02.609' E End: 35°45.779' N - 13°02.317' E	819 – 403
MS 43 S. Malta	*Ophiotreta valenciennesi rufescens* (Koehler, 1896) *Amphipholis squamata* (Delle Chiaje, 1829) *Ophiocomina nigra* (Abildgaard, in O.F. Müller, 1789) *Marthasterias glacialis* (Linnaeus, 1758) *Stylocidaris affinis* (Philippi, 1845)	1 6 2 1 juv. 1	12-04-2007	Epibenthic Trawl	Start: 35°30.720' N - 14°06.561' E End: 35°30.803'N - 14°06.511' E	607 – 452

(continued)

Table 1
Complete data for the echinoderms collected during the RV/Urania MARCOS cruise (April 2007).

Station	Species	No. off	Date	Gear	Location	Depth metres
MS 45 S. Malta	*Amphiura filiformis* (O.F. Müller, 1776)	2	12-04-2007	Epibenthic Trawl	Start:35°30.741' N - 14°06.077' E End: 35°31.276' N - 14°05.680' E	620 – 470
MS 48 S. Malta	*Sclerasterias richardi* (Perrier, 1882)	1	13-04-2007	Grab	36°03.626' N - 14°10.895' E	135
MS 54 SW. Gozo	*Echinocardium mediterraneum* (Forbes, 1844)	2	13-04-2007	Grab	36°00.342' N - 14°17.142' E	120
MS 56 W. Gozo	*Brissopsis lyrifera* (Forbes, 1841)	1	14-04-2007	Epib. Trawl	Start: 36°04.568' N - 14°09.891' E End: 36°04.04' N - 14°12.86' E	201 – 190
MS 57 W. Gozo	*Leptometra phalangium* (J. Müller, 1841) *Sclerasterias richardi* (Perrier, 1882) *Ophiura albida* Forbes, 1839	many* 2 6	14-04-2007	Agassiz Trawl	Start: 36°01.721' N - 14°09.65' E End: 36°01.721' N - 14°09.779' E	177-185
MS 58 W. Gozo	*Leptometra phalangium* (J. Müller, 1841) *Astropecten irregularis pentacanthus* (Delle Chiaje, 1827) *Sclerasterias richardi* (Perrier, 1882) *Ophiura albida* Forbes, 1839 *Ophiacantha setosa* (Retzius, 1805)	many* 1 25 2 1	14-04-2007	Agassiz Trawl	Start: 36°02.91' N - 14°09.41' E End: 36°01.022' N - 14°10.343' E	160-208
MS 59 W. Malta	*Leptometra phalangium* (J. Müller, 1841) *Eostichopus regalis* (Cuvier, 1817) *Astropecten irregularis pentacanthus* (Delle Chiaje, 1827) *Ophiura albida* Forbes, 1839 *Ophiura ophiura* (Linnaeus, 1758) *Stylocidaris affinis* (Philippi, 1845)	many* 3 6 juv. 1 2 many*	14-04-2007	Agassiz Trawl	Start:35°58.292' N - 14°16.278' E End: 35°56.929' N - 14°18.113' E	184-162

(continued)

Table 1
Complete data for the echinoderms collected during the RV/Urania MARCOS cruise (April 2007).

Station	Species	No. off	Date	Gear	Location	Depth metres
MS 60 W. Malta	*Astropecten irregularis pentacanthus* (Delle Chiaje, 1827) *Odontaster mediterraneus* (von Marenzeller, 1893) *Luidia sarsi* Lutken, 1858 *Ophiura albida* Forbes, 1839 *Ophiura ophiura* (Linnaeus, 1758)	7 juv. 1 2 juv. 2 1	14-04-2007	Agassiz trawl	Start: 35°54.465' N - 14°19.896' E End: 35°56.354' N - 14°19.007' E	147 – 99.6
MS 62 W. Malta	*Amphiura chiajei* Forbes, 1843 *Genocidaris maculata* A. Agassiz, 1869	2 1	14-04-2007	grab	35°56.464' N - 14°18.925' E	120
MS 63 S. Malta	*Echinocyamus pusillus* (O.F. Müller,1776)	3 tests	15-04-2007	Grab	35°30.766' N - 14°07.218' E	436
MS 65 S. Malta	*Amphiura chiajei* Forbes, 1843 *Ophiocomina nigra* (Abildgaard, in O.F. Müller, 1789)	1 1	15-04-2007	Epibenthic Trawl	Start: 35°30.76' N - 14°06.42' E End: 35°30.857' N - 14°06.240' E	585 – 492
MS 73 Gela Basin	*Stylocidaris affinis* (Philippi, 1845)	many*	16-04-2007	Agassiz Trawl	Start: 36°22.973' N - 14°19.728' E End: 36°22.745' N - 14°20.877' E	580 – 560
MS 82 SE. Malta	*Leptometra phalangium* (J. Müller, 1841) *Stylocidaris affinis* (Philippi, 1845)	many* many*	17-04-2007	Agassiz Trawl	Start: 35°40.993' N - 14°46.966' E End: 35°41.740' N - 14°47.877' E	130-128
MS 83 E. Malta	*Antedon mediterranea* Lamarck, 1816 *Hacelia attenuata* Gray, 1840	6 2 juv.	17-04-2007	Epibenthic Trawl	Start: 35°53.294' N - 14°46.169' E End: 35°53.857' N - 14°46.182' E	56-49
MS 84 NE. Malta	*Stylocidaris affinis* (Philippi, 1845)	many*	17-04-2007	Epibenthic Trawl	Start: 35°58.739' N - 14°46.815' E End: 35°58.990' N - 14°46.850' E	110 – 114

*indicates number in excess of 50 specimens juv. = juvenile specimens

bottoms. The holothurian *Eostichopus regalis* (Cuvier, 1817) is quite a common circalittoral species. In Maltese waters it is often found inhabiting muddy sands, but at times is also recorded from substrata with coralline algae (maerl).

Astropecten irregularis pentacanthus (Delle Chiaje, 1827) proved to be a frequent species in Maltese waters at various depths and associated with a variety of substrata. A most important find during the research cruise was the asteroid species *Sclerasterias richardi* (Perrier, 1882). This is a very small species, almost overlooked for Maltese waters. It was listed by PÉRÈS & PICARD (1956) and by TORTONESE (1965), who reported many specimens dredged south of Malta at 200 m. The MARCOS finding is fully discussed by MASTROTOTARO & MIFSUD (2008). *Odontaster mediterraneus* (von Marenzeller, 1893) and *Luidia sarsi* Lutken, 1858, are both new records for Maltese echinoderm fauna.

Ophiotreta valenciennesi rufescens (Koehler, 1896) (Family Ophiacanthidae, subfamily Ophiacanthinae) (Figs. 2-3) is herein recorded for the first time from the Mediterranean Sea. The specimen from Stn. MS43 has a 10 mm disc diameter, smaller than the known maximum size of 15 mm (PATERSON 1985), whereas the specimen from Stn. MS36 with 4.5 mm disc diameter is a juvenile. The species is characterized by a dense disc covering of granules, up to six oral papillae, the distal most of which is enlarged, and two tentacle scales. This putative subspecies has been recorded in the Atlantic Ocean from Madeira, South to Angola at depths of 640-1440m (PATERSON, 1985), and from hydrothermal vents at 848m at Menez Gwen on the northern Mid-Atlantic Ridge (STÖHR & SÈ

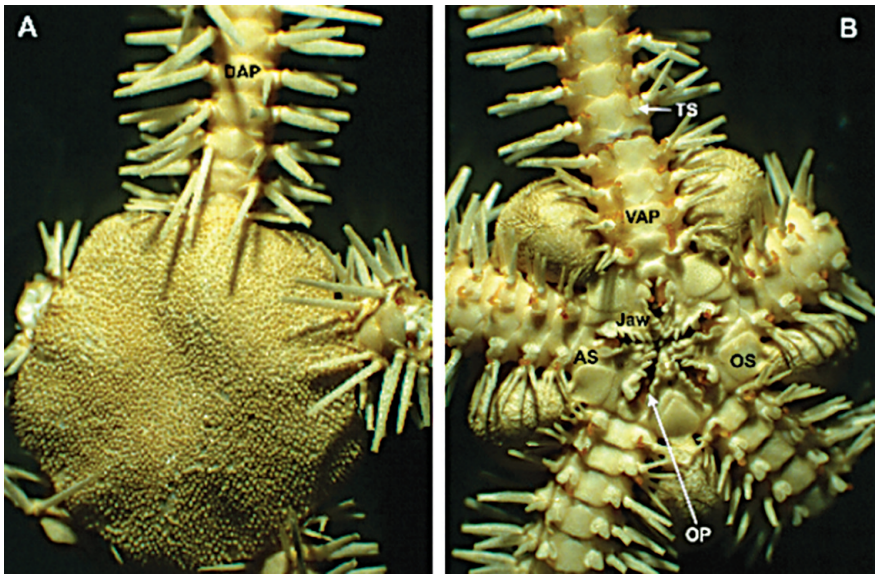

Fig. 2: *Ophiotreta valenciennesi rufescens* (Koehler, 1896). Specimen from stn. 43, disc diameter 10 mm. **A.** dorsal view. **B.** ventral view. AS, adoral shield; DAP, dorsal arm plate; OP, oral papillae; OS, oral shield; TS, tentacle scales; VAP, ventral arm plate.

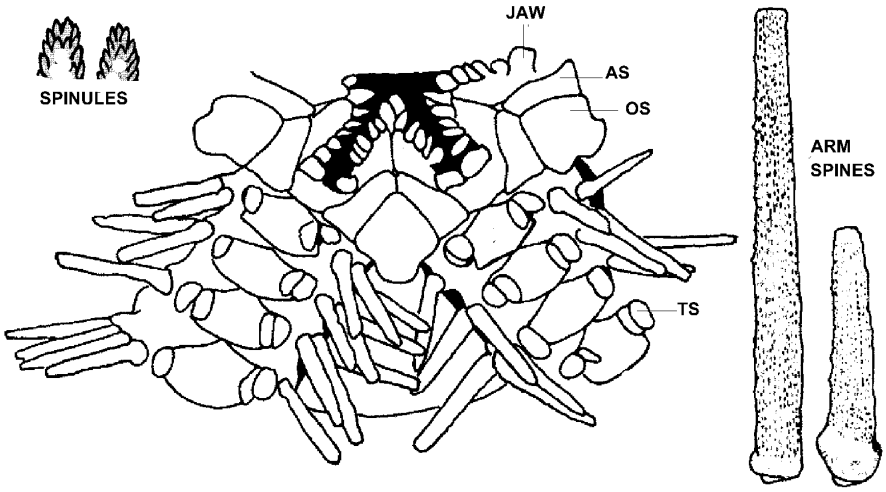

Fig. 3: *Ophiotreta valenciennesi rufescens* (Koehler, 1896). Details of oral side, disc spinules and arm spines (modified after PATERSON 1985 - copyright Natural History Museum, London). Abbreviations as in Figure 2.

GONZAC 2005). In the Gulf of Mexico, it was documented in great numbers associated with *Lophelia* banks near cold seeps at 500m (STÖHR & SÈ GONZAC 2005). The minor differences between *O. valenciennesi rufescens* and *O. valenciennesi valenciennesi* (Lyman, 1879) are that in the former, the disk spinules are not as rugose as those of *O. valenciennesi* and the adoral shields do not, or only just, separate the oral shield from the first lateral arm plate; in *O. valenciennesi* these are more wing-like and extend to the genital slits (PATERSON 1985). As PATERSON (1985) remarked, the elongated jaw, multiple oral papillae and large tentacle pore suggest affinities with the genus *Ophiopristis* (subfamily Ophiotominae). *Ophiura albida* Forbes, 1839, by far the most widespread and abundant ophiuroid recovered during MARCOS, was found at depths ranging from 13m to 500m.

The commonest echinoid recovered during MARCOS was *Stylocidaris affinis* (Philippi, 1845). The specimen recovered from St.43 (607 – 452) may have come from the shallower part of the trawl although its bathymetrical range is 30-1000m (TORTONESE, 1965). *Genocidaris maculata* A. Agassiz, 1869, is usually a very frequent species. However, the lack of more specimens could be due to the large net mesh size of the trawl (minimum 40mm). *Brissopsis lyrifera* (Forbes, 1841) is a species rarely encountered in Maltese waters while the common and minute *Echinocyamus pusillus* (O.F. Müller, 1776) was encountered only as empty tests and in rather deep waters. These may have been carried there by currents due to their small size, although its bathymetrical range is 0-1250m (TORTONESE, 1965).

Conclusion

Although most of the echinoderms recovered during cruise MARCOS had already been recorded from Maltese waters

by TANTI & SCHEMBRI (2006), three new records were added to this list. The recovery of a number of specimens of *Sclerasterias richardi* at shallow depths is remarkable considering the relative rarity of this small endemic Mediterranean asteroid. The crinoid *Leptometra phalangium* and the echinoid *Stylocidaris affinis* stand out for their abundance on a variety of substrata and for their bathymetric range. As for most occurrences in the Atlantic, the two specimens of *Ophiotreta valenciennesi rufescens* sampled by MARCOS were found in association with *Lophelia,* suggesting a link of this ophiuroid to deep-water coral ecosystems. The species *Ophiotreta valenciennesi rufescens* (Koehler 1896), *Odontaster mediterraneus* (von Marenzeller, 1893) and *Luidia sarsi* Lutken, 1858, are also new records for the Maltese Islands.

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References

FREIWALD, A., BEUCK, L., RÜGGEBERG, A., TAVIANI, M. & R/V Meteor M70-1 participants, 2009. The white coral community in the central Mediterranean revealed by ROV surveys. *Oceanography* 22: 58-74.

MASTROTOTARO, F. & MIFSUD, C., 2008. Some observations on the morphology of *Sclerasterias richardi* a rarely encountered Mediterranean Sea star. (Echinodermata: Asteriidae). *Mediterranean Marine Science,* 9(2): 105-111.

MIFSUD, C., MASTROTOTARO, C. & TAVIANI, M, 2008. On the occurrence of *Anamenia gorgonophila* (Kowalevsky, 1880) (Solenogastres: Strophomeniidae) and its host *Paramuricea macrospina* in the Maltese waters (Mediterranean Sea). *Bollettino Malacologico* 44 (5-8): 109-112.

PATERSON, G.L.J., 1985. The deep-sea Ophiuroidea of the North Atlantic Ocean, *Bulletin of the British Museum (Natural History), Zoology Series* 49: 32, 49-50.

PÉRÈS, J.M. & PICARD, J., 1956. Recherches sur les peuplements benthiques du seuil Siculo-Tunisien. *Résultats scientifiques des campagnes de la "Calypso", Fascicule* II, 234-264. *Masson et Cie, Éditeurs.* Paris.

STÖHR, S. & SEGONZAC, M., 2005. Deep-sea ophiuroids (Echinodermata) from reducing and non-reducing environments in the North Atlantic Ocean. *Journal of the Marine Biology Association, U.K.* 85: 383-402.

SCHEMBRI, P. J., DIMECH, M., CAMILLERI, M. & PAGE, R., 2007.

Living deep-water *Lophelia* and *Madrepora* corals in Maltese waters (Straits of Sicily, Mediterranean Sea). *Cahiers de Biologie Marine.* 48 : 77-83.

TANTI, C. M. & SCHEMBRI, P. J., 2006: A synthesis of the echinoderm fauna of the Maltese Islands. *Journal of the Marine Biolology Association, U.K.* 86: 163-165. United Kingdom

TAVIANI, M., ANGELETTI, L. DIMECH, M., MIFSUD, C., FREIWALD, A., HARASEWYCH, M. G. & OLIVERIO, M., 2009. Coralliophilinae (Mollusca: Gastropoda) associated with deep-water coral banks in the Mediterranean. *Nautilus*, 123(3): 106-112.

TORTONESE, E., 1965: *Fauna d'Italia; Echinodermata.* Edizione Calderini, pp. 422. Bologna.

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