

Mediterranean Marine Science

Vol 10, No 2 (2009)



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doi: [10.12681/mms.109](https://doi.org/10.12681/mms.109)

To cite this article:

MIFSUD, C., TAVIANI, M., & STOHR, S. (2009). Remarks on Echinodermata from the South Central Mediterranean Sea based upon collections made during the MARCOS cruise (10 to 20th April, 2007). *Mediterranean Marine Science*, 10(2), 63–72. <https://doi.org/10.12681/mms.109>

Mediterranean Marine Science
Volume 10/2, 2009, 63-71

Remarks on Echinodermata from the South Central Mediterranean Sea based upon collections made during the MARCOS cruise (10 to 20th April, 2007)

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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. *Odonotaster 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 sig-

nificant 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 (Antonini) and an Agassiz trawl. Samples were

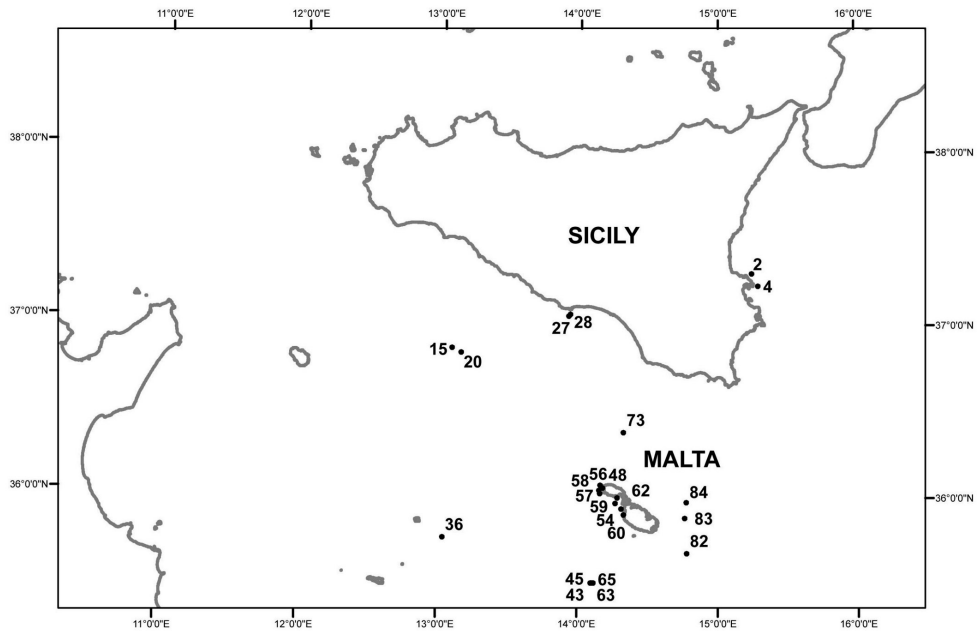


Fig. 1: RV 'Urania' Marcos cruise (April 2007). Map of the cruise sampling sites.

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 list-

ed 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 | <i>Trochodota venusta</i> (Semon, 1887) | 2 | 08-04-2007 | grab | 37°17.291' N - 15°14.521' E | 81 |
| | <i>Amphiura filiformis</i> (O.F. Müller, 1776) | 4 | | | | |
| | <i>Amphiura chiajei</i> Forbes, 1843 | 4 | | | | |
| MS 04 Augusta | <i>Labidoplax digitata</i> (Montagu, 1815) | 2 | 08-04-2007 | grab | 37° 13.794' N - 15° 16.701' E | 65.3 |
| | <i>Labidoplax thomsoni</i> (Herapath, 1865) | 1 | | | | |
| | <i>Amphiura chiajei</i> Forbes, 1843 | 7 | | | | |
| | <i>Amphiura filiformis</i> (O.F. Müller, 1776) | 6 | | | | |
| MS 15 Unnamed Bank | <i>Ophiopsila annulosa</i> (M. Sars, 1859) | 1 | 10-04-2007 | grab | 36° 51.783' N - 13° 05.384' E | 159 |
| | <i>Amphiura filiformis</i> (O.F. Müller, 1776) | 5 | | | | |
| | <i>Sylocidaris affinis</i> (Philippi, 1845) | 1 juv. | | | | |
| MS20 Unnamed Bank | <i>Amphipholis squamata</i> (Delle Chiaje, 1829) | 2 juv. | 10-04-2007 | grab | 36° 50.249' N - 13° 09.491' E | 626 |
| MS 27 Licata | <i>Astropecten irregularis pentacanthus</i> (Delle Chiaje, 1827) | 1 | 10-04-2007 | grab | 37°04.729' N - 13° 56.569' E | 13 |
| | <i>Acrocnida brachiata</i> (Montagu, 1804) | 3 | | | | |
| MS 28 Licata | <i>Ophiura albida</i> Forbes, 1839 | 1 | 10-04-2007 | grab | 37°04.741' N - 13° 56.653' E | 13 |
| MS 36 Linosa | <i>Ophiotreta valenciennesi rufescens</i> (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 |
| | <i>Ophiotreta valenciennesi rufescens</i> (Koehler, 1896) | 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 |
| MS 43 S. Malta | <i>Amphipholis squamata</i> (Delle Chiaje, 1829) | 6 | | | | |
| | <i>Ophiocomicina nigra</i> (Abildgaard, in O.F. Müller, 1789) | 2 | | | | |
| | <i>Marthasterias glacialis</i> (Linnaeus, 1758) | 1 juv. | | | | |
| | <i>Sylocidaris affinis</i> (Philippi, 1845) | 1 | | | | |

(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 | <i>Amphiura filiformis</i> (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 | <i>Sclerasterias richardi</i> (Perrier, 1882) | 1 | 13-04-2007 | Grab | 36° 03.626' N - 14° 10.895' E | 135 |
| MS 54 SW. Gozo | <i>Echinocardium mediterraneum</i> (Forbes, 1844) | 2 | 13-04-2007 | Grab | 36° 00.342' N - 14° 17.142' E | 120 |
| MS 56 W. Gozo | <i>Brissopsis lyrifera</i> (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 | <i>Leptometra phalangium</i> (J. Müller, 1841) <i>Sclerasterias richardi</i> (Perrier, 1882) <i>Ophiura albida</i> 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 | <i>Leptometra phalangium</i> (J. Müller, 1841) <i>Astropecten irregularis pentacanthus</i> (Delle Chiaje, 1827) <i>Sclerasterias richardi</i> (Perrier, 1882) <i>Ophiura albida</i> Forbes, 1839 <i>Ophiacantha setosa</i> (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 | <i>Leptometra phalangium</i> (J. Müller, 1841) <i>Eositichopus regalis</i> (Cuvier, 1817) <i>Astropecten irregularis pentacanthus</i> (Delle Chiaje, 1827) <i>Ophiura albida</i> Forbes, 1839 <i>Ophiura ophiura</i> (Linnaeus, 1758) <i>Sylocidaris affinis</i> (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 | <i>Astropecten irregularis pentacanthus</i> (Delle Chiaje, 1827) | 7 juv. | 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 |
| | <i>Odontaster mediterraneus</i> (von Marenzeller, 1893) | 1 | | | | |
| | <i>Luidia sarsi</i> Lutken, 1858 | 2 juv. | | | | |
| | <i>Ophiura albida</i> Forbes, 1839 | 2 | | | | |
| MS 62 W. Malta | <i>Ophiura ophiura</i> (Linnaeus, 1758) | 1 | 14-04-2007 | grab | 35° 56.464' N - 14° 18.925' E | 120 |
| | <i>Amphiura chiajei</i> Forbes, 1843 | 2 | | | | |
| | <i>Genocidaris maculata</i> A. Agassiz, 1869 | 1 | | | | |
| MS 63 S. Malta | <i>Echinocyamus pusillus</i> (O.F. Müller, 1776) | 3 tests | 15-04-2007 | Grab | 35° 30.766' N - 14° 07.218' E | 436 |
| MS 65 S. Malta | <i>Amphiura chiajei</i> Forbes, 1843 | 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 |
| | <i>Ophiocomina nigra</i> (Abildgaard, in O.F. Müller, 1789) | 1 | | | | |
| MS 73 Gela Basin | <i>Stylocidaris affinis</i> (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 |
| | <i>Leptometra phalangium</i> (J. Müller, 1841) | many* | | | | |
| MS 82 SE. Malta | <i>Stylocidaris affinis</i> (Philippi, 1845) | 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 |
| | <i>Antedon mediterranea</i> Lamarck, 1816 | 6 | | | | |
| MS 83 E. Malta | <i>Hacelia attenuata</i> Gray, 1840 | 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 |
| | <i>Stylocidaris affinis</i> (Philippi, 1845) | many* | | | | |
| MS 84 NE. Malta | <i>Stylocidaris affinis</i> (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 PÉREZ & 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

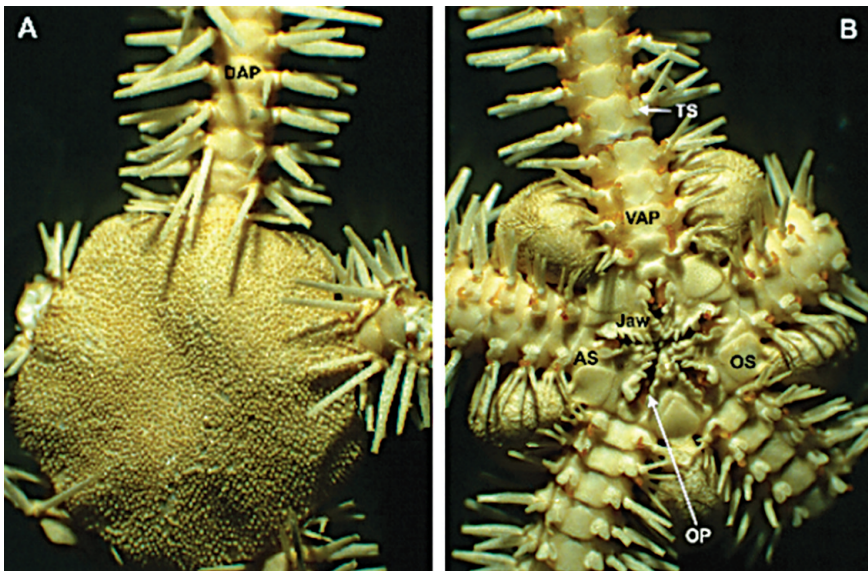


Fig. 2: *Ophiotreta valenciennesi rufescens* (Koehler, 1896). Specimen from stn. 43, disc diameter 10 mm. **A.** dorsal view. **B.** ventral view. AS, adoral shield; DAP, dorsal arm plate; OP, oral papillae; OS, oral shield; TS, tentacle scales; VAP, ventral arm plate.

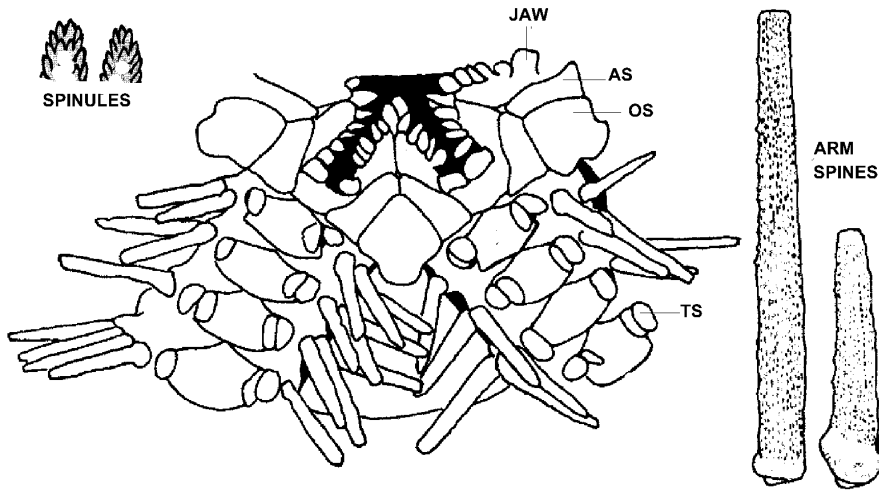


Fig. 3: *Ophiotreta valenciennesi rufescens* (Koehler, 1896). Details of oral side, disc spinules and arm spines (modified after PATERSON 1985 - copyright Natural History Museum, London). Abbreviations as in Figure 2.

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.

Acknowledgements

We gratefully acknowledge the cooperation of the Captain, officers, crew and scientific staff aboard the RV *Urania* during the MARCOS cruise. Thanks are also due to Prof. P.J. Schembri, Ms. R. Pace (Biology Department of the University of Malta) and J. Camilleri, the Maltese technician who was also a participant in the cruise, for their help throughout. Trudy Brennan of The Natural History Museum generously gave permission to reproduce the illustration of *Ophiotreta* from PATERSON (1985). Special thanks are also due to H. Zibrowius, F. Mastrototaro, A. Vertino, L. Angeletti and A. Bonfitto for their valuable contribution in collecting and preparing the biological samples and Alessandro Remia for preparing the map. We also thank two unknown reviewers for important suggestions and advice to improve the manuscript. Partial funding provided by CNR and FP-VI Integrated Project HERMES (GOCE-

CT-2005-511234-1) of the European Commission. This article is a contribution to the EU HERMIONE program and is ISMAR-Bologna scientific paper No 1632.

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Submitted: June 2009

Accepted: September 2009

Published on line: October 2009

