

## Distributional patterns and taxonomic notes on Lumbrineridae from Crete (S. Aegean, Eastern Mediterranean)

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### ABSTRACT

Lumbrineridae were collected from soft sediment at 11 coastal and shelf areas from the island of Crete. Collections were made at 182 stations ranging in depth from 10 to 330 m. Eleven species were found. Three species were common and present throughout the area. Of these, *Lumbrineris gracilis*, was by far the most abundant species at depths down to 130 m. This species was one of the 10 most dominant macrofaunal species between 40 and 70 m depth. *Lumbrineris nonatoi* was the second most abundant species at stations down to 70 m. *Scoletoma emandibulata mabiti* was found in lower numbers than *L. gracilis* at all depths but was recorded from a wider depth range (10-330 m). *Lumbrinerides* sp. A is new for the Mediterranean and its relationship to other species of the genus is discussed.

### RÉSUMÉ

**Modèles de distribution et notes taxonomiques sur les Lumbrineridae de Crète (Sud de la mer Égée, Méditerranée orientale)**

Des Lumbrineridae provenant des sédiments meubles ont été collectés parmi 11 zones de la côte et de la marge continentale tout autour de l'île de Crète, comprenant 182 stations situées à des profondeurs variant entre 10 et 330 mètres. Onze espèces ont été trouvées parmi lesquelles trois espèces étaient présentes sur toutes les zones de l'étude. *Lumbrineris gracilis* était l'espèce la plus abondante à toutes les profondeurs jusqu'à 130 mètres. Entre 40 et 70 mètres, *L. gracilis* était une des 10 espèces les plus dominantes de la macrofaune. *Lumbrineris nonatoi* était la deuxième espèce la plus abondante de toutes les stations peu profondes jusqu'à 70 mètres. *Scoletoma emandibulata mabiti* était moins abondante que *L. gracilis*, à toutes les profondeurs mais a été enregistrée dans une plus grande gamme de profondeurs (10-330 m). *Lumbrinerides* sp. A est une nouvelle espèce pour la Méditerranée et sa relation avec d'autres espèces du même genre est discutée.

### INTRODUCTION

Our knowledge of the Eastern Mediterranean polychaete fauna is limited. Only a small number of papers on



ecology or taxonomy have been published to date. None of these were concerned with the Lumbrineridae. The family Lumbrineridae has been extensively investigated in a number of areas worldwide (HARTMAN, 1965; DAY, 1967; FAUCHALD, 1970; ORENSANZ, 1973, 1990; PERKINS, 1979; UEBELACKER, 1984; IMAJIMA, 1985; GEORGE & HARTMANN-SCHRÖDER, 1985; FRAME, 1992). Up to 13 genera are now recognized in the family, including the recent additions of *Abyssoninoe* Orensanz, 1990, *Eranno* Kinberg, 1865, *Lumbricalus* Frame, 1992, and *Scoletoma* Blainville, 1828. Over 200 species have been described in the family and more are being added (UEBELACKER, 1984). In the Mediterranean, seven genera and approximately 20 species have been recorded. Information concerning this family in the region has been provided by BEN-ELIAHU (1976), RAMOS (1976), CAMPOY (1979) and MIURA (1980) and records have also appeared in a number of benthic species lists (CARPINE, 1970; FREDJ, 1974; SALEN-PICARD, 1982). Previous listings of Lumbrineridae may also include some misidentified species.

The study by RAMOS (1976) remains the most authoritative work for the Mediterranean, but is restricted to the Western Mediterranean from the Spanish Catalan coast to the Adriatic Sea. There is a large gap in the information concerning the Aegean area, in particular the Southern Aegean and the area around Crete. This is an important geographical region where several water masses meet, including from the Atlantic, the Levantine Basin (allowing for passage of Lessepsian migrants), the Libyan Sea, the Ionian sea and influences from the Black Sea through the Sea of Marmara and the Aegean. The present study investigates the family Lumbrineridae from around the island of Crete over a range of different sediment types and depths.

## METHODS AND MATERIALS

Soft bottom lumbrinerid polychaetes were collected from 11 coastal and shelf areas from around the island of Crete during several quantitative benthic faunal surveys carried out from 1987 to 1989 (Fig. 1). These were pilot surveys for the most part. In all, 182 stations were sampled at depths ranging from 10 to 330 m. Most of the stations were along transects at standard depths of 10, 20, 30, 40, 70, 100, 130, 160 and 190 m. Samples were taken using a Smith-McIntyre grab (0.1 m<sup>2</sup>). One macrofaunal grab per station was analysed and four undisturbed cores were taken from an additional grab for physico-chemical measurements. Macrofaunal samples were immediately mixed into a sea water slurry and washed through a 0.5-mm sieve. The residues were transferred to containers and fixed with 10 % buffered formalin. In the laboratory Rose Bengal was added and after 24 hours the samples were washed with freshwater and screened again through a 0.5-mm mesh size sieve. The stained fauna was then sorted to major taxa and preserved in 4 % buffered formalin prior to identification to species. The material is deposited at the Institute of Marine Biology of Crete.

## STUDY AREAS

The north coast of Crete, where most of the stations were situated, has a generally consistent sedimentary environment which grades from coarse sands on the beaches to fine silty clays in deeper areas. Exceptions to this are: the western part of Rethymnon Bay where the sediment at 20-40 m depth is much coarser with high biogenic detritic content; the enclosed Bay of Souda (which physically resembles a fjord) where sediments are generally finer; and Mirambelo Bay which has a central shallow seamount where the sediment is coarser and of biogenic detritic origin.

The south coast, which has rocky shores with only a few bays, is much steeper and the width of the continental shelf is consequently much narrower. Messara and Ierapetra Bays, however, slope away more gently in front of open valleys. At Kali Limenes Bay the sediment is gravelly sand with pebbles at 10-20 m depth and retains a large coarse fraction as far down as 100 m. At the South East stations, the sediment is of biogenic detritic origin and contains calcareous algal fragments.

Biologically, the Cretan coastal sedimentary environment is characterized by seagrasses from 10 to 25 m depth and the alga *Caulerpa prolifera* from 25 to 40 m. At 70 m, numerous dead *Turritella* and, to a lesser extent, *Dentalium* shells are inhabited by hermit crabs and sipunculids. Below this, the environment is rather featureless except in terms of microtopography caused by the bioturbatory activities of burrowing animals. The benthic infauna is characterised by the presence of *Ditrupa arietina* at 30 to 40 m and *Amphiura chiajei* and *A. filiformis* below 50 m. The crinoid *Leptometra phalangium* is present in very high numbers from 130 to 200 m depth (predominantly on the north coast).



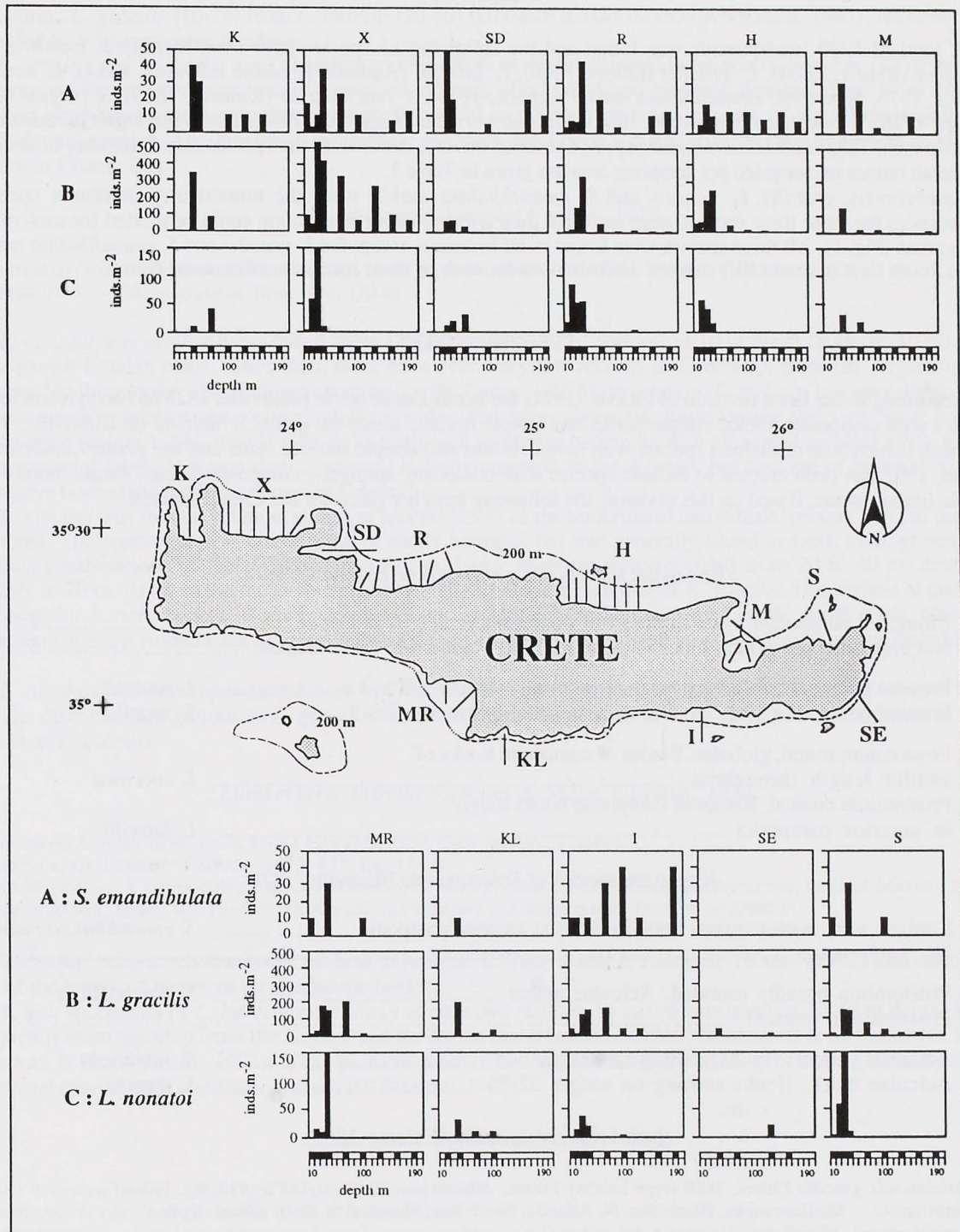


FIG. 1. — Crete. Sampling stations (K: Kissamos, X: Chania, SD: Souda, R: Rethymnon, H: Iraklio, M: Mirambello, S: Sitia, SE: South East, I: Ierapetra, KL: Kali Limenes, MR: Messara). Average depth distribution of *S. emandibulata mabiti* (a), *L. gracilis* (b) and *L. nonatoi* (c) for each of the study areas.

## RESULTS

A total of 1999 lumbrinerids was found and the following 11 species have been identified: *Lumbrineris coccinea* (Renier, 1804), *L. gracilis* (Ehlers, 1868), *L. latreilli* (Audouin & Milne Edwards, 1834), *L. nonatoi* Ramos, 1976, *Scoletoma emandibulata mabiti* (Ramos, 1976), *S. funchalensis* (Kinberg, 1865), *S. fragilis* (O.F. Müller, 1776), *S. impatiens* (Claparède, 1868), *Ninoe armoricana* (Glémarec, 1968), *Lumbrineriopsis paradoxa* (de Saint-Joseph, 1888) and *Lumbrinerides* sp. A. Presence-absence data for all the species found, number of stations and depth ranges investigated per sampling area are given in Table 1.

*Lumbrineris gracilis*, *L. nonatoi* and *S. emandibulata mabiti* were the numerically dominant species. Abundances for these three species were such that their average depth distribution could be plotted for each of the study areas (Fig. 1). All three species were found in all locations except for *L. gracilis* and *S. emandibulata mabiti* in the South East (transect SE) stations. Distributions for each of these species are discussed below.

## SPECIES NOTES

According to the latest revision of FRAME (1992) the genus *Lumbrineris* Blainville, 1828 has been restricted to species with composite hooks, simple hooks and simple limbate setae; the genus *Scoletoma* de Blainville, 1828 has been resurrected to include species with simple hooks and simple limbate setae and the genus *Lumbricalus* Frame, 1992 has been erected to include species with composite spinigers, composite hooks, simple hooks and simple limbate setae. Based on this division, the following keys are given for the Cretan species.

Key to the species of *Lumbrineris* de Blainville, 1828

- |   |  |                     |
|---|--|---------------------|
| 1 | Elongated parapodial lobes in posterior body region. Mx III bidentate .....              | 2                   |
|   | Not elongated parapodial lobes in posterior body region. Mx III unidentate .....         | 3                   |
| 2 | Presetal parapodial lobes longer than postsetal lobes. Mx II = 3 .....                   | <i>L. nonatoi</i>   |
|   | Presetal parapodial lobes smaller than postsetal lobes. Mx II > 3.....                   | <i>L. gracilis</i>  |
| 3 | Prostomium round, globular. Blades of composite hooks of similar length throughout ..... | <i>L. coccinea</i>  |
|   | Prostomium conical. Blades of composite hooks longer in anterior parapodia .....         | <i>L. latreilli</i> |

Key to the species of *Scoletoma* de Blainville, 1828

- |   |  |                               |
|---|--|-------------------------------|
| 1 | Limbate setae with terminal hook in the first anterior parapodia ..... | <i>S. emandibulata mabiti</i> |
|   | No such setae .....  | 2                             |
| 2 | Prostomium broadly rounded. Aciculae amber .....                       | <i>S. funchalensis</i>        |
|   | Prostomium conical .....   | 3                             |
| 3 | Aciculae yellow. Hooks starting on setiger 1-5 .....                   | <i>S. impatiens</i>           |
|   | Aciculae black. Hooks starting on setiger 22-35 .....                  | <i>S. fragilis</i>            |

*Lumbrineris gracilis* (Ehlers, 1868)

*Lumbriconereis gracilis* Ehlers, 1868 (type locality Fiume, Adriatic) — FAUVEL, 1923 : 432, fig. 172 a-f.  
DISTRIBUTION. — Mediterranean, Black Sea, N. Atlantic, North Sea, intertidal to about 680 m depth.

*L. gracilis* has always presented problems as to its identification (SALEN-PICARD, 1982). Some authors would refer to a *L. gracilis-latreilli* complex rather than separating these two species (AMOUREUX, 1987). Apart from the differences used to distinguish the two species, such as the shape of the prostomium and the length of the compound setae, RAMOS (1976) utilised the presence (*L. gracilis*) or absence (*L. latreilli*) of elongated parapodial



lobes in the posterior body region. The number of anterior parapodia with compound hooked setae can also be used to separate *L. gracilis* (10-15) from *L. latreilli* (20-30) (GEORGE & HARTMANN-SCHRÖDER, 1985). However this is probably only applicable to adults.

*L. gracilis* was by far the most abundant species (60 % of the lumbrinerid individuals), found at 117 of the 182 stations, on various combinations of gravel, sand, mud, clay, maërl and biogenic detritus, from 10 to 190 m. Highest abundances were recorded between 30 and 70 m where *L. gracilis* was one of the 10 most abundant macrofaunal species. The maximum abundance observed for *L. gracilis* was 910 ind. m<sup>-2</sup> at a 40-m sandy silt station in Chania Bay.

#### *Lumbrineris nonatoi* Ramos, 1976

*Lumbrineris nonatoi* Ramos, 1976: 124, figs 19-21 (type locality: Rosas Bay, Spanish Catalan coasts).

DISTRIBUTION. — Mediterranean, from 10 to 130 m.

*L. nonatoi* was originally described from a "sandy mud polluted bottom" at 10 m depth (RAMOS, 1976) from the Spanish Catalan coast. Since then, there have been very few records of *L. nonatoi* from the Aegean or the Eastern Mediterranean. Our findings agree well with Ramos' (1976) description. *L. nonatoi* is a very distinct but minute species: prostomium conical, slightly wider than long, composite multidentate and very short hooded hooks from setiger 1, Maxillae II with three teeth each, posterior parapodia with elongated presetal lobes, longer than postsetal lobes. It seems that *L. nonatoi* is fairly common in the Aegean, but because of its small size, it may have been misidentified as juvenile *L. gracilis*.

*L. nonatoi* was the second most abundant species (25 % of the lumbrinerid individuals, present at 69 of the 182 stations). The species prefers coarse sand or shelly bottoms, but was generally found in sand, mud, gravel, and various combinations of these, from 10 to 130 m. Large numbers were recorded from 20 to 40 m, dropping sharply at 70 m. At 20 m the mean abundance was slightly higher than that of *L. gracilis*. The highest abundance recorded for *L. nonatoi* was 370 ind. m<sup>-2</sup> at a 30-m sandy station in Ierapetra Bay, on the south coast, while the maximum average (round Crete average calculated for each depth class) abundance, found at 40 m, was only 81 ind. m<sup>-2</sup>.

*L. nonatoi* had maximum abundances in Sitia, Messara and Chania Bay at 30-40 m depth. *L. nonatoi* has a similar distributional pattern to *L. gracilis*, with maximum abundances at 40 m. It did not extend into as deep waters as *L. gracilis*.

#### *Lumbrineris latreilli* Audouin & Milne Edwards, 1834

*Lumbrineris latreilli* Audouin & Milne Edwards, 1834 (type locality: France).

*Lumbriconeris latreilli*: FAUVEL, 1923: 432, fig. 171 m-r.

DISTRIBUTION. — A cosmopolitan species (Greenland, Norway, Iceland to France, Mediterranean, Gulf of Mexico, Indian Ocean, Red Sea, Japan, West and South Africa), in temperate and warm waters from 10 to 2,000 m.

There has been much discussion on how to separate *L. latreilli* and *L. coccinea*. FRAME (1992) introduced the use of the length of blades of the composite hooks.

A few specimens of *L. latreilli* were found at only two stations, in mixed substrates at 30-40 m depth. It has frequently been reported from the Aegean and the Ionian Sea (HARMELIN, 1969; BOGDANOS & SATSMADJIS, 1987; DOUNAS & KOUKOURAS, 1992); it has probably been occasionally confused with *L. gracilis*. It is usually found in coastal coarse sands and *Ditrupa* sands (GLÉMAREC, 1969).

#### *Lumbrineris coccinea* (Renier, 1804)

*Nereis coccinea* Renier, 1804 (type locality: Mediterranean).

*Lumbriconeris coccinea*: FAUVEL, 1923: 432, fig. 172 g-n.

DISTRIBUTION. — outside the Mediterranean, *L. coccinea* has been found in the Atlantic, North Pacific, South Africa, Red Sea and Indian Ocean, from the intertidal zone to 1,268 m depth.



*L. coccinea* and *L. latreilli* can be separated as shown in the key above. The shape of Maxillae III can also be used to distinguish *L. coccinea* (Maxillae III: B+B, with two "expansions aliformes non dentelées") from *L. latreilli* (Maxillae III: A2+A2, with one "expansion aliforme bidentée") (MIURA, 1980).

A single specimen of *L. coccinea* was found at a gravelly sand station, on the north coast, at 40 m depth. In the Mediterranean it is known to occur frequently in higher numbers in "coralligène" substrates (BELLAN, 1964).

#### *Scoletoma emandibulata mabiti* (Ramos, 1976)

*Lumbrineris emandibulata mabiti*: RAMOS, 1976: 112, figs 7-10 (type locality: Rosas Bay, Spanish Catalan coast).  
DISTRIBUTION. — Mediterranean, from 6 to 330 m.

There are very few previous records of *S. emandibulata mabiti* from the Aegean or the Eastern Mediterranean (DOUNAS & KOUKOURAS, 1992). This is surprising because *S. emandibulata mabiti*, is also well described and distinctive: prostomium conical, longer than wide, simple limbate setae with terminal hook in the first anterior parapodia, which are gradually replaced by simple pluridentate hooded hooked setae, Maxillae II with four teeth and Maxillae III with two teeth each.

*S. emandibulata mabiti* was the third most abundant species (10 % of individuals). It was present at 94 of the 182 stations, from 10 to 330 m depth. *S. emandibulata mabiti* occurred in a variety of mixed substrates but had its higher numbers in fine silty sediments. The bathymetric distribution given by RAMOS (1976) (6 to 295 m) for the Western Mediterranean is essentially within the same depth range. Abundances were generally low throughout the area, lower than *L. nonatoi* at the shallow depths and *L. gracilis* at the deeper stations. Maximum numbers of 140 ind. m<sup>-2</sup> were recorded at a 40 m silty station in Rethymnon Bay.

*S. emandibulata mabiti* had its maximum numbers in the North West stations, at 40 m depth in Souda and Rethymnon Bays and at 70 to 190 m in Ierapetra Bay, in the South. In terms of distributional patterns, Ierapetra Bay was an exception as the maximum abundances were found at depths below 40 m. This is perhaps due to localised enrichment which was reflected in a slightly modified macrofaunal community.

*S. emandibulata mabiti*, has the same distributional pattern as *L. gracilis* but with a wider depth range and significantly lower numbers.

#### *Scoletoma impatiens* (Claparède, 1868)

*Lumbriconereis impatiens* Claparède, 1868 (type locality: Cape of Good Hope, South Africa) — FAUVEL, 1923: 429, fig. 171 a-i.

DISTRIBUTION. — A cosmopolitan species. Atlantic, Mediterranean, Indian Ocean, Red Sea, South West Africa, from the intertidal zone to a depth of approximately 2500 m.

Thirteen specimens of *S. impatiens* were found at 9 stations around Crete, from 20 to 160 m, in sand, mud, broken shell, gravel and mixed bottoms. *S. impatiens* has frequently been reported from both the Western and the Eastern Mediterranean. It is often confused with *S. emandibulata mabiti* (SALEN-PICARD, 1982) since they are very similar in appearance. Both have a sharply conical prostomium but *S. emandibulata mabiti* has simple limbate setae with a terminal hook in the first anterior parapodia and *S. impatiens* has simple hooded hooked setae starting on setigers 1-5.

#### *Scoletoma fragilis* (O.F. Müller, 1766)

*Lumbricus fragilis* O.F. Müller, 1766 (type locality: Denmark)

*Lumbriconereis fragilis*: FAUVEL, 1923: 432, fig. 171 k-l.

DISTRIBUTION. — Mediterranean, N. Atlantic, N. Pacific, North Sea, Bering Sea, Japan, from the intertidal zone to 3,500 m depth.

*S. fragilis* was found at a single fine silt station (two specimens), off the north coast, at 130 m depth, in Iraklio Bay. *S. fragilis* can easily be separated from *S. impatiens* and *S. funchalensis* by the presence of black aciculae.

It has been reported from sand, mud, gravel and various combinations of these, and among *Posidonia* meadows (GEORGE & HARTMANN-SCHRÖDER, 1985). It is commonly found in coastal coarse sands and gravel from atlantic french coasts (GLÉMAREC, 1969).



*Scoletoma funchalensis* (Kinberg, 1865)

*Lumbriconereis funchalensis* Kinberg, 1865 (type locality: Madeira), FAUVEL, 1923: 434, fig. 172 o-r.

DISTRIBUTION. — Mediterranean and Atlantic, to about 100 m depth.

*S. funchalensis*, along with *S. impatiens* and *S. fragilis*, lacks compound hooded hooked setae. The first 12-20 anterior parapodia with winged capillary setae and simple hooded hooked setae with the remaining parapodia with only simple hooded hooked setae. Aciculae amber coloured.

*S. funchalensis* was found at only two stations in Iraklio Bay, in very low densities at 20 and 30 m depth, in coarse sands with broken shell. *S. funchalensis* has been previously recorded in association with the sponges in the North Aegean (VOULTSIADOU-KOUKOURA *et al.*, 1987).

*Ninoe armoricana* Glémarec, 1968

*Ninoe armoricana*: GLÉMAREC, 1968: 315, fig. 1-4, (type locality: North Bay of Biscay, continental shelf), RAMOS, 1976: 130, figs 24-26.

DISTRIBUTION. — North Eastern Atlantic, Mediterranean, from 6 to 330 m depth.

VAMVAKAS (1970) found one specimen of *Ninoe kinbergi* Ehlers, 1887 in Iraklio Bay at 330 m depth. This record, which is the only record of *N. kinbergi* from the Eastern Mediterranean, may have been misidentified. We believe that the Aegean form is closer to *N. armoricana* Glémarec, 1968 rather than to *N. kinbergi* or *N. nigripes* Verrill, 1873 *sensu* PETTIBONE (1963).

Only 10 individuals were found on the north coast of Crete; at four stations in Souda Bay, in fine silty sediments, at 95-265 m depth and at a single station in Iraklio Bay at 160 m. In the Eastern Mediterranean, *N. armoricana* was previously recorded from the North Aegean, in high densities at 50-70 m depth (DOUNAS & KOUKOURAS, 1992).

*Lumbrineriopsis paradoxa* (de Saint-Joseph, 1888)

*Lumbriconereis paradoxa* de Saint-Joseph, 1888, ? FAUVEL, 1923 : 434, fig. 173 a-h.

*Lumbriconereis mucronata* Ehlers, 1908, ORENSANZ, 1973: 377, fig. XIII.

*Lumbrineris paradoxa* Harmelin, 1964

*Lumbrineriopsis paradoxa* ORENSANZ, 1973: 375, not GARDINER, 1976: 205, fig. 26 m-o.

DISTRIBUTION. — Mediterranean, West Africa, Azores, Bermuda, N. Carolina, Mexico from 10 to 1,700 m depth.

This species has received much attention as to the specimens ascribed and to its synonymy with *L. mucronata*. RAMOS (1976) criticized the synonymy with *L. mucronata* and discussed a Mediterranean form *Lumbrineris* cf. *paradoxa*. This later species has one peristomial ring and short mandibles with denticulate margin which has been observed in all previous collections from the Mediterranean and also from this study. These characters have also been observed from specimens from Bermuda (HARTMAN, 1965) and from the Gulf of Mexico (UEBELACKER, 1984). MIURA (1980) in his revision of the genus introduced the use of the shape of the prostomium and the colour of the aciculae. He described *Lumbrineriopsis gardineri* from Gardiner's (1976) "*L. paradoxa*" material. It seems that some confusion still exists and further work is required.

Only a few specimens were found at 16 of the 182 stations in coarse sediments such as "*Amphioxus* sands" at depths from 20 to 160 metres. Mean abundance ranged from 2 to 4 ind. m<sup>-2</sup> with maximum abundance at 40 m. Known previously from the Ionian Sea (BOGDANOS & SATSMADJIS, 1987) and the North Western Mediterranean (BELLAN, 1964; RAMOS, 1976).

*Lumbrinerides* sp. A

MATERIAL EXAMINED. — Kali Limenes, seven specimens at 16 m depth; Chania Bay, 5 specimens at 20 and 30 m depth; and Rethymnon Bay, eight specimens at 20-40 m. Found in coarse sediments such as "*Amphioxus* sands", coarse sands with shell fragments and gravelly sand.

The body is long and slender and the prostomium is elongate, conical without eyes or eye spots. The peristomium is composed of two equally long rings. Maxillae I with 2 weakly developed small accessory teeth each, Maxillae II with three round teeth each, Maxillae III dentate subrectangular plates and Maxillae IV cup shaped



oval plates. Maxillary carriers triangular, darker than rest of maxillae. Mandibles Y-shaped, light brown. First 6-7 anterior parapodia minute, with very small setal lobes, increasing in size from the 8th setiger. They reach their maximum length at setiger 12-13 and from setiger 22 onward they decrease in size. The setae include simple hooded hooks from the first setiger, broadly limbate setae and two pale pointed aciculae. The pygidium is typical for the genus.

*Lumbrinerides* sp. A differs from the other Mediterranean species of the genus: *L. carpinei* (Ramos, 1976) which has one accessory tooth in Maxillae I, one very long peristomial ring and only three minute anterior parapodia, and *Lumbrinerides* sp. (RAMOS, 1976) (originally identified by RAMOS as *Lumbrineris acuta*) which has no accessory tooth in Maxillae I and simple hooded hooks from the 16th setiger.

*Lumbrinerides* sp. A will be described in the near future by us after a revision of the Mediterranean members of the family and further examination of type material and material from other localities.

## DISCUSSION

In considering the biogeographical origins of the Cretan Lumbrinerids, three groups can be identified. The first is the cosmopolitan species, *Lumbrineris latreilli*, *L. coccinea*, *Scoletoma impatiens* and *S. fragilis*. These have a world wide distribution from the Atlantic through the Mediterranean and Red Sea to the Indian and Pacific Oceans. The second group includes the Atlanto-Mediterranean species, *Lumbrineris gracilis*, *Ninoe armoricana* and *Lumbrineriopsis paradoxa*. These are probably of Atlantic origin, which have penetrated the Mediterranean and, in the case of *L. gracilis*, the Black Sea. The last group is the Mediterranean endemic species, *L. nonatoi* and *S. emandibulata mabiti*. No lessepsian migrants have been recorded from the Red Sea. The probable explanation for the recorded distributions are probably due to factors such as the depth range of the species, dispersive current patterns and the temperature and salinity extremes in the Mediterranean and Red Sea.

TABLE 1. — Occurrence of species, depths sampled and number of stations per sampling area

	SAMPLING AREAS (See Fig. 1 for location)										
	K	X	SD	R	H	M	S	SE	I	KL	MR
Number of stations	6	35	13	39	40	12	9	4	9	4	11
Depths sampled (in m)	16-100	10-190	25-330	10-190	10-190	40-190	10-190	10-100	10-190	10-100	10-190
Species											
<i>Lumbrineris gracilis</i>	*	*	*	*	*	*	*	*	*	*	*
<i>L. nonatoi</i>	*	*	*	*	*	*	*	*	*	*	*
<i>L. latreilli</i>					*					*	
<i>L. coccinea</i>							*				
<i>Scoletoma emandibulata mabiti</i>	*	*	*	*	*	*	*		*	*	*
<i>S. funchalensis</i>					*						
<i>S. impatiens</i>		*		*	*					*	
<i>S. fragilis</i>					*						
<i>Ninoe armoricana</i>			*		*						
<i>Lumbrineriopsis paradoxa</i>		*		*	*	*	*	*	*	*	
<i>Lumbrinerides</i> sp. A		*		*						*	

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