CONTRIBUTION TO THE KNOWLEDGE OF THE SOFT BOTTOM ECHINODERMS OF MADEIRA ISLAND

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With 1 table and 4 figures

ABSTRACT. This paper paper presents a list of echinoderm species collected during a study devoted to the soft bottom macroinvertebrates of Madeira Island.

One hundred and twenty stations were established between 20 and 100 meter's depth along the south coast of Madeira island providing a total of more than 3000 individuals. These specimens remained classified in 20 families, 27 genera and 52 identified species and 5 still indetermined. Most of them are new records for the Archipelago of Madeira.

KEY WORDS: Echinodermata, soft bottom species, taxonomy, distribution, Madeira Island.

RESUMO. Neste trabalho é apresentada a lista de espécies de equinodermes, recolhidas durante um programa de investigação sobre as comunidades de macroinvertebrados de substratos móveis da ilha da Madeira.

Das recolhas realizadas em cento e vinte estações de amostragem, entre os 20 e os 100 metros de profundidade, ao longo da costa Sul da Ilha da Madeira, resultaram mais de 3000 indíviduos, os quais foram classificados em 20 famílias, 27 géneros e 52 espécies identificadas e 5 ainda por determinar. A maioria destas espécies constituem novos registos para a Ilha da Madeira.

PALAVRAS CHAVE: Equinodermes, substratos móveis, taxonomia, distribuição, Ilha da Madeira

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INTRODUCTION

The Echinodermata phylum is one of the less studied zoological groups in Madeira Archipelago. There are important lacks in the knowledge about their faunistics and distribution as well as about the ecology and biology of the species inhabiting the archipelago.

The marine waters surrounding the archipelago are of great importance biogeographicaly speaking. The geographic position of Madeira contributes to the presence of a large set of distinct biogeographical elements. The echinoderm fauna of the Archipelago of Madeira includes species from the Mediterranean-Atlantic region, to which it belongs (BRIGGS, 1974); from the Boreal region, presenting also tropical influences from both sides of the Atlantic.

Faunal studies of the less known marine groups of the marine fauna of Madeira will bring relevant data to help and sustain biogeographical analysis as also to clarify some taxononomic positions of rare and little known macroinvertebrate species.

METHODS

One hundred and twenty stations were established between along 24 transects between the 20 and 100 m depth along the South coast of Madeira Island (Fig. 1). The sampling program was developed between June and September of 1993.

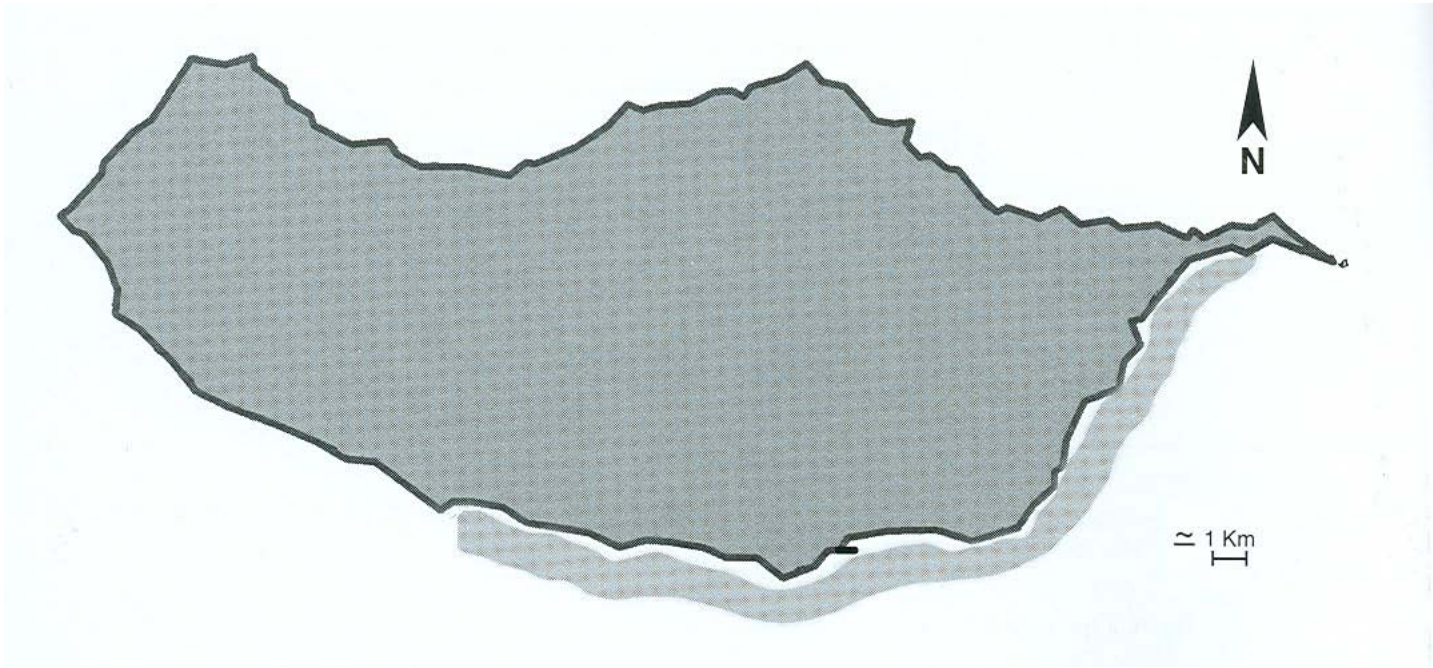

Fig. 1 - Madeira Island, sampling area

The samples were collected with a modified Van Veen grab; the biological material was separated by major taxonomic groups and kept in plastic bottles. This material was fixed in 10 % formalin and after stored in ethanol 70%.

The specimens were identified following several taxonomic keys (CLARK, 1953; CLARK & DOWNEY, 1992; HENDLER *et al*, 1995; KOEHLER, 1921,1924, 1927; MADSEN, 1950, 1970; MORTENSEN, 1925, 1927, 1951; TORTONESE, 1965).

The taxonomic criteria used are those of CLARK & DOWNEY, 1992 for the class Asteroidea, TORTONESE (1965) for the classes Echinoidea, Ophiuroidea, Crinoidea and Holothuroidea.

RESULTS

A total of 3099 individuals was studied and remained classified in 20 families, 27 genera and 52 identified species and 5 still indetermined (Table 1). About 42% of this fauna occur in both the Atlantic and the Mediterranean, 37% are of boreal influence, 14% are African speciesand 7% occurs in Atlantic West

TABLE 1 - Systematic list of the species of the phylum Echinodermata recorded in the south coast of Madeira island (* new records) (The letters in front of each species indicate the region of influence: B, species of Boreal influence; AM, species of Atlantic-Mediterranean influence; AF, species considered of African influence; AW, species of Atlantic West influence; between parenthesis, the region where they also have been found).

CLASSE ASTEROIDEA	
Ord. Phanerozonia	
Subord. Paxillosida	
Fam. Astropectenidae	
Gen. *Astropecten*	
Astropecten aranciacus (LINNAEUS, 1758)	(AF)
Astropecten ibericus PERRIER, 1894	AM
Astropecten irregularis (PENNANT, 1777)	B (AM)
Astropecten spinulousus PHILIPPI, 1837	AM
Ord. Forcipulata	
Fam. Asteriidae	
Gen. *Coscinasterias*	
Coscinasterias tenuispina (LAMARCK, 1816)	AM
CLASSE OPHIUROIDEA	
Ord. Ophiurida	
Fam. Ophiacanthidae	
Gen. *Ophiacantha*	
**Ophiacantha abyssicola* G.O. SARS, 1871	B (AM)

**Ophiacantha bidentata* (RETZIUS, 1805)	B (AM)
**Ophiacantha brevispina* KOEHLER, 1898	AM
**Ophiacantha* c.f. *mesembria* H.L. CLARK	AW
**Ophiacantha smitti* LJUNGMAN, 1872	AM

Fam. Amphiuridae

Gen. *Amphiura*

Amphiura sp. FORBES, 1842	
**Amphiura abyssorum* NORMAN, 1876	AM
**Amphiura chiajei* FORBES, 1843	B (AM)
Amphiura filiformis (O.F. MÜLLER, 1776)	B (AM)
**Amphiura fragilis* VERRIL, 1885	B
**Amphiura grandisquama* LYMAN, 1869	AF
**Amphiura incana* LYMAN, 1879	AF (AM)
**Amphiura lymani* (LJUNGMAN 1867)	
**Amphiura mediterranea* LYMAN, 1882	AM
**Amphiura sarsi* LJUNGMAN, 1871	AF (AM)
**Amphiura securigera* (DÜBEN & KOREN, 1844)	B (AM)
**Amphiura senegalensis* MADSEN, 1970	AF

Gen. *Amphipholis*

Amphipholis squamata (D.CHIAJE, 1829)	B (AM)

Fam. Ophiactidae

Gen. *Ophiactis*

***Ophiactis balli* (THOMPSON, 1840)	B (AM)
**Ophiactis lymani* LJUNGMAN, 1871	AF
***Ophiactis profundi* LÜTKEN & MORTENSEN, 1899	B
***Ophiactis savignyi* MÜLLER & TROSCHEL, 1842	AM
**Ophiactis virens* (M. SARS, 1857)	AM

Fam. Ophiocomidae

Gen. *Ophiocomina*

***Ophiocomina nigra* (ABILDGAARD, 1789)	AM (B)

Gen. *Ophiopsila*

Ophipsila sp. FORBES, 1843	
Ophiopsila aranea FORBES, 1843	AM
Ophiopsila annulosa (M. SARS, 1857)	B, AM
**Ophiopsila guineensis* (KOEHLER, 1914)	AF (AM)

Fam. Ophiodermatidae

Gen. *Ophioconis*

***Ophioconis vivipara* MORTENSEN, 1925	AM

Fam. Ophionereididae

Gen. *Ophionereis*

***Ophionereis sexradia* MORTENSEN, 1936	AW

Fam. Ophiuridae	
Gen. *Ophiura*	
Ophiura affinis LÜTKEN, 1858	B
Ophiura grubei HELLER, 1863	AF (AM)
**Ophiura (Ophiura) imprudens* (KOEHLER, 1906)	B (AM)
**Ophiura sarsi* LÜTKEN, 1854	B
Gen. *Ophiopleura*	
* *Ophiopleura inermis* (LYMAN, 1878)	B (AM)
Gen. *Amphiophiura*	
**Amphiophiura* cf. *bullata convexa* (LYMAN, 1878)	B

CLASSE ECHINOIDEA

Sub cl. REGULARIA

Ord. Diadematoida

Subord. Aulodonta

Fam Diatematidae

Gen. *Centrostephanus*	
Centrostephanus longispinus (PHILIPPI, 1845)	AM

Subord. Stirodonta

Fam. Arbaciidae

Gen. *Arbacia*	
Arbaciella elegans MORTENSEN, 1910	AF (AM)

Subord. Camarodonta

Fam. Temnopleuridae

Gen. *Genocidaris*	
Genocidaris maculata A. AGASSIZ, 1869	AM

Fam. Toxopneustidae

Gen. *Sphaerechinus*	
Sphaerechinus granularis (LAMARCK, 1816)	B (AM)
Sphaerechinus sp. DESOR, 1856	

Fam. Echinidae

Gen. *Psammechinus*	
Psammechinus microtuberculatus (BLAINVILLE, 1825)	AM
Psammechinus sp.	
Gen. *Paracentrotus*	
Paracentrotus lividus LAMARCK, 1816	AM

Subcl. Irregularia

Ord. Clypeastroida

Fam. Fibulariidae

Gen. *Echinocyamus*	
Echinocyamus pusillus (O.F. MÜLLER, 1776)	B (AM)

Ord. Spatangoida	
Fam. Lovennidae	
Gen. *Echinocardium*	
Echinocardium cordatum (PENNANT, 1777)	B (AM)
Echinocardium flavescens (O.F. MÜLLER, 1776)	B (AM)
Fam. Schizasteridae	
Gen. *Schizaster*	
**Schizaster* sp.	
**Schizaster canaliferous* (LAMARCK, 1816)	AM
Fam. Brissidae	
Gen. *Brissopsis*	
**Brissopsis atlantica* MORTENSEN, 1913	AM
Gen. *Brissus*	
**Brissus unicolor* (LESKE, 1778)	AM
Gen. *Plagiobrissus*	
**Plagiobrissus costai* (GASCO, 1876)	AM
CLASSE HOLOTHUROIDEA	
Ord. Dendrochirota	
Fam.Cucumariidae	
Gen. *Thyone*	
Thyone fusus (O.F. MÜLLER, 1788)	B (AM)
Fam. *Phyllophoridade*	
Gen. Phyllophorus	
**Phillophorus urna* GRUBE, 1840	AM

DISCUSSION

The soft bottom echinoderms of Madeira Island are predominantly Atlantic-Mediterranean and Boreal having also a significant tropical influence from both sides of the Atlantic (e.g. *Ophiura grubei* HELLER, 1863; *Amphiura senagalensis* MADSEN, 1970; *Ophionereis sexradia* MORTENSEN, 1936).

Of the 52 species mentioned, 34 are new records for the Archipelago of Madeira, several are noteworthy:

Ophiacantha smitti LJUNGMAN, 1872: This species has been recorded from both sides of the Atlantic in depths between 994 to 2282 m. It's a new species for the Archipelago, it was collected at 75 m, what makes it batimetric distribution to be altered.

Amphiura incana LYMAN, 1879: is known from scattered localities along the whole West African coast, round the Cape of Good Hope to Durban, from south coast of Portugal and from the Western Mediterranean, in 10 to 110 m depth. It is the first time that is being reported to the Atlantic Islands above the Tropic of Cancer.

Ophiacis lymany LJUNGMAN, 1871: amphi-Atlantic sub-littoral species dwelling

down to depths of 110 m on both sides of the Atlantic. It is a very small species of a secretive habit as is characteristic of the genus. In the East Atlantic was until now known only from the Gulf of Cadiz (MONTEIRO, 1980) and from Cape Verde Islands to northern Angola (MADSEN, 1970).

Ophiactis savignyi (MÜLLER & TROSCHEL, 1842) (Fig. 2): it's a circumtropical, littoral and sub-littoral species: in warm waters throughout the Indo-Pacific, eastern Pacific, and on both sides of the Atlantic, also in Red Sea and Mediterranean (by way of the Suez Canal). First time registered to Madeira Islands and to Portugal, collected at depths between 20 and 75m.

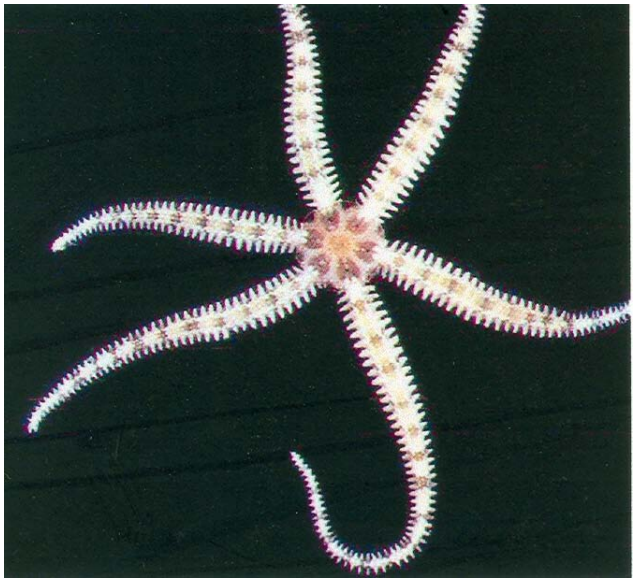

Fig. 2 - *Ophiactis savignyi* (MÜLLER & TROSCHEL, 1842), aboral view.

Ophiactis virens (M. SARS, 1857): is a Mediterranean species, a near relative of *O. lymani*, as discussed by KOEHLER (1914) and CLARK (1955). As been reported from Azores, NW coast of Africa to Cape Verde Islands.

Ophiopsila guineensis KOEHLER, 1914: recorded in East Atlantic, from tropical West Africa as far as south as Annobon to Canary Islands, and recently in Mediterranean Sea by MASSÉ (1963), first time registered to the Archipelago of Madeira.

Ophionereis sexradia MORTENSEN, 1936: This six-armed species was described by MORTENSEN on some specimens from Annobon (18-30 m), CLARK (1953) found that the "Challenger" specimen, from the Canary Islands (130m), reported by Lyman (1882) as *Ophiolepis dubia* (MÜLLER & TROSCHEL) was the same species. It was until now only known from these two localities. It was collected at 35m depth.

Ophiura (Ophiura) imprudens (KOEHLER, 1906): This species is considered a

bathyal species and it has been reported from the Rockall Trough and off Azores between 168-560m depth (PATERSON, 1985). Recently was described to southwest coast of Portugal (JESUS & FONSECA, in press.) between 135 to 198 m. It was collected in south coast of Madeira at 75 m, so it's bathymetric range is now of 75-560 m.

Amphiura incana LYMAN, 1879: is known from scattered localities along the whole West African coast, round the Cape of Good Hope to Durban, and from the Mediterranean, until now never was registered to the Macarronesian Islands.

Schizaster sp. A. (Fig. 3 e 4): test low rising gently towards the posterior end, the posterior end vertical, oral side convex. Anterior ambulacrum very deepened; petals deep and the posterior ones very short (about 1/3 of the anterior petals); posterior interambulacrum raised to form a fairly distinct keel on the upper side, apical system posterior to the middle of the test (MORTENSEN, 1927, TORTONESE, 1965), no genital pores were found. The hypothesis of the specimens collected being juveniles of *Schizaster canaliferous* (LAMARCK) was considered. According to Mortensen (in TORTONESE, 1965), *S. canaliferous* develops it's genital pores when reaching 35 mm length, Tortonese has considered 27,5 mm; the smallest *S. canaliferous* collected in Madeira, as 11 mm length and already presents genital pores. Several specimens collected under this denomination *Schizaster* sp.A) are bigger (12 - 20 mm length) and still don't present genital pores.

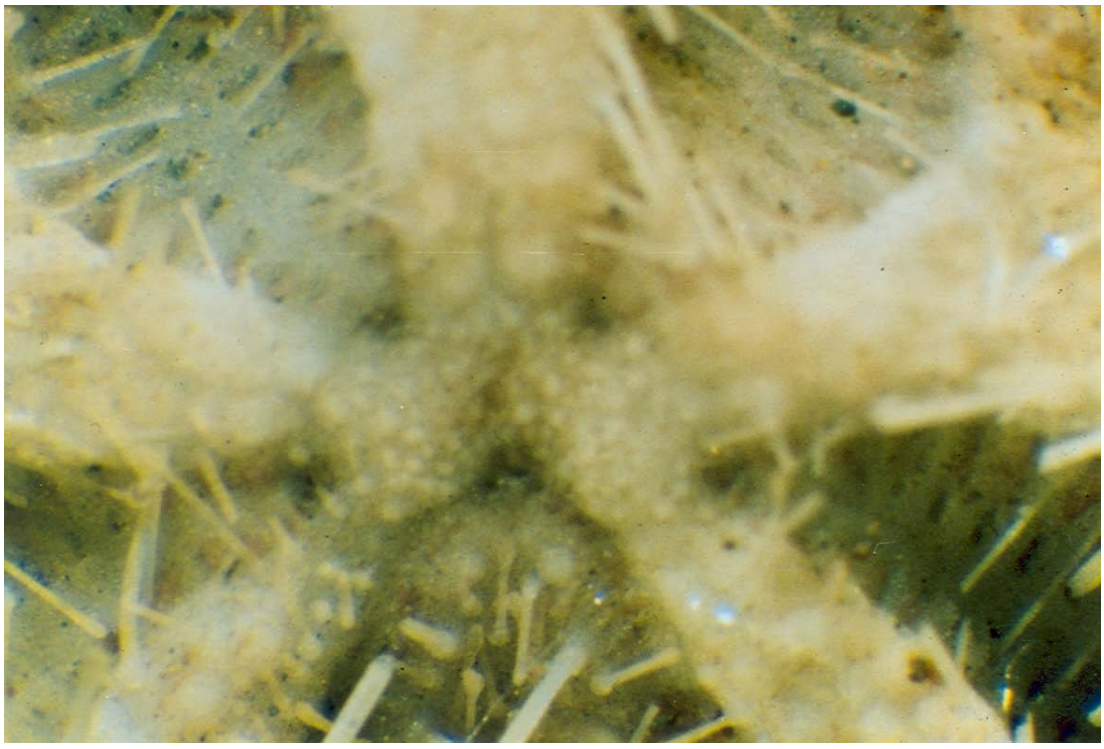

Fig. 3 - *Schizaster* sp. apical system.

Fig. 4 - *Schizaster* sp., aboral view.

ACKOWLEDGEMENTS

Thanks are due to L. MENEZES and B. SILVEIRA for their help with sieving the material; to the Direcção Regional de Pescas by providing the research vessel Lobos during part of the sampling period. A special thank to the crews of Lobos and Ianthina the MMF(HN)'s research boat, without whom it would be impossible to reach the end of this project.

Much of this work was developed at the Laboratório Marítimo da Guia (FCUL) to which the authors want to express their gratitude.

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