

First records of 13 echinoderm species on the southwest coast of Portugal

*D. Cunha de Jesus*¹ and *L. Cancela da Fonseca*²

¹ CCMar e IMAR, Laboratório Marítimo da Guia, Estrada do Guincho, Cascais 2750, Portugal

² CCMar e UCTRA, Universidade do Algarve, Campus de Gambelas, Faro 8000, Portugal

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ABSTRACT

As part of a characterisation study of the marine area contiguous to the Sudoeste Alentejano e Costa Vicentina Natural Park (PNSACV), biological material proceeding from cruises of the SE-PLAT (PLATform SEdiments) programme (Portuguese Navy's Hydrographic Institute) has been studied.

The sampling took place on the continental shelf contiguous to the PNSACV, between Sines and Cape St Vicente, at water depths ranging from 15-387 m.

During these cruises, echinoderms were found to be a well-represented faunal group. Sixty echinoderm species were identified, distributed as follows, by classes: 2 crinoids, 2 asteroids, 32 ophiuroids, 12 equinoids and 12 holothuroids. Thirteen of the 60 species are first records on the Portuguese coast.

Key words: Echinoderms, southwest Portugal, new citations.

RESUMEN

Nuevas citas de equinodermos para la costa suroeste de Portugal

En el ámbito de un análisis de caracterización del área marina adyacente al Parque Natural do Sudoeste Alentejano y Costa Vicentina (PNSACV) se ha estudiado material biológico diverso proveniente de campañas del programa SEPLAT (SEdimentos de la PLATaforma), del que es responsable el Instituto Hidrográfico de la Marina Portuguesa.

Las muestras se obtuvieron en el área de plataforma continental adyacente al PNSACV, entre Sines y el cabo de San Vicente, a profundidades comprendidas entre los 15 y los 387 metros.

Los equinodermos constituyeron, en esas campañas, un grupo bien representativo de la fauna marina presente en esta área de la plataforma continental.

Se recogieron 60 especies de equinodermos distribuidos en las clases siguientes: 2 Crinoidea, 2 Asteroidea, 32 Ophiuroidea, 12 Echinoidea y 12 Holothurioidea. Trece de las 60 especies tienen aquí su primera cita para la costa portuguesa.

Palabras clave: Equinodermos, suroeste de Portugal, nuevas citas.

INTRODUCTION

The geographic location of Portugal and the fact that its marine economic zone includes the confluence of several rich and important zoogeographic regions, gives the country special status in marine studies.

Therefore, the study of Portuguese marine fauna is of great interest, not only because of its relationship with the faunas of other regions, but also because of how that same fauna is established and distributed all over the Portuguese coast.

As part of a characterisation study of the marine area contiguous to the Sudoeste Alentejano e Costa Vicentina Natural Park (PNSACV), biological material proceeding from cruises of the SEPLAT (PLATform SEdiments) programme (of the Portuguese Navy's Hydrographic Institute) has been studied.

The SEPLAT programme is aimed at collecting and studying the sediments settled on the continental shelf, so that sediment charts of the entire Portuguese continental shelf may be drawn up.

Cruises 6 and 7 of this programme, during the months of May, October and December 1981 and October 1983, covered the platform shelf area contiguous to the PNSACV, between Sines and Cape St. Vicente (figure 1). The biological sampling carried out during these cruises was aimed at studying the region's benthic populations qualitatively, in order to further knowledge of the fauna living there.

During these cruises, 60 echinoderm species were sampled, distributed as follows, by classes: 2 crinoids, 2 asteroids, 32 ophiuroids, 12 equinoids and 12 holothuroids. According to previous species inventories for Portugal (Costa, 1938, 1940; Cumano, 1934, 1937, 1945, 1953; Monteiro Marques, 1979, 1980, 1987; Nobre, 1909, 1931, 1938; Pérez-Ruzafa and López-Ibor, 1988), of the 60 species identified, 13 are first citations on the Portuguese coast.

MATERIALS AND METHODS

The sediment samples and their biologic material were obtained by the Portuguese Navy vessel N.R.P. *Almeida Carvalho*, and samples from under a depth of 20 m were taken by the vessels N.H.D. *Jeremias* and the Navy Support Unit (UAM) *Sete Estrelas*.

The samples were taken with Shipek and Van Veen grabs, and in some cases a traditional trawl

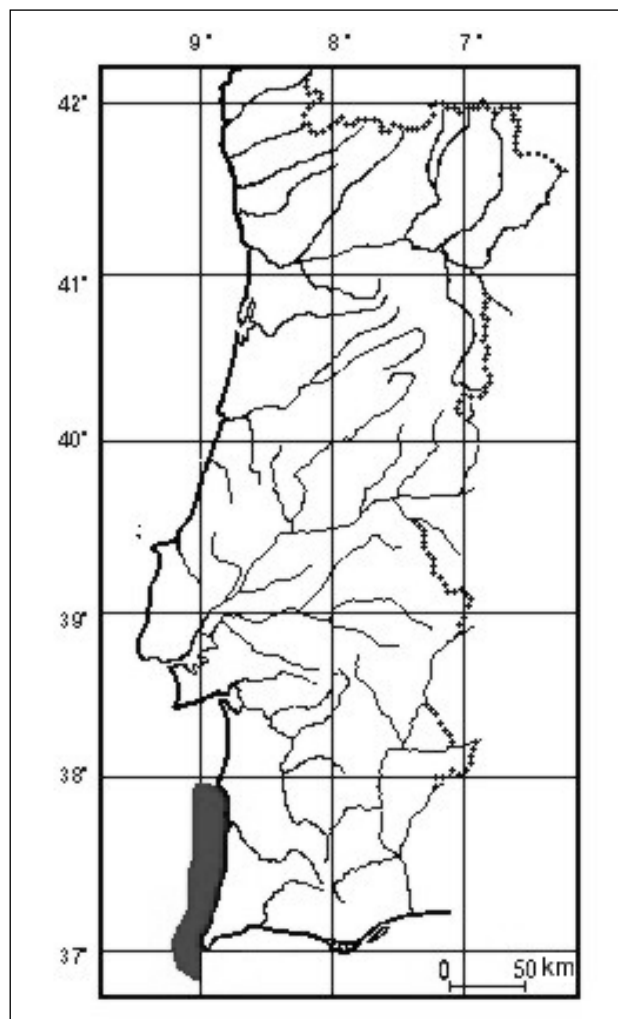


Figure 1. Area studied

was also used. The trawls were made between two sampling stations.

The sediment samples collected were sieved *in situ* by 1 950- μ m and 1 000- μ m mesh sieves, with seawater, and the biological material was kept in plastic bottles. This material was fixed in 10 % formalin, and then stored in 70 % alcohol.

The specimens were identified following several taxonomic keys (Koehler, 1921, 1924, 1927; Mortensen, 1927; Tortonese, 1965; Clark, 1977; Paterson, 1985; Clark and Downey, 1992).

The taxonomic criteria used are those of Clark and Downey (1992) for the class Asterozoa, Tortonese (1965) for the classes Echinozoa, Ophiurozoa, Crinozoa and Holothurozoa.

Table I presents the identified species inventory, as well as the depths and substrates where they were collected.

Table I. Species inventory for the studied area, depths and sediments type where they were collected (S): sand; (R): rock; (M): mud; (SM): sandy mud; (MS): muddy sand; (CS): coarse sand and pebbles

	Depths (m)	Sediment type
Crinoidea		
<i>Antedon bifida</i> (Pennant, 1777)	30, 32, 125	S, R
<i>Leptometra celtica</i> (MacAndrew & Barret, 1858)	125, 130, 160, 175, 215, 375	S, MS
<i>Leptometra</i> sp. A. H. Clark, 1908	175	SM
Asteroidea		
<i>Astropecten aranciacus</i> (Lamarck, 1758)	132	S
<i>Astropecten irregularis</i> Koehler, 1909	110, 130, Arrasto (310 > 290)	S, MS, SM
Ophiuroidea		
<i>Amphipholis squamata</i> (D. Chiaje, 1876)	45, 99, 365	S, R
<i>Amphiura</i> cf. <i>abyssorum</i> Norman, 1876	28	S
<i>Amphiura chiajei</i> Forbes, 1843	141	MS
<i>Amphiura filiformis</i> (O. F. Müller, 1776)	27, 35, 50, 69, 150, 180, 371	SM, MS, R, S, M
<i>Amphiura fragilis</i> Verrill, 1885	40	S
<i>Amphiura grandisquama</i> Lyman, 1869	371	S
<i>Amphiura securigera</i> (Düben & Koren, 1846)	245	MS
<i>Aspidopphiura</i> sp. cf. Matsumoto, 1815	356	SM
<i>Ophiacantha bidentata</i> (Retzius, 1805)	170, 265, 284	S, MS
<i>Ophiacantha smitti</i> (Ljungman, 1872)	210	MS
<i>Ophiacantha</i> sp. Müller & Troschel, 1842	317	S
<i>Ophiactis balli</i> Thompson, 1840	64, 118, 284, 302	R, S, MS
<i>Ophiactis</i> sp. Lütken, 1856	69	R
<i>Ophiocomina nigra</i> (Abildgaard, 1789)	32, 64, 118	R
<i>Ophiocten scutatatum</i> Koehler, 1898	150, 330, 78	S, MS
<i>Ophiopsila annulosa</i> (M. Sars, 1857)	70	R
<i>Ophiopsila aranea</i> Forbes, 1843	30, 52, 64, 118	R
<i>Ophiotrix fragilis</i> (Abildgaard, 1789)	ARRASTO, 40, 30	R
<i>Ophiotrix indigna</i> Koehler	32, 52, 92, 118	R
<i>Ophiotrix quinqueaculata</i> (D. Chiaje, 1828)	15 > 50, 105 > 155, TRAWL, (160 > 151)	S, R
<i>Ophiotrix</i> sp. Müller & Troschel, 1842	52	R
<i>Ophiotypha simplex</i> Koehler, 1897	27	MS
<i>Ophiura</i> (<i>Ophiura</i>) <i>imprudens</i> (Koehler, 1906)	135; 198, 322	MS, S
<i>Ophiura affinis</i> Lütken, 1856	29, 55, 83, 110, 160, 240, 350	S, MS
<i>Ophiura grubei</i> Heller, 1863	45, 54, 140, 47	M, R, S, MS
<i>Ophiura albida</i> Forbes, 1839	17, 36, 85, 110, 118	MS, S
<i>Ophiopleura inermis</i> (Lyman, 1878)	180, 378	R, S
<i>Ophiura robusta</i> (Ayres)	68, Arrasto	R
<i>Ophiura</i> sp. Lamarck, 1816	74, 145	S, MS
<i>Ophiura texturata</i> (Linnaeus, 1758)	Arrasto (310 > 290), 132	S
<i>Ophiura</i> (<i>Dictenopphiura</i>) <i>carnea</i> (Lutken, 1858)	89, 125, 180, 310	MS, S
<i>Paramphiura</i> sp. cf. Koehler, 1895	32	R
Echinoidea		
<i>Brissopsis atlantica</i> Mortensen, 1913	148; 152, 204, 220, 238, 287	MS, S
<i>Brissopsis lyrifera</i> (Forbes, 1841)	94, 238	MS, SM
<i>Echinocardium cordatum</i> (Pennant, 1777)	17-55, 70-90, 100-120, 160-175	MS, CS, S
<i>Echinocardium fenauxi</i> Péquignat, 1963	125-128	S
<i>Echinocardium flavescens</i> (O. F. Müller, 1776)	90, 150, 155	S, MS
<i>Echinocardium mortensenii</i> Thiéry, 1909	71, 79, 110, 125, 145	MS, S
<i>Echinocardium pennatifidum</i> Norman, 1892	65	CS
<i>Echinocyamus pusillus</i> (O. F. Müller, 1776)	17-39, 52-90, 100-130	S, CS, MS
<i>Paracentrotus lividus</i> (Lamarck, 1816)	32, 40	S, R
<i>Psammechinus microtuberculatus</i> (Blainville, 1825)	36	S
<i>Psammechinus</i> sp. L. Agassiz, 1846	101	CS
<i>Spatangus purpureus</i> (O. F. Müller, 1776)	86, 128	S, CS
Holothuroidea		
<i>Cucumaria brunnea</i> Forbes	130	S
<i>Cucumaria grubei</i> Marenzeller, 1874	140, 145	MS, CS
<i>Cucumaria hyndmani</i> Thompson	35, 120	R

Table I (continued)

	Depths(m)	Sediment type
<i>Cucumaria saxicola</i> Brady & Robertson, 1871	35	R
<i>Havelockia inermis</i> Heller, 1868	118, 122, 130	MS, S
<i>Kolga Ludwigi</i> Marenzeller, 1893	48	R
<i>Labidoplax digitata</i> (Montagu, 1815)	29, 78, 101 > 185, 218, 255, 287	MS, S
<i>Leptosynapta inhaerens</i> (O. F. Müller, 1776)	25	MS
<i>Pseudothyone raphanus</i> (Düben & Koren, 1844)	76, 118, 125	S, MS
<i>Stichopus regalis</i> (Cuvier, 1817)	TRAWL (160 > 151)	
<i>Thyone fusus</i> (O. F. Müller, 1788)	122	S
<i>Trachythyone elongata</i> (Düben & Koren, 1844)	120	S

RESULTS

The echinoderm fauna collected on the southwest coast presents Atlantic-Mediterranean characteristics.

Of the 60 captured species, there are a few representative of the several zoogeographic regions; of boreal influence: *Leptometra celtica* (McAndrew & Barret, 1858); *Amphiura securigera* (Düben & Koren, 1846); *A. chiajei* (Forbes, 1843); *Ophiacantha bidentata* (Retzius, 1805); *Ophiocomina nigra* (Abildgard); *Ophiopsila aranea* (Forbes, 1843); of Mediterranean influence: *Antedon bifida* (Pennant, 1777); *Ophiotrix quinquemaculata* (D. Chiaje, 1828); *Echinocardium mortenseni* (Thiéry, 1909); *E. fenauxi* (Péquignat, 1963); and of African influence: *Ophiura grubei* (Heller, 1863); *O. albida* (Forbes, 1839); *Amphipholis squamata* (D. Chiaje, 1876).

Following are the 13 new citations for the area studied.

Ophiuroidea

Amphiura cf. abyssorum Norman, 1876

According to Paterson (1985), it has a bathymetric range of 915-3 210 m. The specimen probably belonging to this species was collected at a depth of 28 m, in a sandy substrate. This is the first time it has been reported on the Portuguese coast, and if our identification is correct, this would alter the species's known bathymetric range.

Amphiura fragilis Verril, 1885

This species can be easily recognised by the shape and number of the arm spines, as well as by

the lack of tentacle scales and the lack of scales on the ventral interradial area. Its bathymetric range was formerly considered to be 155 m (Mortensen, 1927) to 2 640 m (Paterson, 1985); since it was collected at 40 m on a sand bottom, our finding alters its known bathymetric range to 40-2 640 m.

Aspidophiura sp. cf. Matsumoto, 1815 (figure 2)

One specimen was collected at a depth of 356 m, on a sandy-mud bottom.

Ophiotrix indigna Koehler, 1906

According to Mortensen (1927), this species was collected by the *Talisman* off Madeira, between

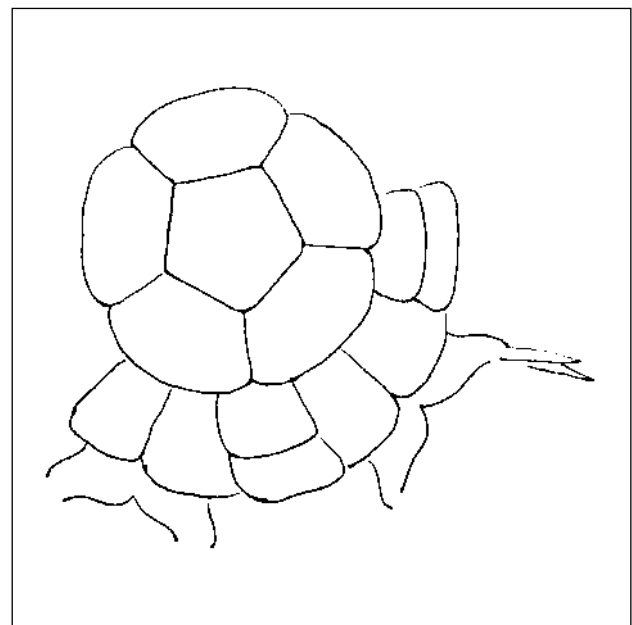
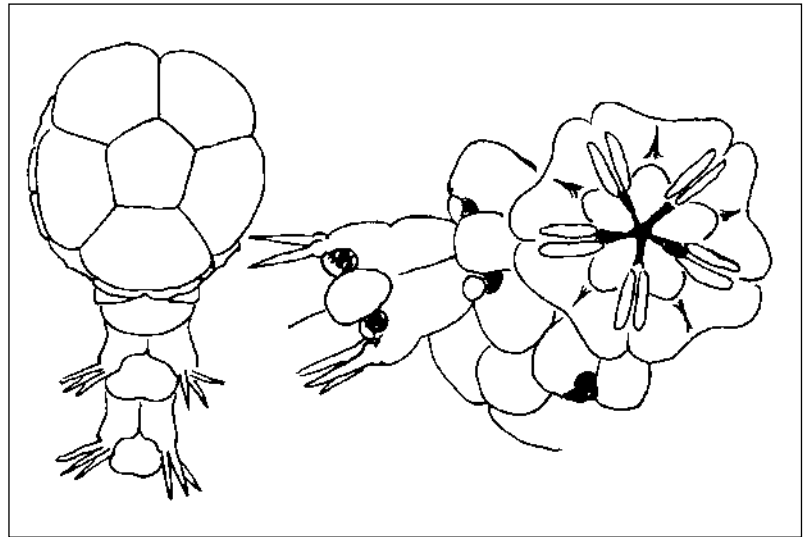


Figure 2. *Aspidophiura* sp. cf. (Matsumoto, 1815) aboral view

Figure 3. *Ophiotypa simplex* (Koehler, 1897)
aboral and oral view



depths of 150-370 m. Ours is the first citation on the Portuguese continental shelf; it was collected between 52-118 m, always on a rocky bottom.

Ophiotypa simplex Koehler, 1897 (figure 3)

It has a wide geographic distribution, and can be found in the North Atlantic from off the Azores and Cape Verde Islands, but it has also been found in the Venezuela Basin in the Caribbean and in the Indian Ocean (Paterson, 1985). It has been recorded previously at depths ranging from 3 595-4 366 m, but we collected it at 27 m on a muddy-sand bottom.

Ophiura (Ophiura) imprudens (Koehler, 1906)

Specimens collected between the depths of 135-198 m, on sand and muddy-sand bottoms.

Ophiopleura inermis (Lyman, 1878)

It can be found on both sides of the North Atlantic between 150-1 740 m (Paterson, 1985). Our specimen was collected on a rocky bottom at 378 m.

Ophiura robusta (Ayres, 1851)

A well-known species from the arctic and boreal region of Europe, ranging to the west coast of Scotland. In the coldest waters, it appears from 400 m, and in more temperate waters from 25 m (Koehler, 1921). Our specimens were collected at 68 m on a rocky bottom.

Paramphiura sp. cf. Koehler, 1895

One specimen, collected on rock at a depth of 32 m.

Holothuroidea

Kolga Ludwigi Marenzeller, 1893 (figure 4)

Species known from the Mediterranean Sea on muddy and sandy bottoms. Only one specimen, in poor condition, was collected at a depth of 48 m on a rocky bottom.

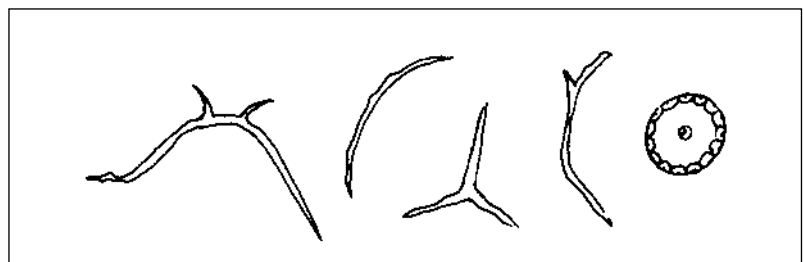


Figure 4. *Kolga ludwigi* (Marenzeller, 1893)
several calcarous plates

Echinoidea

Echinocardium fenauxi Péquignat, 1963

Species very similar to *E. cordatum*, differing only in the periproct transversal expansion and in the number of pore pairs on the latter's ambulacra (≥ 12). It was collected off Cape St Vicente at 125 m on a sandy bottom.

Echinocardium mortenseni Thiéry, 1909 (figure 5)

Five specimens were collected at depths between 71-145 m, on sand and muddy-sand bottoms.

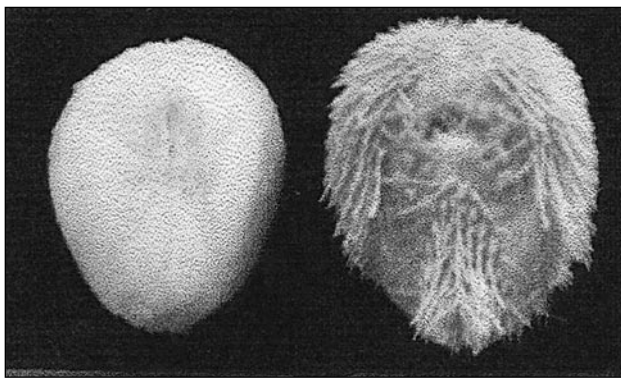


Figure 5. *Echinocardium mortenseni* (Thiéry, 1909) aboral and oral view

Brissopsis atlantica Mortensen, 1913

This is a common species in the Mediterranean Sea and the Atlantic (West Africa and North America). Collected at depths between 87-148 m, on muddy-sand bottoms.

DISCUSSION

Portugal's geographic location gives it a special status for marine studies. Our findings confirm that special status, and provide evidence that southwest Alentejo and the Vicentina coast are the nexus of several zoogeographic regions in the Atlantic.

This research should therefore be continued, mainly to obtain better knowledge of Cape St Vicente's role in the zoogeographic distribution of all fauna and flora existing in this area.

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